

9-2009

School of Natural Resources Comprehensive Five-Year Review

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SNR

School of Natural Resources



Comprehensive Five-Year Review



September 21-25, 2009



In cooperation with CSREES/USDA



University of Nebraska—Lincoln

Acknowledgements

I acknowledge here the many individuals in the School of Natural Resources who have provided their time and insights to the preparation of the unit's review. Our issue-based strategic planning process has been ongoing for more than a year and it is through the dedication of our faculty, staff, and students that this process has been completed on schedule and with a significant positive outcome. In particular, I would like to thank Jim Merchant. He willingly volunteered his time and organizational skills to lead this planning process. Without his diligence, patience, and ability to keep everyone on task, this process would not have reached a successful conclusion.

Thanks also to those members of the faculty who have spent many hours contributing to this planning effort and the authorship of the document. In particular, I would like to acknowledge the important role of the SNR Five-Year Review Planning Team for coordinating and leading many listening sessions and for the wide variety of other contributions that they provided through countless emails and meetings. These team members include Sunil Narumalani, Matt Joeckel, Betty Walter-Shea, Mark Kuzila, Christine Steggs, and David Gosselin. Thanks also to Ed Harvey, SNR associate director, for his participation in this process. In addition, Shashi Verma, Michael Hayes, David Wedin, and Mark Burbach provided significant time and effort to document the outcomes of our listening sessions on SNR's current and emerging issues.

I also express my sincere gratitude to Sharon Kelly and Deborah Wood. Sharon helped with many aspects of the planning process, from scheduling meetings and reviewing documents to handling the local logistics for the review. Deborah was responsible for the final editing of the chapters, a challenging task as there were multiple authors involved in the document preparation process.

Thanks also to Carol Cartwright, manager of the Natural Resources Business Center, and her very capable staff. Documenting the budget and financial history of SNR is a significant task for such a large unit but the NRBC was up to the task and provided detailed information in a timely manner when it was requested.

In addition, we wish to express thanks to those support staff who contributed in various ways to the preparation of this document. SNR is fortunate to have a dedicated staff committed to the success of the unit. We all value their commitment to SNR's programs.

The unit appreciates the efforts of members of the CSREES review panel and the UNL comprehensive review team for their significant commitment in preparing for and conducting this review. We look forward to their counsel and insight. We likewise appreciate the support of the UNL administration, particularly those in IANR and the College of Arts and Sciences, for their responsiveness to our ideas and for providing support for various programs. We value the opportunity to work in a collaborative environment that we perceive as being people-oriented and one that looks toward and plans for the future.

Don Wilhite, Director
August 12, 2009

SNR Five-year Comprehensive Review *Agenda*

September 21-25, 2009

Monday, September 21, 2009

Location

4:30 p.m.	Review team meets with Don Wilhite for discussion of key issues	Embassy Suites
6:00 p.m.	Review team meets for dinner with IANR and College of Arts and Sciences administration (IANR VC John Owens, IANR Dean's Council, and CAS Dean, David Manderscheid and CAS Associate Dean, Greg Snow) Introductions; briefing on review goals, format, agenda, etc.	Embassy Suites

Tuesday, September 22, 2009

7:00 a.m.	Review team breakfast/meeting chaired by Louie Tupas	Embassy Suites
8:30	Welcome, SNR Overview, Synthesis of Review Document, and Key Issues, Don Wilhite (SNR faculty, staff and students)	HarH Auditorium
9:30	Review Team Break	901 HarH
10:00	Current and Emerging Issues: Climate variability and change	901 HarH
11:00	Current and Emerging Issues: Water quantity/quality	901 HarH
12:00- 1:15 p.m.	Lunch with IANR unit heads, selected College of Arts and Sciences department chairs, and Manager, Natural Resources Business Center	East Campus Union
1:30 p.m.	Current and Emerging Issues: Ecological challenges	901 HarH
2:30	Current and Emerging Issues: Human dimensions	901 HarH
3:30	Break	901 HarH
4:00	Current and Emerging Issues: NR/ES education	901 HarH
5:00	Reception: SNR faculty, staff, and students with Review team	Lobby, 1 st floor
6:00	Return to hotel	
6:30pm	Dinner with SNR Administrative Team	Misty's (private room reserved)

Wednesday, September 23, 2009

7:00 a.m.	Review team breakfast/meeting chaired by Louie Tupas	Embassy Suites
8:30	Brief Tour of Hardin Hall: Don Wilhite and Mark Kuzila	
9:15	Discussion of undergraduate and graduate teaching programs and goals - 2014	901 HarH
10:15	Break	901 HarH
10:45	Discussion of SNR research program and goals – 2014	901 HarH
11:45	Working lunch (<u>Review Team</u>)	901 HarH
1:30 p.m.	Discussion of Extension, Outreach, Survey goals - 2014	901 HarH
2:30	Break – walk to Dairy Store	
3:15	Individual time for faculty to meet with review team members (Review team splits up to meet individually or with groups of faculty)	Rooms reserved
4:30	Return to hotel	
6:30	Working dinner (<u>Review Team</u>)	Embassy Suites

Thursday, September 24, 2009

7:00 a.m.	Review team breakfast/meeting chaired by Louie Tupas	Embassy Suites
8:15	Meeting with Center directors CALMIT, NDMC, HPRCC, GPRC, Water Center, CSD, Coop Unit	901 HarH
9:30	Review team to split up to meet with Center directors and staff	
	CALMIT (Dan Brown)	207 HarH
	NDMC (Ed Miles)	901 HarH
	HPRCC (Jerry Hatfield)	209 HarH
	GPRC (Louie Tupas)	102b HarH
	Water Center (Kathy Jacobs)	202 HarH
	CSD (Bill Shilts)	234 HarH
10:30	Break	901 HarH



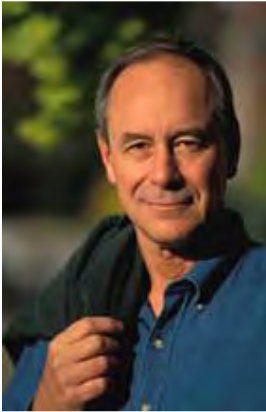
Thursday, September 24, 2009

10:45-11:45	Review team meeting with SNR External Advisory Committee	901 HarH
12:00-1:15 p.m.	Lunch with representatives of state and federal agencies and other organizations	East Campus Union
1:30 p.m.	Review team meeting with SNR staff	901 HarH
2:30	Review team meeting: SNR <u>undergraduate</u> students (includes SNR and Geography students)	901 HarH
3:15	Review team meeting: SNR <u>graduate</u> students (includes SNR and Geography students)	901 HarH
4:00	Return to hotel – Review Team works on draft report	Embassy Suites
6:00	Working dinner – Review Team completes draft report	Embassy Suites

Friday, September 25, 2009

7:00 a.m.	Breakfast with Don Wilhite and Ed Harvey	Embassy Suites
8:30	Exit report to IANR and CAS administration	901 HarH
10:00	Break	901 HarH
10:30	Exit report to SNR faculty, staff, students	HarH Auditorium
Noon	Lunch - SNR Administrative Team and Review Team	901 HarH
1:30 p.m.	Adjourn, Review team to hotel or airport	

Review Team Members	Affiliation and Areas of Expertise
	<ul style="list-style-type: none"> • Louie Tupas, Team Leader. National Program Leader, Natural Resources and Environment, CSREES/USDA. <ul style="list-style-type: none"> – Global change and climate – Forests – Education and extension programs in carbon and water cycles, land use change – Represents CSREES on USDA's Global Change Task Force, Drought Coordination Team, and Environmental Indicators Group. – Member, Interagency Working Group on Earth Science Applications – Member, Interagency Arctic Research Policy Committee
	<ul style="list-style-type: none"> • Jerry Hatfield, USDA/ARS, Director, USDA Soil Tilth Lab, Iowa State University. <ul style="list-style-type: none"> – Biometeorology – Soils – Water quality – Climate change – Interaction of water, nutrients, carbon, and light in the response of crops to management systems across varying landscapes. – Primary author of new USDA report on Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity.
	<ul style="list-style-type: none"> • Dan Brown, School of Natural Resources and Environment, and Director, Environmental Spatial Analysis Lab, University of Michigan. <ul style="list-style-type: none"> – Linking landscape patterns with ecological and social processes – Land-use and land-cover dynamics – GIScience, remote sensing, digital terrain analysis – Ecological mapping – Social surveys and statistics – Computer simulation

	<ul style="list-style-type: none"> • Kathy Jacobs, Professor, Department of Soil, Water, and Environmental Science, University of Arizona and former Director of the Arizona Water Institute. Deputy Director, NSF Center for Sustainability of Arid Region Hydrology and Riparian Areas (SAHRA), Former water manager, State of Arizona. <ul style="list-style-type: none"> – Water policy – Connecting science and decision-making – Climate Change – Stakeholder engagement – Use of climate information for water management applications, design of conservation programs and drought planning.
	<ul style="list-style-type: none"> • Edward Miles, Professor, Marine & Public Affairs; Team leader, Climate Studies group; Joint appointment, School of Public Affairs; Adjunct Professor of Fisheries, School of Aquatic and Fisheries Sciences, University of Washington. <ul style="list-style-type: none"> – Marine policy and ocean management – International science and technology policy – Global and regional climate impacts science and policy – Marine ecosystems
	<ul style="list-style-type: none"> • William Shilts, Executive Director, Institute of Natural Resource Sustainability, University of Illinois. <ul style="list-style-type: none"> – Geology, deposits of continental glaciers, physical and chemical characteristics of glacial sediments – Environmental geochemistry – Relationship of disrupted sediments to the recurrence rate and strength of prehistoric earthquakes.
Internal Review Team Members	
Ron Yoder	Head, Biological Systems Engineering (IANR Unit Head Representative)
Shelley Fuller	Department of Art and Art History, UNL (Academic Planning Committee Representative)
John Quinn	SNR Graduate Student Representative (Applied Ecology)
Laura Snell	SNR Undergraduate Student Representative (Water Science)

School of Natural Resources Five-Year Review

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EXECUTIVE SUMMARY

The University of Nebraska–Lincoln’s (UNL) School of Natural Resource Sciences (SNRS) was established in 1997 as a cross-campus enterprise spanning both the Institute of Agriculture and Natural Resources (IANR) and the UNL College of Arts and Sciences (CAS). With the merger of the Conservation and Survey Division (CSD) and the Water Center in 2003, SNRS became the School of Natural Resources (SNR). In many respects, SNR is a new model for interdisciplinary research and education at UNL. SNR faculty, staff, and students come from many backgrounds, including ecology, climate science, geography, geology, soil science, water science, and the social sciences. Our diverse backgrounds are, however, focused on a single mission: to be an international leader in natural resources education, research, and outreach, and the primary provider of natural resources information to the citizens of Nebraska.

During the past six years, SNR has made important and substantial progress toward our vision. Certainly, public (and student) interest in natural resources and environmental issues has increased. SNR has expanded to include nearly 150 faculty and staff and more than 400 students, and each year serves hundreds of clients in Nebraska and elsewhere. To better address increasing demands for information about natural resources, SNR has developed new approaches to strategic planning and to improving internal integration and external collaboration. Strategic planning, for example, has been undertaken to focus SNR efforts on five current and emerging issues that must be addressed in the near future. SNR is particularly well equipped to deal with these issues:

1. Increasing understanding of the potential impacts of **climate variability and change** on natural resources and agricultural productivity.
2. Enhancing **water resources quantity and quality** by improving water consumption and conservation practices as well as social systems for management of aquatic ecosystems.
3. Addressing **emerging ecological challenges** including invasive species, wildlife-related diseases, threatened and endangered species, adaptation to environmental stressors, and maintenance of biodiversity.
4. Enhancing understanding of **human-environment interaction**, including social/human factors in natural resources management and policy that are critical for establishing and maintaining sustainable environmental systems.
5. Improving **natural resources and environmental science education** for undergraduate and graduate students and the general public to enhance informed decision making and policy formulation.

These issues form the framework around which this report is written.

To improve our ability to respond to such issues, in January 2009 SNR was restructured into “faculties,” a unique organizational model that sets SNR apart from most academic units. These faculty areas are: applied climate science, applied ecology, geography/GIScience, geology and soils, human dimensions, and water. Our faculties are designed to maintain disciplinary strengths, but, at the same time, encourage and facilitate interdisciplinary teaching and research. SNR has also counted many other significant achievements over the past five years. In 2004, for

example, the U.S. Geological Survey (USGS) established the Nebraska Cooperative Fish and Wildlife Research Unit (CFWRU) within SNR. In 2006, SNR faculty, staff, and students moved to a new home in Hardin Hall, a modern research and classroom facility located on UNL's East Campus. And in 2008, UNL's geography program was integrated into SNR, adding new undergraduate and graduate degrees, faculty, and students. Today, SNR faculty, staff, and students are working together to address critical issues related to water quality and quantity, climate change, drought, severe storms, fisheries and wildlife management, invasive species, environmental restoration, energy, geologic resources, outdoor recreation, and land use.

Teaching, Research, Extension/Outreach and Survey Programs

SNR faculty and staff focus on four principal cross-cutting missions: teaching, research, extension/outreach, and natural resources survey. SNR offers BS, MS, and PhD degrees in natural resource sciences and, since July 2008, the BA, BS, MA, and PhD in geography. All degree programs have experienced significant growth since 2003. A continuing challenge for SNR over the next five years will be allocation of sufficient faculty FTE to meet growing student enrollments, especially in high-demand areas such as adaptive management, climate change, ecosystem science, and GIScience. This challenge will be exacerbated by the number of faculty who will be reaching retirement-eligible age by 2014.

Since its inception, SNR has been one of the most productive research units within IANR. External grant support and publications/FTE have increased steadily, and SNR will strive to continue this trend in the future. However, because of reduced state funding for UNL, it is anticipated that grants will increasingly be required to cover acquisition, replacement, and maintenance of equipment and laboratory facilities, travel and field work, and support of graduate students and technical staff. SNR extension and outreach programs focusing on drought, wildlife damage, agroforestry, and water issues have received national and international recognition. During the next five years, SNR will enhance the scope and effectiveness of information delivery to our clients, with special emphasis on the Internet. SNR survey faculty and staff provide critical data and outreach regarding Nebraska's geological and mineral resources, weather and climate, water resources, and soils. During the next five years, SNR will continue to develop synergism among survey programs, faculty and staff, and the School's programs in extension, research, and teaching.

SNR is one of the most interdisciplinary and diverse academic units at UNL. It has experienced almost continual change since its formation in 1997; yet, SNR faculty and staff have forged an exceptionally well-integrated and focused enterprise, manifested in an "integrated systems approach" paradigm that guides SNR's teaching, research, extension/outreach, and survey missions. During the next five years, integration of these missions will be re-energized and focused through efforts to address five critical areas of concern: climate variability and change, water resources quantity and quality, ecological challenges, human-environment interaction, and natural resources and environmental science education. In addition, SNR will continue to enhance and enlarge its external linkages and collaborations, now numbering well over 250, and the scope of international activities.

Addressing Current and Emerging Issues in Natural Resources (2009–14)

The SNR mission statement asserts that the operational paradigm for SNR will be an “*integrated systems approach*” to natural resources science. SNR faculty and staff recognize that, in order to explicitly embody the “systems” paradigm, integration needs to be defined to include specific actions designed to bring together, in a synergistic way, the specialized knowledge and expertise of professionals in different, but related fields, in order to advance natural resource science, better achieve our personal and collective goals, and benefit our partners and stakeholders, especially students. In 2007 the SNR director formed an ad hoc integration advisory team (IAT), comprising faculty from across SNR, to identify critical and emerging issues in natural resources and ways in which these issues can be addressed through integrated approaches that involve the full range of SNR’s teaching, research, extension/outreach, and natural resources survey activities. The IAT met throughout 2008, initiating an issues-based strategic planning process that is manifested in the organization of this report. From September 2008 to March 2009, each of the five issues identified by the IAT was discussed in a series of future-directed listening and planning sessions to which all SNR faculty, staff, and students were invited. The outcomes of these sessions are summarized below (and presented in Chapter 4).

Increasing understanding of potential impacts of climate variability and change: The applied climate science (ACS) program continues the tradition of excellence established in the Department of Agricultural Meteorology and its predecessors, traditionally leaders in research and graduate education. The research, outreach, and service areas of the ACS program are highly collaborative with faculty in SNR and across campus. Our research/outreach/service efforts focusing on the issue of climate variability and change can be divided into four broad categories: climate monitoring and climate data utilization; climate and crop modeling; carbon, water, and energy exchanges; and human dimensions. To address undergraduate education (a high priority at UNL), an undergraduate option in applied climate science was recently established as part of the environmental studies major. In addition, a major in applied climate science and a minor in climate change studies are under development to further enhance ACS’s undergraduate involvement. Future initiatives will include (1) development of a summer institute on climate change, (2) further development of outreach and education efforts in climate change and variability, (3) ecosystem modeling to quantify interactions between biological and physical processes, including abiotic and biotic stress of different (managed and unmanaged) ecosystems important to Nebraska, and (4) environmental economic modeling to develop an integrated ecosystem-economic modeling approach to analyze the impacts of climate change.

Enhancing water resources quantity and quality: Effective management of the quality and quantity of Nebraska’s groundwater and surface water is critical in preserving this resource for future use. SNR is the focal point for water resource research and teaching at UNL. Researchers in SNR investigate hydrologic connections between river systems and adjacent aquifers, the effects of water flow on wildlife habitats, and the hydrology of groundwater-dependent wetlands, lakes, and streams. Hydrologic models have been developed to characterize the hydrologic connectivity between streams and aquifers and to analyze the impact of groundwater irrigation on stream flow. New tools and methods for studying evapotranspiration and recharge to groundwater are being developed and will be even more critical as the local climate changes. The impact of water flow on managed ecosystems has been investigated through the study of water

use of cropping systems and the application of windbreak technology and evapotranspiration across various ecosystems. SNR researchers team with other faculty in science and engineering to develop and apply new methods to investigate and mitigate agricultural and other anthropogenic impacts on surface and groundwater quantity and quality. Research and extension programs help improve the quality of water in lakes, streams, and groundwater through the adoption of practical nutrient loading within the TMDL (Total Maximum Daily Load) requirements, better wastewater treatment systems, and the detection, migration characterization, and/or remediation of contaminants such as nitrogen, phosphorous, arsenic, hormones, pharmaceuticals, pesticides, munitions, sediments, and algal toxins. Landscape watershed contamination vulnerability models and remote sensing techniques are used to identify impacted areas. Water resource outreach and extension programs are shaped through efforts in the UNL Water Center and other SNR-based centers. Students in natural resources, through the undergraduate programs of water science and environmental restoration science and graduate programs via specializations in hydrologic sciences (MS and PhD) and aquatic ecology (MS only), are trained to provide expertise for future generations of effective stewardship of this precious resource.

Addressing emerging ecological challenges: Global ecological challenges, which present potentially dire consequences if they are unmet, face humankind in the immediate future. Nebraska is far from immune to ecological challenges presented by global climate change; wildlife management (including wildlife damage), agroecosystems, land cover and land use change, the preservation of unique ecosystems and threatened and endangered (T&E) species, and other issues have risen to the forefront in the state. SNR is making key contributions in four focus areas: (1) assessing biodiversity and ecosystem functions and services, (2) researching ecological resilience and its applications in management, (3) promoting effective resource management using adaptive management, and (4) promoting widespread ecological literacy, especially through existing graduate and undergraduate education programs. SNR is well positioned to make such contributions, but additional resources and new strategies will be necessary, particularly as enrollments remain at current levels or, more likely, increase. A wetland ecologist position identified as part of a prioritization process for new faculty in spring 2008 has yet to be filled. Creative approaches toward solving shortfalls in teaching FTEs will need to be implemented. Additional goals in education, research, and outreach include implementing a new National Science Foundation (NSF) Integrative Graduate Education and Research Traineeship (IGERT) grant, producing a sustainable graduate program in adaptive management, increasing the analytical and quantitative rigor of the fish and wildlife major, effectively articulating natural resources management and conservation with production agriculture in Nebraska, developing ecosystem modeling, and improving ecological informatics, statistics, and survey.

Enhancing understanding of human-environment interaction: SNR has a substantial record of achievement in addressing the human dimensions of natural resources (HDNR). SNR faculty and staff are well recognized for their research and extension programs that address issues including ecological decision making, human-wildlife conflicts, water policy, human impacts of drought and other natural hazards, agroforestry, and natural resources economics. Yet, in many respects the SNR HDNR program today is not as “mature” as SNR’s other major focal areas, especially in the academic arena. During the past five years, SNR has established MS and PhD

specializations in HDNR that have shown steady growth, but faculty teaching FTE has not kept pace. To enhance its HDNR programs, SNR should proceed as quickly as possible to create a new tenure-track faculty position in HDNR with principal support from CAS, encourage the integration of Geography and Survey faculty in the HDNR program, improve coordination of the SNR HDNR program with other UNL academic units, improve the HDNR undergraduate program and develop a “marketing” plan to better engage prospective students and students from other units in SNR HDNR programs, initiate a graduate-level seminar in HDNR, enhance use of SNR field facilities in HDNR programs, and explore placing more emphasis on international concerns.

Improving natural resources and environmental science education: SNR aspires to be an international leader in natural resources and environmental education and the primary provider of natural resources and environmental information in Nebraska. SNR serves an academic audience consisting of undergraduate and graduate students, and a public audience, which includes policy makers, professional audiences, and K-12 educators. Substantial growth and expansion of SNR educational programs has occurred since 2003. Recent funding of science education projects in the unit, the hiring of an Extension Educator in Climate Variability and Change, and a Summer Institute on Climate Change are all excellent examples of new initiatives that will continue to enhance our programming in natural resources and environmental science education. As we look toward the future, SNR’s long-term goals are to (1) enhance the natural resources educational program so that it is recognized for its up-to-date, high-quality educational experience; (2) establish a well-supported infrastructure that provides for the educational needs of undergraduate and graduate students; (3) strengthen the recruitment and retention program to increase the number, diversity, and retention of undergraduate and graduate students; and (4) build an integrated public education network within the SNR faculty and staff, students, and the community at large.

Challenges

The ability of SNR to achieve its goals over the next five years will be founded on the creativity, hard work, and resourcefulness of its existing faculty and staff. In this respect, SNR is fortunate to have a body of employees who are highly motivated and inventive and work together extremely well. Moreover, SNR faculty, staff, and students have excellent physical and support facilities with which to work. Like most academic units, however, SNR is confronted with resource limitations with which it will have to contend. It is anticipated that during the next five years some faculty research FTE may need to be redirected to support greater demands for teaching, and grant funds may increasingly be required to support technical staff and to purchase equipment and supplies. Retention of existing faculty is also a concern. However, the prospect of having to replace many faculty who will be reaching retirement-eligible age over the next five years is perhaps the greatest challenge facing SNR. However, these retirements also provide SNR with a significant opportunity to redirect faculty resources into higher priority areas. Changing technologies, methodologies, and paradigms in natural resource sciences will require that SNR’s faculty be composed of people conversant with the state of the art in modeling, GIScience, adaptive management, and other critical areas.

During the period from January through April 2008, SNR faculty engaged in a process to evaluate priorities for future faculty positions in SNR. The five highest priorities for SNR (listed in alphabetical order) were determined to be a climate change scientist, environmental microbiologist, GIScientist, human-environment interactions specialist, and wetland ecologist. In spring 2009, SNR was able to fill the climate change scientist and GIScientist positions. Martha Shulski, an applied climate scientist and the director of the High Plains Regional Climate Center, will focus largely on climate variability and change in her research, teaching, and extension program. The GIScientist position was recently filled through the hiring of Qingfeng (Gene) Guan. He will be conducting research on advanced GIS techniques and teaching GIS courses. The GIS position is funded 50/50 between IANR and CAS. In addition, we have had approval from the dean of Extension to hire a climate change educator to develop a comprehensive extension program in climate variability and change. This position will address a need for a natural resources educator. And SNR has also recently submitted a request to the dean of Arts and Sciences for a new faculty position in human-environment interactions. Two critical positions remain to be addressed: the environmental microbiologist and the wetland ecologist.

Throughout SNR's issue-based strategic planning process there have been significant discussions regarding additional faculty and staff positions that will be necessary for the unit to achieve its longer-term vision. Although the two unfilled faculty positions from our 2008 prioritization process mentioned above remain our highest priority (i.e., wetland ecologist and environmental microbiologist), the five-year review planning process has identified numerous other faculty positions of critical importance to the unit's ability to achieve our vision. However, SNR's faculty have not yet had the opportunity to fully discuss these proposed faculty positions and prioritize them following the procedures and criteria used previously for other positions. These faculty positions include a regional climate modeler, drought risk management scientist, ecohydrologist, environmental/economic modeler, human-environment interaction scientist/geographer, and surface water hydrologist. The SNR director will engage faculty in a discussion to prioritize these positions during fall 2009. Once this process is completed, strategies to fill the positions of highest priority will likely need to rely on the redirection of existing faculty lines when SNR faculty retire, external funding, or reliance on adjunct faculty members.

The outlook for the continued success of SNR is bright. Our issue-based planning process has helped to focus our efforts on five key areas where we feel the unit has both the strength and dedication to make a difference. We are fortunate to have a talented faculty and staff that are meeting the current needs of the state while, at the same time, responding effectively to future national needs and priorities. With stable leadership at the unit level and the continued support of IANR, CAS, and UNL administration, we are convinced that the growth and success SNR has achieved in recent years will continue. Society's growing interest in natural resources and environmental issues has placed SNR in a pivotal position to provide leadership at the state, national, and international levels. We are meeting, and we will continue to meet, this challenge.

1 INTRODUCTION AND OVERVIEW

1.1 Historical Perspective

The formation of a broader natural resources unit at the University of Nebraska–Lincoln (UNL) was discussed periodically by numerous committees, subcommittees, external review teams, and task forces, beginning in 1965. Indeed, many of the units merged to form the School of Natural Resources (SNR) were included in a subcommittee report to the Board of Regents in 1980. Their recommendations included the following:

Study the feasibility and advisability of establishing a School of Natural Resources within the Institute of Agriculture and Natural Resources to include: Conservation and Survey, Meteorology and Climatology, Forestry, Fisheries and Wildlife, Arboretum, Range Management, Hydrology, Environmental Programs, and possibly the Geology Department from the College of Arts and Sciences.

After decades of discussion, debate, and recommendations, the **School of Natural Resources Sciences (SNRS)** was formed in 1997 by consolidation of the Department of Forestry, Fisheries and Wildlife; the Department of Agricultural Meteorology; a portion of the Conservation and Survey Division (CSD), including the Center for Advanced Land Management Information Technologies, or CALMIT; the UNL Water Center; and faculty from several other academic units, including the Department of Agronomy and Horticulture, the Department of Geosciences, and the School of Biological Sciences. The Nebraska Forest Service and the Nebraska Statewide Arboretum were identified as close affiliates of the new School. Thus, SNRS was formed by the merger of two long-standing units and faculty from several others, yet it did not include all of the units envisioned by the subcommittee report to the Regents in 1980 or by the SNRS Implementation Committee in 1996 (which essentially echoed the 1980 report).

SNRS represented a new model for academic units at UNL, because it was the first unit to be part of *both* the College of Arts and Sciences (CAS, located on City Campus) and the College of Agricultural Sciences and Natural Resources (CASNR), which is part of the Institute of Agriculture and Natural Resources (IANR, located on East Campus). Thus, the director of SNRS reported to four deans in two colleges, one in CAS and three in IANR (i.e., teaching, research, and extension). In addition, SNRS comprised many faculty with *joint appointments* in SNRS and other academic units, as well as a large number of affiliated faculty with adjunct or courtesy appointments. A major goal of the School was to enhance the professional expertise of the faculty by facilitating programmatic interactions needed to address priority needs. In addition, SNRS was designed to foster partnerships and linkages with state and federal agencies. The broad vision of SNRS is given below.

The School will be a nationally prominent leader in academic, research, scholarly service and outreach programs in natural resource and environmental sciences. The School will have strong scientific programs to provide understanding of complex relationships and interactions within and among natural and managed ecosystems, will provide leadership in developing outstanding academic programs in natural resources and environmental sciences, and will develop integrated strategies to affect the social and economic processes. Thus, the School will serve the academic and scientific community, government agencies, resource managers, landowners, and the general public with timely and relevant information on the use and conservation of renewable and nonrenewable natural resources and on resource management opportunities and environmental challenges, particularly those in the Great Plains. Collaboration within and among disciplines will characterize the School's programs.

Since its inception in August 1997, the School has undergone numerous important changes, including several changes in leadership. In addition, the Natural Resources Business Center (NRBC), which provided business and administrative support to SNRS (and now SNR) and its affiliates, was centralized in a new location along with SNRS administrative offices, and the Water Center was transferred back out of the School in 2001.

The former head of the Department of Agricultural Meteorology, Blaine Blad, chaired the SNRS Implementation Committee and was the first director of SNRS. The directorship was originally established for two years, but was extended to nearly three, including a national search for a new director. Ted Elliott, an ecosystem scientist, became director in June 2000 and served until December 2001, when he went on medical leave. Ted passed away in June 2002 after battling cancer for more than a year. Following an internal search, Kyle Hoagland became acting and then interim director, from December 2001 to August 1, 2003.

The School of Natural Resources was established on July 1, 2003, by the consolidation of the School of Natural Resource Sciences, CSD, and the Water Center. Programmatic opportunities and enhanced service to clientele groups were key elements in the decision to create a new unit. This merger was intended to leverage a history of collaboration at a time when administrative efficiencies and limited funding issues were critical, as they remain today. Integrating CSD with SNRS and the Water Center was a logical extension of a high level of formal and informal integration already in place through SNRS, and it fulfilled most of the recommendations made in 1980. Following an internal search, Mark Kuzila, formerly director of CSD, became director of SNR on August 1, 2003, for a minimum of a three-year period. The faculty in SNR expressed their desire to IANR administration of having the option to conduct another national search for a new director, beginning in early 2005.

A national search for a new SNR director was initiated in November 2005. In spring 2006, following an unsuccessful search, additional candidates were nominated by SNR faculty and IANR administration. A second round of interviews was conducted in late 2006 and early 2007. This interview process failed to reach a successful outcome. In February 2007, Don Wilhite, professor of climatology in SNR and founder/director of the National Drought Mitigation Center, applied for the SNR director position. A full interview process was conducted in May 2007, and Don was appointed director of SNR on August 1, 2007.

1.2 Integration of SNRS, CSD, and Water Center

Before the merger to create SNR in 2003, personnel in the three units had close working relationships. These three units shared faculty through joint and courtesy appointments, joint research projects, and dual administrative duties (e.g., the acting director of the Water Center was also associate director of CSD). SNRS focused on the teaching, research, and outreach missions of the university; CSD and the Water Center were units focusing primarily on research and scholarly service to clientele throughout Nebraska. Thus, the integration of these units was expected to result in a new, stronger unit than the individual units, one that would fully utilize their combined strengths to develop a more comprehensive natural resources program in all areas of academic and scholarly service. A majority of faculties in the three units supported the integration in fall 2002. In the interest of elevating natural resources within IANR, the IANR vice chancellor

decided that integration of the three units would be in the best long-term interest for all involved. These units are considered to have high-priority core programs within IANR; thus, excellence in these areas is important to both the university and the state.

The three units had missions that reflected a partial overlap in faculty scientific expertise and unit objectives, so their integration was expected to be mutually complementary, enhancing teaching, research, and outreach activities. Their individual missions were as follows:

SNRS: To combine innovative interdisciplinary approaches with disciplinary excellence in the physical, biological and social sciences in order to: (1) foster an integrated, ecosystem approach to address complex natural resource and environmental issues; (2) provide a quality academic experience for students that prepares them to assume roles as natural resource scientists, managers and users during the 21st century; (3) provide relevant scientific information to stakeholders via innovative outreach and education programs, and (4) nurture the development of a conservation ethic, which includes a responsible role for humans as components of ecosystems and stewards for natural resources.

CSD: To investigate and record information about Nebraska's geologic history, its rock and mineral resources, the quantity and quality of its water resources, land cover and other aspects of its geography, as well as the nature, distribution and uses of its soils.

Water Center: To develop and implement programs in water science associated with agriculture and natural resources.

The SNR combined mission is clearly a hybrid of these mission statements, addressing teaching, research, outreach, and service missions that encompass all three units optimally. To illustrate the mutually complementary nature of this combined unit, SNRS outreach efforts were expected to be greatly enhanced by the merger with CSD and the Water Center because of their core missions, whereas CSD research-related activities were expected to be expanded and improved by merging with SNRS. This was already apparent through joint appointments of CALMIT faculty (i.e., in CSD and SNRS), when SNRS was formed. Similarly, activity in all aspects of water sciences is expected to increase in all three units as a result of the merger. Additional synergistic interactions were also anticipated, and these have largely been realized. For example, more team-taught courses in some areas, more interdisciplinary large-grant projects, and better coordination of natural resources information services were expected and have been achieved. All units involved were expected to benefit relative to their previous strengths, rather than one or two units being enhanced at the expense of another. For academic program enhancement and the potential expansion of natural resources course offerings, faculty with total or partial survey and scholarly service appointments in CSD have a greater opportunity to teach undergraduate and graduate courses under the broader mission of the new unit; likewise, extension faculty in SNRS have an excellent opportunity to work more closely with CSD faculty and Water Center personnel on delivering natural resources outreach programs.

In the past two years (2007 to current), a concerted effort has been made to integrate the programs of CSD with those in SNR. The goal has been to enhance the ability of CSD, SNR, and IANR to meet clientele demands for information and services related to water, soils, geology, and climate in a time of diminishing resources for providing service-related activities. This approach has relied on the willingness of other faculty in SNR and other units across the university to respond to the needs of clientele. Although this approach is a work in progress, results to date are encouraging.

We are aware that an effective integration of these three units requires an effective integration at the individual level as well for the new unit to be successful. Significant progress since the 2003 merger has been achieved, and was greatly enhanced by the co-location of the unit in Hardin Hall in 2006, following the building's renovation.

1.3 Our Long-term Vision for the School of Natural Resources

SNR addresses the IANR Strategic Plan (2008–16) through all four of the identified priorities:

- Priority one: The life sciences, ranging from molecular to global systems;
- Priority two: Sustainable food, fiber, and natural resources systems that support a bio-based economy;
- Priority three: Economics and environments for a sustainable future; and
- Priority four: Human capital development of children, youth, and families.

These elements of IANR priorities are addressed in the components of SNR's mission statement. The unit places a high priority on (a) providing water and mineral resources programs; (b) augmenting the understanding, management, and stewardship of Nebraska's soil and rangeland resources; (c) supporting programs on geographic information systems (GIS) and natural resource database activities; (d) supporting programs on global climate and environmental change; and (e) enhancing Nebraska's woodlands, wildlife, fisheries, and other aquatic resources through research, education, and service programs.

Key contributions by SNR faculty and staff to natural resources and environmental science issues facing the state, the nation, and the world are reflected in our six faculty areas:

- Applied Climate Science
- Applied Ecology
- Geography/GIScience
- Geology and Soils
- Human Dimensions
- Water

Further discussion of the evolution of these key faculty areas within SNR will be discussed in Chapter 2.

SNR views its mission as broader than the mission of any of the individual, pre-merged units, and one that offers a plethora of new opportunities in research, teaching, extension/outreach, and survey. Natural resources programs have been elevated within IANR to unprecedented levels in the history of this land-grant institution. Integration of these disciplinary areas within SNR was hampered before 2006 because the unit's faculty and programs were housed in eight buildings on east and city campuses. With the completion of the Hardin Hall renovation in 2006 and the co-location of nearly all elements of SNR in one facility, greater collaboration and integration of research, teaching, and extension programs and activities across the unit has occurred.

SNR's Vision Statement:

The School of Natural Resources will be an international leader in natural resources education, research, and outreach. The School will also be the primary provider of natural resources information and service to the citizens and stakeholders of Nebraska.

SNR's Mission Statement:

The School of Natural Resources will combine interdisciplinary approaches and disciplinary excellence to:

- foster an integrated, systems approach to address complex natural resource, environmental, and human issues;
- provide a quality academic experience for students;
- conduct fundamental research of the mechanisms associated with natural resource systems;
- provide innovative outreach to citizens and stakeholders;
- investigate, record, and disseminate information about Nebraska's earth, water, atmospheric, and biological resources; and
- promote a comprehensive conservation ethic for the effective and appropriate management and sustainable utilization of natural resources.

1.4 Format and Content of Review Document

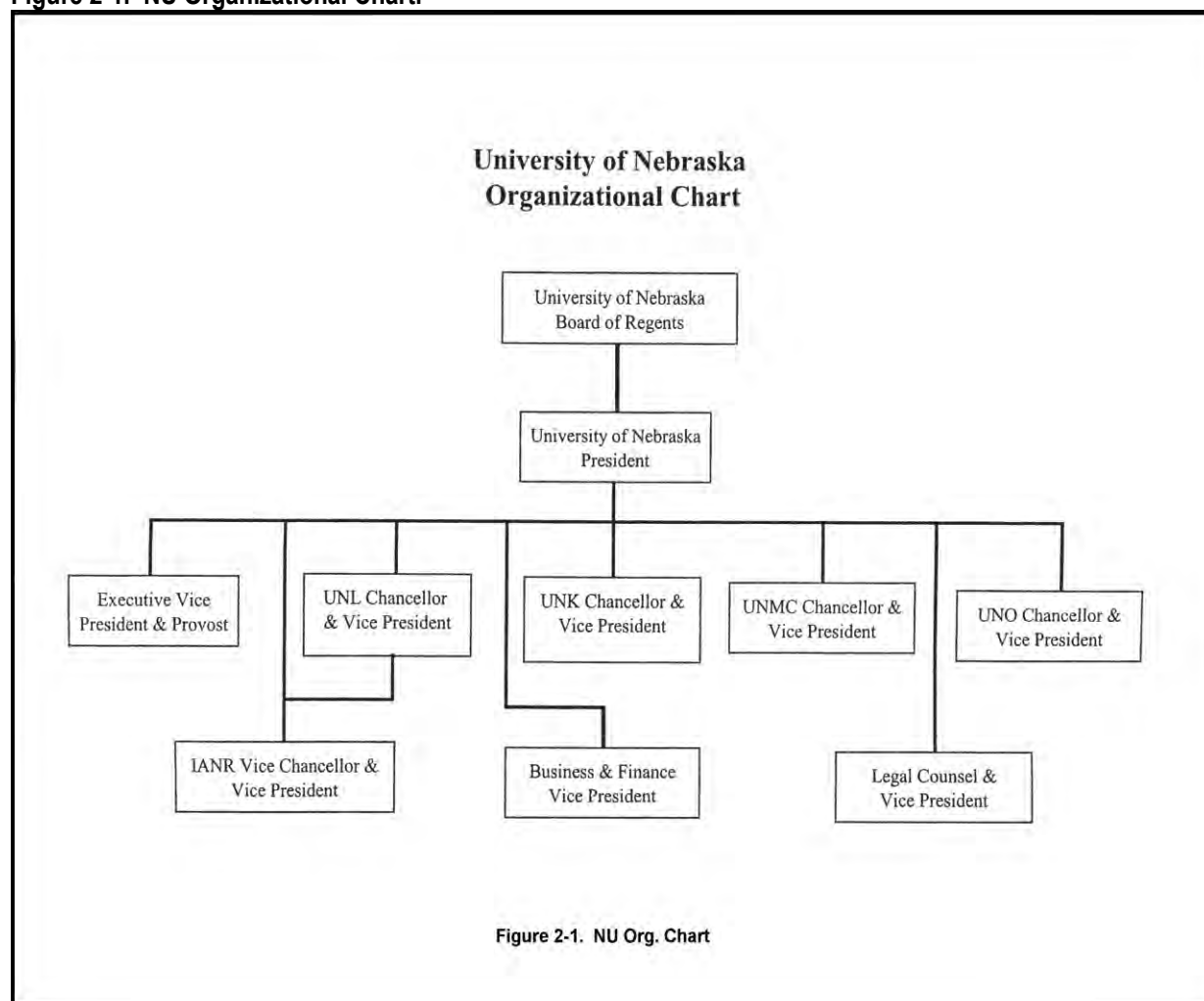
This review document and the upcoming on-site external review are organized principally around five current and emerging issues in natural resources and environmental science. These issues were identified and consensus was reached by SNR faculty in early 2008 as part of an issue-based strategic planning process initiated by the SNR director in preparation for the unit review. Our goal was to prepare a review document that was focused on our collective vision for the unit as expressed by the key issues in natural resources and environmental science. We have attempted to incorporate the key research, teaching, and extension/outreach components associated with each of these issues in this discussion. We are anxious to gain feedback from the review team and the IANR administration on the effectiveness of this approach. Further elaboration of the five current and emerging issues and the process by which they were identified by SNR faculty will be provided in Chapter 2. The current and future goals associated with each of these issues is the focus of Chapter 4.

2 ADMINISTRATION AND STRUCTURE

2.1 Introduction

2.1.1 Institutional Setting. The University of Nebraska system consists of four campuses -- the University of Nebraska-Lincoln (UNL), the University of Nebraska at Omaha (UNO), the University of Nebraska at Kearney (UNK), and the University of Nebraska Medical Center (UNMC). Figure 2-1 represents the organization of the University of Nebraska. The School of Natural Resources (SNR) is one of twelve departmental units located administratively within the Institute of Agriculture and Natural Resources (IANR) (Figure 2-2). With the inclusion of non-tenure-track faculty, it is the largest unit (i.e., number of faculty) in IANR. IANR is under the leadership of John Owens, Harlan Vice Chancellor and University of Nebraska vice president. SNR is one of eighteen departments in the College of Arts and Sciences (CAS).

Figure 2-1. NU Organizational Chart.



2.1.2 Reporting Deans. SNR is one of three units administratively housed primarily within IANR with an administrative link to a city campus college. SNR has a significant and growing number of linkages through joint programs and faculty appointments with the College of Arts

and Sciences and the College of Engineering at the University of Nebraska–Lincoln (UNL) and the College of Public Health at the University of Nebraska’s Medical Center. The SNR director reports to the three deans within IANR (research, teaching, and extension) and also to the dean of the College of Arts and Sciences. These reporting deans are:

- Gary Cunningham, dean and director, Agricultural Research Division (ARD)
- Elbert Dickey, dean and director, Extension Division
- Steven Waller, dean, College of Agricultural Sciences and Natural Resources (CASNR)
- David Manderscheid, dean, College of Arts and Sciences (CAS)

Each departmental unit within IANR is assigned a cognizant or lead dean. For SNR, the lead dean is Gary Cunningham, ARD.

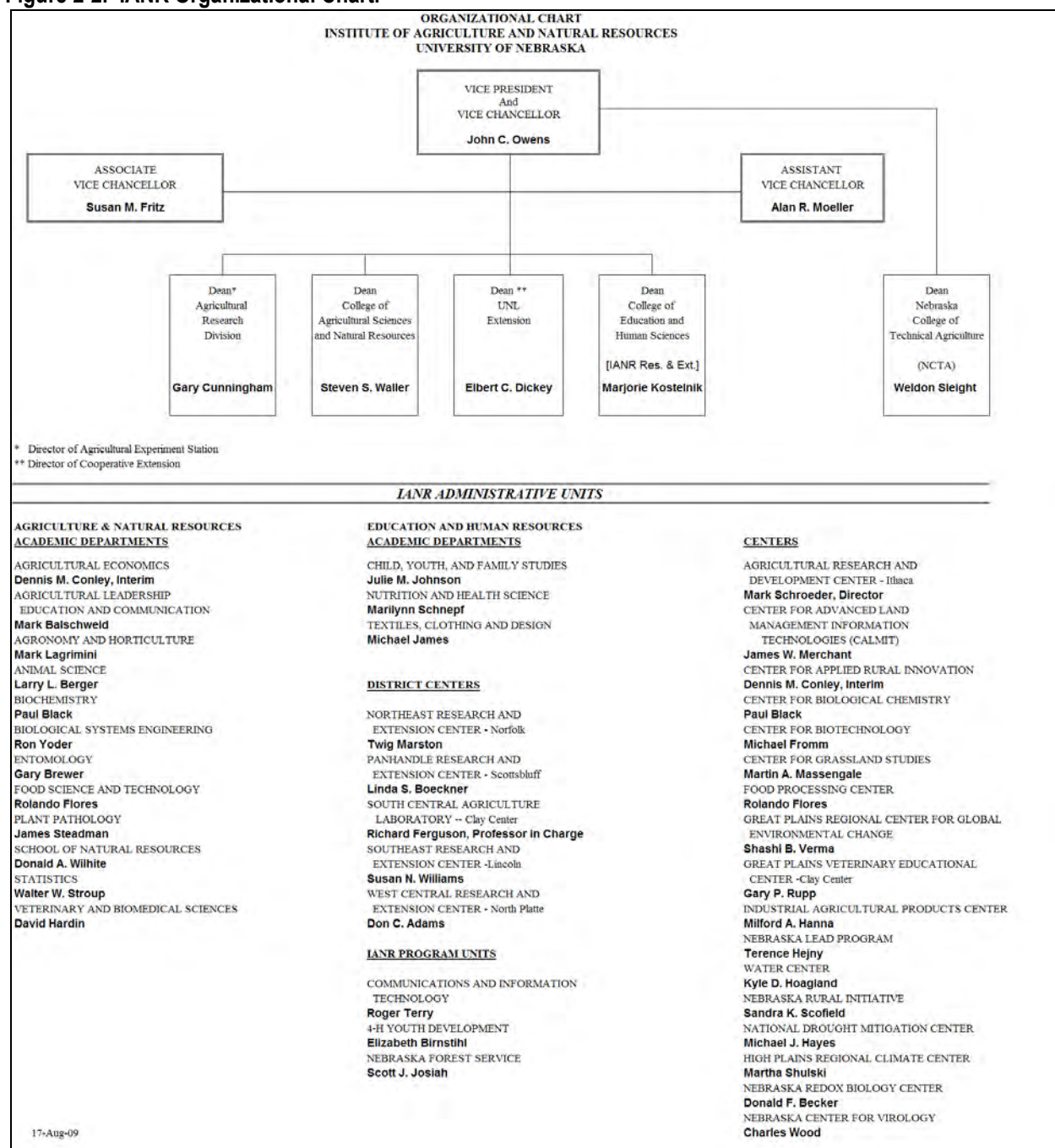
2.1.3 SNR Administrative Structure. Because of the size and diversity of SNR, the administrative structure is large and reflects the various departmental functions of the unit. SNR has a significant research mission, but also has quite comprehensive teaching programs at the undergraduate and graduate levels and extension programs in several areas. In addition, following the merger of the Conservation and Survey Division (CSD) (i.e., Nebraska’s state geological survey) with the School of Natural Resource Sciences (SNRS) and the Water Center in 2003, the unit also has a survey mission. Faculty with designated “survey” appointments were required to change those appointments to reflect research, teaching, or extension functions. Issues associated with the merger of CSD with SNRS and the Water Center in 2003 will be discussed in greater detail elsewhere in this document.

The research, extension/outreach, teaching, and survey missions of SNR are:

- **Research.** SNR conducts basic and applied research emphasizing disciplinary excellence and, often, an interdisciplinary approach. In solving problems related to the environment, SNR’s research addresses holistically the complex of interrelated natural and managed systems. Links with the agricultural, health, and social sciences allow faculty and staff to contribute to better management in agribusiness, environmental policy, and sustainable rural and urban communities.
- **Extension/Outreach.** SNR’s extension program provides research-based natural resource education and information for all Nebraskans, rural and urban. It is designed to enhance lives, families, and communities. SNR uses an interdisciplinary approach well suited to engaging the university’s strengths with partners and stakeholders in natural resource education. Through the Survey division’s outreach and education efforts, natural resources information has been shared with landowners, private citizens, and decision makers.
- **Teaching.** Undergraduate teaching in SNR emphasizes an interdisciplinary approach while providing students with a strong grounding in the major of their choice. Graduates of these majors are taught to understand the interactions among these natural resource systems and evaluate the impacts of humans as the stewards and managers of these systems. Students in the natural resources program will receive a BS degree in natural resources through CASNR. Students in the geography program will receive a BA or BS degree through CAS. Graduate students in natural resources

- may pursue an MS or a PhD degree in natural resource sciences through CASNR with an optional specialization in 1 of 12 areas. Geography students may obtain an MA or PhD in geography through CAS.
- Survey. Extensive data-gathering, often accompanied by mapping; provides baseline data that is necessary for justifying more detailed investigations. The effects of human development generally must be compared to some survey of pre-development conditions. The Survey Division has been the state's geological, geographical, water and soil survey.

Figure 2-2. IANR Organizational Chart.



2.2 SNR Administration

The administrative structure for SNR has evolved to reflect the diversity and size of the unit. This structure is illustrated in Figure 2-3. SNR is under the leadership of a director. Don Wilhite has been SNR's director since August 1, 2007. His appointment is 100% administration, or 1.00 FTE. Before his appointment as director, he was the founder and director of the National Drought Mitigation Center. Don has been a faculty member at the University of Nebraska–Lincoln since 1977.

The SNR's associate director is F. Edwin (Ed) Harvey, a professor of hydrogeology. His administrative appointment is 0.50 FTE. The remainder of Ed's appointment is research and teaching. Ed joined the UNL faculty in 1996 as a member of CSD. He became a faculty member in SNRS (later SNR) at the time of its creation.

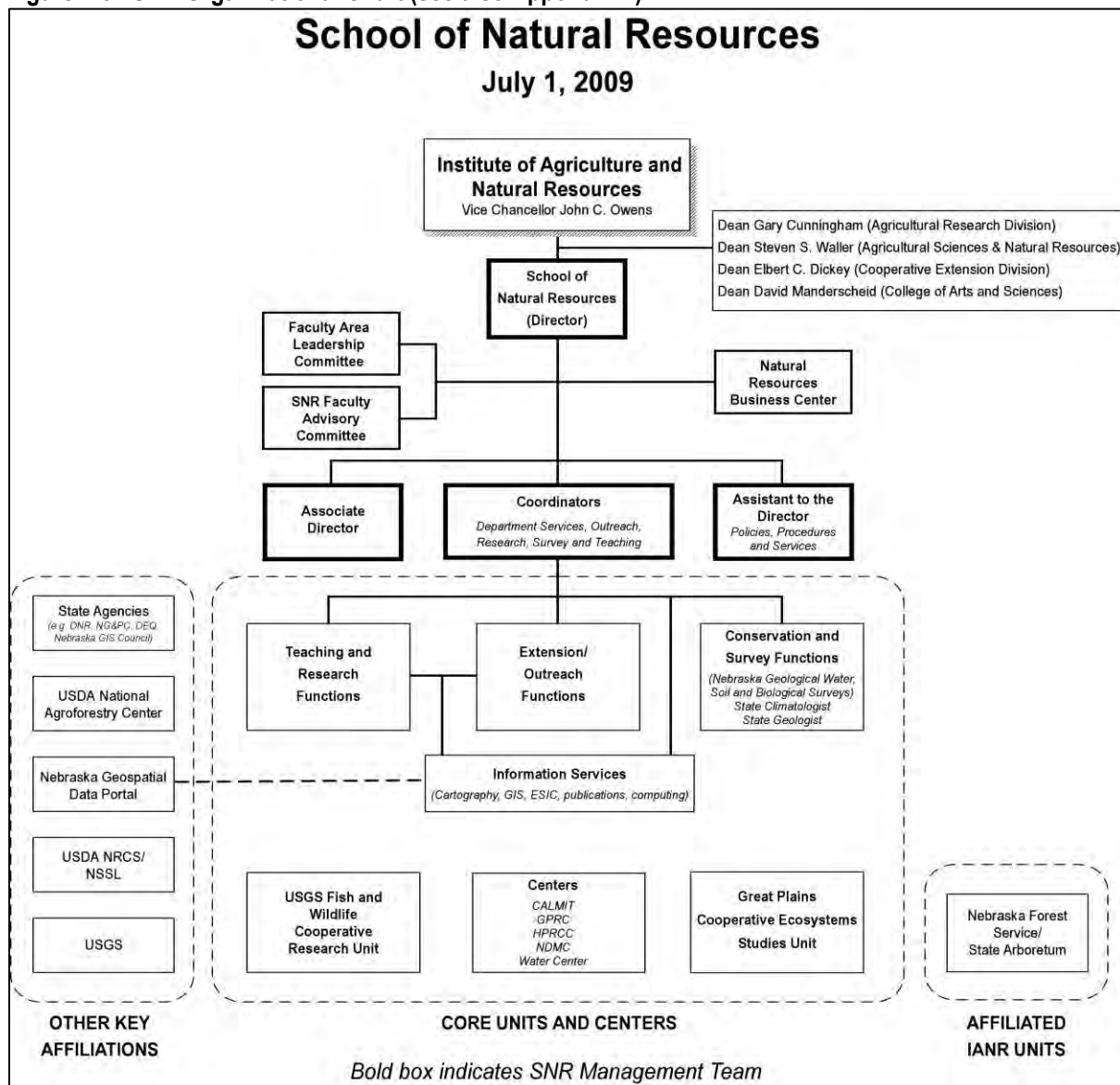
The SNR administrative team is assisted in the operational aspects of the unit's administration by Christine Steggs, assistant to the director, who has been with SNR since 1998. Her duties include policy development, safety, and departmental operations. Sharon Kelly is the administrative assistant for SNR, providing clerical and administrative support to SNR's administrative team and the unit's faculty and staff. Sharon has been with SNR since 1997.

SNR also appoints faculty members as coordinators to assist in administering the various functions of the unit. Each coordinator's responsibilities consume approximately 0.25 FTE of their faculty appointment. The current SNR coordinators are:

- Elizabeth Walter-Shea, teaching coordinator
- Mark Kuzila, survey coordinator
- Matt Joeckel, outreach coordinator

The associate director and coordinators are appointed by the director. These appointments are renewed on an annual basis.

Figure 2-3. SNR Organizational Chart (see also Appendix A).



SNR has recently adopted a new organizational approach to stimulate more interaction and integration within and between what have typically been characterized as “program areas” within the unit. In early 2009, after considerable discussion associated with the five-year review planning process, faculty members were asked to self-select their affiliations with six faculty areas. These faculty areas are applied climate science, applied ecology, geography/GIScience, geology and soils, human dimensions, and water. Faculty members were required to select their primary area of affiliation. The choice of a secondary or tertiary affiliation was encouraged, as appropriate (Appendix B). The faculties met and selected leaders by consensus. Current faculty leaders for the groups are:

- Applied Climate Science—Shashi Verma
- Applied Ecology—Dave Wedin
- Geography/GIScience—Jim Merchant

- Geology/Soils—Matt Joeckel
- Human Dimensions—Mark Burbach
- Water—Dan Snow

Faculty groups meet monthly to discuss issues related to teaching, research, and outreach programs. They are also encouraged to meet, as needed, with other SNR faculties to discuss areas of integration or interaction. The leaders of the faculties constitute a faculty leadership committee that meets monthly with the SNR director and associate director. This new component of the SNR structure is intended to improve communication within faculty areas and with the SNR administrative team and to further integrate disciplines within our teaching, research, and outreach programs.

Financial operations and procedures are distributed within IANR to a series of business centers. Each business center has several departments/units as part of their responsibility. SNR's financial operations and accounting are under the Natural Resources Business Center (NRBC). This business center also has responsibility for the business operations of the Department of Statistics, Nebraska Forest Service, Nebraska LEAD program, environmental studies program, and Nebraska Statewide Arboretum. NRBC staff include the administrative team leader, Carol Cartwright, and assistants in purchasing, human resources, accounting, grants management, payroll, and travel.

2.2.1 *Bylaws and operating procedures.* SNR maintains written bylaws that are approved by a vote of the faculty. SNR's operating procedures follow all NU, UNL, IANR, and CAS procedures/guidelines. We are in the process of developing a website that will host the SNR operating procedures. SNR's Bylaws may be found at <http://snr.unl.edu/download/employeeinfo/information/SNRByLaws06192007.pdf>.

2.2.2 *SNR Committees.* SNR has 11 standing committees. The composition of each committee is shown in Table 2-1.

Table 2-1. SNR Standing Committees.

Committee Name	Faculty	Staff	Ex Officio Member	Grad students
Faculty Advisory	5	1	Associate director	
Courtesy	Appointed			
Curriculum	Chairs of each major	None	Teaching coordinator	
Graduate	5	None	Teaching coordinator	1
Nominating	5	2		
Outreach	5	2		
Promotion & Tenure	7, 4 of which must be fully promoted	None		
Research	6, 2 of which must be appointed to represent centers, 3 of which must be elected	1 m/p	Research coordinator, ex officio and chair	
Safety & Facilities	4	3	Assistant to the director, safety & training asst., facilities coordinator, lab safety coordinator	
Staff Advisory & Professional Devel.	1	5	Associate director	
Survey	5	2	Survey coordinator, ex officio and chair	

2.2.3 SNR Centers and Other Units. A more complete description of each center and the Coop Unit can be found in Appendix C-H.

- **Center for Advanced Land Management Information Technologies (CALMIT).** Jim Merchant, director (Don Rundquist served as director of CALMIT from the time the center was formed in 1986 until August 2008). CALMIT was formed in 1986 (though its history as the Nebraska Remote Sensing Center dates back to 1972) and is recognized as a center-of-excellence for education and research focused on the areas of remote sensing, GIS, and Global Positioning Systems. The people and partners of CALMIT utilize interdisciplinary expertise. See also Appendix C.
- **Great Plains Regional Center for Global Environmental Change (GPRC).** Shashi Verma, director. A primary purpose of the GPRC is to support a research program that increases basic understanding of how agricultural and grassland ecosystems exchange CO₂ with the atmosphere and how environmental change is likely to impact these ecosystems in the region. Faculty, students, and staff from several UNL departments collaborate with the GPRC personnel on detailed process-level studies of soil carbon dynamics, vegetation growth and partitioning, soil moisture, soil gas exchange, and residue decomposition. A collaborative effort with CALMIT scientists is intended to provide regional extrapolation of CO₂ exchange using tower flux and satellite observations. Another collaborative project with scientists at the National Soil Tilth Laboratory (Ames, IA), NOAA-Atmospheric

- Turbulence, and Diffusion Division (Oak Ridge, TN), and the University of Minnesota and USSDA-ARS (St. Paul, MN) focuses on a synthesis of tower CO₂ and water vapor flux observation in key agricultural systems in the North American Carbon Program MCI (Mid-Continent Intensive) region. See also Appendix D.
- **High Plains Regional Climate Center (HPRCC).** Martha Shulski, director (effective August 1, 2009; Ken Hubbard was HPRCC director from the time the center was formed in 1987 until August 2009). The HPRCC is one of six regional climate centers funded by the National Oceanic and Atmospheric Administration (NOAA). The HPRCC's mission is to increase the use and availability of climate data in the High Plains area. HPRCC personnel work closely with scientists from other regional and federal climate centers on climate services and programs and provide a regional structure for climate applications. The long-term objectives of the HPRCC are to carry out applied climate studies, develop improved climate information products, and provide climate services in the High Plains region. See also Appendix E.
 - **National Drought Mitigation Center (NDMC).** Mike Hayes, director (Don Wilhite was the founder of the NDMC in 1995 and served as its director until 2007). The NDMC is a unique organization that plays a significant role in drought monitoring, mitigation, impact assessment, planning, and policy at the national and international levels. The NDMC's mission is to help people and institutions develop and implement measures to reduce societal vulnerability to drought. The NDMC stresses preparation and risk management rather than crisis management. The NDMC is primarily funded through base-level support from the U.S. Department of Agriculture (USDA) Cooperative State Research, Education, and Extension Service (CSREES) and through competitive grants with numerous federal agencies, particularly USDA and NOAA. See also Appendix F.
 - **Water Center.** Bruce Dvorak, interim director (effective September 1, 2009; Kyle Hoagland was the Water Center director 2000 through August 2009). The Water Center began operating at UNL in 1964 as part of a federally established network of 55 water resources programs at land-grant universities. The overall aim of the Water Center and allied initiatives is to position the University of Nebraska to become the key resource in teaching, research, and extension education in water sciences, water management, and water law/policy to serve Nebraska, and to become recognized as a national and international leader in these areas. The UNL Water Sciences Laboratory, a world-class, state-of-the-art water research core facility, is also part of the UNL Water Center. It provides highly trained faculty and staff and the latest in instrumentation for measuring chemicals in water, specializing in trace organics. See also Appendix G.
 - **USGS Cooperative Fish and Wildlife Research Unit.** Craig Allen, leader. USGS Cooperative Research Units (CRUs) are unique collaborative relationships between the federal government, universities, states, and a nonprofit organization. The first CRU was established in 1935 and located in Ames, Iowa, at Iowa State College (now Iowa State University). With the addition of the Nebraska Unit in 2004, the CRU program now comprises 40 units. The mission of the Cooperative Fish and Wildlife Research Unit Program is to (1) train graduate students for professional careers in natural resource research and management, (2) conduct research that will create new

information useful for management of natural resources, and (3) provide technical assistance to cooperators. See also Appendix H.

- **Conservation and Survey Division (CSD).** Mark Kuzila, director. CSD, the natural resource survey component of SNR, is a unique, multidisciplinary research, service, and data-collection organization established by state statute in 1921. CSD's mission is to investigate and record information about Nebraska's geologic history; its rock, mineral, oil, and natural gas resources; the quantity and quality of its water resources; land cover and other aspects of its geography; and the nature, distribution, and uses of its soils. The division was part of the merger that formed SNR in 2003.
- **Great Plains Cooperative Ecosystems Studies Unit (GP-CESU).** Kyle Hoagland, director. Gary Willson, National Park Service research coordinator. The mission of the GP-CESU is to determine the ecological state of public lands of the Great Plains and examine the future of state and public lands within the context of private lands. This determination is focused on improving the scientific basis for managing ecosystems in the region, through more active and interactive technical assistance, research, and education among the partner institutions and agencies. The GP-CESU is a network of 16 academic institutions in the Great Plains region and 8 federal agencies. UNL serves as host to the GP-CESU. The unit encompasses a broad geographical portion of the Great Plains and offers an outstanding group of scientists in grasslands, ecosystems studies, natural, and cultural resources management for collaborative research, technical assistance, and educational opportunities.

2.2.4 Major External Collaborations and Linkages (Appendix I). IANR comprises 12 departments, including SNR, and 4 research and extension centers. CAS has 18 departments and another 17 centers or jointly shared majors. SNR faculty and staff have considerable interactions and collaborations with many of these units. The departments are shown in Table 2-2.

Table 2-2. IANR and CAS Departments.

IANR		College of Arts and Sciences	
1. Agricultural Economics		1. Anthropology	9. History
2. Agricultural Leadership, Education, and Communication		2. Chemistry	10. Mathematics
3. Agronomy and Horticulture		3. Classics & Religious Studies	11. Modern Languages & Literatures
4. Animal Science		4. Communication Studies	12. Philosophy
5. Biochemistry		5. Computer Science & Engineering	13. Physics & Astronomy
6. Biological Systems Engineering (two SNR faculty have joint appointments)		6. English	14. Political Science
7. Entomology		7. Geography	15. Psychology
8. Food Science and Technology		8. Geosciences (five SNR faculty have joint appointments)	16. School of Biological Sciences
9. Plant Pathology			17. Sociology
10. School of Natural Resources			18. Statistics
11. Statistics			
12. Veterinary and Bio-Medical Sciences			

The four IANR research and extension centers are the Northeast R&E (Norfolk), Panhandle R&E (Scottsbluff), Southeast R&E (Lincoln), and West Central R&E (North Platte). SNR has collaborations with all of these research and extension centers in a variety of program areas. SNR faculty members affiliated with CSD are stationed at the Panhandle, Northeast, and West

Central stations and work in the areas of geology and water. Another faculty member affiliated with the Southeast station (Dennis Ferraro) has a .2 FTE teaching appointment in SNR.

The Nebraska Forest Service is an affiliated unit within IANR. It has had a long-term affiliation with SNR. The director of the Nebraska Forest Service, Scott Josiah, is a tenured faculty member in SNR.

SNR also has significant collaborations with several departments in CAS. SNR has 5 faculty with joint appointments in Geosciences (Bathke, Hu, Joeckel, Lenters, and Oglesby). One faculty member (Harvey) holds a courtesy appointment as well. In addition, numerous courses in meteorology/climatology and water are cross-listed. Joint research projects between SNR and Geosciences are common.

The School of Biological Sciences, also located in CAS, also has considerable collaborative linkages with faculty in SNR, particularly in the area of applied ecology. The director of the Cedar Point Biological Station, Jean Knops, has a joint appointment in SNR. SNR faculty teach on a regular basis at Cedar Point.

The Department of Computer Science and Engineering has had strong research collaborations with SNR, especially with the Applied Climate Sciences faculty associated with the NDMC and HPRCC.

Numerous faculty have worked closely with a wide range of federal agencies on numerous research and outreach projects. A list of those agencies is given below.

- Department of Interior
 - U.S. Fish and Wildlife Service
 - U.S. Geological Survey
 - Bureau of Indian Affairs
 - Bureau of Reclamation
- U.S. Department of Agriculture
 - Cooperative State Research, Education, and Extension Service
 - Risk Management Agency
 - Natural Resources Conservation Service
 - Farm Service Agency
 - Foreign Agricultural Service
 - Agricultural Research Service
 - World Agricultural Outlook Board
- National Oceanic and Atmospheric Administration
 - Climate Prediction Center
 - National Climatic Data Center
 - National Weather Service
- Department of Energy
- National Aeronautical and Space Administration
- National Institutes of Health

Collaboration between SNR and state agencies is a major component of the unit's programs in research, teaching, and extension/survey. The primary collaborating agencies are:

- Nebraska Game and Parks Commission
- Nebraska Department of Natural Resources
- Nebraska Department of Environmental Quality
- Nebraska Department of Agriculture
- Nebraska Emergency Management Agency
- Nebraska GIS Council

2.3 Teaching, Research, Extension/Outreach, and Survey Appointments

SNR has 89 faculty positions, which include tenured, tenure track, and non-tenure track faculty, lecturers, and post-doctoral research associates (Table 2-3). We have a total of 74.96 faculty FTE: 15.93 teaching, 36.95 research, 5.10 extension/outreach, 11.67 scholarly service, 3.01 university service, and 2.30 administration. Of these positions, 14 have split appointments with other departments/colleges; 42 (32.91 FTE) are non-tenure track and 47 (42.05 FTE) are tenured or tenure track; 70 (51.78 FTE) are state-funded (23 [9.73 FTE] non-tenure track) and 47 [42.05 FTE] tenure track. The faculty are supported by 85 staff, 81.28 FTE.

Table 2-3. Faculty and Staff FTE.

Type	#	Teaching	Research	Extension/ Outreach	Scholarly Service	Univ Service	Admin	SNR Total	Soft- funded
Tenured/ Tenure-Track Faculty	47	11.00	18.56	3.48	4.01	2.70	2.30	42.05	.47
Non-tenureTrack	42	4.93	18.39	1.62	7.66	.31		32.91	21.34
Subtotal	89	15.93	36.95	5.10	11.67	3.01	2.30	74.96	21.81
M/P Staff	59		35.65	13.50			8.25	57.40	35.97
O/S Staff	26		11.13	3.75			9.00	23.88	11.38
Subtotal	85		46.78	17.25			17.25	81.28	47.35
Total	174	15.93	83.73	22.35	11.67	3.01	19.55	156.24	69.16

* includes lecturers and post-doctoral research associates.

Source: 2007-08 Adjusted Budget.

2.4 Public Relations and Outreach

SNR has many public relations and outreach activities that include, but are not limited to, the School's website, director's monthly report, *Water Current*, *Droughtscape*, *Nebraska Earth Systems Network*, *Tern and Plover Conservation Partnership Volunteer Newsletter*, brochures for each major, and fact sheets for each center. We also give back to the community through student, faculty, and staff volunteerism (e.g., coat collection for Clinton Elementary School, Harvest of Books, Food Bank Backpack Program). Our Sustainability Committee has been working to involve faculty, staff, and students in making Hardin Hall green. We've implemented a recycling program that includes office paper, newspaper, plastics, and aluminum, and implemented energy-saving occupancy sensors in offices, work rooms, and select public/student spaces. These sensors control the heating, ventilation, and air conditioning (HVAC) and lighting for each room. The HVAC sensors are expected to recover their installation cost within three years, and light sensors within five years.

2.5 SNR Community

SNR has implemented several activities and procedures to enhance and strengthen the School as a community. These include, but are not limited to, processes for new and departing employees to simplify their transition, a monthly birthday bash, improved employee information on the SNR website, reassignment of job duties to make better use of expertise and physical facilities, information for employees, procedures for regular review/updates, communication with employees through a monthly report from the director, a potluck once each semester, faculty-staff meetings twice a year, a faculty-graduate student get together the first Friday of each semester, and email communication announcing new/departing employees, office changes, and adjunct/courtesy appointments.

Four goals that will be addressed in the next five years are directed at (1) improving employee satisfaction; (2) making the department more student-friendly; (3) offering time management strategies for faculty, staff, students; and (4) improving communication. Action items for these goals are in Table 2-4.

Table 2-4. Building SNR Community, 2009–14.

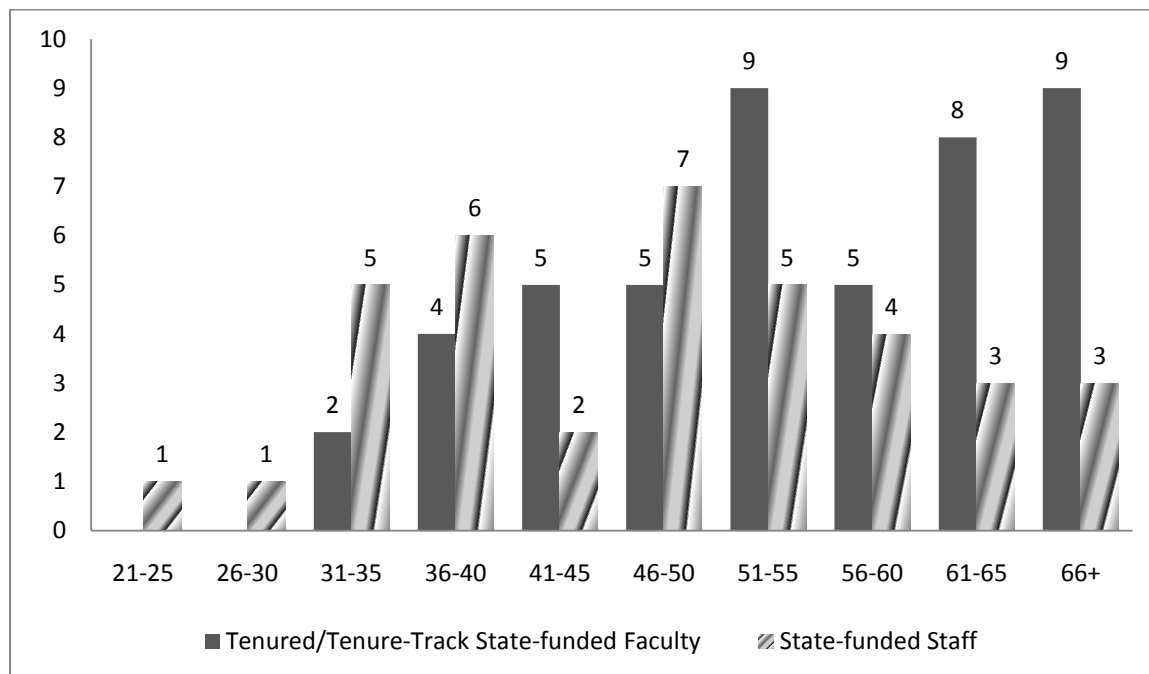
Goals and Actions
Goal 1 (Employee satisfaction)
Action 1: Create website for SNR policies/procedures; update annually
Action 2: Establish procedure to involve employees in identifying needed policies and developing/changing policies
Action 3: Develop survey of new employees to determine timeliness of services (i.e., phone setup, email address, office sign)
Action 4: Offer training on interpersonal communication (e.g., as supervisor, meeting facilitator, employee)
Action 5: Create awards committee that will take the lead on compiling nominating materials
Action 6: Upgrade furniture in Hardin Hall Employee Lounge
Goal 2 (Student-friendly)
Action 1: Make changes to Hardin Hall that create a student-friendly environment
Action 2: Create a directory of graduate students in Hardin (web directory already created)
Goal 3 (Time management)
Action 1: Schedule/offer time management training to faculty, staff, and students
Action 2: Reduce the number of SNR meetings faculty and staff are asked to attend
Action 3: Offer training to committee/meeting chairs to conduct more streamlined, effective meetings
Goal 4 (Communication)
Action 1: Create SNR student internship in natural resources journalism
Action 2: Hire student intern to help SNR science communicator with web information, including faculty profiles, spotlight on staff, etc.
Action 3: Establish procedure for developing materials to post to the website

3 TEACHING (T), RESEARCH (R), EXTENSION/OUTREACH (E/O), AND SURVEY (S) PROGRAMS

Executive Summary

School of Natural Resources (SNR) faculty and staff focus on four principal cross-cutting missions: teaching, research, extension/outreach, and natural resources survey. SNR offers BS, MS, and PhD degrees in natural resource sciences and, since July 2008, BA, BS, MA, and PhD degrees in geography. All degree programs have experienced significant growth since 2003. A continuing challenge for SNR over the next five years will be allocation of sufficient faculty FTE to meet growing student enrollments, especially in high-demand areas such as adaptive management, climate change, ecosystem science, and GIScience. This challenge will be exacerbated by the number of faculty who will be reaching retirement-eligible age by 2014. See Figure 3-1 for faculty and staff retirement data. Since its inception, SNR has been one of the most productive research units within the Institute of Agriculture and Natural Resources (IANR). External grant support and publications/FTE have increased steadily, and SNR will strive to continue this trend in the future. However, because of reduced state funding for the University of Nebraska–Lincoln (UNL), it is anticipated that grants will increasingly be required to cover acquisition, replacement, and maintenance of equipment and laboratory facilities, travel and field work, and support of graduate students and technical staff. SNR extension and outreach programs focusing on drought, wildlife damage, agroforestry, wildlife damage, and water issues have received national and international recognition. One of SNR’s goals is to enhance the scope and effectiveness of information delivery to our clients, with special emphasis on the Internet. SNR survey faculty and staff provide critical data and outreach regarding Nebraska’s geological and mineral resources, weather and climate, water resources, and soils. For the planning horizon of this report, SNR will continue to develop synergism between survey programs, faculty, and staff and SNR’s programs in extension, research, and teaching. SNR is one of the most interdisciplinary and diverse academic units at UNL, a unit that has experienced almost continual change since its formation in 1997; yet, SNR faculty and staff have forged an exceptionally well-integrated and focused enterprise, manifested in an “integrated systems approach” paradigm that guides SNR’s teaching, research, extension/outreach, and survey missions. During the ensuing five years, integration of these missions will be re-energized and focused through efforts to address five critical areas of concern: climate variability and change, water resources quantity and quality, ecological challenges, human-environment interaction, and natural resources and environmental science education. In addition, SNR will continue to enhance and enlarge its external linkages and collaborations, now numbering well over 250, and the scope of international activities.

Figure 3-1. SNR Faculty by Faculty Area, Tenure, and Age, 2008-09. (Appendix V.)



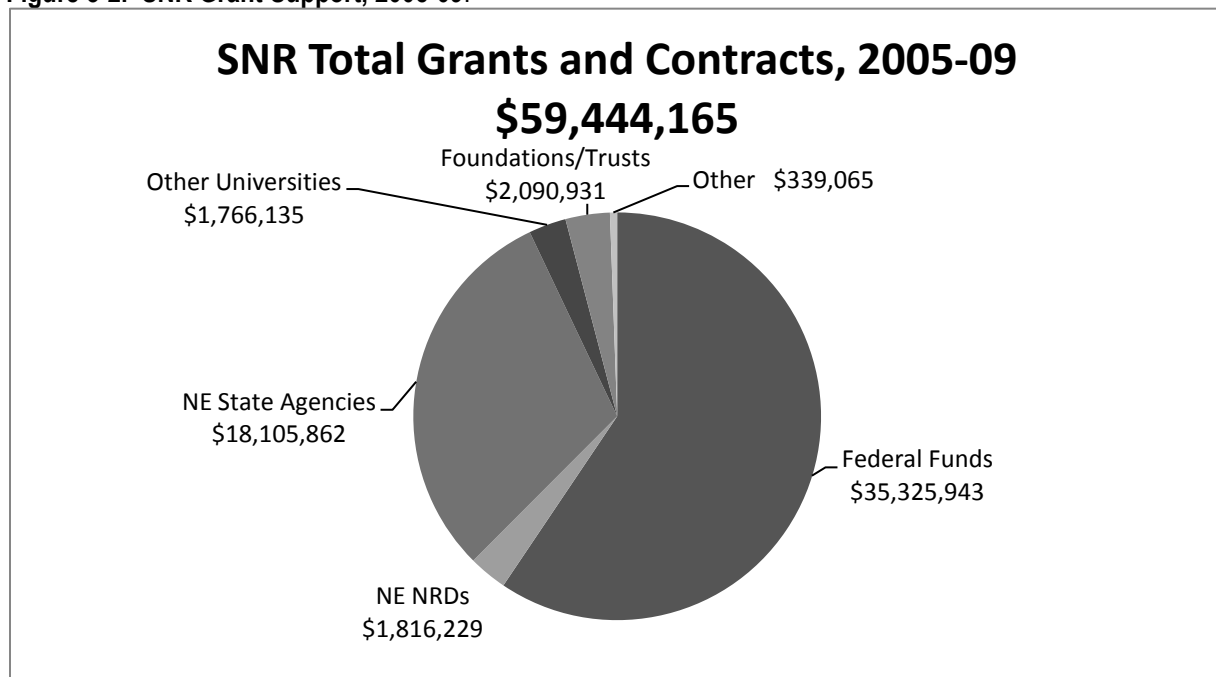
Source: 2008-09 Adjusted Budget

3.1 Introduction

SNR is structured in a nontraditional manner intended to retain traditional disciplinary strengths through its faculty areas (Chapter 2), and, at the same time, encourage and facilitate interdisciplinary teaching and research required to address important issues involving climate variability and change, water resources, ecology, human-environment interaction, and natural resources education. Most SNR faculty and staff allocate their time between several of the School's four principal cross-cutting missions: teaching, research, extension/outreach, and natural resources survey (Appendix L). This chapter summarizes each of these missions, the progress made over the past five years, and plans for enhancements over the next five years and beyond. Additional details regarding plans for addressing SNR teaching, research, extension/outreach, and survey missions are provided in Chapter 4 within the context of the discussions of the key critical and emerging issues in natural resources identified as foci for SNR.

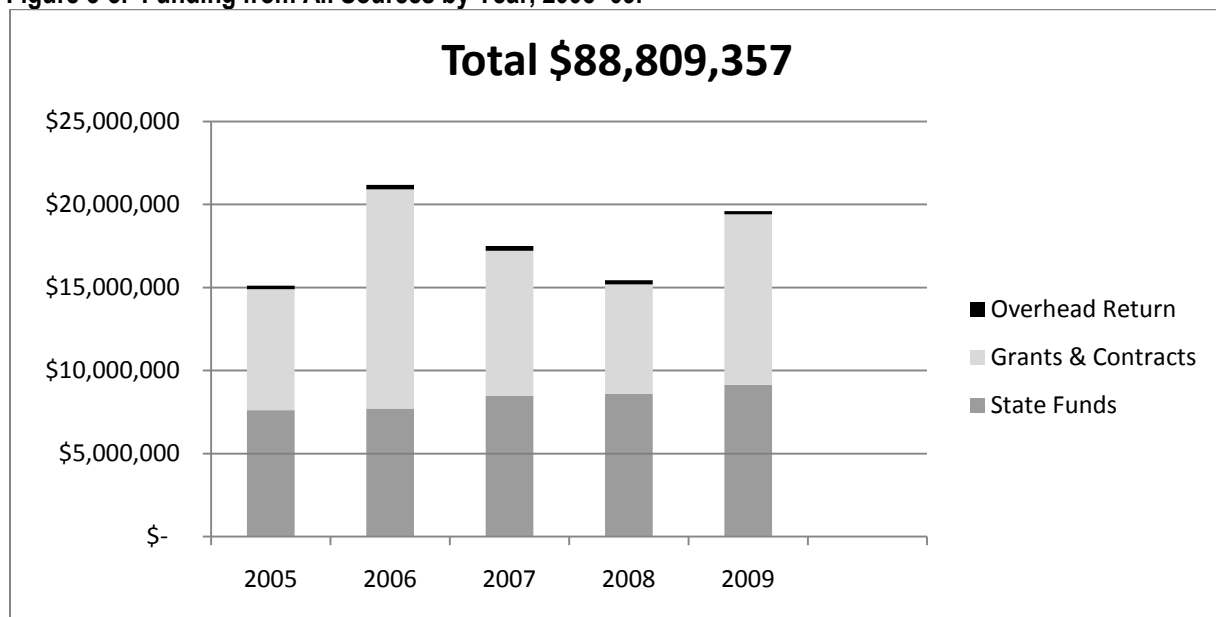
An area of growing interest to both the School and others is the amount of external funding we generate to support our missions (Figure 3-2). Figure 3-3 shows the School's total operating funds by year.

Figure 3-2. SNR Grant Support, 2005-09.



Source: NUGrant

Figure 3-3. Funding from All Sources by Year, 2005-09.



Source: 2005-2009 NUGrants, Adjusted Operating Budget

3.2 Teaching Programs

SNR aspires to be an international leader in natural resources and environmental education and the primary provider of natural resources and environmental information in Nebraska. As noted in Chapter 1, natural resources education is one of five critical and emerging issues to which SNR has devoted, and will continue to devote, substantial attention and resources. SNR faculty are noted for their excellence in teaching, as noted by high student evaluation scores—the highest in CASNR. A detailed discussion of current SNR programs in natural resources education and plans for enhancements over the next five years are presented in Chapter 4. Selected key points are summarized below.

SNR is committed to providing a quality academic experience for students that prepares them to assume roles as educators, scientists, managers, and users of natural resources during the twenty-first century. Both undergraduate and graduate degrees are offered. These include a BS in natural resources (any of our programs) in the College of Agricultural Sciences and Natural Resources (CASNR), as well as MS and PhD degrees in natural resource sciences. Since July 2008, BA, BS, MA, and PhD degrees in geography are also offered through SNR in the College of Arts and Sciences (CAS). SNR participates in the Program of Excellence through Assessment, Research, and Learning (PEARL) as a means of evaluating and improving our undergraduate and graduate programs. SNR serves both a traditional academic audience of undergraduate and graduate students and a growing nontraditional audience that includes policy makers, natural resources professionals, K-12 educators, and, increasingly, the public at large. Substantial growth and expansion of SNR educational programs has occurred since 2003. For example, SNR has added two new freshman-level classes and one new sophomore-level class, increased class size and lab sections offered for introduction to ecology courses, and developed four new field courses.

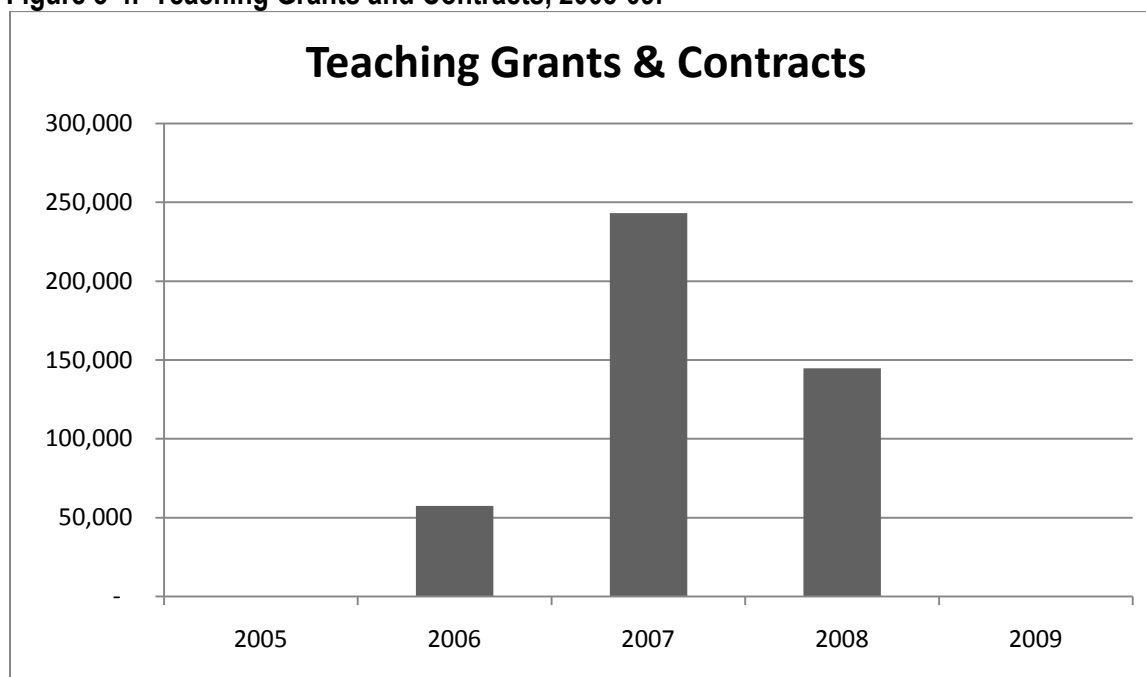
3.2.1 Teaching Faculty. SNR currently has a total teaching FTE of 10.74 through CASNR and the Agricultural Research Division (ARD), distributed among 40 faculty members (including 2 lecturers), and 5.19 teaching FTE through CAS, distributed among 16 faculty members (including 7 lecturers). This is a significant increase in teaching FTE from past years, reflecting in large part the addition of the geography program to SNR in July 2008, and a change in some survey faculty appointments that formalizes their teaching assignments. Faculty and their teaching appointments and courses are listed in Appendix M. The unit will generate 10,960 (estimate for summer sessions) student credit hours (SCH) in the academic year 2008–09 (4,659 in CASNR, 6,301 in CAS), resulting in 688 SCH/FTE (495 in CASNR and 1,077 in CAS). The CASNR average SCH/FTE was 522 in 2007–08.

3.2.2 Teaching Funding. SNR teaching is supported financially by primarily internal funding and to a lesser extent, external funding. State-appropriated teaching operating support has averaged a little less than \$22,000/year; state-appropriated teaching assistantships averaged \$47,000/year. Teaching grants and contracts averaged \$89,000/year. Although limited, grants and contracts come from a variety of state and federal sources, including NASA, Toyota USA Foundation, and USDA-CSREES.

In 2005, SNR faculty and staff submitted 12 teaching-related grant proposals for \$2,838,920 in combined internal and external funding and were awarded \$677,748 in funding for 5 projects. These were interdisciplinary grants, and of the 5 project awarded, SNR's portion totaled

\$445,205. Figure 3-4 shows that on an annual basis, total grant dollars generated per faculty teaching FTE have fluctuated from about \$50,000 (in 2006) to \$245,000 (in 2007).

Figure 3-4. Teaching Grants and Contracts, 2005-09.



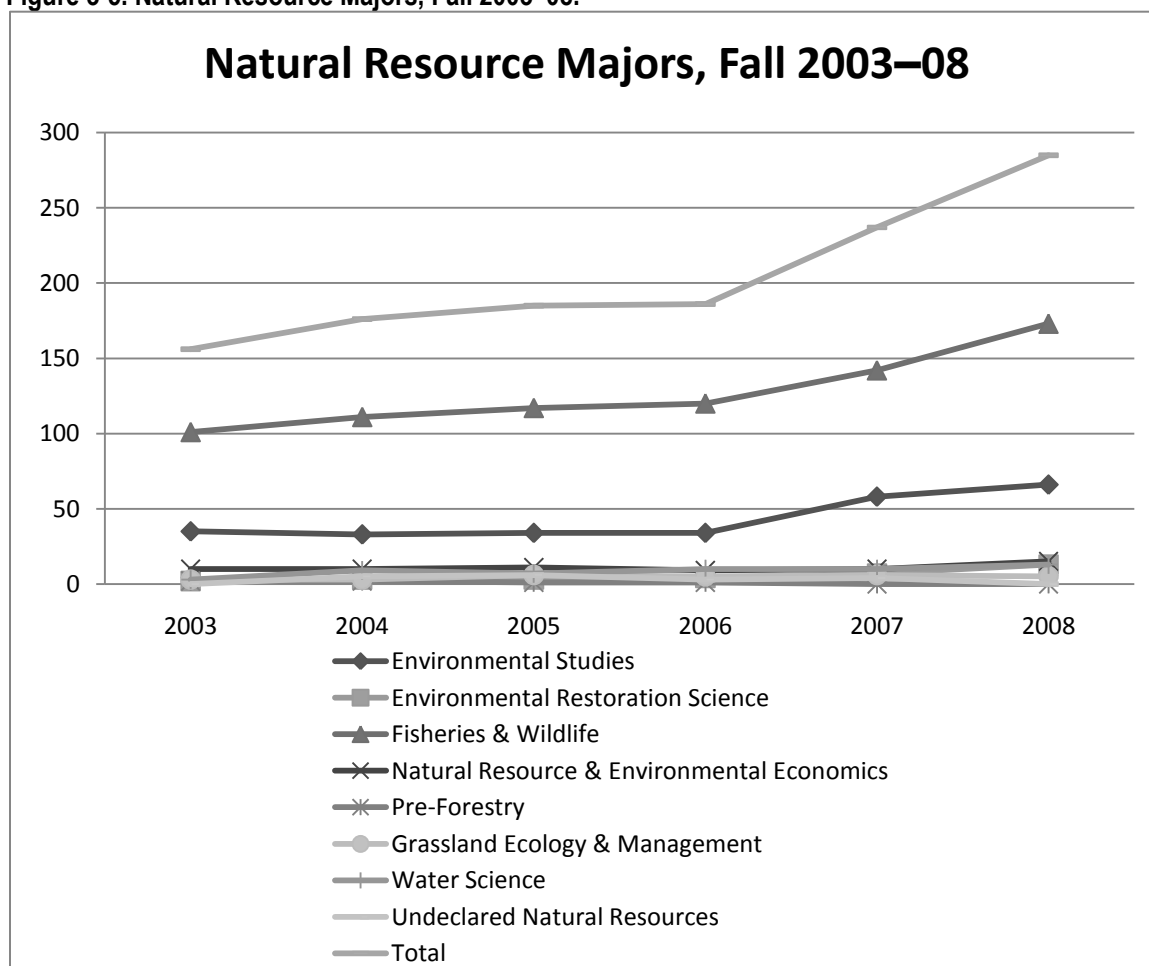
Source: NUGrants

3.2.3 Undergraduate Programs. SNR is the administrative home to four of the six undergraduate major programs in the BS degree in the natural resources area. These programs are environmental restoration science, fisheries and wildlife, grassland ecology and management, water science, and pre-forestry. In addition, SNR faculty make major contributions to two other programs administered by other units: (1) environmental studies, administered by CASNR/SNR and CAS, has areas of emphasis in natural resources and applied climate science, and (2) natural resources and environmental economics. An interdepartmental natural resources undergraduate curriculum committee (NRUCC) oversees and coordinates the curriculum in the natural resources area. The curriculum is designed to help students understand the interactions among natural resource systems and evaluate the impacts of humans as stewards and managers of these systems. All of the natural resource programs share a core curriculum of degree requirements. These requirements apply to every major leading to a BS in the natural resources area and reflect a common foundation essential for professionals in these sciences. The requirements include 18-19 hours in natural resources, three of which must be from the introductory class, Introduction to Agriculture and Natural Systems. One course is required from each of the following areas: geographic information science, principles of ecology, natural resources policy, earth science, natural resources, and environmental economics. Also required are 5 hours of mathematics and analytical skills, 16-17 hours of natural sciences (biology, physics, and chemistry), 9 hours of communications, 18 hours of economics, humanities, and social sciences, and a 3-hour senior capstone course.

Since July 2008, SNR has also offered both the BA and BS degrees in geography. The major in geography requires a total of 30 hours including the following: Introductory Human Geography, Elements of Physical Geography, Quality of the Environment, Geography of World Regions, GIS and cartography, and a Senior Seminar. Students may specialize in cartography, environmental geography, geographical information analysis, Great Plains Studies, and historical geography.

3.2.3.1 Student enrollment. Student enrollment has increased in all majors since 2003 (Figure 3-5) and is now approaching numbers of the mid-1990s. Recruiting efforts have significantly increased since the last review with the hiring of a recruiting coordinator in the summer of 2005. In response to the increase in enrollment, an advising coordinator was hired in the summer of 2008 to assist faculty advisors with advising, jobs, and internships for undergraduate students.

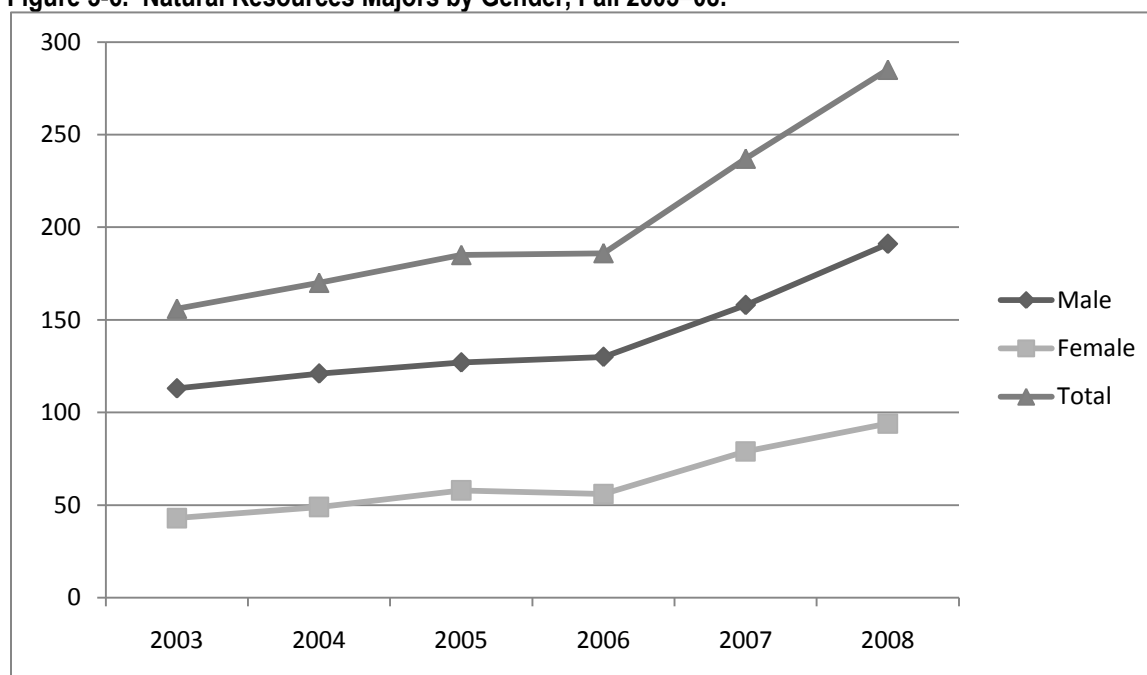
Figure 3-5. Natural Resource Majors, Fall 2003–08.



Source: CASNR Annual Report

Currently, 285 undergraduate students are enrolled in natural resources programs and 40 are enrolled in the geography program. Most of the programs have more male than female students, which is the general trend in CASNR (Figure 3-6). Very few represent ethnic minorities. SNR will continue to strive to increase the number of minorities in its natural resources and geography programs.

Figure 3-6. Natural Resources Majors by Gender, Fall 2003–08.



Source: CASNR Annual Report

Table 3-1 shows the faculty advising load by faculty area and degree for Fall, 2008; Table 3-2 shows the faculty advising load by major for Fall, 2008.

Table 3-1. SNR Faculty Advising Load by Faculty Area, Fall 2008.

Faculty Area	Undergraduates	Masters ¹	PhD ²	Total
Applied Climate Sciences		8	8	
Applied Ecology	157	26	20	
Geography/GIScience	40	18	23	
Geology & Soils	9		2	
Human Dimensions	11	5	3	
Water	12	10	13	
Total	229 ³	67	68	

Source: SNR Database

¹Includes 7 non-NRES/GEOG majors

²Includes 11 non-NRES/GEOG majors

³57 environmental studies majors are advised by an academic advisor/staff member and are excluded from this table

Table 3-2. SNR Faculty Advising Load by Major, Fall 2008.

Major	Undergraduates	Masters	PhD	Total
Undergraduate				
Environmental Studies	57 ¹			
Environmental Restoration Science	9			
Fisheries & Wildlife	150			
Natural Resource & Environmental Economics	11			
Pre-Forestry				
Grassland Ecology & Management	6			
Water Science	12			
Undeclared Natural Resources	1			
Subtotal	246			
Geography	40			
Graduate				
Geography		17	18	35
Natural Resources		43	39	82
Non-NRES/GEOG majors		7	11	18
Subtotal		67	68	135
Total	286	67	68	135

Source: CASNR, 6th day of class census

¹Includes only CASNR majors; all Environmental Studies majors are advised by an academic advisor (staff)

3.2.4 Graduate Programs. SNR offers graduate programs leading to the MS and PhD in natural resource sciences. Twelve specializations are available at the MS level: agroforestry, aquatic ecology, bio-atmospheric interactions, climate assessment and impacts, environmental studies, geographic information systems, Great Plains studies, human dimensions, hydrologic sciences, remote sensing, soil science, and wildlife ecology. Students also can pursue MS minors in water resource planning and management and natural resource sciences.

Seven specializations are available at the PhD level. These are applied ecology, bio-atmospheric interactions, climate assessment and impacts, environmental studies, human dimensions, hydrologic sciences, and soil science. MS and PhD students may also pursue degrees through departments affiliated with SNR while being advised by SNR faculty who have courtesy appointments in these units. Affiliated units include the Departments of Agronomy and Horticulture, Biological Sciences, Biological Systems Engineering, and Geosciences. Specializations through these affiliated units permit flexibility needed to cover the student's area of interest. Current specializations available include agricultural meteorology (through Agronomy/Horticulture and Biological Systems Engineering), environmental studies (Agronomy/Horticulture, Biological Sciences, Entomology), soil science (Agronomy/Horticulture), and hydrogeology (Geosciences).

Specializations at both the MS and PhD levels will be under review during the 2009–10 academic year by faculty in each of the faculty areas. The purpose of this review will be to re-evaluate the core courses within these specializations and how well these specializations are meeting the needs of SNR's graduate students. The outcome of this review is likely to result in the elimination of some specializations (or their modification) and the development of new

specializations. SNR faculty will also be discussing whether or not a specialization should be required for all SNR graduate students.

Since July 2008, SNR also has offered the MA, MS, and PhD in geography. Students can specialize in geographic information science (remote sensing, GIS, and cartography), historical and human geography, natural resources, or community and regional planning, the latter a cross-disciplinary PhD combining strengths of the SNR faculty of geography and geographic information sciences and UNL's Community and Regional Planning Program in the College of Architecture.

3.2.4.1 Student enrollment. Currently, SNR faculty advise a total of 135 graduate students (50 MS, 17 MA, and 68 PhD, with 45 MS and 39 PhD students in the natural resource sciences major and 17 MA and 18 PhD students in the geography major). Note that 18 of these students are earning degrees in other programs while being advised by SNR faculty. We anticipate that students will continue to be advised in other majors because of the interdisciplinary nature of the research of our faculty.

3.2.5 Future Directions. Faculty FTE allocated to teaching is a continuing concern for SNR. This concern is reflected in the discussions of virtually every issue presented in Chapter 4. A particular priority during the next five years will be to evaluate current FTE allocations to ensure that adequate and sufficient time and effort are committed to undergraduate teaching. This will include ensuring that teaching is a priority in the FTE of all new positions, reviewing teaching needs and addressing these through priority hires, and developing opportunities (e.g., field trips, guest lectures, field short-courses) for faculty and staff who have not traditionally been involved in the teaching mission of SNR. Efforts to enhance the human dimension components of the undergraduate and graduate programs also are critical. And integration of the expertise of the faculty of Geography into the natural resources education program must be a primary goal.

SNR will continue to strengthen the recruitment and retention program in order to increase the number, diversity, and retention of undergraduate and graduate students. Our goal is to increase racial and ethnic diversity. We also will seek to increase scholarship funds and continue to improve advising services for our undergraduate majors, and seek to bolster assistantships for graduate students. A major step in this direction is the recent award of a National Science Foundation Integrative Graduate Education and Research Traineeship (NSF IGERT) grant in adaptive management of watersheds on the Great Plains to SNR faculty and collaborators in other departments. The grant will fund up to 26 fellowships for PhD students and has the potential to have a significant impact on our majors.

To address demands for continuing education, SNR will explore development of additional distance-delivered opportunities that can provide important access to professional development opportunities for many disciplines. This will include contributing to the creation of new online graduate courses and specializations related to CASNR's professional masters degree program, the masters of applied science.

3.3 Research Programs

Faculty, staff, and students of SNR conduct research focused on a host of issues critically important to the state, region, nation, and world. These investigations include both basic and applied research, as well as research related to the teaching, extension/outreach, and survey missions of SNR. Our research is founded on the leadership, innovation, and publications of the faculty. Recent research foci, initiatives, and productivity of individual faculty are summarized in the abbreviated vitae in Appendix W. Programmatic accomplishments and plans for future enhancements are presented in the discussions of current and emerging issues within Chapter 4.

3.3.1 Research Organization. SNR faculty and staff, to varying degrees, work independently, in interdisciplinary groups (~~research~~ “research clusters”), and through the SNR centers to achieve their research goals. Although SNR generally seeks to encourage multidisciplinary team-oriented research, the School also rewards and recognizes those contributions that arise from the work of one or a few individuals. SNR interdisciplinary research clusters involve several faculty, staff, and students collaborating closely to address a major research problem. By combining talents and facilities in an organized, concerted, and well-coordinated manner, research clusters seek to make major inroads in answering complex natural resources questions while at the same time achieving regional, national, or international stature for SNR research. Research clusters led by SNR faculty often include faculty members from other UNL units, and occasionally from outside the University. In 2009, SNR research clusters included groups focused on carbon sequestration, lake classification and surface water quality, agroforestry and shelterbelt dynamics, drought risk assessment, biocomplexity of the Sand Hills, and environmental remediation of soils. SNR research clusters are somewhat fluid, each cluster commonly having a lifespan of 2-5 years tied to the nature of the problem(s) being addressed and, often, to the duration of supportive grants. Usually research clusters arise when faculty and staff collaborate in development of major proposals that are subsequently funded. Research clusters that are addressing problems of sufficient magnitude and longevity may evolve into research centers.

SNR is currently the administrative home for five centers—the Center for Advanced Land Management Information Technologies (CALMIT), the Great Plains Regional Center for Global Environmental Change (GPRC), the High Plains Regional Climate Center (HPRCC), the National Drought Mitigation Center (NDMC), and the Water Center. These centers serve as foci for research and outreach programs that cut across many disciplines and units. Some centers include significant participation from faculty, students, and organizations external to SNR and UNL. The centers are briefly described in Appendices C-G. The centers differ from research clusters in several regards. Centers generally deal with research topics that, though related, are broader in scope, and longer in duration, than those dealt with by clusters. Most centers have achieved national and international stature through 10-30+ years of sustained achievements in research and outreach efforts. As a result, the centers are chartered by the NU Board of Regents, as cross-campus centers of excellence in their respective areas. While research clusters are led by one or two principal investigators, research centers have a director, a number of full-time faculty and staff, post-doctoral fellows and faculty affiliates, and often many graduate research assistants. Most centers also have permanent physical facilities (offices, laboratories, and sometimes field facilities), and generate substantial external funding via multiple grants that may be loosely linked thematically.

In addition to the SNR centers described above, in 2004 the U.S. Geological Survey (USGS) established the Nebraska Cooperative Fish and Wildlife Research Unit (CFWRU) within SNR. As noted in Chapter 2, the “Coop Unit” faculty and staff engage in collaborative research with UNL faculty, offer classes, and advise students in the SNR applied ecology program (<http://snr.unl.edu/necoopunit/>). The USGS unit is an important complement to other research activity in SNR. The Great Plains Cooperative Ecosystem Studies Unit (GP-CESU) created a home at UNL in 2000. The GP-CESU works with 8 federal agencies and 16 academic institutions in the Great Plains, and is a focal point for distributing federal funding in an expedited manner for projects that fit the mission of the GP-CESU. (<http://snr.unl.edu/gpcesu/>)

3.3.2 Research Appointments and Funding. Currently, 89 faculty hold tenured, tenure-track, or equivalent rank positions within SNR. Of these, 71 have full (100%) or partial (10-90%) research appointments (Appendix L). Collectively, these faculty constitute 36.94 FTE research positions. Twenty-two of these positions (21.81 FTE) are supported mostly or entirely on soft funds (i.e., grants and contracts). Table 3-3 shows FTE by faculty area. Recognizing that many people work in several areas, it is evident that the largest concentrations are in applied climate sciences and water, while the smallest are in geology and soils and human dimensions.

Table 3-3. Faculty FTE by Faculty Area and by Tenure.

Description	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	SNR Total	Soft Funded
FTE by Faculty Area								
Applied Climate Sciences	18	1.39	8.65	1.73	3.22	1.30	16.29	6.00
Applied Ecology	17	3.52	8.98	.80	.50		13.80	4.44
Geography/GIScience	17	5.64	4.06	.05	2.49		12.24	3.00
Geology & Soils	7	1.06	2.92	.35	2.22		6.55	
Human Dimensions	8	1.80	2.63	.48	1.54		6.45	4.02
Water	22	2.50	9.70	1.69	4.74	1.00	19.63	4.35
Total	89	15.91	36.94	5.10	14.71	2.30	74.96	21.81
By Tenure								
Tenured/Tenure-Track	47	10.98	18.58	3.48	6.71	2.30	42.05	.47
Nontenure-Track	42	4.93	18.36	1.62	8.00		32.91	21.34
Total	89	15.91	36.94	5.10	14.71	2.30	74.96	21.81

Source: 2008-09 Adjusted Budget

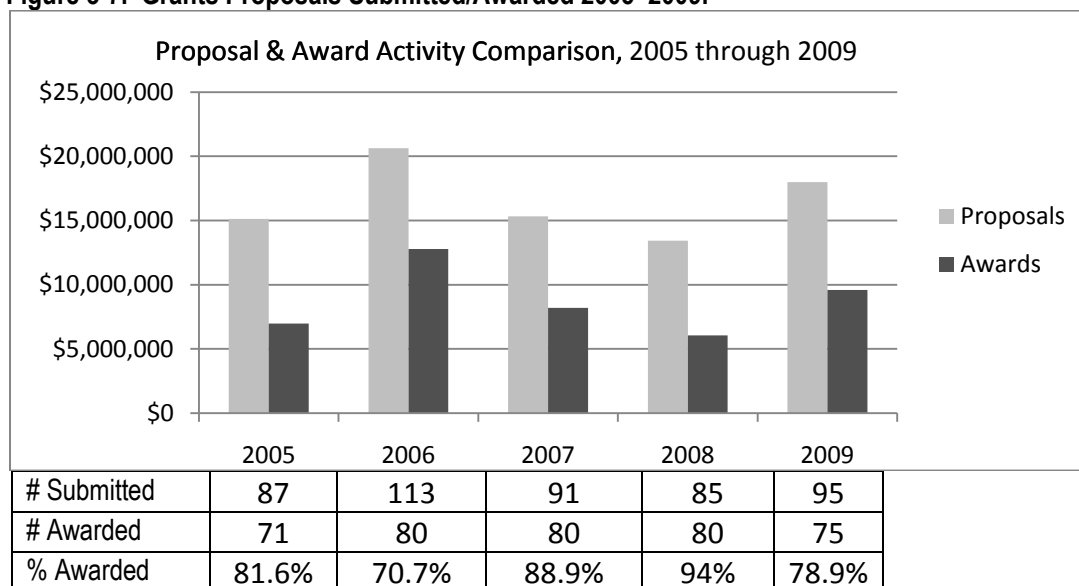
Faculty are complemented by 85 managerial-professional, technical, and clerical staff (67.15 research FTE) that conduct research and/or provide research support. Of these position, 50 (45.80 FTE) are supported by soft funds. Most staff are assigned to one faculty area (Appendix K). Note that these numbers do not include staff who are part of the Natural Resources Business Center (Chapter 2). Research conducted by SNR salaried faculty and staff is enhanced by contributions of, and collaborations with, 48 UNL faculty who hold courtesy appointments and 39 others who hold adjunct appointments in SNR. The latter represent many external organizations with which SNR faculty work, including several universities, the Nebraska Game and Parks Commission (NGPC), Nebraska Department of Natural Resources,

National Park Service, USDA National Agroforestry Center, National Center for Atmospheric Research, National Aeronautics and Space Administration, and National Oceanic and Atmospheric Administration.

SNR research is supported financially by internal and/or external funding. State-appropriated research operating support has averaged about \$245,000/year; state-appropriated research assistantships averaged about \$155,000/year. Research grants and contracts generate income of more than \$7.5M/year and contribute much additional support for research programming. Grants and contracts come from a variety of state and federal sources, including USDA, U.S. Dept. of Commerce, U.S. Dept. of Energy, U.S. Dept of Interior, U.S. Dept of Defense, Environmental Protection Agency, NASA, NSF, NE Natural Resources Districts, NE Dept. of Agriculture, NE Dept. of Environmental Quality, NE Dept. of Health and Human Services, NE Dept. of Natural Resources, NE Dept. of Roads, NE Game and Parks Commission, NE Military Dept., NE Office of the CIO, NE Environmental Trust, NE Ethanol Board, NE Community Foundation, Platte River Whooping Crane Maintenance Trust, James S. McDonnell Foundation, City University of New York Research Foundation, Institute of Museum and Library Services, North American Lake Management Society, National Wild Turkey Federation, Grasslands Foundation, World Wildlife Fund, UT-Battelle LLC, and various colleges and universities.

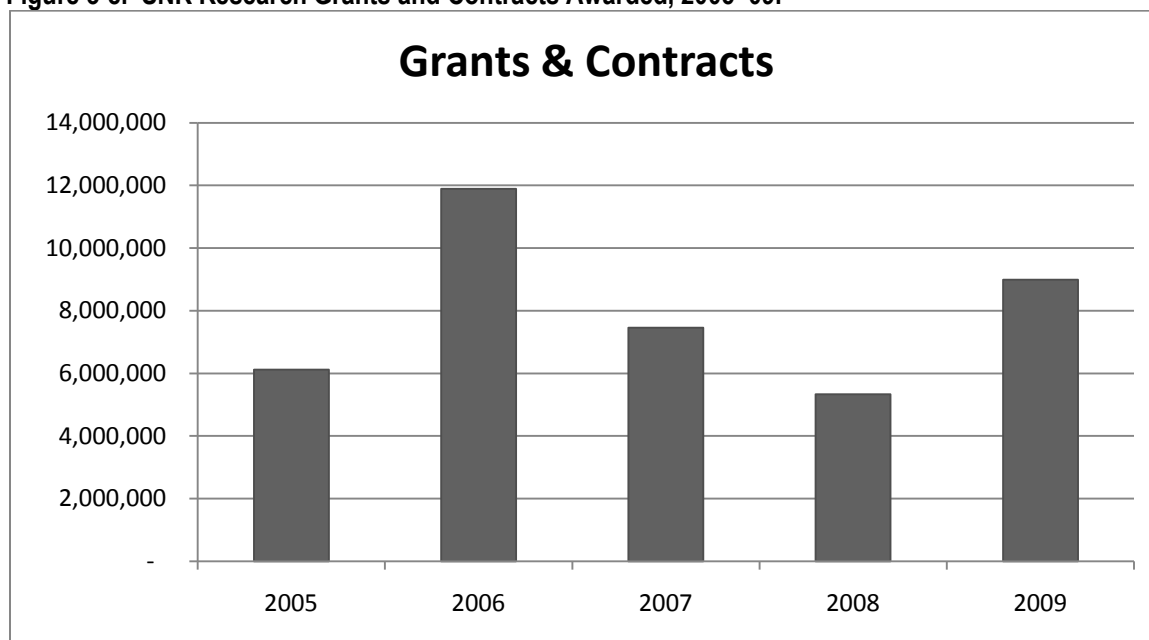
Figure 3-7 shows a comparison of grant proposals submitted and awarded, 2005-2009. In 2005, SNR faculty and staff submitted 87 proposals for \$15,121,205 in combined internal and external funding and were awarded \$6,972,453 in funding for 71 projects. On an annual basis, total grant dollars generated per faculty research FTE have fluctuated from about \$200,000 in FY2005 to \$259,000 in FY2009 (Figure 3-8).

Figure 3-7. Grants Proposals Submitted/Awarded 2005–2009.



Source: NUGrants

Figure 3-8. SNR Research Grants and Contracts Awarded, 2005–09.



Source: NUGrants

3.3.3 Major External Collaborations and Linkages. SNR research is enhanced by close working relationships among SNR faculty and staff and other units and organizations located on the UNL campus or nearby in the region. Strong collaborations exist with, respectively, the UNL Departments of Agronomy and Horticulture (soils, agroforestry, and grassland ecosystems), Entomology (agroforestry and forensic science), Computer Science and Engineering (drought and climate science), Geosciences (meteorology/climatology, water science, and geology), and the School of Biological Sciences (ecological sciences). Staff of the Nebraska State Museum (NSM) and Nebraska Forest Service (NFS), both located on campus, collaborate with SNR faculty on research in geological sciences (NSM), woodland management (NFS), wildlife ecology (NSM), and related areas. SNR faculty also collaborate with many colleagues at institutions of higher education throughout the Midwest and in other states. For example, in the area of agroforestry, close linkages exist between faculty in SNR and at Iowa State University.

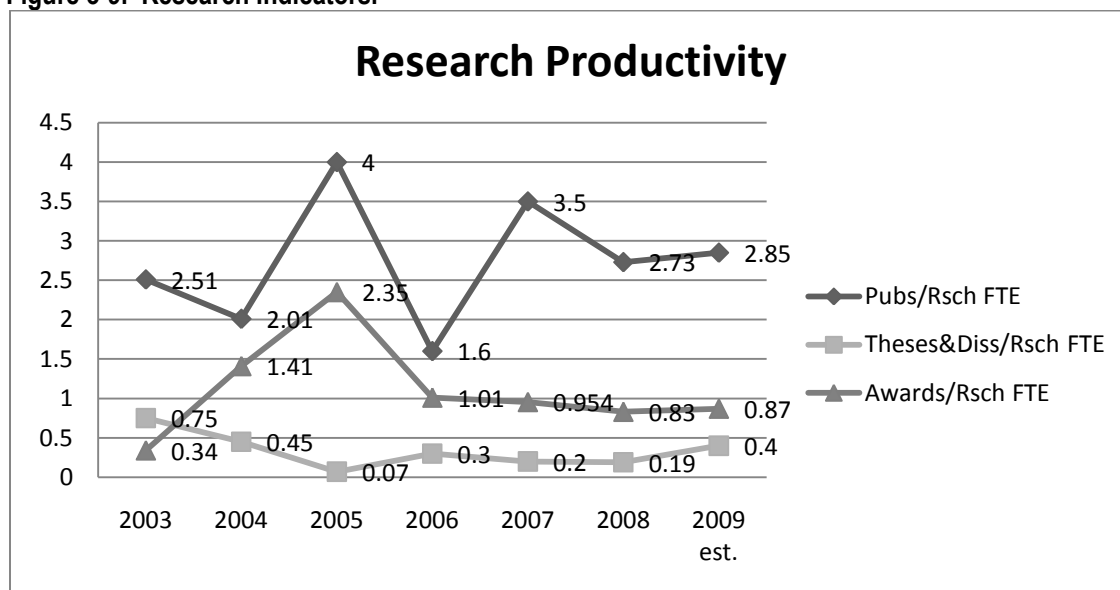
Among state agencies, SNR researchers have strong linkages with investigators at the NGPC (located adjacent to East Campus), the Nebraska Department of Environmental Quality (NDEQ), the Nebraska Department of Natural Resources, and the Nebraska GIS Council (all located in downtown Lincoln). The unique regional Natural Resource Districts (NRDs), into which Nebraska is organized, are also important SNR clients and cooperators.

Among federal agencies, close research collaborations exist with the USDA National Agroforestry Center (located on the UNL East Campus), the National Park Service (a key agency in the SNR-affiliated GP-CESU), the National Center for Atmospheric Research (Boulder, CO), the USGS Center for Earth Resources Observation and Science (a national center for remote sensing research located in Sioux Falls, SD), the USGS Nebraska Water Science Center (in Lincoln), the USDA/NRCS National Soils Survey Center (located in downtown Lincoln), the

USDA National Wildlife Research Center, USDA/APHIS Wildlife Services, and the U.S. Fish and Wildlife Service (located in Grand Island, NE).

3.3.4 Indicators of Research Productivity (2003–09). Research productivity can, in part, be assessed by examining statistics on publications, theses generated, and honors received by faculty. According to ARD, during the past five years, refereed publications authored by SNR faculty have generally hovered around 2-3 per FTE per year (Figure 3-9). Theses/ dissertations supervised by SNR faculty have, according to IANR records, ranged from about 0.5 per FTE per year to slightly over 1.0.

Figure 3-9. Research Indicators.



Source: IANR Report, eARFA

Although they are the only statistics currently available, we believe that these metrics under-represent SNR research achievements. As indicated by honors and awards received (Table 3-4), SNR faculty are well recognized by peers for their research accomplishments. Moreover, perusal of the vitae attached to this report give clear indications of research productivity (Appendix W). A major issue for SNR over the next five years will be to develop better methods of reporting, documenting, and accounting for faculty and staff productivity.

Table 3-4. Research Faculty Honors and Awards, 2003–09.

Faculty Area	2003	2004	2005	2006	2007	2008
Applied Climate Sciences		6	6	5	3	1
Applied Ecology	4	6	6	5	11	16
Geography/GIScience		4	1	2	3	1
Geology & Soils		3	8	1	2	1
Human Dimensions		1	9	4	4	1
Water	1	1	6	7	5	5
Total	5	21	36	24	28	25

Source: eARFA

3.3.5 Research Enhancement 2009–14. SNR will seek, over the next five years, to continually increase externally funded grants, engage more faculty in research, increase publications per research faculty FTE, and develop new research areas (e.g., human dimensions). The current and emerging issues identified by SNR faculty all represent research, outreach, and education focus areas with significant opportunities for expanding external funding. The establishment of “faculty areas” in SNR in early 2009 is considered to be a positive step toward enhancing collaborative linkages within and between the range of disciplinary areas in the unit.

In order to achieve its research potential, however, SNR will need to address several challenges. The School’s future research posture will depend, first and foremost, on SNR’s ability to retain and enhance existing faculty and staff positions. Second, because the IANR fiscal situation is unlikely to improve significantly within the next several years, funding for graduate assistants, managerial-professional staff, post-doctoral research associates, and other staff required to support research will need to come largely from external sources (i.e., grants and contracts) and reallocation. SNR will continue to seek opportunities exemplified by the recent award of a major NSF IGERT grant in adaptive management to SNR faculty and collaborators.

Likewise, acquisition, replacement, and maintenance of equipment and laboratory facilities, travel and field work, and related expenses will, increasingly, have to be borne by external monies. SNR will need to (1) encourage development of new, cutting edge research by providing faculty incentives and rewards for success, (2) seek to ensure that UNL policies on research issues such as overhead return are serving the best interests of enhancing research, (3) identify better means to assist faculty in administering and managing grants and contracts through the Natural Resources Business Center and (4) and work with the University of Nebraska Foundation to enhance its list of potential donors to support endowments and SNR’s programs.

In order to have maximum impact, the results of SNR research must be disseminated to a broad audience using both traditional media (refereed publications, maps, brochures, books, and reports) and computer-based technologies. SNR will seek to develop stronger linkages with the UNL Extension Division and with extension educators throughout Nebraska. SNR research faculty will also be encouraged to employ new methods for distributing information on the nature and results of SNR research activities, with special emphasis on delivery of research results through the Internet.

3.4 Extension and Outreach Programs

As part of its Land Grant mission, UNL provides information and education for Nebraskans to enhance their lives, families, and communities and to bolster the economic and environmental conditions of the state. Such outreach is provided to some extent by virtually all faculty and staff in SNR, but primarily by those affiliated with UNL Extension, the SNR centers, and faculty and staff with scholarly service appointments (e.g., Survey faculty and staff). The scholarly service area is supported by ARD and, to a lesser extent, UNL Extension, and represents essential services that require creativity and leadership outside the traditional research, teaching, and extension appointments. SNR extension and outreach efforts are strengthened by faculty who hold courtesy appointments in the School, several of whom carry extension appointments in their home departments.

3.4.1 Extension and Outreach Faculty and Staff. SNR extension/outreach faculty typically have appointments in teaching and/or research and have offices located in the same areas with other teaching, research, and service faculty. Joint appointments and office proximity enhance communication and teamwork and increase the visibility and understanding of extension/outreach activities among non-extension faculty. More than 90% of extension and outreach programs are interdisciplinary with others in the University; about two-thirds involve outside agencies, organizations, or businesses; and about 25% involve collaborations with other states.

Extension/outreach appointments within SNR is reflected in Table 3-5. A total of 5.10 FTE is distributed among 16 faculty (Appendix L), of which 3.68 FTE is directed at extension/outreach programs; the remaining 1.42 FTE is directed at services for clientele within the state. Table 3-6 shows a summary of staff FTE by faculty area. SNR has 36 managerial/professional or office/service positions (17.25 FTE) related to extension or outreach (Appendix K). Of these, 16 (12.45 FTE) are supported by grants or contracts.

Table 3-5. Faculty FTE by Faculty Area.

Faculty FTE by Faculty Area	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	SNR Total	Soft Funded
Applied Climate Sciences	18	1.39	8.65	1.73	3.22	1.30	16.29	6.00
Applied Ecology	17	3.52	8.98	.80	.50		13.80	4.44
Geography/GIScience	17	5.64	4.06	.05	2.49		12.24	3.00
Geology & Soils	7	1.06	2.92	.35	2.22		6.55	
Human Dimensions	8	1.80	2.63	.48	1.54		6.45	4.02
Water	22	2.50	9.70	1.69	4.74	1.00	19.63	4.35
Total	89	15.91	36.94	5.10	14.71	2.30	74.96	21.81

Source: 2008-09 Adjusted Budget

Table 3-6. Staff FTE by Faculty Area.

Staff FTE by Faculty Area	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin Svcs	SNR Total	Soft Funded
Applied Climate Sciences	22		11.58	9.10		.75	21.43	18.90
Applied Ecology	16		13.00	3.00			16.00	15.00
Geography/GIScience	7		6.80				6.80	6.80
Geology & Soils	4		2.75	1.25			4.00	1.00
Human Dimensions	0							
Water	18		12.65	3.90			16.55	5.25
Administrative Services	18					16.50	16.50	.40
Total	85		46.78	17.25		17.25	81.28	47.35

Source: 2008-09 Adjusted Budget

3.4.2 SNR Extension/Outreach Implementation. Extension programs are developed and conducted in concert with the UNL Extension Division's interdisciplinary action teams of extension specialists, educators, and others. SNR's primary focus has been with the Natural Resources and Environmental Management (NREM) action plan and, to a lesser degree, the Integrated Crop Management, Community and Residential Environment, Integrated Animal Systems Management, and Youth and Family Responsibility plans. Major SNR focus areas include wildlife conservation and education; wildlife damage management; forestry, agroforestry, and lake water quality; and climate information for decision makers and resource planners. Extension programming is now being focused more toward the Spires of Excellence recently identified by IANR. These Spires are Child and Youth Development; Food, Nutrition, and Health; Beef Systems; Crops for the Future; and Water, Climate, and Environment. In the future, SNR's emphasis areas will be primarily in Water, Climate, and Environment and Crops for the Future. This change in programming emphasis will increase the ability of SNR faculty with extension appointments to be more engaged. The addition of an extension educator in climate variability and change will strengthen our capacity to develop new programs in these areas. Another recent hire in applied climate science, Martha Shulski, will also enhance our extension capability in the Water, Climate, and Environment Spire.

3.4.2.1 Wildlife conservation and education. (<http://ternandplover.unl.edu>) This program focuses on enhancing the knowledge base and quality of life for adults and youth through research and educational programs related to wildlife, people, economics, sustainable natural resource systems, and achieving an economic quality of life. The NGPC and the Nebraska Environmental Trust are SNR's principal partners in this work. Grants support the Tern and Plover Conservation Partnership. Program sponsors also support the Wildlife Habitat Evaluation Program, Extension Wildlife Awards Program, and Nebraska Tern and Plover Conference, which is becoming "THE" conference that is attended by everyone in the country who works on terns and plovers or threatened and endangered species.

3.4.2.2 Master Naturalist Program. (<http://naturalist.unl.edu>) In a 2007 survey of Nebraska conservation organizations, 93% indicated that they use volunteers. These volunteers are used for education programs (82%), conservation work (61%), and outreach and fundraising (49%). In 2009, SNR and various conservation partners (approximately 15), initiated the Nebraska Master Naturalist Program, designed to train a network of "master volunteers" dedicated to promoting the conservation of Nebraska's natural resources and conducting service to their community. This partnership will recruit, train, manage, and provide incentives for volunteers participating in habitat conservation, environmental education, citizen science, and ecotourism. Volunteers will learn about Nebraska's ecosystems and become networked with others who share a passion for the conservation of our diverse natural resources. These professional volunteers will receive science-based training and the skills necessary to manage natural areas, conduct public programs, provide outdoor skills training, and staff nature centers. Participants will train alongside scientists, land managers, and educators from the natural resource community, with local experts serving as instructors and mentors. Certification as a master naturalist is a credential that volunteers can use to access highly sought-after volunteer opportunities or even paid positions.

3.4.2.3 Wildlife damage management. Wildlife damage in the United States costs well over \$25 billion annually, and human-wildlife conflicts are pervasive in society. SNR has developed a diverse, internationally recognized program to provide information to reduce the negative impacts of wildlife associated with (1) damage to food, fiber, personal property, and natural resources; (2) threats to human health and safety; and (3) nuisance problems. External grant support is provided by the USDA Division of Wildlife Services and National Wildlife Research Center, U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, USGS Biological Resources Division, NGPC, Nebraska Department of Roads, Rocky Mountain Elk Foundation, National Wild Turkey Federation, and others. SNR faculty and staff have developed a book, *Prevention and Control of Wildlife Damage*, which is the leading reference in the field, and the Internet Center for Wildlife Damage Management, a grant-funded site that provides research-based information on how to responsibly handle wildlife damage problems (<http://icwdm.org/>). This site provides access to a wide selection of manuals, reports, and articles authored by SNR faculty and staff. A recent innovation has been the publication of a free quarterly e-zine (online/electronic magazine) dealing with wildlife damage management. SNR faculty and staff also regularly offer workshops dealing with issues such as management of deer damage (<http://icwdm.org/credits/deerdamagemanagement.asp>).

3.4.2.4 Forestry, agroforestry, and market-driven conservation. This effort provides information to federal and state agencies, communities, landowners, and residents to improve rural and community forestry resources and their management, stimulate natural resource-based (tree and woody perennial) rural development statewide, and improve public awareness of the value and importance of trees and forests. One emphasis is on windbreaks and shelterbelts, including the economic value of various forms of shelter and the role that windbreaks play in maintaining biodiversity on farms and ranches. The second version of a crop windbreak-economics model has been developed based on intensive studies of windbreak airflow dynamics and will quantify precise effects on corn or soybean production in the north-central United States. Another venture involves investigating the effects of windbreaks on carbon sequestration.

3.4.2.5 Lake Water Quality Extension Program. (<http://water.unl.edu/lakes/wqt>) Since its inception in 1999, the Lake Water Quality Extension Program has grown substantially, and is now the main contact and source of information for lake water quality issues in Nebraska. The primary goal of the program is to improve the quality of water in Nebraska's lakes and reservoirs through education, management technique, research and development, and technical expertise. The combined efforts and funds from UNL Extension, UNL ARD, NDEQ, and NGPC help support the Lake Water Quality Extension Program at UNL. A three-year grant (\$2.9 million) from the Nebraska Environmental Trust Fund established the Community Lake Enhancement and Restoration (CLEAR) Program in cooperation with personnel from NGPC and NDEQ.

During the past five years, SNR faculty and staff have focused on the restoration of degraded lakes. Regular meetings are held with public and private landowners, lake owners, residential lake associations, and lake managers to provide information about good water-quality practices for maintaining healthy fisheries, safe recreational uses, and aesthetics. A particular focus has been working with toxic blue-green algae. A statewide lake volunteer monitoring program was developed to assess water quality and the presence or absence of toxic algae. Extension-related

research has led to algae-control methods and other practical developments, including using aluminum sulfate to control toxic algae in lakes (<http://ianrnews.unl.edu/static/0906040.shtml>).

3.4.2.6 Climate Information for Decision Makers and Resource Planners. This program focuses on dissemination of climate data and information to weather-affected audiences. A strong interdisciplinary component has been developed to understand and develop interfaces between climate and other sectors (e.g., water resources, agriculture, and economics). The program involves many SNR faculty and staff within HPRCC (<http://www.hprcc.unl.edu/index.php>), NDMC (<http://drought.unl.edu/>), and the state climatologist's office (<http://climate.unl.edu>).

Efforts to collect, archive, and disseminate data from the state and surrounding region date to 1973 when the University took over the State Climate Resource Office. A special automated weather data network for energy and water balance assessments was begun in 1981. This network has grown to more than 159 stations (including 60 in Nebraska). During the span of this program, significant efforts have been made to coordinate the public release of advisories by crop, disease, insect, soil, water, and weather specialists. The program also serves the governor of Nebraska and the state's Climate Assessment Response Committee on drought monitoring, flood, and policy issues. Funding for the program includes state and Cooperative Extension Service (CES) support for salaries and basic operating costs. Grants and contracts from federal sources largely fund staff support and the operating costs for monitoring, archiving, analyzing, and disseminating data and information. Funding has been received from USDA agencies, NOAA, the Nebraska NRDs, and other organizations.

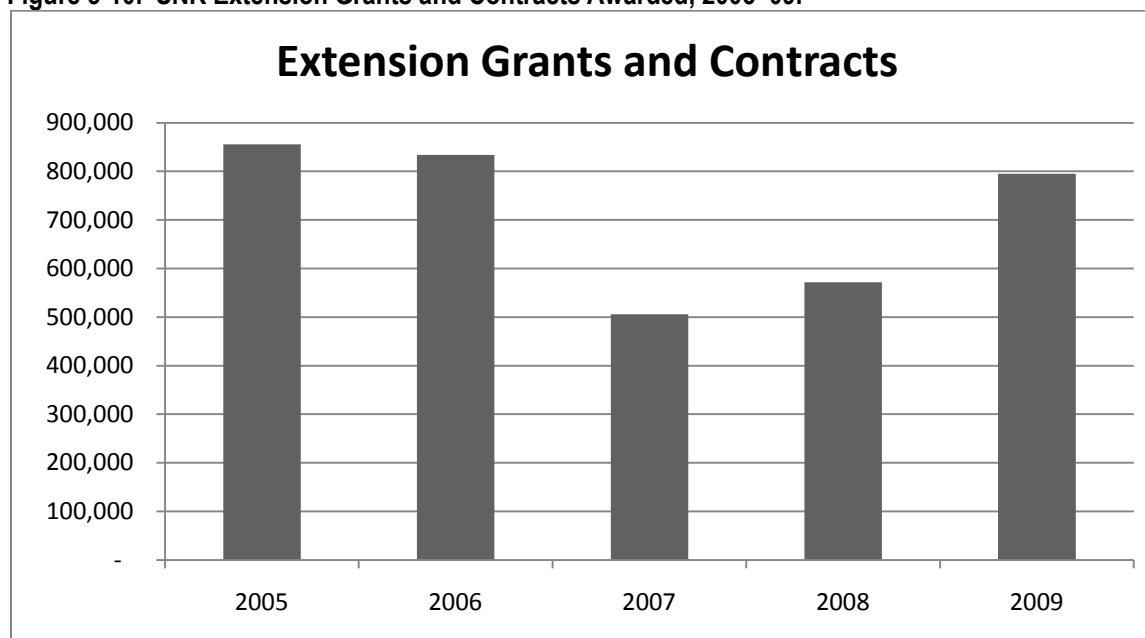
Important recent initiatives of the Climate Information Program include the Nebraska Weather web site (<http://www.nebraskaweather.unl.edu/>), the enhanced U.S. Drought Monitor (<http://drought.unl.edu/dm/monitor.html>), and the Vegetation Drought Response Index (VegDRI), a satellite-based index of vegetation response to drought. These latter two initiatives are projects of the NDMC. The climate program also sponsors the Central Plains Severe Weather Symposium, a free event held each spring to educate the public about weather and public safety (<http://www.lincolnweather.org/cpsws2009.html>). In April 2009 the symposium attracted more than 3,500 people.

3.4.3 Extension and Outreach Support

State-appropriated extension operating support has averaged about \$104,000/year.

Extension/outreach grants and contracts generate income of more than \$700,000/year and contribute much additional support for extension programming (Figure 3-10). Grants and contracts come from a variety of state and federal sources, including U.S. Dept. of Commerce, NE Environmental Trust, NE Dept. of Environmental Quality, eXtension Foundation, U.S. Dept. of Agriculture, NE Game and Parks Commission, and National Fish and Wildlife Foundation.

Figure 3-10. SNR Extension Grants and Contracts Awarded, 2005–09.



Source: NUGrants

3.4.4 Future Enhancements. Over the next five years, we will continue to enhance extension and outreach programs by building upon the strengths and resources available across SNR. Special attention will be directed toward improving access to publications and other information, strengthening the SNR website, and developing Prairie Pines Research Farm (operated by SNR) and the Horning State Demonstration Forest for educational outreach. A Hatch project has recently been approved that will focus on the development of the Prairie Pines facility.

Working in concert with SNR’s research programs, our extension and research programs will employ both traditional media (refereed publications, maps, brochures, books, and reports) and computer-based technologies to provide information to clients. Special emphasis will be placed on increasing the scope and effectiveness of delivery of information through the Internet.

SNR will seek to develop stronger linkages with the UNL Extension Division and with extension educators throughout Nebraska, and will encourage hiring of extension educators with backgrounds in ecological systems and natural resources, an increasing need in dealing with complex natural resource systems. For example, SNR has recently received approval to hire an extension educator in climate variability and change. This person will greatly enhance SNR’s connection with UNL Extension, and will also increase educational resources available to extension audiences throughout the state. We propose to establish at least one extension assistantship to increase graduate-level extension education and to provide other associated outreach benefits.

3.5 Natural Resources Survey Programs

Natural resources survey is defined as the systematic collection, organization, analysis, storage, and dissemination of data that define the character, condition, and changes in an area’s geology and minerals, soils, climate, water (surface and groundwater), biology/ecology (flora and fauna),

and land use and land cover. Survey data are collected on a regular basis over long periods of time using standardized, well-documented protocols and procedures. This data is used in support basic scientific research and serves to identify and quantify trends (e.g., decline/improvement in water quality, increasing/decreasing abundance of species, depletion of groundwater). Survey data also provide reliable and unbiased data on which policy and management decisions can be based.

The principal survey programs of SNR reside in the Conservation and Survey Division (CSD) of IANR (<http://snr.unl.edu/csd/>). CSD, a unique, multi-disciplinary research, service, and outreach organization established by state statute in 1921, merged with SNR in 2003 (Appendix N, summary of state statutes dealing with CSD). CSD's research, service, and outreach programs contribute substantially to the mission of UNL. Historically, CSD was charged with investigating and recording information about Nebraska's geologic history; its rock and mineral resources; the quantity and quality of its water resources; its land cover and other aspects of its geography; and the nature, distribution, and uses of its soils. The survey program in SNR has grown to include biological/ecological and climatological surveys such as those conducted through SNR's HPRCC and the State Climate Office. An important aspect of the SNR survey mission is to provide information to the public and to governmental and private agencies. This has involved greater emphasis on computing technologies, such as geographic information systems, and information delivery via the Internet (see, for example, <http://snr.unl.edu/Data/NebrGIS.asp>). All survey activities employ a multi-disciplinary approach involving interaction among CSD staff members and those of other university units, as well as local, state, and federal agencies and private organizations and individuals.

3.5.1 *Survey Programs and Activities.* During the past five years, SNR/CSD activities and programs have focused on geology, soils, and water and information delivery. Survey functions of HPRCC, the State Climate Office, and CALMIT are outlined in Chapter 4.

3.5.1.1 *Geology.* Geological survey emphases have included geologic field mapping as part of the USGS STATEMAP project; collection and interpretation of data on Precambrian-age crystalline rocks and Lower and Middle Paleozoic-age rocks for the Nebraska deep well dataset; integrated research on the spatiotemporal coupling of geological, ecological, and climatic dynamics of the Nebraska Sand Hills; and, the surficial geology of eastern Nebraska. As part of CSD's mandate to investigate and record information about the geologically related natural resources of the state, survey staff analyze and evaluate rock and mineral deposits, including data on more than 20,000 oil and gas wells and more than 5,000 test holes (drilled for geologic and hydrogeologic research), as well as information from all irrigation and some water wells in the state (more than 100,000 wells).

3.5.1.2 *Water.* Hydrologic systems survey focuses on quantitative assessment of the hydrogeologic and geochemical properties of groundwater and surface water systems. For nearly 90 years, the CSD test drilling efforts, along with the gathering of drillers' logs and core cuttings from non-university entities, have supported an intensive and extensive evaluation of Nebraska's hydrogeological framework. This program has placed Nebraska near the top of the nation in test holes drilled. An extensive network of observation wells permits assessment of the impact of droughts and intensive water use on groundwater reserves. Faculty and staff are often

called upon to present technical workshops for licensed well drillers and pump installers and for persons responsible for collection of water quality data. Some of this continuing education is required by law.

CSD faculty and staff have assisted natural resources districts in their preparation of comprehensive groundwater management plans required by state law. Through experience in such undertakings, SNR has found that additional data collection and analysis are often needed to address issues of particular importance to district officials. For example, research by several faculty deals with quantitative assessment of the hydrogeologic and geochemical properties of groundwater and surface water systems and their interaction. Principal projects have included the Cooperative Hydrologic Study of the Platte River watershed west of Columbus, Nebraska; Elkhorn and Loup Rivers Groundwater Modeling; and the Eastern Nebraska Water Resources Assessment.

3.5.1.3 Soils. SNR/CSD faculty and staff have collaborated with the USDA Natural Resources Conservation Service (NRCS) to complete the second generation of soil surveys in Nebraska. Modern soil surveys have been published for all of Nebraska's 93 counties. Documentation of soil map units is the current focus of the soils program. Additional soils projects include determining the physical and chemical properties of soils under grassland and forest ecosystems and investigating the morphology of glacial soils in southeast Nebraska.

3.5.1.4 Information delivery. Distribution of information to the public is an important service provided by SNR. SNR survey faculty and staff fill requests for information and services from citizens, agencies, businesses, cities and towns, and other state and local natural-resource organizations. Frequent inquiries involve specific information and assistance on groundwater supplies; environmental matters ranging from the sighting of buildings and landfills to groundwater contamination; mineral deposits, including oil and gas; geologic history; identification of rocks and fossils; soils and their uses; and availability of geospatial (GIS) data and remote sensing imagery.

SNR distributes information on Nebraska's resources to general and scientific audiences by publishing several series of publications. These include geologic studies, guidebooks, resource reports (examinations of specific resources statewide such as water, oil, or coal), water survey publications, soil survey reports, and educational circulars (lay-audience guides to parks and protected areas, other field sites, natural history or hazards, and resource-analysis tools such as aerial photography). In addition, atlases, field guides and division-produced maps, and cross sections illustrate various aspects of Nebraska's geology, water, soils, and geography. This information is available through the SNR Maps and More Store and through the SNR website.

3.5.2 Evolution of Survey (CSD) Programs and Staff, 2003–09. Since 2003, CSD has operated as a program within SNR. Incorporation of CSD in SNR was the culmination of several years of change in CSD. In 2001, with severe budget cuts affecting the university, IANR recommended that the School of Natural Resource Sciences (SNRS) and CSD be merged. Although CSD had been headed by a "dean-level" director who reported directly to the IANR vice chancellor before 2003, within SNR, CSD is now led by a director who reports to the director of SNR, who in turn reports to the IANR and CAS deans.

Historically, CSD faculty and staff have had research, public service, and scholarly service appointments. Some were also engaged in teaching, through joint or courtesy appointments with academic units or on a contract basis. When SNRS was created in 1997, several CSD faculty and programs moved to joint appointments in both units. Examples included faculty associated with CALMIT, a center that conducts research on geospatial technologies, and the Nebraska Earth Systems Education Network (NESEN), an outreach activity that focuses on enhancing communication and links between K-12 earth science teachers and university resources and expertise.

At the time of the 2003 CSD five-year review, CSD had a total of 23.12 state-funded faculty FTE (25 positions) and 12.80 state-funded staff FTE (15 positions). Currently, 15 SNR faculty have Survey appointments (14.28 FTE), 13 SNR staff have Survey appointments (10.73 FTE). Since 2003, the state-funded Survey faculty and staff FTE has decreased, while their staff have expanded services to SNR personnel, causing an even greater decrease to the resources available to the survey mission.

Since the merger, faculty that had survey appointments in their position descriptions have had their responsibilities changed to reflect new assignments that span research, extension, and teaching programs as well as traditional scholarly service roles. Several of these faculty are now responsible for teaching classes and seminars offered to undergraduate and graduate students in natural resources science, geography, geology, engineering, regional planning, natural resources law and policy, and other disciplines. Most CSD faculty and staff are now fully integrated into SNR. An important recent focus of SNR Survey has been to broaden the traditional CSD survey mission to include all survey activities in SNR. A directory now lists 27 faculty and staff with survey expertise in climate/weather, economics/policy, human behavior, geology/geomorphology, groundwater, hydrogeology, surface hydrology, lakes/ponds/streams, remote sensing/GIS, and soils. Many of the faculty and staff listed in the directory have not been affiliated with CSD in the past and are not supported by Survey funds.

3.5.3 Future Directions. Increasing emphasis on teaching and research at UNL has been problematic for Survey programs. Although it is good that most former CSD faculty are now engaged in teaching and are fully integrated into the mission of SNR, the assignment of FTE to teaching has negatively affected SNR's ability to fulfill CSD's legislatively-mandated mission since a portion of the survey efforts of these faculty is now being directed to teaching. This issue is compounded by the fact that a number of CSD faculty and staff have retired or will soon do so. Survey data and information are critical in order to address the increasingly complex use, regulation, and management of our natural resources. The most pressing need is to fill three staff positions in hydrogeology. One person is required to coordinate field data collection and implement automated geologic and hydrogeologic databases in order to improve dissemination of data and information to clientele. A second person is needed to provide a smooth transition when our hydrogeologist at the West Central Research and Extension indicates his intent to retire. We hope to have someone in place one or more years in advance of his retirement. A third position is required to conduct applied research on hydrogeologic issues pertaining to expanding development in southeast Nebraska. All three positions would require that the persons retained prepare technical reports and presentations on water resources issues; provide

service to governmental and educational agencies, industry, and the general public; promote the wise use of water and natural resources; and assist public and governmental agencies in developing programs to monitor, properly manage, and help conserve water and other natural resources. Recent discussions with NRDs and IANR administration indicate that there may be partnership opportunities to fund one or more of these positions.

3.6 An Integrated Approach to Natural Resource Sciences

The SNR mission statement asserts that the operational paradigm for SNR will be an *“integrated systems approach”* to natural resource science. SNR faculty and staff recognize that, in order to explicitly embody the *“systems”* paradigm, integration needs to be defined to include specific actions designed to bring together, in a synergistic way, the specialized knowledge and expertise of professionals in different but related fields in order to advance natural resource science, better achieve our personal and collective goals, and benefit our partners and stakeholders, especially students (Herlihy, 2006). During the past five years, SNR has continued its efforts to manifest the *“integrated systems approach”* paradigm in fulfilling its teaching, research, extension/outreach, and survey missions.

In 2007 the SNR director formed an ad hoc Integration Advisory Team (IAT), composed of faculty from across the School, to identify critical and emerging issues in natural resources and ways in which these issues can be addressed through integrated approaches that involve the full range of SNR’s teaching, research, extension/outreach, and natural resources survey activities. The IAT met throughout 2008, initiating an issues-based strategic planning process that is manifested in the organization of our five-year review. This report embodies many of the ideas that originated in the IAT’s efforts, including identification of high-priority future faculty positions (Chapter 4).

The IAT noted that within SNR, much progress has been made in integrating departments, programs, and faculty. A recent example is the merging of the Geography program with SNR, a change having ramifications for many faculty, staff, and students that was completed successfully in only one year. Evidence of success can also be seen in the extraordinarily congenial relationships that exist between faculty, staff, and SNR administration, the consensus evident in prioritizing prospective new SNR hires, and the diversity of representation on both SNR standing committees and graduate student advisory committees. Moreover, the SNR Promotion and Tenure (P&T) committee and SNR director explicitly encourage and reward faculty and staff for working across traditional disciplinary boundaries, and this has resulted in major innovation and external funding for projects dealing with drought mitigation, Sand Hills bio-complexity, and carbon sequestration.

3.6.1 External Collaborations. As noted in Chapter 2 and elsewhere in this document, SNR has demonstrated external integration of its programs through widespread collaborations both within the University of Nebraska and with other universities and many public agencies. SNR Associate Director Ed Harvey has documented more than 250 linkages between School faculty and staff and external collaborators. Within UNL, SNR faculty and staff collaborate with colleagues in Agronomy and Horticulture, Geosciences, Biochemistry, Biological Systems Engineering, Agricultural Economics, Entomology, Animal Science, Food Science and Technology, Plant Pathology, Agricultural Leadership, Education and Communication,

Computer Science and Engineering, Statistics, Chemistry, Journalism, Civil Engineering, Community and Regional Planning, Public Policy Research Center, Center for Great Plains Studies, Anthropology, Political Science, Sociology, English, UNL Libraries, School of Law, College of Fine and Performing Arts, College of Education and Human Sciences, School of Biological Sciences, NU Rural Initiative, NU Medical Center, NFS, and all IANR Research and Extension centers. Outside of UNL, SNR faculty and staff currently work with collaborators in more than 50 public agencies, NGOs, and other institutions. Some of these include the Nebraska Department of Natural Resources, NDEQ, Nebraska NRDs, Nebraska GIS Council, and NGPC; USGS, USDA, NOAA, NASA, and the United Nations Food and Agriculture Organization; the Platte River Whooping Crane Trust, Nature Conservancy, and Audubon Society; and approximately 25 other universities.

3.6.2 *International Activities.* Environmental and natural resources issues must be addressed in a global context. Thus, faculty and staff of SNR are increasingly engaged in work that involves international field work, conferences, and collaboration. An extensive list of collaborations of SNR faculty and staff is provided in Appendices I and J, along with a list of SNR faculty and staff international travel in recent years. Research projects involve faculty in Greece, Switzerland, Russia, China, Hungary, Canada, Spain, Australia, and other countries. SNR faculty have taught courses in Namibia, Greece, Spain, Syria, Morocco, and China, among other places, and have led student trips to Honduras, Puerto Rico, Israel, and Namibia. NDMC faculty and staff have a long history of extension and outreach, including work with the United Nations through collaborations with the World Meteorological Organization, FAO, and Secretariat for the International Strategy for Disaster Reduction. NDMC faculty and staff have also been involved in collaborative projects in Egypt, Morocco, Jordan, Saudi Arabia, India, Thailand, South Korea, the Czech Republic, Hungary, and Austria. In recent years, SNR has hosted visiting scientists (up to 12 months) and tours for delegations from China, Slovenia, Spain, Chile, Portugal, Pakistan, Japan, Russia, Vietnam, and Jordan. SNR will continue to build upon, and broaden, the extent of international activities during the next five years.

3.6.3 *Future Directions.* SNR has been extraordinarily successful in achieving both internal and external integration of its personnel, programs, and missions. However, the School cannot be complacent about its successes. The IAT recognized that integration is *both a process and an outcome* (United Nations University [Programme for Comparative Regional Integration Studies](#), 2000). Thus, SNR faculty and staff are committed to continuing to strive for better integration since the identification of potential solutions to most natural resources and environmental issues requires an interdisciplinary approach.

In listening sessions held to prepare for this review, faculty, staff, and students identified a suite of challenges and opportunities, and developed many proposals, to improve integration within SNR and between SNR and its partners and stakeholders. Goals for the next five years include:

- Better integrate the environmental studies (ES) program/major with other majors in SNR (ES is itself an “integrative” major);
- Develop integrated programs with other UNL units (e.g., journalism, business);
- Enhance integration of the SNR community by more service activities such as the coat collection for Clinton Elementary School, or the Harvest of Books;

- Recognize and reward faculty, staff, and students willing to lead projects that are inherently “integrative”;
- Redefine the responsibilities of the SNR research coordinator or develop other mechanisms to include specific leadership in building “response teams” to address calls for proposals;
- Provide seed funding for exploratory research that emphasizes integration;
- Redouble efforts to ensure that all faculty feel welcome to participate in research teams;
- Encourage graduate students to participate in development of integrative proposals as part of their training;
- Develop courses and curricula that require active participation of different disciplines/approaches (including more team-taught courses);
- Develop strategies to engage faculty who do not have explicit teaching appointments in SNR (e.g., teaching assignments, presenting lectures, teaching a lab, leading a field trip).

3.7 References

Herlihy, P., 2006. Integration Is the Wave of the Future, article originally published by WFC Resources. <http://www.workfamily.com/Work-lifeClearinghouse/GuestColumns/Herlihy.htm>

United Nations University [Programme for Comparative Regional Integration Studies](http://www.unu.edu/programme-for-comparative-regional-integration-studies/), 2000. What is Integration? http://ocw.unu.edu/programme-for-comparative-regional-integration-studies/introducing-regional-integration/Course_listing

4 CURRENT AND EMERGING ISSUES—OVERVIEW

In the fall of 2007, Don Wilhite, School of Natural Resources (SNR) director, initiated an issue-based strategic planning process in anticipation of the yet-to-be-scheduled comprehensive review. The purpose of this planning process was to identify key issues in natural resources and environmental science in the context of the strengths of SNR faculty and staff. Following a review of scientific publications, state and federal agency priorities, and the priorities of selected foundations, a list of ten issues was presented to the SNR Integration Advisory Team (IAT), an ad hoc committee comprising faculty representing all disciplinary areas and functions in SNR. The IAT discussed these issues at length and came to agreement on five major issues. These issues were presented to the entire faculty in early 2008 for discussion.

The current and emerging issues in natural resources and environmental science agreed to by SNR faculty are:

1. Increase understanding of the potential impacts, adaptation strategies/mitigation actions, policy implications, and ecological consequences of **climate variability and change** on natural resources and agricultural productivity.
2. Enhance **water resources quantity and quality** by improving water consumption and conservation practices, mitigating surface and groundwater contamination, creating more efficient water clean-up technologies, developing more comprehensive water monitoring networks for decision support, and providing the theoretical framework for more effective social systems for management of resilient aquatic ecosystems.
3. Address **emerging ecological challenges** including invasive species, wildlife-related diseases, threatened and endangered species, adaptation to environmental stressors, maintenance of biodiversity, and the development of more resilient and biologically diverse natural resource systems, integrating both human and ecological factors.
4. Enhance understanding of **human-environment interaction**, including social/human factors in natural resources management and policy that are critical for establishing and maintaining sustainable environmental systems.
5. Address the growing concern and lack of understanding of environmental and natural resources issues through greater emphasis on **natural resources and environmental science education** for undergraduate and graduate students and the general public to enhance informed decision making and policy formulation.

These issues are unranked in terms of their priority within SNR. Our intent is to address these issues to the best of our ability given the resources available to us from the State of Nebraska and from external funding sources.

As the SNR administrative team (which includes the SNR coordinators, the assistant to the director, the director, associate director, and the five-year review coordinator, Jim Merchant) discussed the format of the review document in the early planning stages, the director proposed that the review document be organized around these five issues rather than following the traditional approach of organizing review documents by function, i.e., research, teaching, and outreach. Although we realized that this approach would create some organizational difficulties, the administrative team came to the conclusion that this approach could result in a document that

was more visionary and integrated. Following a discussion with IANR Associate Vice Chancellor Susan Fritz, we were encouraged to organize our review around these key issues in natural resources and environmental science. From the outset, the vision for SNR was to develop an interdisciplinary unit that integrated the wide range of disciplines represented within the unit to address interdisciplinary issues. The consensus was that this approach would foster this intent.

A discussion of these issues follows. The content and organization of each of these subchapters was prepared by faculty and staff with expertise in these areas, with oversight provided by a member of the SNR administrative team. We did not require the authors of these chapters to follow an identical format. However, the emphasis of each subchapter was to be on the current capability of the faculty working in each issue area and their vision for the future. The subchapter authors were also asked to focus on the strengths of the faculty and staff working within the scope of each issue to address the research, teaching, and outreach (including survey) needs of each issue in the near and longer term.

4.1 Climate Variability and Change

Increase understanding of the potential impacts, adaptation strategies/mitigation actions, policy implications, and ecological consequences of climate variability and change on natural resources and agricultural productivity.

Executive Summary

The applied climate science (ACS) program continues the tradition of excellence established in the Department of Agricultural Meteorology and its predecessors, traditionally leaders in research and graduate education. The research, outreach, and service areas of the ACS program are highly collaborative with faculty in SNR and across campus. Our research/outreach/service efforts focusing on the issue of climate variability and change can be divided into four broad categories: climate monitoring and climate data utilization; climate and crop modeling; carbon, water, and energy exchanges; and human dimensions. To address undergraduate education (a high priority at UNL), an undergraduate option in ACS was recently established as part of the environmental studies major. In addition, a major in ACS and a minor in climate change studies are under development to further enhance ACS's undergraduate involvement. The graduate program is supported by excellent field facilities, data availability, and technical support.

Overview and Definitions

The US Climate Change Science Program's (CCSP) Strategic Plan for the Climate Change Science Program defines climate change as:

A statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or to external forcing, including changes in solar radiation and volcanic eruptions, or to persistent human-induced changes in atmospheric composition or in land use.

The same document offers the definition of climate variability as:

Variations in the mean state and other statistics of climatic features on temporal and spatial scales beyond those of individual weather events. These often are due to internal processes within the climate system. Examples of cyclical forms of climate variability include El Nino-Southern Oscillation (ENSO), the North Atlantic Oscillation (NAO), and the Pacific Decadal Variability (PDV).

4.1.1 Importance to Nebraska and the Nation

The University of Nebraska–Lincoln (UNL) and the School of Natural Resources (SNR) consider the issues of climate change and variability (CVC) to be critical at the local, state, regional, national, and global levels. The primary focus of activities related to CVC issues is to increase understanding of the potential impacts, adaptation strategies/mitigation actions, policy implications, and ecological consequences of CVC on natural resources and agricultural productivity.

The Office of Policy, Economics, and Innovation, US Environmental Protection Agency (USEPA), described the impacts of climate change on all facets of life in Nebraska (USEPA, 1998). Various models predict an average rise in spring and summer temperatures of 3°F, with frequencies of extreme hot days in summer increasing because of the global warming trends. Precipitation would increase by 10-15% and the consequences to human health because of heat-related illnesses, expansion of habitats of disease-carrying insects, and water-borne diseases would be considerable.

Water resources in Nebraska would also be severely impacted. With the potential of earlier spring snowmelt, higher temperatures, and increased evaporation, there would be a reduction in streamflows and lake levels leading to increased competition for water—between agricultural, human consumption, and wildlife needs (e.g., habitat for migratory waterfowl). Low water levels and flows would also compromise important uses of the resources (e.g., recreation, municipal-industrial supply). Higher precipitation may ease some of the competition but could in turn lead to increases in flood events and erosion, thus exacerbating pollution concerns.

Agriculture—the mainstay of Nebraska’s economy—would be affected by the mix of climate change and water availability. Production patterns may shift northward and the warmer climate may increase demands on water for irrigation. Other factors such as increases in (or new, previously unknown) crop pests and pollution (caused by higher ozone levels) can significantly impact both crop yield and livestock productivity.

4.1.2 Current Status

The ACS group has been a leader in research and graduate education, emphasizing collaboration with faculty within and outside the unit. A list of recent research projects is in Table 4.1-1. Research/outreach/service activities are primarily in four areas: climate monitoring and climate data utilization; climate and crop modeling; carbon, water, and energy exchanges; and human dimensions. The graduate program is supported by these activities. FTE apportionments among research, teaching, and extension/outreach and service are given in Table 4.1-2. We have addressed the University’s call to improve undergraduate education at UNL by offering an undergraduate option in ACS in the environmental studies major (launched in 2007) and are developing a major in ACS and a minor in climate change studies. Included below is a brief description of our ongoing activities in research/outreach/service and teaching.

Table 4.1-1. Selected Grants Awarded to Faculty in the Applied Climate Sciences area, 2003–09.

Title	Granting Agency	Total Amt	Term	Faculty
Drought Risk, Impact & Mitigation Information System	Dept of Agriculture-RMA-FCIC	6,407,473	2005-10	Wilhite
Services of NOAA Regional Climate Centers	Dept of Commerce-NOAA	2,107,365	2002-07	Hubbard
Carbon Sequestration in Dryland	Dept of Energy	1,950,000	2003-09	Hubbard Suyker Verma
High Plains Regional Climate Center	Dept of Commerce-NOAA	1,520,466	2007-10	Hubbard
2004-05 Administrative & Research Budget of the Great Plains Regional Center of the National Institute for Global Environmental Change	Dept of Energy-NIGEC	1,269,121	2004-05	Verma
2004-05 Administrative & Research Budget of the Great Plains Regional Center of the National Institute for Global Environmental Change	Dept of Energy-NIGEC	1,268,660	2005-06	Verma
Climate & Soil Risk Information System	Dept of Agriculture-RMA	1,212,056	2005-08	Wilhite Hubbard
Rangeland & Forage Geospatial Decision Support System for Drought Risk Management	Dept of Agriculture-RMA	1,023,038	2005-10	Wilhite
Drought Prep Framework Tribal Govt	Dept of Interior-BIA	609,539	2007-10	Svoboda Hayes Wilhite
Developing Drought Mitigation & Preparedness Technologies for US	Dept of Agriculture-CSREES	589,996	2004-07	Wilhite
Satellite-Based Carbon Exchange	NASA	496,124	2008-11	Verma Suyker
Drought Monitoring, Planning & Mitigation	Dept of Agriculture-CSREES	495,371	2004-07	Wilhite
Measurement of Growing Season	Central Platte NRD	492,564	2007-11	Verma
Transition Drought Impact Reporter	Dept of Commerce-NOAA-NCTP	445,257	2007-10	Hayes
Drought Mitigation, NE Project	Dept of Agriculture-CSREES	437,244	2009-10	Hayes Svoboda
Riparian Vegetation Impacts	Ne Dept Natural Resources	433,960	2008-10	Lenters
Drought Mitigation, NE Project	Dept of Agriculture-CSREES	347,246	2008-09	Hayes Svoboda
Dev Seasonal Predictive Capability	Univ of Illinois-Urbana/Champaign	311,000	2008-11	Svoboda
Estimating the Impacts of Complex C	Dept of Commerce-NOAA	300,000	2006-10	Hayes Wilhite
Weather & Climate Forecasts	Dept of Commerce-NOAA	293,732	2005-08	Hu Hubbard

Title	Granting Agency	Total Amt	Term	Faculty
NOAA Warm Season Precip N America	Dept of Commerce-NOAA	292,000	2009-10	Hu Oglesby Feng
Dev Drought Ready Communities Prog	Dept of Commerce-NOAA	288,670	2008-10	Svoboda
GRACE Water Storage Data GSFC	NASA-Goddard Space Flight Ctr	224,991	2008-11	Svoboda
Drought Decision Support Portal	Dept of Commerce-NOAA	223,524	2007-09	Svoboda
Soil Moisture Monitoring Program for Nebraska	Dept of Interior-BR	206,000	2001-08	Hubbard
High Plains Regional Climate Center	Dept of Commerce-NOAA	199,983	2009-10	Hubbard
US Daily Temperatures 1950s-2000s	Dept of Commerce-NOAA	169,829	2006-10	Hubbard Lin
NIDIS Portal & Help Desk Support	Dept of Commerce-NOAA	165,409	2008-09	Svoboda
OM Evolution in Piedmont Catchments	NSF	138,458	2008-11	Lenters
Changes in Lake Dynamics	NSF	114,087	2007-10	Lenters
Livestock Output & Climate Change	Michigan Technological University	98,000	2006-08	Hu
Remote Sensing Info in US Drought	Dept of Interior-GS	97,784	2007-10	Svoboda Tadasse
Impact of CO2 Changes in US	Michigan Technological University	89,862	2008-10	Lenters

Source: NUGrants

Table 4.1-2. FTE of Faculty in the Applied Climate Sciences Area, 2008-09.

Name, Rank	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	SNR Total	Soft Funded
Deborah Bathke, Assistant Professor of Practice	.59 SNR .41 Geos	1	.24	.35				.59	.35
Ken Dewey, Professor (AY appt)	1.00 SNR	2	.15		.83	.02			
Al Dutcher, State Climatologist	1.00 SNR	3			.70	.30			
Song Feng, Research Assistant Professor (AY appt)	1.00 SNR	4		1.00				1.00	.62
Mike Hayes, Associate Professor, NDMC Director	1.00 SNR	5	.10	.23		.37	.30	1.00	
Steve Hu, Professor	.70 SNR .30 Geos	6		.53		.17		.70	
Ken Hubbard, Professor, HPRCC Director	1.00 SNR	7	.10	.48	.20	.22		1.00	.03
John Lenters, Associate Professor	.70 SNR .30 Geos	8	.15	.50		.05		.70	
Xiaomao Lin, Research Assistant Professor	1.00 SNR	9		.97		.03		1.00	1.00
Robert Oglesby, Professor (AY appt)	.30 SNR .70 Geos	10		.28		.02		.30	
Andy Suyker, Research Assistant Professor	1.00 SNR	11		.60		.40		1.00	1.00
Mark Svoboda, Associate Geoscientist	1.00 SNR	12		.25		.75		1.00	1.00
Tsegaye Tadesse, Assistant Geoscientist	1.00 SNR	13		.50		.50		1.00	1.00
Shashi Verma, Professor	1.00 SNR	14	.15	.83		.02		1.00	
Betty Walter-Shea, Professor and SNR Teaching Coordinator	1.00 SNR	15	.35	.40		.25		1.00	
Al Weiss, Professor	1.00 SNR	16	.15	.83		.02		1.00	
Don Wilhite, Professor and SNR Director	1.00 SNR	17					1.00	1.00	
Jinsheng You, Research Assistant Professor	1.00 SNR	18		.90		.10		1.00	1.00
TOTAL	16.29 SNR 1.71 Geos	18	1.39	8.65	1.73	3.22	1.30	16.29	6.00
Applied Climate Sciences Faculty FTE by Tenure									
Tenured/Tenure-Track	8.70 SNR 1.30 Geos	10	1.15	4.08	1.03	1.14	1.30	8.70	.03
Nontenure-Track	7.59 SNR .41 Geos	8	.24	4.60	.70	2.05		7.59	5.97
TOTAL	16.29 SNR 1.71 Geos	18	1.39	8.65	1.73	3.22	1.3	16.29	6.00

Source: 2008-09 Adjusted Budget

4.1.2.1 *Research/Outreach/Service.*

Climate Monitoring and Climate Data Utilization

- *Regional climate monitoring and service.* In order to understand how stakeholders might utilize climate data more effectively, each sector must be studied to determine how climate and other factors can potentially affect decisions in that sector. Timely and reliable climate data reveal the probability of weather-related events critical to the particular sector. Sector specific models can use climate data together with future climate scenarios to determine the future risks of climate change and variability. The federal government, with the National Oceanic and Atmospheric Administration (NOAA) as the lead agency, has announced the pending creation of a national climate service in support of climate issues, much like the National Weather Service (NWS) supports critical weather services. The High Plains Regional Climate Center (HPRCC), National Drought Mitigation Center (NDMC), and the Nebraska State Climate Office (NSCO) are in an excellent position to participate in the National Climate Service as envisioned in a three-tiered structure—federal, regional, and state. The strengths of the HPRCC are in monitoring, summarization, data stewardship, and dissemination of near real-time and historical climate data. A regional climate mesonet of 199 automated climate sites in 10 states is a significant source of data for modeling efforts. The network is managed by HPRCC in cooperation with the respective states (CO, IA, KS, MN, MO, MT, ND, NE, SD, and WY). This hourly network is widely used in the region in support of research and operational decisions. The decisions are related to irrigation scheduling, planting time, crop/hybrid selection, evapotranspiration (ET) modeling, drought assessment, and freeze risks in spring and fall, among other issues. HPRCC's body of research on quality assurance has led the National Climatic Data Center (NCDC) to revise the quality assurance of official data. HPRCC also prepares a monthly climate summary and summaries of other climate-related happenings in the region (<http://www.hprcc.unl.edu>). The HPRCC maintains one of the six synchronous Applied Climate Information Systems (ACIS). ACIS offers clientele a suite of tools (CLIMOD interface) for use in deriving various summaries and probabilities for design/planning, policy, strategy, and decision making. The other ACIS hubs are at regional climate centers (RCCs) in NY, NC, LA, IL, and NV. HPRCC with other RCCs provides the NWS Weather Forecast Offices (WFOs) with a special web interface (xmACIS) to provide WFO staff access to the ACIS database for information on records and rankings. A public version of this system (NowData) is included on every NWS local office web page. Likewise, an ACIS interface (agACIS) has been developed for use by U.S. Department of Agriculture (USDA) staff at Service Centers across the nation. Models like Metric use data from this network to evaluate regional water use by river basin, irrigation district, and natural resource district. (Participating SNR tenured/tenure track state-funded faculty: Hubbard, Shulski, Hu, Irmak; nontenure-track faculty: You, Feng; staff: Sorensen, Umphlett, Roebke, Hanneman, Li; non-SNR faculty: Cassman, Specht, Todey)
- *Nebraska State Climate Office.* NSCO is an American Association of State Climatologists' (AASC) Recognized State Climate Program (ARSCO), which is the highest level of recognition given by the AASC. NSCO has an active outreach program, which includes (on average) 20 presentations across the state each year, usually from

early in the year until planting time. NSCO handles an average of 750 requests for climate information per year, including approximately 200 media interviews, and they contribute a weekly weather report to the Market Journal, a University of Nebraska television show geared toward the agricultural sector. In addition, weekly national weather forecasts are provided to the World Wide Ag Network, an internet-based agricultural website, and two-week forecasts are provided to Heartland Express, a Nebraska-based media publication targeted to rural Nebraska agricultural producers. The Nebraska State Climatologist is the chair of the Water Availability and Outlook Committee, one of three subcommittees of the governor's Climate Assessment and Response Committee, which is responsible for assessing current climate trends and their potential implications for Nebraska economic sectors. NSCO provides daily climate data products for the Nebraska Agricultural Statistics Service, the Nebraska Farm Service Agency, and CropWatch, an interdisciplinary publication developed to assist agricultural producers in the areas of crop production, fertilizer management, insect control, and weed control. NSCO also performs monthly quality control of weather records submitted by National Weather Service cooperative observers. Observational errors are reported directly to NWS and NCDC for corrective action. The NSCO website is currently being developed to conform to the University of Nebraska template and, when completed, will offer the public more than 20,000 files containing products such as monthly climate updates, freeze probabilities, temperature and precipitation extremes, weekly weather outlooks, and in-house climate study results. Website: <http://nco.unl.edu>. (Participating SNR tenured/tenure-track state-funded faculty: Dewey, Hubbard, Shulski, Hayes; nontenure-track faculty: Dutcher, Svoboda)

- *Drought monitoring.* The National Drought Mitigation Center (NDMC), HPRCC, and NSCO have been involved in operational drought monitoring for Nebraska and the nation for more than two decades. They are involved in the making of some well-known products, including the weekly U.S. Drought Monitor (USDM) map, the monthly North American Drought Monitor map, and daily-updated drought and climate products (including 3,500 maps at state, regional, and national scales) derived from HPRCC's ACIS. The USDM is now mandated by the 2008 Farm Bill to be used by multiple programs within the USDA's Farm Service Agency for making potentially billion-dollar drought disaster declarations. The USDM is also written into policies used by the Internal Revenue Service and state drought task forces. In addition to operational monitoring, faculty in this area are continually working on methods to improve the information within these products, as well as ways to make the products more accessible to decision makers using web tools, GIS, and decision support systems. SNR's drought monitoring strengths extend to other components of the hydrological cycle as well, with knowledge and data covering soil moisture, surface water, and groundwater monitoring. SNR has a group of remote sensing researchers directly or indirectly working on drought monitoring techniques. One of these tools, the Vegetation Drought Response Index (VegDRI), is now operational and is focusing on drought-related vegetation conditions at a 1-km resolution, providing critical supplemental information for products developed at a much larger scale, such as the USDM. The NDMC's Drought Impact Reporter is an interactive, web-based mapping tool that was designed (in 2005) to compile and display drought impact information (e.g., crop losses, fish kills, water restrictions, national forest closures) across the United States in near real-time from a variety of sources such as

media, government agencies, and the public. This first step in aggregating national drought impact information helps policy makers and resource managers identify and quantify the occurrence and severity of impacts. This tool also provides an opportunity to research the connection between drought conditions and impacts, as well as the role of citizens who can identify information otherwise unavailable. Several SNR faculty serve on Nebraska's Drought Task Force and the state's Water Availability and Outlook Subcommittee. (Participating SNR tenured/tenure-track state-funded faculty: Hayes, Dewey, Gitelson, Hubbard, Shulski, Irmak, Kuzila, Narumalani; nontenure-track faculty: Burbach, Dutcher, Svoboda, Tadesse, Wardlow; participating staff: Callahan, Fuchs, Gutzmer, Mesarch, Poulsen, Scott, Smith, Widhalm, Wood)

Climate and Crop Modeling

- Regional climate modeling.* The importance of regional climate modeling was highlighted by the recent series of Intergovernmental Panel on Climate Change (IPCC) reports. This modeling effort is focused on basic questions of climate change science and linking the results of this basic research with practical applications and impacts for stakeholders. It integrates other areas of expertise within ACS, SNR as a whole, and other units in the University, notably the Department of Geosciences. It also well positions us as a group to take advantage of emerging university-wide initiatives in climate change. The following ACS faculty currently have projects that involve regional climate modeling: (1) Oglesby—physically based downscaling for climate change studies; effects of land use changes, especially as they affect drought, (2) Lenters—coupling regional climate model projections with land surface hydrologic modeling to investigate effects of climate change on water resources, (3) Hubbard and You—modeling solar radiation and dew point temperature in the High Plains region, and (4) Hu, Oglesby, and Feng—using both regional and global climate modeling (GCM) models to understand North American summer precipitation variations at decadal timescales. These studies also integrate and interact with the work of other ACS faculty—for example, the carbon and water flux measurements of Verma's group, which can lead to improvements in the way these fluxes are quantified in the climate models. (Participating SNR tenured/tenure track state-funded faculty: Oglesby, Lenters, Hu, Shulski, Hubbard; nontenure-track faculty: Feng, You; staff: Hays; non-SNR faculty: Rowe, Wang, Swanson, Ramamurthy)
- Diagnostics and modeling studies of climate variability.* Climate variations are reflected in specific processes and interactions in the earth's atmosphere and in changes of precipitation, temperature, and evapotranspiration observed at the earth's surface. Understanding these interactions and feedbacks and the resulting changes in precipitation will help us understand climate variations and also predict climate change. Achieving such understanding and predictive ability at interannual to multidecadal timescales has been one of the goals in our study of climate variability. In the past six years, we have developed an understanding of some of these variations and interactions and built expertise and strengths to further advance our studies of climate variability. Some of our major achievements have gained national and international attention and recognition. For example, our results indicate that the effects of El Niño-Southern Oscillation on interannual variations in warm-season rainfall in the central United States vary on multidecadal timescales, and that the Pacific Decadal Oscillation may have played a

strong role in this variation. Also, the “land memory effect” connecting antecedent winter snow cover in the western United States to the North American summer monsoon is related to variations in large-scale circulation over the north Pacific and North America. The persistent droughts at decadal timescales in North America have been strongly influenced by the Atlantic Multidecadal Oscillation (AMO). The physical processes associated with the effect of the North Atlantic sea surface temperature anomalies on regional circulation and rainfall anomalies in the central and western United States are related to changes in the regional circulation regimes and phases of the AMO. These findings are likely to change our view of climate and weather predictions.

(Participating SNR tenured/tenure-track state-funded faculty: Hu, Shulski, Hubbard, Oglesby; nontenure-track faculty: Feng, Lin; participating staff: Hays)

- *Crop modeling.* Crop simulation modeling is the synthesis of biological and physical knowledge in the form of mathematical algorithms related to crop growth, development, and yield. There are two basic components to any crop simulation model: the ability to simulate plant development accurately (biological time), and the ability to simulate what happens during this time (growth and yield). Until recently, our work has focused mainly on simulating plant development in winter wheat. For many years, thermal time ($^{\circ}\text{C d}$) was used as the basis for simulating plant development. Implicit in the use of thermal time is the assumption of linearity. Within the last 10-15 years, nonlinear approaches to simulate crop development have appeared in the literature, based mainly on the beta function. We have improved an existing developmental model, reducing the root-mean-squared error by 50%. The beta function was also used to simulate the leaf appearance rate in winter wheat, which provided superior performance compared to models using a constant phyllochron, or a variable phyllochron as a function of leaf number. As graduate students complete their programs, these efforts have continued in crops as varied as rice and potatoes. Current efforts are devoted to three areas of crop simulation modeling. The first area is to develop or improve “simple,” robust models of crops for managerial decisions. Examples of this effort are a recently developed model of switchgrass and a modified maize model. SimSoy, a soybean model, which will be released later this year, was developed as part of this effort. The second area focuses on phenotypic plasticity. An example of this area is the effort to incorporate genetic information into crop simulation models using plant height as a prototype system. Plant height is influenced by major genes that are discrete and well characterized genetically and phenotypically. Our goal of simulating final plant height for different height classes across environments was met. The third area is a recent focus on using existing models to determine the climate risks and climate impact on yield to optimize production in local areas. Future research will expand this area to assess potential climate change impacts. Efforts will also be directed toward simulating dry matter partitioning between above- and below-ground plant components. (Participating SNR tenured/tenure-track state-funded faculty: Weiss, Hubbard; nontenure-track faculty: You; non-SNR faculty: Baenziger, McMaster, Cassman)

Carbon, Water, and Energy Exchanges

- *Carbon sequestration project.* This ongoing project, initiated in 2001, involves the work of ten faculty members from four UNL departments (Agronomy and Horticulture,

Biochemistry, School of Biological Sciences, and SNR). The overarching goal of this project is to achieve a detailed understanding of soil, plant, and atmospheric processes governing the carbon (C) cycle and C sequestration in key agricultural systems of the north-central United States. A state-of-the-art field research facility has been established at the University of Nebraska Agricultural Research and Development Center near Mead, Nebraska. Initial focus is being placed on three major cropping systems: (1) irrigated continuous maize, (2) irrigated maize-soybean rotation, and (3) rainfed maize-soybean rotation. Landscape-level fluxes of CO₂, water vapor, and energy are being measured year-round using tower eddy covariance systems at the three study sites. Within each site, detailed process-level measurements are made of soil C dynamics, crop growth and partitioning, soil moisture, canopy and soil gas exchange, and crop residue decomposition. The effort involves detailed, interdisciplinary studies intended to quantify annual amounts of carbon stored; develop reliable, cost-effective procedures for predicting annual carbon storage; and improve our understanding of processes controlling soil carbon storage. These three tower sites are ranked “Tier 1” by AmeriFlux and provide a comprehensive set of biological/ecological measurements. These sites constitute the most widely used central U.S. agricultural sites in providing flux and biological measurements for many national and international modeling and synthesis studies. Scientific outputs from this program will provide the critical information needed to improve our ability to predict the amount of C that can be stored in the major cropping systems of the north-central United States and to better manage crop production systems for improved efficiency, profitability, and environmental quality. (Participating SNR tenured/tenure-track state-funded faculty: Verma, Gitelson, Hubbard, Knops, Walter-Shea; nontenure-track faculty: Suyker; staff: Hatch, Lowman, Mesarch, Schimelfenig; non-SNR faculty: Cassman, Arkebauer, Martin, Soundararajan, Walters)

- *Surface energy and water balance studies.* Climate affects water resources through the surface energy and water balance, and SNR has a number of ongoing projects related to this important area of study. These include both numerical modeling and field studies of land surface and lake hydrology. For example, we have numerous faculty involved in studies of invasive riparian vegetation and the impacts of its removal on the regional water balance, water quality, and stream ecology. Established field sites in both the Republican and Platte River basins incorporate instrumentation such as Bowen ratio stations, eddy covariance towers, large aperture scintillometers (LAS), and remote sensing of evapotranspiration. Additional instruments have been installed to measure and calculate water quality and ecological parameters such as pH, conductivity, dissolved oxygen, CO₂ fluxes, and primary production. Using these instruments with a terrestrial biosphere model, we are addressing many issues related to the impacts of climate and land use on the regional energy and water balance. In addition to riparian vegetation, Istanbuluoglu and Lenters are also investigating the impacts of climate variability and change on the water balance of the Nebraska Sand Hills. This effort has included analysis of historical climate and streamflow data, numerical modeling of evapotranspiration and groundwater recharge, and field studies of the energy and water balance of Sand Hills lakes. Lenters’ research group is also investigating the impacts of climate on lake evaporation in the Great Lakes region, as well as the dynamics of thaw lakes in northern Alaska. Together, these various studies are contributing to our understanding of lake energy and water balance across diverse climates (humid, semiarid, and polar).

(Participating SNR tenured/tenure-track state-funded faculty: Lenters, Awada, Istanbuloglu, Irmak, Verma; nontenure-track faculty: Suyker, Szilagyi; non-SNR faculty: Irmak, Martin)

- *Remote sensing techniques applied to land surface processes.* Remote sensing techniques are being used to nondestructively assess physiological status of plants via the relation between reflectance and leaf chlorophyll, leaf area, and plant cover. Estimation of spatially distributed leaf chlorophyll content is important for estimating photosynthesis and responses to fertilizer application. Midday gross primary production (GPP) is closely related to total crop chlorophyll content, and light use efficiency is linearly related to remotely sensed “simple ratio” vegetation indices. Thus, remote sensing techniques are applicable to carbon balance studies. Research as part of the Carbon Sequestration Project has recently focused on this application. In order to better understand the landscape-level results, measurements at small scales (leaf optical properties, leaf and soil gas exchange, and canopy photosynthetically active radiation interactions) have been used to scale up to the landscape level. Remote sensing techniques are also being used in drought monitoring tools (such as VegDRI), which incorporate remotely sensed climatological and biophysical information within a computerized, geospatial analysis framework. Moderate resolution vegetation indices are being used to characterize regional-scale land surface phenology, in an effort to monitor and understand interannual variability related to both climate variations and anthropogenic factors (e.g., management practices and land use/land cover change). In addition, satellite-based land surface temperature observations are being used to monitor regional patterns of evapotranspiration and develop new, early-stage drought indicators. (Participating SNR tenured/tenure-track state-funded faculty: Gitelson, Rundquist, Walter-Shea, Irmak, Hubbard; SNR nontenure-track faculty: Wardlow, Szilagyi, Lin, Tadesse; staff: Mesarch, Leavitt, Poulsen, Callahan, Scott)

Human Dimensions

The human dimensions program in SNR strives to build a strong scientific base for understanding and affecting human thought and behavior toward natural and managed environments. Our goals include improving stewardship of ecosystems and natural resources as well as providing the public with the tools to make educated decisions that will help them minimize their exposure to impacts from extremes in the climate system. Environmental managers are finding it increasingly necessary to understand people’s attitudes, behaviors, and needs and incorporate them into natural resources planning. These also play important roles in our effort to facilitate collaborations between disciplinary groups, help resolve conflicts, create policies, and advocate for environmental issues. Our human dimensions activities are working toward these goals.

- *The Central Plains Severe Weather Symposium (CPSWS) and Family Weatherfest.* This annual spring event is held in conjunction with the Nebraska statewide Severe Weather Awareness Week (<http://www.cpsws.unl.edu>). It is a unique activity organized by SNR that takes advantage of our location in the primary severe weather region of the United States. Our mission is to provide severe weather education and preparedness information to the public through a symposium that brings severe weather experts to our community. The CPSWS has established partnerships with Emergency Management, NWS, HPRCC,

NDMC, all of the Lincoln and Omaha television weathercasters, State Farm Insurance Loss Mitigation Group, The Lincoln Amateur Radio Storm Spotters Network, and several academic centers at the University of Nebraska. The Weatherfest is organized by SNR graduate students into multiple hands-on K-12 family-friendly weather and science educational exhibits. These SNR graduate student team leaders have assistance from undergraduate students in SNR and the Geosciences Department. More than 3,500 people attend the CPSWS and Family Weatherfest all-day event, making it the largest nonathletic public event at UNL. The goal of this SNR activity is to modify the behavior of the public in order to reduce their vulnerability to severe weather. (Participating SNR tenured/tenure-track state-funded faculty: Dewey; SNR nontenure-track faculty: Bathke, Woudenberg; staff: Widhalm, Callahan, Bernadt, Fuchs, Gutzmer, Smith, Umphlett, Wall, Wood; non-SNR faculty: Houston)

- *Drought planning and mitigation strategies.* Efforts to promote drought planning and mitigation began during the 1980s (see, for example, Wilhite's 10-Step Drought Planning Process, which is still being used today) and continue to be a main cornerstone within the NDMC's mission, with recent interactions taking place at international, state, tribal, local, and individual levels. A couple of the most recent examples include a project working directly with ranchers to improve drought planning at the ranch level; working with specific tribes and helping the Hualapai Tribe in northwest Arizona with a virtual drought exercise to improve their drought plan; working with communities in Nebraska, Oklahoma, and Illinois to help them become "drought ready"; and developing two planning documents for countries in the Near East. Over the past two years, the NDMC has organized 30 drought workshops around the country focused on drought monitoring, planning, and mitigation. SNR provides additional outreach promoting these strategies through presentations and specific drought-related case studies. An important component of the NDMC workshops is feedback from the participants, and the NDMC continues to work on public participation strategies. The NDMC is also an integral component of the National Integrated Drought Information System (NIDIS: Public Law 109-430 signed by President George W. Bush in December 2006) and has been working to assist NIDIS directly, through assistance with the development of NIDIS's web portal, organizing and participating in NIDIS conferences around the country, and serving on the NIDIS Implementation Team and various NIDIS Working Groups. Additionally, the NDMC is working with NWS and NIDIS on a basin-by-basin basis to create a national low-flow impacts database to complement the existing online Advanced Hydrologic Prediction Services flood impacts database. (Participating SNR tenured/tenure track state-funded faculty: Hayes, Dewey, Wilhite; nontenure-track faculty: Bathke, Ding, Dutcher, Knutson, Svoboda, Wardlow, Woudenberg; staff: Bernadt, Nothwehr, Smith, Wall, Widhalm, Haigh, Bernadt)
- *Emergency management outreach.* Interns are trained in SNR throughout the year to be placed at the Lincoln-Lancaster County Emergency Management Office. These interns provide severe weather forecasts and on-site weather monitoring and forecasting during severe weather occurrences. The Nebraska Vortex Intercept Team (NEVIT), organized in SNR and consisting of SNR undergraduate and graduate students as well as SNR faculty and staff, storm chase and provide storm observations to the regional NWS offices and regional county emergency management offices during the spring and summer severe weather season. This is not only an educational opportunity for the

students to take what they are learning about weather forecasting into the field, but it is also a public service activity that allows us to provide timely storm conditions to appropriate agencies. Each spring, the Lancaster County storm spotters are trained in a workshop organized by SNR and held in Hardin Hall. The goal of this activity is to create safer and stronger communities. (Participating SNR tenured/tenure-track state-funded faculty: Dewey; staff: Fuchs, Umphlett, Widhalm)

- *ACIS*. HPRCC, located within SNR, provides the general public, research agencies, private industry, and the academic community with a suite of tools that can be used to acquire climate data (e.g., full data sets, data rankings, data extremes, self-generated maps). These data products allow the user to derive various summaries and probabilities for design, planning, policy, strategy, and decision making. The HPRCC website (<http://www.hprcc.unl.edu>) also includes timely regional climate impact summaries as news items to keep user communities informed about timely regional climate variations. (Participating SNR tenured/tenure-track state-funded faculty: Hubbard, Shulski, You; nontenure-track: You; staff: Umphlett, Sorensen; non-SNR faculty: DeGaetano, Robbins, Hilberg, Brown, Robinson, Redmond)
- *Decision-making science*. Steve Hu has been collaborating with faculty at UNL in the departments of Psychology, Education, and Agricultural Economics to better understand how the social environment and personal attitudes, efficacy beliefs, and personal traits may affect the decision-making process of individual farmers. This collaborative team is working on the development of effective models to (1) assist farmers in building personal and subjective knowledge and self-efficacy about climate predictions and information and (2) change farmers' personal attitudes and intentions so that they can actively and effectively use climate information in the decision-making process. (Participating SNR tenured/tenure-track state-funded faculty: Hu, Hayes, Hubbard, Wilhite; non-SNR faculty: Bruning, Lynne, Pytlik-Zillig)

4.1.2.2 Teaching.

Undergraduate program. ACS faculty teach a variety of courses (Table 4-1.3). In fall 2007, the ACS faculty established an applied climate science option in the environmental studies major in the College of Agriculture Sciences and Natural Resources (CASNR) as a means of providing undergraduates with important insights into our changing climate. Ken Dewey serves as the coordinator of this option. Two entry-level undergraduate courses were developed to strengthen the course offerings in applied climate science. NRES 104 (Climate in Crisis) was developed for students across campus, with or without a science background. The course will help students sort through conflicting views on global warming, and the difference between normal scientific debate and ideologically driven denial. NRES 208 (Applied Climate Science) was developed to provide students in CASNR with a background in the fundamentals of atmospheric resources and related topics to begin to learn the tools needed for effective management of natural resources. Students in the course become acquainted with environmental risks and hazards (e.g., droughts, flood, severe storms), and various applications of climate data for decision making and an appreciation of how weather impacts animals (livestock and wildlife) and vegetation. Courses supporting the undergraduate program are listed in Table 4-1.3 (100–400 level). In addition, undergraduates have research opportunities through UCARE (Undergraduate Creative Activities and Research Experiences), as interns, through part-time employment, especially in HPRCC and

NDMC, and have access to undergraduate research dollars through the Agricultural Research Division.

Table 4-1.3. Courses Taught by Applied Climate Science Faculty.

Course Number	Course Title	Instructor(s)
NRES 104	Climate in Crisis	Dewey and Swinehart
NRES 208	Applied Climate Sciences	Bathke and Walter-Shea
ENVR 249##	Individual and Cultural Perspectives on the Environment	Woudenberg
NRES 370	Basic and Applied Climatology	Dewey
NRES 408/808	Microclimate: The Biological Environment	Verma and Walter-Shea
NRES 452/852	Climate and Society	Hayes
NRES 467/867*	Global Climate Change	Hu
NRES 469/869	Bio-atmospheric Instrumentation	Hubbard
NRES 478/878	Regional Climatology	Lenters
NRES 496/896	Hydroclimatology	Lenters
NRES 896	Quantitative Remote Sensing	Gitelson
NRES 906	Crop Growth and Yield Modeling	Weiss
NRES 907	Agricultural Climatology	Weiss
NRES 908	Solar Radiation Interactions at the Earth's Surface	Walter-Shea
NRES 954	Turbulent Transfer in the Atmospheric Surface Layer	Verma

Source: SNR Course Database.

Course home in Environmental Studies (starting spring 2010)

*Course home in Geoscience

##Last taught spring 2009; revised as ENVR 249

- Graduate program.* Our strong research program and facilities (including the Agrometeorology Laboratory at the University of Nebraska Agricultural Research and Development Center near Mead, measuring stations for the National Atmospheric Deposition Program and the U.S. Department of Agriculture UV-B Monitoring Network, HPRCC and its Automated Weather Data Network, NDMC, and CALMIT) enable us to offer an outstanding graduate program. Graduate students can specify one of three applied climate science-related specializations at the MS and PhD level in the natural resource sciences major: bio-atmospheric interactions, climate assessment and impacts, or human dimensions. ACS faculty also advise graduate students in the agricultural meteorology specialization at the MS and PhD levels through the agronomy major (as courtesy faculty in the Department of Agronomy and Horticulture).

The agricultural meteorology specialization was designed to provide students with a unique learning environment to promote understanding of the interactions between the atmosphere and the biosphere in an agricultural setting and to encourage cooperation among the community of scientists and students within the agricultural meteorology research area.

Bio-atmospheric interactions is designed to provide students with a unique learning environment to promote understanding of the interactions between the atmosphere and

the biosphere and to encourage cooperation among the community of scientists within the bio-atmospheric research area.

Climate assessment and impacts provides students with a learning environment that promotes an understanding of the interactions between climate and society and methodologies for climate assessment and impact. Students conduct research that draws on the expertise of multiple faculty working on climate assessment, climate impacts, and problem-oriented policy research.

The human dimensions program builds a strong scientific base for understanding current thought and behavior toward natural and managed environments, with the goal of instilling behaviors consistent with good stewardship of ecosystems and natural resources. This specialization offers both natural resources and social science courses to provide a well-rounded curriculum focused on human-environment interactions.

Currently, ACS faculty advise eight MS and eight PhD students. Courses that support the graduate program are listed in Table 4-1.3 (800-900 level courses).

4.1.3 Future Goals

4.1.3.1 Research/Outreach/Service.

Strengthening Existing Initiatives:

Climate Monitoring and Climate Data Utilization

- Continue to research, develop, and deliver climate- and drought-related decision support tools and products that expand weather, climate, and drought information for users that are affected by climate at a variety of scales, incorporating GIScience and newly developing social science methodologies.
- Continue to expand climate and drought monitoring efforts within the context of a national climate service to better characterize climate variability and the impacts associated with these conditions.
- Analyze past climatic trends and investigate the relationships between climate change and drought (and other climate extremes) in the Plains in an effort to develop climate products and appropriate adaptation strategies that will help Nebraska constituents mitigate the impacts of potential climate change.
- Develop better understanding of the connections between climate variability and change, including the occurrence of extreme climatic events, and impacts on various sectors such as agriculture, water supply, environment, recreation and tourism, and public health.

Climate and Crop Modeling

- Continue to develop the Nebraska Center for Regional Climate Modeling, with particular emphasis on bridging the gap between basic and applied climate research.

- Use regional climate models to investigate and understand variations in warm-season precipitation in the central and western United States from interannual to multidecadal timescales and thereby improve precipitation predictions for the region.
- Integrate model expertise and applications into the educational curriculum—both graduate and undergraduate. Also, investigate how existing (or new) courses could be used to provide a modeling perspective for a new climate change studies minor.
- Understand the physical processes that result in the observed multidecadal variations in circulation regimes, and gain the ability to make decadal predictions of climate.
- Improve our understanding of the impacts of changes in climate and land use on water resources (stream flow, lake levels, groundwater, etc.), including quantifying the role of the Nebraska Sand Hills in recharging the High Plains aquifer and its response to drought and climate change.
- Use vegetative growth models for both unmanaged and managed ecosystems at local and regional scales to assess the impact of climate change and climate variability on water use and ecosystem productivity.

Carbon, Water, and Energy Exchanges

- Measure, understand, and predict the effects of climate and land cover on the fluxes of water, carbon, and energy in a variety of landscapes.
- Quantify the potential of biofuel crops (e.g., switchgrass, miscanthus, maize, soybean, sorghum) to sequester carbon and their ability to mitigate the increase in atmospheric CO₂ concentrations.
- Extend the application of remote sensing techniques to quantify carbon, water, and energy fluxes on a regional basis. Using current and past satellite imagery, we can capture the spatiotemporal variation of crops for the past and current conditions. In addition, testing and evaluating observations from new satellite-based sensors planned for launch in the near future for these applications will be vital for extending the accomplishments from our ongoing research efforts in exploring new applications for crop characterization and environmental monitoring.

Human Dimensions

- Strengthen existing collaborations and foster new collaborations between ACS faculty/staff and other university faculty/staff and/or community organizations, agencies, and/or individuals. This will increase the internal recognition and understanding of (1) the importance of the human dimensions component and (2) the inherent nature of the human dimensions component in ACS research, products and programs, and education and outreach activities.
- Develop new understanding of decision-making behavior and effective methods and strategies to improve the use of climate change information in decision making.
- Continue to enhance the ACS program's ability to provide extreme weather and climate preparedness information to the public in order to reduce injuries, fatalities, and economic losses resulting from these events.
- Continue to expand K-12 educational outreach activities to increase the understanding and "literacy" of weather, climate, drought, and other natural hazard issues.

Drought Risk Reduction and Management

- Improve the integration between the physical characterization of drought severity levels and drought impacts to improve drought decision support for planning, mitigation, response, and other policy options.
- Continue to investigate and enhance drought planning processes and the implementation of drought mitigation strategies to meet the needs of stakeholders, including the identification of appropriate case studies and lessons learned and how these can be applied in other situations through technical assistance.
- Continue to build collaborations with national and international scientists and decision makers on the application of climate-based information for drought risk management, including exploring new opportunities with NIDIS and various NOAA organizations, USDA, and other agencies.
- Develop methodologies to understand the economic impacts caused by droughts and the costs avoided by successful drought mitigation strategies in order to enhance the visibility and attention drought mitigation and response actions receive.

Developing New Initiatives

- Further develop outreach and education efforts in climate change and variability.
- To help bridge the gap between applied and basic climate research, it is essential to have expertise on campus to model responses of ecosystems and economies to predicted climate change. Thus, two new programs need to be developed at UNL.
 - Ecosystem modeling: Quantify interactions between biological and physical processes, including abiotic and biotic stress of different (managed and unmanaged) ecosystems important to Nebraska. Our strong site-based research in SNR and across campus would provide the essentials in scaling up site-based research to larger spatial and temporal scales. Thus, a collaborative effort with the SNR applied ecology group and the ACS group would be the key to the success of this research effort.
 - Environmental economic modeling: Working with an ecosystem modeler, develop an integrated ecosystem-economic modeling approach to analyze the impacts of climate change on economies associated with ecosystems important to Nebraska. This will be a collaborative effort with the SNR applied climate science and applied ecology groups and the Department of Agricultural Economics.
 - Funding Strategy: To develop these two programs, it will be imperative to redirect resources from SNR faculty retirements or from faculty attrition to other universities or positions, collaborate with other departments on joint positions, attract external funding, or utilize adjunct faculty affiliations from other universities or federal/state agencies.

4.1.3.2 Teaching.

- A main ACS teaching goal is to develop an *undergraduate major* in applied climate science (Appendix 4.1-1 at the end of this subchapter) to provide students with the fundamentals in climatology with a foundation in plants, soils, water, and ecology. This major would complement our graduate program and the undergraduate program offered through Geosciences (BS in meteorology-climatology, through the College of Arts and Sciences [CAS]). The distinction between the ACS major and the majors in meteorology and climatology and environmental studies, with the applied climate science option, is that the new major will provide the opportunity to apply climate science with a foundation in plants, soils, water, ecology, and GIS. Options in the major will permit students to apply their climatology studies to specific areas such as ecosystems, geospatial technologies, hazard assessment, human dimensions and environmental policy, livestock and wildlife, and water resources. The undergraduate major would provide students with several career options upon completion of their degree. Opportunities include positions with environmental consulting firms, planning agencies, nongovernmental organizations and local governments addressing climate issues, or fulfillment of a pre-professional degree requirement and graduate studies. Agencies where graduates can find employment include Natural Resources Districts, water or irrigation districts, USDA/Natural Resources Conservation Service, Climate Services Division of NWS, regional climate centers, National Climatic Data Center, Joint Agriculture and Weather Facility, and Environmental Protection Agency. The major was developed in response to SNR's 2003 unit review and also addresses the University's emphasis on undergraduate education.
- ACS will take further steps to enhance the undergraduate experience in climate and to increase undergraduate student credit hours. An *undergraduate minor* is being considered in climate change studies (Appendix 4.1-2). This minor (modeled after the energy science minor) is intended to appeal to students with an interest in furthering their understanding of climate change in association with their major in fields such as business, journalism, or engineering. NRES 104 (Climate in Crisis) will be proposed for Achievement-Centered Education (ACE) certification for student learning outcome 9 (global awareness through analysis of an issue). UNL has implemented ACE certification for courses; students in various majors are required to take a pre-determined number of ACE courses. Having NRES 104 ACE certified will make the course more attractive to students across campus, as all students will need to fulfill this learning outcome for graduation. Instructors for NRES 208 will renew their effort in getting the course to be explicitly listed as a required course or elective in additional CASNR programs (currently, 4 programs list NRES 208 as such).
- Development of an *umbrella program of atmospheric sciences* with the Department of Geosciences (which expects to change its name to the Department of Earth and Atmospheric Sciences) will provide visibility to UNL's educational and research programs in atmospheric sciences. The umbrella program will highlight both tracks in atmospheric sciences, providing UNL students an option: meteorology-climatology (through CAS) or applied climate science (through CASNR). The major, as currently proposed, will be built on current courses and a capstone course (to be developed), which is required by CASNR. The first year of study would be applicable to either track—a

benefit to undecided students since the different colleges have different core requirements. With a major and minor associated with ACS and an umbrella program in atmospheric sciences, we anticipate that we will be getting students across both campuses involved in climate-related activities and will see more involvement of students in climate-related research through UCARE and internships.

- Our *graduate program* continues to be one of the strengths of the ACS program, supported by strong research programs and facilities. The collaborative nature of our research with scientists in SNR, across campus, and across institutions and agencies provides many of our graduate students with an opportunity for an interdisciplinary approach to addressing research problems. To ensure a strong graduate program, the graduate specializations in applied climate science will be reviewed. SNR has a number of specializations in the natural resource sciences major that are optional for students to declare (the specialization will appear on their transcript). Are these specializations being effectively utilized, and if so, do they meet our students' needs?
- ACS faculty have organized a *summer institute on climate change*, which will include the topics outlined in Table 4-1.4. This institute will be offered for the first time in 2010 and the primary audience will be extension educators and state and federal agency personnel and NRD staff.

Table 4-1.4. Proposed Summer Institute on Climate Change.

Topic	Instructor(s)	Affiliation
Understanding and Modeling Future Climate Change	Oglesby	SNR
IPCC Report on Climate Change	Hubbard	SNR
Climate Variability	Hu	SNR
Climate Monitoring	Hubbard	SNR
Impact on Water Resources	Knutson	SNR
Drought and Water Availability: International to Local Consequences	Hayes	SNR
Role of Ecosystems	Wedin	SNR
Agriculture, Biofuels, and Climate Change	Walters Verma	Agronomy and Horticulture SNR
Impact on Livestock	Mader	Animal Science
Economic and Policy Implications	Perrin and Fulginiti	Agricultural Economics

Appendix 4.1-1

Applied Climate Sciences Major Requirements
UNL College of Agricultural Sciences and Natural Resources

Natural Resources Core Courses		20-21 Hours		
Requirement	Course Title	Hrs		
NRES 103	Food, Agricultural & Natural Resource Systems	3		
METR 200	Weather and Climate	4		
NRES 220 & 222	Principles of Ecology & Lab	4		
NRES 323	Natural Resources Policy	3		
NREE 265 or 465	Natural Resources & Environmental Economics	3		
NRES 312, 412 or 418	Geographic Information Science Course	3-4		
Mathematics and Quantitative Methods		9-11 Hours		
MATH 104 or 106*	Calculus for Managerial and Social Sciences (3 cr) or Analytical Geometry & Calculus I (5 cr)	3-5		
CSCE 150A or CSCE 150E	Intro to Problem Solving with Computers	3		
STAT 218	Intro to Statistics	3		
Communications Courses		9 Hours		
Written. Select from:	ENGL 150, 151, 254; JGEN 200, 300	3		
Oral. Select from:	COMM 109, 209, or 311	3		
Communication/ Interpersonal Skills. Select from:	ALEC 102, ENGL 150, 151, 254; JGEN 120, 200, 300; COMM 109, 209, 311, JOUR 444	3		
Humanities and Social Science Courses**		18 Hours		
Economics ECON 212 or AECN 141		3		
<i>Select one from:</i>				
ECON 211 Principles of Macroeconomics				
ECON 212 Principles of Microeconomics				
AECN 141 Intro to Economics & Agriculture				
ACE Requirements		15		
** Select one course each in ACE areas 5, 7, 8, and 9 and one elective				
Natural Science Courses		11 Hours		
BIOS 101 & 101L or	General Biology/Lab	4		
AGRO 131 & 132	Plant Science & Lab			
WATS 281	Introduction to Water Science	3		
SOIL 153	Soil Resources	4		
Physical Sciences Courses		8 Hours		
CHEM 105 or 109*	Chemistry in Context I or General Chemistry I	4		
PHYS 211* or	General Physics I or Physical	4		
MSYM 109	Principles in Agriculture			
			Applied Climate Sciences Courses 31 Hours	
			NRES 101	Natural Resources Orientation 1
			NRES 106	Climate in Crisis 3
			NRES 208	Applied Climate Science 3
			NRES 370	Basic & Applied Climatology 3
			NRES 408	Microclimate: The Biological Environment 3
			NRES 450	Climate & Society 3
			NRES 478	Regional Climatology 3
			METR 470	The Climate System 3
			NRES 469	Bio-Atmospheric Instrumentation 3
			METR 467	Global Climate Change or
			or 477	Hydroclimatology (proposed) or
			or 487	Earth's Climate: Past, Present & Future 3
			or 475	Physical Climatology
				Capstone Course 3
			*Recommended for those in options: Agroecosystems, Geospatial Technologies, Water Resources	
			Major Requirements: 106-109 Hours	
			Option Requirements and Free Electives: 19-22 Hours	
			Credits Required to Graduate: 128 hours	
			Note: In addition to these requirements, students must select and meet the requirements of one of the options, depending on their needs and interests.	
			Options:	
			General Option	
			Agroecosystems	
			Geospatial Technologies	
			Hazard Assessment	
			Human Dimensions & Environmental Policy	
			Livestock and Wildlife	
			Water Resources	

Appendix 4.1-2

Proposed Minor in Climate Change Studies School of Natural Resources

Climate change is an issue of extreme environmental and economic importance, globally. Our undergraduate students need to be exposed to the scientific principles that underlie the climate change issue so that they can be engaged in debates on the issue and become informed citizens and decision makers. The proposed minor in climate change studies is modeled after the energy science minor and is intended to appeal to students with an interest in furthering their understanding of climate change in association with their major in fields such as business, journalism, or engineering.

Climate Change Studies Minor (18 hrs):

NRES 104—Climate in Crisis (Dewey and Swinehart)

NRES 208—Applied Climate Science (Bathke and Walter-Shea)

ENSC 230—Energy and the Environment, Economics and Policy (Perrin/Fulginiti)

NRES 370—Basic and Applied Climatology (Dewey)

METR 487—Earth's Climate: Past, Present & Future (Lawson)

Choose one course from the following:

NRES 450—Climate and Society (Hayes)

METR 477 (proposed)—Hydroclimatology (Lenters)

4.2 Ecological Challenges

*Address **emerging ecological challenges** including invasive species, wildlife-related diseases, threatened and endangered species, adaptation to environmental stressors, maintenance of biodiversity, and the development of more resilient and biologically diverse natural resource systems, integrating both human and ecological factors.*

Executive Summary

Global ecological challenges, which present potentially dire consequences if they are unmet, face humankind in the immediate future. Nebraska is far from immune to ecological challenges presented by global climate change; wildlife management (including wildlife damage), agroecosystems, land cover and land use change, the preservation of unique ecosystems and threatened and endangered (T&E) species, and other issues have risen to the forefront in the state. In this chapter, we identify four focus areas in which the School of Natural Resources (SNR) can make significant contributions toward meeting ecological challenges, regionally and globally: (1) assessing biodiversity and ecosystem functions and services, (2) researching ecological resilience and its applications in management, (3) promoting effective resource management using adaptive management, and (4) promoting widespread ecological literacy, especially through existing graduate and undergraduate education programs. SNR is well positioned to make such contributions, but the redirection of resources and new strategies will be necessary, particularly as enrollments remain at current levels or, more likely, increase. A position identified as part of a prioritization process for new faculty in spring 2008 has yet to be filled. Creative approaches toward solving shortfalls in teaching FTEs will need to be implemented. Additional goals in education, research, and outreach include implementing a new National Science Foundation (NSF) Integrative Graduate Education and Research (IGERT) grant, producing a sustainable graduate program in adaptive management, increasing the analytical and quantitative rigor of the fish and wildlife major, effectively articulating natural resources management and conservation with production agriculture in Nebraska, developing ecosystem modeling, and improving ecological informatics, statistics, and survey.

4.2.1 Ecological Challenges in the Twenty-first Century

SNR can continue to play important roles in addressing significant ecological challenges. Given regional to global trends and existing SNR faculty expertise and interest, as well as the overall potential for success, the applied ecology faculty have identified four focus areas in which SNR is uniquely positioned to make major contributions:

1. Assessing biodiversity and ecosystem functions and services. Biodiversity, the sum total of biological entities, is generally regarded as one of the most basic metrics of the health of ecosystems. *Ecosystem services* can be distinguished from the more general category of *ecosystem functions* because they consist only of those processes and resources (e.g., food production, water, decomposition of wastes, crop pollination, etc.) provided by nature that directly benefit human civilization. Specific activities in this general area that SNR intends to pursue are (a) promoting the teaching at UNL of organismal biology that includes surveying biodiversity, and maintaining critical

long-term collections and data sets, (b) assessing the impacts of environmental change (e.g., climate change) on populations, communities, and ecosystems, and (c) understanding the ecological consequences of landscape changes driven by socioeconomic factors including agriculture and surface water allocations.

2. *Researching ecological resilience and its applications in management.* Closely tied to the areas of interest defined in the preceding section is the assessment of how ecosystems respond to changes in environmental factors, particularly climate. *Resilience* is defined as the ability of an ecosystem to tolerate disturbance without undergoing irreversible changes in state. Specific activities in this general area that SNR intends to pursue are (a) developing the mathematical and statistical tools for analyzing resilience in population and community data sets, (b) ecosystem modeling, and (c) exploring ecosystem resilience with experiments manipulating diversity and landscape configuration.

3. *Promoting effective resource management using adaptive management.* Adaptive management is an organizational decision-making process in which managers, researchers, and stakeholders learn from experience in a collaborative setting and thereby make critical decisions under conditions of significant uncertainty. It is an approach toward understanding the ecological and socioeconomic components and thresholds of systems (i.e., resilience) that seeks to identify and reduce key uncertainties, and to use management options as testable hypotheses. In the area of resource management, SNR will seek to provide, on a local to international scale, the intellectual basis and training for making defensible decisions about the use of limited resources and the sustainable production of food and fiber. The *adaptive management* of ecosystems combines research, monitoring, and evolving practices in an iterative process, the overall intent of which is to optimize the long-term health of managed ecosystems.

4. *Promoting widespread ecological literacy.* Ecological literacy involves learning ecological concepts, engendering “ecological wisdom”, and developing skills in sound ecological stewardship. Coyle (2005), observed that “at a time when Americans are confronted with increasingly challenging environmental choices . . . our citizenry is by and large both uninformed and misinformed.” SNR upholds the assertion that widespread ecological literacy is the essential basis for dealing effectively with major ecological issues such as anthropogenic perturbations of the global carbon cycle, climate variability and change, new wildlife-human disease threats, and water resources. SNR will promote ecological literacy across a broad spectrum, including (a) formal education at the undergraduate and graduate level; (b) informal education; (c) interactions with stakeholders, including the business community, industry, media, and government and other decision makers; and (d) formal K-12 education, including the development of courses for future teachers being trained at the University of Nebraska–Lincoln (UNL).

4.2.2 Importance to Nebraska and the Nation

The ecological issues described in the preceding section articulate well with Priorities 1-4 described in the IANR strategic plan (IANR, 2008). These issues are of paramount importance not only in Nebraska, but nationally and globally.

Nebraska occupies a central position within what was once one of the largest grassland biomes in the world, but which is now “a patchwork landscape that is a mere shadow of its past glory” (The

Nature Conservancy, undated). The Great Plains is a complex mosaic of natural and managed landscapes in which habitats continue to change in response to agricultural practices, climate change, altered water resources, and invasive species. These changes influence the spatial pattern of resource selection by individual species, as well as overall species diversity at landscape and regional scales. Major habitat loss has occurred in grasslands and wetlands in Nebraska, the latter biomes receiving considerable attention because of their disproportionately high biological productivity and their roles as habitat islands in agricultural landscapes. The Nebraska Sand Hills region ($> 60,000 \text{ km}^2$), an important mixed-grass prairie community containing abundant wetlands, has been designated as a separate ecoregion by the World Wide Fund for Nature (World Wide Fund for Nature, undated). Simultaneously, however, the area remains a particularly productive cattle-ranching area having great economic importance in the state.

In Nebraska and across the Great Plains, the preservation of biodiversity and ecosystem health is imperiled by a number of pressures such as intensive land use, extreme fragmentation of remaining native prairies, suppression of naturally occurring fire and ungulate grazing, and the spread of invasive species. Many of the T&E species in the region are associated with contested water resources (e.g., pallid sturgeon, piping plover, whooping crane), and, therefore, their status is closely tied to management practices, including new efforts in adaptive management. Moreover, several invasive species (e.g., purple loosestrife, emerald ash borer, and bighead Asian carp) are considered problematic in the state and require additional study in terms of management practices. Habitat loss and degradation and disease, as well as predation by invasive species, have caused marked declines in the populations of several native species of plants and animals (Schneider et al., 2005). Agricultural pollution and its effects on aquatic ecosystems have long been concerns in the state. Corn ethanol production in Nebraska and the surrounding region has only recently become the focus of considerable ecological concern and public debate. Interest and research in sustainable agriculture and organic farm products continues to grow in Nebraska, as evidenced by major grants to UNL (including SNR). At the global scale, climate change, biodiversity, invasive species, land degradation, freshwater availability, and food security have been defined as emerging issues of paramount significance by the United Nations (United Nations System-Wide Earthwatch, undated). All of these issues have very direct relationships with the four focus areas defined above for SNR's future development.

4.2.3 Progress Since 2003 and Current Status

Nine tenured or tenure-track applied ecology faculty have 100% SNR appointments (Awada, Brandle, Freeman, Hygnstrom, Pegg, Powell, Thomas, Tyre, and Wedin), and four full-time federally paid faculty members in the Nebraska Cooperative Fish and Wildlife Research Unit (NE CFWRU) or the Great Plains Cooperative Ecosystems Studies Unit National Park Service representative are associated with applied ecology (Allen, Fontaine [starting summer 2009], Pope, and Willson) (Table 4.2-1). Three applied ecology faculty have partial appointments in SNR (Adams, Ferraro, Knops) and four have grant-funded research appointments (Baasch, Hiller, Huddle, Zhou). Although the core disciplines of the applied ecology group are still forestry, fisheries, and wildlife, the 2009 faculty numbers reflect several major changes since 2003. The Nebraska Forest Service, while still part of UNL, is no longer directly affiliated with SNR. A total of 2.5 extension/outreach FTEs in applied ecology have also been lost this decade.

Table 4.2-1. SNR Applied Ecology Faculty FTE, 2008–09.

Name, Rank	Current Appt	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	SNR Total	Soft Funded
Dennis Adams, Forester	.30 SNR .70 NFS	1			.30			.30	
Craig Allen, Adjunct Professor ¹									
Tala Awada, Associate Professor	1.00 SNR	2	.25	.68		.07		1.00	
David Baasch, Post Doctoral Research Associate	1.00 SNR	3		1.00				1.00	1.00
Ann Bleed, Lecturer	.10 SNR	4	.10					.10	
Jim Brandle, Professor	1.00 SNR	5	.28	370		.02		1.00	.29
Dennis Ferraro, Extension Educator	.20 SNR .80 SREC	6	.20					.20	
Fontaine, Joseph J. "TJ", Adjunct Assistant Professor ¹									
Trish Freeman, Professor	1.00 SNR	7	.25	.48		.27		1.00	
Tim Hiller, Post Doctoral Research Associate	1.00 SNR	8		1.00				1.00	1.00
Julie Huddle, Research Assistant Professor	1.00 SNR	9		.98		.02		1.00	1.00
Scott Hygnstrom, Professor	1.00 SNR	10	.25	.25	.50			1.00	.15
Jean Knops, Associate Professor	.20 SNR .80 SBS	11	.10	.10				.20	
Mark Pegg, Associate Professor	1.00 SNR	12	.49	.49		.02		1.00	
Kevin Pope, Adjunct Associate Professor ¹									
Larkin Powell, Associate Professor	1.00 SNR	13	.60	.38		.02		1.00	
Steve Thomas, Assistant Professor	1.00 SNR	14	.20	.78		.02		1.00	
Drew Tyre, Associate Professor	1.00 SNR	15	.40	.58		.02		1.00	
Dave Wedin, Professor	1.00 SNR	16	.40	.58		.02		1.00	
Willson, Gary ²									
Xinhua Zhou, Research Assistant Professor	1.00 SNR	17		.98		.02		1.00	1.00
Total	13.80 SNR .80 SREC .80 SBS .70 NFS	17	3.52	8.98	.80	.50		13.80	4.46
Applied Climate Sciences Faculty FTE by Tenure									
Tenured/Tenure-Track	9.20 SNR .80 SBS	10	3.22	5.02	.50	.46		9.20	.44
Nontenure-Track	4.60 SNR .80 SREC .30 NFS	7	.30	3.96	.30	.04		4.60	4.00
TOTAL	13.80 SNR .80 SREC .80 SBS .70 NFS	17	3.52	8.98	.80	.50		13.80	4.46

Source: 2008-09 Adjusted Budget

¹NE CFWRU

²NPS CESU

Some of SNR's aquatic ecologists (Barrow, Hoagland, and Holz) now have a primary affiliation with SNR's water faculty. SNR ecology faculty members have achieved major success in recent grant applications (Table 4.2-2). Retirement issues are likely to emerge in the ecology faculty over the next five years, but faculty retention is likely to be a bigger issue, in reaction to teaching overloads and space needs.

Table 4-2.2. Selected Recent Grants Awarded to SNR Faculty in Ecological Research Areas, 2004–09.

Title	Granting Agency	Total Amt	Term	Faculty
Angler Behavior on NE Reservoirs	NE Game & Parks Commission	3,147,776	2009-13	Pope
Sand Hills Biocomplexity: Integr Biogeophys Process	NSF	1,794,730	2003-07	Wedin
Sturgeon Mgmt in the Platte River	NE Game & Parks Commission	801,000	2008-13	Pegg
Improving Organic Farming Systems across Nebraska Agroecosystems	Dept of Agriculture-CSREES	762,949	2005-09	Brandle
NGPC Niobrara Environmental Flows	NE Game & Parks Commission	726,754	2009-12	Pegg
Development of Spatially Explicit Models of Wildlife Diseases	Dept of Agriculture-APHIS	588,945	2004-09	Hygnstrom
NCFWRU: Walleye/White Bass in Irrig	NE Game & Parks Commission	484,448	2006-11	Pope Allen
NGPC MO River Sportfish Ecol & Mgt	NE Game & Parks Commission	401,210	2009-14	Pegg
USGS NE Water Resource 104B 2006 - 2009	Dept of Interior-GS	369,340	2006-11	Pope
Monitoring, Mapping & Risk Assess	NE Environmental Trust	325,081	2006-09	Allen
FIBR: Linking Genes to Ecosystems	Univ of California-Riverside	307,176	2006-11	Thomas
Cross-Scale Structure & Scale Breaks in Complex Systems	James S. McDonnell Foundation	248,986	2004-09	Allen
USGS Missouri River Adaptive Mgmt	Dept of Interior-GS	247,104	2009	Allen Tyre
NE EIPM-CS Coordination Program	Dept of Agriculture-CSREES	235,725	2009-10	Hygnstrom
Nebraska Cooperative Fish & Wildlife Research Unit	NE Game & Parks Commission	214,000	2003-28	Allen
Assessing GP Grassland Birds	Dept of Interior-GS	212,122	2007-10	Powell Allen
Western Deer Movement	NE Game & Parks Commission	190,000	2003-07	Hygnstrom
Vegetation Control along Missouri	Dept of Interior-GS	182,286	2007-10	Allen
Platte Riv Catfish Population Dynam	NE Game & Parks Commission	173,554	2007-09	Pegg
Bank Restoration in Cedar River	NE Dept Environmental Quality	149,952	2007-09	Thomas

Title	Granting Agency	Total Amt	Term	Faculty
NCFWRU: Channel Catfish Popul in NE	NE Game & Parks Commission	139,845	2008-10	Pope
Woody Material/Habitat Restoration	NE Game & Parks Commission	133,000	2006-09	Pegg
W Ne Grassland Bird Conservation	NE Game & Parks Commission	129,990	2006-09	Tyre
Western Nebraska Grassland Bird Conservation: Population Monitoring to Implementation	NE Game & Parks Commission	129,990	2006-08	Tyre
Pheasant Habitat Selection Study	NE Game & Parks Commission	121,334	2005-09	Tyre Powell
Red Cedar Removal on Bird Populations in Habitats of Niobrara Valley (CESU)	Dept of Interior-NPS	112,109	2003-06	Powell
Coupling Consumer-Resource Interact	St. Olaf College	111,666	2006-09	Thomas
NCFWRU:Multi-Criteria Assess Habit	Dept of Interior-GS	107,391	2007-09	Pope
Platte River Whooping Crane Assistantship	Platte River Whooping Crane Maint Trust	100,000	2006-10	Powell

Source: NUGrants

Some of SNR's goals in the 2003 review document are particularly relevant to the discussions in this chapter: (1) review undergraduate majors and revise the natural resources curriculum; (2) increase the focus on teaching, involve more existing faculty in teaching, hire replacement faculty for undergraduate teaching, and increase undergraduate enrollment; (3) build geographic information science (GIS) coursework into the undergraduate curriculum; (4) provide state-of-the-art teaching, laboratory, and field facilities; and (5) increase cooperation, particularly in undergraduate education, with UNL's School of Biological Sciences (SBS) and Department of Geosciences. All of these issues have been aggressively addressed by applied ecology faculty in the past six years. Major developments since 2003 include:

- *Hardin Hall.* With the move of SNR to Hardin Hall in 2006, teaching and research facilities were greatly improved. The single teaching laboratory in the old Natural Resources Hall (rated the worst life sciences teaching lab in the entire NU system) was replaced by two large teaching labs, plus preparation rooms and three computer teaching labs in Hardin Hall. As of May (2009), 111 faculty, research faculty, staff, graduate students, and undergraduate research students use the applied ecology labs on the first floor (fisheries and wildlife lab complex) and second floor (forestry lab complex) of Hardin Hall. Applied ecology space for both teaching and research in Hardin Hall is at full occupancy.
- *Co-location of the USGS NE CFWRU.* The 2006 move to Hardin Hall included the NE CFWRU, founded in 2004, which is closely integrated with SNR's applied ecology faculty. The co-location of the NE CFWRU has (1) stimulated a four- to five-fold increase in applied ecology graduate student numbers (from somewhere around 10-15 students in 2001 to more than 50 now), (2) benefited fisheries research, especially with a functional fisheries group, and (3) stimulated renewed ties with Nebraska Game and Parks Commission (NGPC) and other partners.

- *Dramatic increases in enrollment and the improvement of curricula.* Undergraduate majors in natural resources nearly doubled, from 142 in 2003 to 257 in 2009. Most notably, enrollments in the flagship fisheries and wildlife major grew from 91 students in 2003 to 160 students (May 2009). Curriculum integration and growth occurred in all six natural resource majors. In 2003, SNR-taught courses accounted for only 6 of the 27 optional courses forming the natural resources core curriculum. In contrast, all natural resources students now take Ecology (NRES 220), Natural Resources Policy (NRES 323), Natural Resources Economics (NREE 265), a GIS course (NRES 312), and an earth science course (3 of 8 options taught by SNR). This is in addition to the required core courses in biology, chemistry, physics, communication, economics, and liberal arts. Thus, considerably more coursework integrates the natural resources curriculum in 2009 than in 2003.
 - *Development of ten new options within the fisheries and wildlife major.* Ten options have been added to the fisheries and wildlife major in addition to its general option (aquatic ecology, conservation biology, fisheries ecology and management, geospatial information science, habitat management, law enforcement, wildlife damage management, wildlife disease, wildlife ecology and management, and zoo animal care). By laying out coursework to achieve distinct career paths, these options have dramatically improved our ability to recruit, advise, and find internships for our students.
 - *Development of new field courses.* Applied ecology faculty members have developed field courses in wilderness ecology (northern Minnesota), tropical ecology (Puerto Rico), and African wildlife ecology (Namibia). Also, SNR now offers wildland fire training in the federal “red card” system (in cooperation with the Nebraska Forest Service) and does prescribed burns with student crews at UNL field sites.
 - *Incorporation of GIS course.* An introductory GIS course is now required of all natural resources students, and computer labs for such courses are included in Hardin Hall. This new requirement encourages landscape-scale thinking about ecosystems and underscores the importance of multidisciplinary approaches to complex ecological problems.
- *Increasing out-of-SNR enrollment in SNR courses.* SNR has worked toward bringing students from other UNL programs into its courses. NRES 220 (Principles of Ecology) is now required for the science education program in UNL’s Teachers College. Enrollment in NRES 220 in fall 2008 was 145 students, and is projected to increase to more than 200 students in the 2009–10 school year (offered both semesters).
- *Increases in SNR undergraduate research.* In the last four years, SNR has sponsored 33 undergraduate research projects funded through UNL’s Undergraduate Creative Activities and Research Experiences (UCARE) program. Applied ecology faculty mentored 28 of the 33.
- *Growth of extension programs.* Under Hygnstrom’s leadership, extension programs in wildlife damage management and disease have grown significantly since 2003. Staff member Vantassel manages the [Internet Center for Wildlife Damage Management](http://icwdm.org/) (<http://icwdm.org/>) administered by SNR in cooperation with Cornell University, Clemson University, and Utah State University.
- *Improvement of field facilities and education.* Applied ecology faculty and staff manage Nine Mile Prairie (<http://snr.unl.edu/aboutus/where/fieldsites/ninemileprairie.asp>), a 230-acre

tallgrass prairie and site of UNL grassland research since the 1920s. Applied ecology faculty and staff have also recently developed a new management plan for Prairie Pines (<http://snr.unl.edu/aboutus/where/fieldsites/prairiepines.asp>), an arboretum/woodland/agroecosystem study area. Both sites are near Lincoln and have frequent use by UNL faculty, staff, and students. SNR also played a key role in the development of new research facilities and programs at UNL's Barta Brothers Ranch (<http://snr.unl.edu/aboutus/where/fieldsites/bartabrothersranch.asp>) in the Nebraska Sand Hills.

- *Improved cooperation across UNL campuses.* The working relationship between SNR and SBS, especially with respect to teaching, has improved dramatically since 2003. The home department of three courses has been transferred from SBS to SNR (NRES 220 Principles of Ecology, NRES 474 Herpetology, and NRES 476/876 Mammology) and several other courses are now cross-listed. The unit best able to staff and teach a course now assumes responsibility for the course and receives credit accordingly. Cooperation with the Department of Geosciences has also increased by way of joint appointments, research collaboration, increased levels of administrative communication, and other activities.

4.2.4 Current Research Strengths

Applied population and community ecology. The population dynamics of individual species or species assemblages (i.e., communities) has traditionally been at the heart of both basic and applied ecology. An understanding of population ecology requires solid foundations in both organismal biology (including taxonomy) and the mathematical/statistical tools needed for analyzing and projecting population estimates. The applied ecology faculty have diverse population-oriented research projects supporting a large number of graduate students (Allen, Freeman, Hygnstrom, Pegg, Pope, Powell, Tyre). A number of projects partner with state and federal agencies to study T&E species. These projects often place T&E species in a community context and assess overall biodiversity of a particular group or habitat. Because many of the Great Plains' T&E species are associated with contested water resources (e.g., pallid sturgeon, piping plover, whooping cranes), their status is closely tied to management practices, including new efforts at adaptive management in cooperation with state and federal agencies. We also maintain strengths in the study and management of game species (e.g., fisheries). Current research addresses overabundant and invasive species, as well as negative human-wildlife interactions. These negative interactions increasingly include wildlife–disease–human interactions (e.g., hantavirus, chronic wasting disease, West Nile virus). UNL is fortunate to have a strong group of quantitative population ecologists in SNR, SBS, and the Department of Mathematics. This group currently has an NSF grant entitled RUTE (Research for Undergraduates in Theoretical Ecology, 2005–09, \$710,000). Several SNR faculty (Powell, Tyre) mentored RUTE interns in the summers of 2006 and 2007.

Landscape ecology. Several SNR faculty (Allen, Awada, Brandle, Huddle, Powell, Wedin, Zhou) examine landscape-ecosystem relationships and the ecological consequences of changing land cover and land use. Landscape ecology computing facilities (maintained by Powell, Tyre, and Hygnstrom) and the remote-sensing expertise of the Center for Advanced Land Management Information Technologies (CALMIT) provide the tools to assess landscape change. SNR's existing strengths in applied population and community ecology allow us to examine the impacts of those landscape changes. Current applied ecology research includes three broad areas:

(1) agriculture, sustainable agriculture, and agroforestry, including the roles of woody plants in agricultural systems; (2) range management, grazing practices, and grassland fragmentation; and (3) altered streamflows, invasive species, and woody species encroachment in riparian corridors, particularly the Platte and Republican rivers. Research projects in landscape ecology include assessing diversity in intensive versus sustainable farms, effects of grassland fragmentation on prairie chickens in southeast Nebraska, dune destabilization and its consequences in the Nebraska Sand Hills, Sand Hills bird diversity under traditional and intensive grazing management, and burying beetle diversity in woodland and grassland Sand Hills habitats.

Adaptive management. SNR faculty members have received major federal grants in recent years for the refinement and application of adaptive management (Allen, Fontaine, Hoagland, Pope, Powell, Tyre). Recent published papers deal with discontinuities in ecosystems, cross-scale resilience in ecosystems, predictive management, planning for robust reserve networks, and gap analysis. SNR has strengths in statistical and modeling approaches to uncertainty (Tyre) and also partners with diverse agencies for education, research, and natural resource management. Furthermore, the applied ecology group has expertise in resilience theory (Allen, Fontaine, Hoagland, Pope), and has developed new adaptive management specializations in its MS and PhD programs. A new NSF IGERT adaptive management grant dealing with overappropriated watersheds on the Great Plains has recently been awarded to SNR faculty and collaborators. This program will integrate faculty from diverse UNL departments and train more than 20 PhD students.

Ecosystem science. Primary production, ecosystem carbon balance, and nutrient cycling are central themes in ecosystem science, and there is considerable overlap with biogeochemistry, earth system science, global change biology, and complex environmental systems. Remote sensing platforms, distributed sensor arrays, cyberinfrastructure, and interdisciplinary conceptual advances have led to a bigger, yet more complex, picture of ecosystem dynamics at landscape, regional, and global scales. Several SNR faculty participate in large, federally funded interdisciplinary efforts and research networks such as Long-term Ecological Research (LTER), National Ecological Observatory Network (NEON), and Ameriflux (the carbon flux network of the Americas). In particular, SNR has strengths in measuring ecosystem fluxes of carbon, water, and energy. Recent unsuccessful UNL proposals to NSF (e.g., the \$25 million Center for Integration of Climate and Landscape Dynamics proposal led by SNR in October 2008) indicate strong prospects for the development of ecosystem science projects, but SNR's current limitations in terms of ecosystem modeling limit its potential impact in global change research. Current ecosystem science research efforts in SNR include carbon balance and greenhouse gas emissions of soybean and maize ecosystems; nutrient dynamics and primary production of aquatic ecosystems; and the interactions of ecology, hydrogeology, and geomorphology in the Sand Hills. The forestry faculty (Awada, Brandle, Huddle, Wedin, Zhou) have published recent papers on the ecophysiology of invasive woody species, hydrologic effects of conifer encroachment, and the impacts of agricultural shelterbelts on microclimate and aerodynamic.

4.2.5 Partnerships

SNR maintains that the future of natural resources management and habitat conservation lies in partnerships between private stakeholders, management agencies at all level of government, nongovernmental organizations, and the academic community. This view is supported by the

Nebraska Natural Legacy Project (Schneider et al., 2005). Toward that end, the applied ecology program in SNR has cultivated active and mutually beneficial research and teaching partnerships with a number of organizations, including, but not limited to the following.

- *U.S. Fish and Wildlife Service (USFWS)*. SNR partners with USFWS in the research, monitoring, and recovery of T&E species in Nebraska and the surrounding region, including the piping plover, least tern, pallid sturgeon, and American burying beetle.
- *Nebraska Game and Parks Commission (NGPC)*. SNR has a special relationship with NGPC that has deep historical roots. SNR partners with both NGPC and USFWS toward the research, monitoring, and recovery of T&E species. SNR and NGPC also cooperate toward the management of sport fisheries and wildlife species. The fisheries group within applied ecology in SNR has carried out considerable research on the population dynamics and human aspects of recreational fisheries in rivers and manmade reservoirs. Research and management protocols are relatively well established for deer, waterfowl, and upland game birds in Nebraska after decades of cooperation between what is now SNR and NGPC. At any given time, six or seven NGPC personnel serve as adjunct faculty.
- *U.S. Army Corps of Engineers (USACE)*. SNR partners with USACE in adaptive management for the protection of water and wildlife resources.
- *The Nature Conservancy*. SNR partners with The Nature Conservancy in the management and restoration of high-diversity prairies and in researching the role of biodiversity and landscape structure in maintaining ecological resilience.
- *Sandhills Task Force*. The Sandhills Task Force (<http://www.sandhillstaskforce.org/>) is a consortium of private ranchers, conservation agencies (including The Nature Conservancy, USFWS, NGPC, and NRCS), and UNL scientists. The goal of the group is to promote sound economic and environmental practices within the Nebraska Sand Hills. UNL range scientists affiliated with SNR examine grazing practices and the maintenance of bird and mammal diversity in partnership with the Sandhills Task Force.
- *Natural Resource Conservation Service (NRCS)*. NRCS personnel have provided information regarding knowledge and training of graduates, which has contributed toward improving assessment in the SNR ecology curriculum.

4.2.6 Teaching and External Educational Programs

Applied ecology faculty members hold 33% of SNR's teaching FTE, yet they produce a full 72% of SNR's student credit hour production in CASNR. Applied ecology faculty teach all of the natural resources students in foundation courses such as NRES 220 (Principles of Ecology) and also serve as thesis advisors for many of the environmental studies students. Undergraduate courses in ecology taught in SNR serve not only undergraduate majors within SNR, but also other programs in CASNR and in CAS. Furthermore, upper-level undergraduate ecology courses taught by SNR faculty are taken by a number of students in animal science, agronomy, agricultural leadership, and agricultural economics. Therefore, additional faculty or, at the least, additional teaching FTE assignments are needed to meet this increasing demand. In the fisheries and wildlife major, maximum practical enrollment may have already been reached considering current teaching FTEs and teaching facilities. A wide variety of courses in ecology are taught by SNR faculty (Table 4.2-3).

Many of the partnerships discussed previously also have presented and will continue to present enhanced opportunities for all forms of education carried out by SNR, particularly undergraduate internships and graduate research projects. The most important aspect of our partnerships in traditional wildlife management involves cooperation with NGPC in undergraduate education, particularly because dozens of SNR students complete internships with NGPC every year. The close physical proximity and historical ties between NGPC and SNR mean that students in fisheries and wildlife courses are frequently visiting NGPC headquarters. Likewise, NGPC staff members, serving as adjunct faculty in SNR, routinely teach courses, meet with students, attend seminars, and help select the Thomas Fisheries Scholarship recipient each year. Furthermore, the very active SNR Wildlife Club conducts hunter education programs and deer check stations during hunting season in cooperation with NGPC and the Izaak Walton League, and the newly organized student chapter of the American Fisheries Society within SNR cooperates with NGPC on fish habitat service projects.

SNR faculty, staff, graduate students, and undergraduate students are greatly involved with K-12 natural resources and environmental education in eastern Nebraska and beyond. SNR graduate students, with the help of Jim Brandle, have conducted formal science outreach programs for many years in the Lincoln Public Schools, emphasizing disadvantaged youth. The SNR Wildlife Club directly engages in K-12 students through Project Learning Tree (<http://www.plt.org/>), a nationwide multidisciplinary environmental education program. SNR has consistently sponsored and staffed award-winning environmental-education-oriented displays for events such as UNL's recruiting/outreach event, the "Big Red Road Show" (http://admissions.unl.edu/road_show/); the earth wellness festival (<http://lancaster.unl.edu/ewf/>), a 4-H-affiliated environmental education fair that has been attended by more than 40,000 fifth-grade students from Lancaster County, Nebraska, over a period of 15 years; and the Nebraska Children's Groundwater Festival (<http://www.cpnrd.org/GW%20Festival.htm>). Such efforts have reached thousands of children and parents. Graduates of SNR now play key roles in public education programs at both the Lincoln and Omaha zoos.

4.2.7 Goals for the Future (2009–14)

Education

- *Implement the new NSF IGERT grant in adaptive management (AM) and build a long-term sustainable graduate program in AM.* SNR has a new graduate specialization in AM, a new faculty member (Fontaine of the NE CFWRU), a new NSF grant to fund graduate stipends, and existing AM partnerships with federal agencies. Developing a "pipeline" of new students interested in AM will be a critical component in these ventures.
- *Build the quantitative rigor of SNR's fisheries and wildlife undergraduate major.* We have dramatically increased enrollment in recent years and reorganized the curriculum. However, we find many of our seniors falling short of the analytical and quantitative skills they need to excel as professionals. Courses will need to be integrated more effectively by building skills and knowledge through particular course sequences (e.g., from NRES 220 Ecology to NRES 311 Wildlife Ecology to NRES 433 Wildlife

Techniques to NRES 450 Biology of Wildlife Populations), and by enforcing lower-level prerequisites (e.g., calculus, statistics, and chemistry) *before* allowing students to enroll in upper-level quantitative courses. This approach should facilitate collaboration with other departments (e.g., SBS, Statistics, Math) on upper-level courses, and it should also increase the number of SNR undergraduates who are prepared for success in graduate programs, including our own. SNR should continue to build partnerships in research and graduate education across campus in the interdisciplinary area of ecology, math, and statistics.

- *Creatively address our shortfalls in teaching FTE.* As undergraduate student credit hour production continues to grow, new strategies must be developed in order to meet demands. Such strategies could include encouraging our partners at state and federal agencies to participate and/or teach in our upper-level courses, and using those SNR faculty who are not traditionally involved in undergraduate education to teach field courses, laboratories, short courses, and course components (e.g., climate or drought) *within* existing large enrollment courses. SNR will also need to determine how to fund and staff the large number of graduate teaching assistantships that now are needed in our program.

Research and Outreach

- *New wetlands ecologist position.* This position was determined to be a priority for SNR's water, applied ecology, and restoration science programs during the faculty prioritization process in spring 2008. SNR's existing gap in wetland expertise has hampered both high-impact research and effective teaching. Wetlands are a critical consideration in local and regional hydrology as well as biological conservation. They provide habitat in Nebraska for millions of migratory birds, and they are also the focus of research and management efforts by a number of our partners, including NGPC, NRCS, USFWS, the Sandhills Taskforce, and the Rainwater Basin Joint Venture. We intend to fund the wetlands ecologist position through the redirection of resources resulting from faculty retirements at the earliest possible date. A new hire will need to contribute in teaching large enrollment lower-level courses, as well as in upper-level or graduate level courses, notably NRES 468/868 Wetlands, which will be offered in spring 2010, after a six-year break, when the department hires a lecturer.
- *Articulation of natural resources management and conservation with production agriculture in Nebraska.* Much of our applied ecology research already deals with the configuration of agricultural and nonagricultural landscapes; wildlife habitat in managed grasslands, arable land, and shelter belts; and the environmental impacts of intensive versus sustainable/organic agriculture. These issues will only increase in importance in the next decade and well into the future, yet UNL is poorly positioned to address them. Neither SNR nor Agronomy/Horticulture has the critical mass of faculty members to present alternative visions to the status quo for production agriculture, yet our society is demanding such a vision. We will attempt to collaborate with Agronomy/Horticulture to determine opportunities to support of this research and outreach program area.
- *Improvement of ecological informatics, statistics, and survey.* SNR's mission is to be a leading provider of data, maps, and assessments for natural resources in Nebraska. There is a consensus that integrating and linking existing data and databases (geoinformatics,

bioinformatics, and climate informatics) is of paramount importance, as is the long-term maintenance of data sets. Moreover, there is a clear need for staff technical expertise in informatics, data visualization, and twenty-first-century information technology in general.

- *Development of ecosystem modeling is a major part of current global change research.* Empirical flux measurements for carbon, water, and energy (such as those measured by SNR's eddy covariance flux towers) need to be rescaled spatially and temporally before they can be used to drive climate models addressing land surface–mesoscale climate feedbacks. Climate scientists are also producing increasingly explicit regional future climate scenarios. Ecosystem modeling is needed to predict the impacts of those climate changes on the productivity, hydrology, and carbon balance of Nebraska's natural and managed ecosystems. The necessity of better ecosystem modeling in SNR has been evident for a decade, but has not yet been addressed because of budget constraints and other factors.
- *Development of expertise in molecular ecology.* Expertise in molecular ecology is needed in order to bolster the program in conservation biology and to facilitate research in applied ecology. SNR applied ecology faculty have slowly been working toward partnerships with scientists at Omaha's Henry Doorly Zoo in this regard, but a faculty member specializing in this area may eventually need to be hired.

Table 4.2-3. Courses Taught by Applied Ecology Faculty.

Course number	Title	Instructor(s)
NRES 101	Natural Resources Orientation	Tyre
AGRI/NRES 103	Introduction to Agriculture and Natural Resource Systems	Brandle
NRES 211	Introduction to Conservation Biology	Ferraro
NRES 220	Principles of Ecology	Wedin
NRES 222	Ecology Laboratory	Wedin
NRES 310	Introduction to Forest Management	Awada
NRES 310	Introduction to Forest Management Lab	Awada
NRES 311	Wildlife Ecology and Management	Powell
NRES 312	Introduction to Geospatial Information Sciences (no longer taught by applied ecology faculty)	Irmak
NRES 348	Wildlife Damage Management	Hygnstrom
BIOS/NRES 386	Vertebrate Zoology	Freeman
NRES 404	Forestry, Fisheries, and Wildlife Seminar	Pegg
NRES 406/806	Plant Ecophysiology: Theory and Practice	Awada
NRES 417/817	Agroforestry Systems in Sustainable Agriculture	Brandle
NRES 424/824	Forest Ecology	Wedin
NRES 433	Wildlife Management Techniques	Powell
NRES 448/848	Advanced Topics in Wildlife Damage Management	Hygnstrom
NRES 450/850	Biology of Wildlife Populations	Tyre
NRES 463/863	Fisheries Science	Pegg
NRES 464/864	Fisheries Biology (not currently offered)	
NRES 468/868	Wetlands (has not been offered since 2004, will be offered in 2010)	Herrman(Lecturer)
NRES 474/874	Herpetology	Ferraro
NRES 476/876	Mammalogy	Freeman
NRES 492/892	Study Tours in Natural Resources Management	Allen, Pegg, Powell, Wedin
NRES 498/896	Special Topics - Stream and River Ecology	Thomas
NRES 810	Landscape Ecology (not currently offered)	Allen
NRES 849	Woody Plant Growth and Development	Paparozzi (Agron-Hort), Brandle (SNR)
NRES 898	Special Topics - Ecological Statistics	Tyre

Source: SNR Course Database

4.2.8 References

- IANR, 2008. At Work for Nebraska: A Strategic Plan for the University of Nebraska Institute of Agriculture and Natural Resources 2008–2016. <http://ianrhome.unl.edu/strategicplan>
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- The Nature Conservancy, undated. Cover Story: Global Grasslands. <http://www.nature.org/earth/grasslands/coverstory.html>
- United Nations System-Wide Earthwatch, undated. Assessments by environmental issues. <http://earthwatch.unep.net/assessments/issues/index.php>
- World Wide Fund for Nature, undated. WildWorld Ecoregion Profile: Nebraska Sand Hills mixed grasslands (NA0809). <http://www.nationalgeographic.com/wildworld/profiles/terrestrial/na/na0809.html>

4.3 Water Resources Quantity and Quality

Enhance water resources quantity and quality by improving water consumption and conservation practices, mitigating surface and ground water contamination, creating more efficient water clean-up technologies, developing more comprehensive water monitoring networks for decision support, and providing the theoretical framework for more effective social systems for management of resilient aquatic ecosystems.

Executive Summary

Nebraska's water resources support food production through irrigation and recreation through lakes, rivers, and wetlands, and they provide process water for industry and a reliable supply of drinking water for the state's 1.8 million residents. Effective management of the quality and quantity of Nebraska's groundwater and surface water is critical in preserving this resource for future use. Over the past five years, the School of Natural Resources (SNR) has become the focal point for emerging water resource issues. Researchers in SNR investigate hydrologic connections between river systems and adjacent aquifers, the effects of water flow on wildlife habitats, and the hydrology of groundwater-dependent wetlands, lakes, and streams. Hydrologic models have been developed and used to characterize the hydrologic connectivity between streams and aquifers and to analyze the impact of groundwater irrigation on stream flow. New tools and methods for studying evapotranspiration and recharge to groundwater are being developed and will be even more critical as the local climate changes. The impact of water flow on managed ecosystems has been investigated through the study of water use of cropping systems and the application of windbreak technology and evapotranspiration across various ecosystems. SNR researchers team with other faculty in science and engineering to develop and apply new methods to investigate and mitigate agricultural and other anthropogenic impacts on surface and groundwater quantity and quality. Research and extension programs help improve the quality of water in lakes, streams, and groundwater through the adoption of practical nutrient loading (TMDL) requirements, better wastewater treatment systems, and the detection, migration characterization, and/or remediation of contaminants such as nitrogen, phosphorous, arsenic, hormones, pharmaceuticals, pesticides, munitions, sediments, and algal toxins. Landscape watershed contamination vulnerability models and remote sensing techniques are used to identify impacted areas. Water resource outreach and extension programs are shaped through efforts in the University of Nebraska–Lincoln (UNL) Water Center and other SNR-based centers. Students in natural resources, through the undergraduate programs of water science and environmental restoration science and graduate programs via specializations in hydrologic sciences (MS and PhD) and aquatic ecology (MS only), are trained to provide expertise for future generations of effective stewardship of this precious resource.

4.3.1 Importance to Nebraska and the Nation

Water resources are critical to Nebraska's economic and environmental health. Nebraska ranks fourth in the nation for food production, depending principally on irrigated agriculture. Water plays a major role in the status of Nebraska's natural resources, especially with abundant groundwater and unique areas such as the Sand Hills, rainwater basins, eastern saline wetlands, and western playa lakes. Like much of the United States, our agriculture and the growth of

communities across the state depend on the quality and quantity of Nebraska's water. With limited water, the state relies largely on groundwater from the High Plains Aquifer system and Platte River stream flow fed by snow melt from the Rockies in the neighboring states of Colorado and Wyoming. Understanding the water cycle and how to effectively manage the quality and quantity of Nebraska's groundwater and surface water-systems is critical for the state and central Plains. Resolving conflicts between water uses will become even more important as the world's population and prosperity increases.

Water resource research areas identified in the National Research Council (NRC) 2004 report (*Confronting the Nation's Water Problems: The Role of Research*, National Academies Press, Washington, D.C.) that are relevant to Nebraska and the central Plains are:

- Manage and control nonpoint source pollutants
- Understand impact of contaminants on ecosystem services
- Develop new techniques for measuring water flows and water quality, including remote sensing and in situ measurements
- Develop data collection, archiving, and distribution in near real time for improved forecasting and water resources operations
- Understand global climate change and its hydrologic impacts
- Understand relationships between agricultural water use and climate, crop type, and water application rates
- Understand behavior of aquatic ecosystems in a broad, systematic context, including their water requirements
- Understand interrelationships between humans and aquatic and terrestrial ecosystems to support watershed management

SNR supplies critical leadership and expertise in research, teaching, survey, and outreach efforts for these and other pressing water resource issues. Collaborations between SNR and other units within and beyond the University of Nebraska continue to grow and strengthen our water resources programs. Water is clearly a resource requiring interdisciplinary understanding.

4.3.2 Status in 2003

Since the time of our last review, water resources faculty interaction with colleagues in engineering and human dimension studies has increased, as evidenced by the increased number of research proposals and publications as well as the formation of the human dimensions program area in SNR. The water science major was administered in the Department of Biological Systems Engineering with the majority of majors focusing on hydrology from an engineering perspective. The Water Sciences Laboratory (part of the Water Center) served a limited number of faculty and provided a relatively narrow range of analytical services. Outreach activities were limited and most emphasized production agriculture. Sixteen faculty (15.33 FTE) were involved in water resources in 2003, with 2.7 FTE in teaching, 7.74 FTE in research, and 4.84 FTE in extension/outreach. The Conservation and Survey Division (CSD) and the Water Center were officially merged with SNR in July 2003. The merged units improve and enhance water resources related teaching, research, and extension efforts in Nebraska.

4.3.3 Progress and Change (2003–09)

Since 2003, the Conservation and Survey Division has completed its merger into SNR, two faculty have retired, and two have accepted positions elsewhere. A major transformation in the water resources program at UNL came about in 2005 with the funding of the Water Resources Research Initiative (WRRI). The goal of WRRI is to build a strong education program for interdisciplinary training in environmental problem solving related to water and develop effective extension/outreach programs to increase public literacy and provide information for regional policy and planning. WRRI resulted in the hiring of nine faculty members at UNL, helping to expand UNL research, extension, and teaching expertise in key water-related disciplines. Progress has been made toward a strong educational program in water resources, but this goal has not yet been accomplished. Several of the newly hired faculty members have joint appointments in SNR (Irmak, Istanbuluoglu, Lenters, Oglesby, Schoengold, and Thomas; Istanbuluoglu will be leaving mid-September and a search to fill the position will be initiated soon with funding from the Water Resources Research Initiative). Currently, 22 SNR faculty members list water resources as their primary program affiliation (16.38 FTE, with 2.55 in teaching, 9.37 in research, and 4.26 in extension/outreach) (Table 4.3-1); affiliated faculty (24.87 FTE) and cooperative teaching, research, and extension efforts with faculty from other departments support the water resources area. Other faculty members are associated with various aspects of water resources, but not as their primary activity. The Water Sciences Laboratory has acquired additional state-of-the-art laboratory equipment including automated analyzers and several mass spectrometers (triple quadrupole, plasma, stable isotope) to expand the range of methods and services for water-related research. Faculty use of the facility has almost tripled since 2002.

Table 4.3-1. SNR Water Faculty FTE.

Name, Rank	Current Appt	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	Total	Soft Funded
Tadd Barrow, Assistant Extension Educator	1.00 SNR	1		.49	.49	.02		1.00	.50
Xun-Hong Chen, Professor	1.00 SNR	2		.74		.26		1.00	
Anatoly Gitelson, Professor	1.00 SNR	3		.83		.17		1.00	
Jim Goeke, Professor	1.00 SNR	4		.05	.72	.23		1.00	
Dave Gosselin, Professor & ESP Director	1.00 SNR	5	.90			.10	.20	1.00	
Ed Harvey, Professor & SNR Associate Director	1.00 SNR	6	.25	.13		.12	.50	1.00	
Kyle Hoagland, Professor & WC Director	1.00 SNR	7	.15	.35			.50	.50	
Aris Holz, Research Assistant Professor	1.00 SNR	8	.25	.73		.02		1.00	.75
John Holz, Research Assistant Professor ¹	1.00 SNR	9	.15	.70	.13	.02		1.00	
Ayşe Irmak, Assistant Professor ²	.60 SNR .40 CE	10	.15	.43		.02		0.60	
Erkan Istanbuluoglu, Assistant Professor ³	.70 SNR .30 BSE	11	.30	.37		.03		.70	
Mike Jess, Geoscientist	1.00 SNR	12	.20	.15		.65		1.00	
Sue Lackey, Geoscientist	1.00 SNR	13		.25		.75		1.00	

Name, Rank	Current Appt	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	Total	Soft Funded
Jae Ryu, Postdoctoral Research Associate	1.00 SNR	14		.70		.30		1.00	1.00
Pat Shea, Professor	.75 SNR .25 UNMC	15	.10	.30	0.10	.25		.75	
Steve Sibray, Geoscientist	1.00 SNR	16		.25		.75		1.00	
Ramesh Singh, Postdoctoral Research Associate	1.00 SNR	17		1.00				1.00	1.00
Dan Snow, Research Associate Professor	1.00 SNR	18	.05	.50		.45		1.00	.10
Mary Spalding, Professor	1.00 SNR	19		.40		.60		1.00	
Joe Szilagyi, Associate Professor	.33 SNR	20		.33				.33	
Tiejun Wang, Postdoctoral Research Associate	1.00 SNR	21		1.00				1.00	
Wayne Woldt, Associate Professor	.25 SNR .75 BSE	22			.25			.25	
Total	19.63 SNR 1.05 BSE .40 CE .25 UNMC	22	2.50	9.70	1.69	4.74	1.00	19.63	4.35
<u>Water Faculty by Tenure</u>									
Tenured/Tenure Track	9.30 SNR 1.05 BSE .40 CE .25 UNMC	11	1.85	3.60	1.07	1.78	1.00	9.30	
Nontenure Track	10.33 SNR	11	.65	6.10	.62	2.96		10.33	4.35
Total	19.63 SNR 1.05 BSE .40 CE .25 UNMC	22	2.50	9.70	1.69	4.74	1.00	19.63	4.35

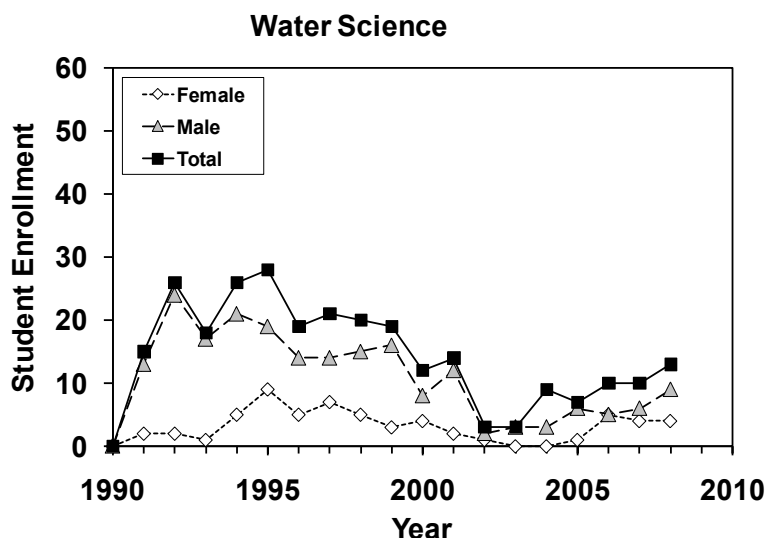
Source: 2008-09 Adjusted Budget

¹Left UNL June, 2009; position has been filled on a temporary basis; ²WRRI hire; ³WRRI hire; will be leaving UNL mid-September and a search to fill the position will be initiated

CE=Civil Engineering; BSE = Biological Systems Engineering; UNMC = University of Nebraska Medical Center

In 2007, the water science major was moved to SNR and four new options were added to the major in addition to hydrology: aquatic ecology, water law and policy, water quality, and watershed management. The new options allow students to gain not only a broad education in water science, but also to specialize in an area, making them increasingly attractive to employers. The hydrology option prepares students for the exam to become a certified hydrologist with the American Institute of Hydrology. Since 2003 (our lowest enrollment), student enrollment in the undergraduate water science program has increased from 3 students to 15 students (Figure 4.3-1).

Figure 4.3-1. Undergraduate Student Enrollment in the Water Science Major Since 1990.



Source: CASNR

Sixty-six percent of our majors have internships in a hydrology, water quality, or water policy related field (U.S. Geological Survey [USGS], Department of Interior, National Parks Service, Lincoln Wastewater System, and with UNL faculty). Many of our current students have expressed an interest in the new options of the aquatic ecology and water quality programs. Four faculty (Holz, Harvey, Eisenhauer [BSE], and Supalla [Ag Econ]) currently advise the fifteen water science students. Five graduate students have the hydrologic sciences graduate specialization (three MS and two PhD) and nine MS students are in aquatic ecology (a specialization added in the past five years). Faculty hired as part of WRRRI contribute to courses in hydrologic and climate modeling in addition to performing research in these areas.

A second undergraduate major relevant to water resources, environmental restoration science, was developed in the last five years. The curriculum for this major was developed by faculty from SNR and the departments of Entomology and Agronomy and Horticulture, led by Comfort in SNR. This major is discussed in a subsequent section of this chapter.

4.3.4 Current Status

SNR faculty members are addressing many of the water-related issues identified by the NRC (2004), broadly defined in two main areas: hydrology of natural and managed ecosystems, and agricultural and other anthropogenic impacts on surface and groundwater quantity and quality. See Table 4.3-2 for a list of select water-related grants funded since 2003. These efforts support our undergraduate and graduate programs. The Water Center, High Plains Regional Climate Center (HPRCC), National Drought Mitigation Center (NDMC), and Center for Advanced Land Management Information Technologies (CALMIT) all contribute to hydrologic research. Other programs with strong hydrologic emphasis include the Sandhills Biocomplexity Project and the Statewide Groundwater-Level Monitoring Program.

Table 4.3-2. Selected Recent Grants Awarded to SNR Faculty in the Water Faculty Area, 2003–09.

Title	Granting Agency	Total Amount	Term	Water Faculty
Effects of Cattle Manure Handling & Management Strategies on Fate & Transport of Hormones	EPA	\$699,607	2007-10	Snow
Targeting Watershed Vulnerability & Behaviors Leading to Adoption of Conservation Management Practices	Department of Agriculture - CSREES	\$570,000	2006-09	Shea Burbach
Eastern Nebraska Water Resources Assessment LPNRD	Lower Platte North NRD	\$459,588	2007-10	Lackey
Integrated Real-Time Groundwater-Level Monitoring Network to Support Drought Impact Assessment and Mitigation Programs	Nebraska DNR	\$403,293	2005-11	Burbach
Investigation of the Role of Rainwater Basin Wetlands in Contributing to the Functions of Groundwater Recharge, Water Quality Improvement, and the Wildlife Habitat, including an Assessment of the Impact of Sediment on these Functions	NGPC	\$388,520	2007-10	Harvey
Habitat Conservation Plan for the Salt Creek Tiger Beetle and the Eastern Saline Wetlands of Nebraska	NGPC	\$380,000	2006-08	Harvey
Earth Science Institute for Elementary Educators	NASA	\$356,094	2005-09	Gosselin
Solving Complex Issues in Nebraska: Modeling the Western Platte River Valley-Phase II	EPA	\$347,200	2005-11	Hoagland
Advancing Onsite Wastewater Treatment in Nebraska	NDEQ	\$259,742	2005-10	Woldt
Development of Regional Groundwater Flow Model for Integrated Water Resources Management in the Lower Platte Area	Lower Platte North NRD	\$220,428	2003-06	Chen
Fremont Lake #20 Alum Treatment Evaluation Project	NDEQ	\$201,700	2007-09	Holz Barrow Hoagland

Source: NUGrants

4.3.5 Research/Outreach/Extension

Advancing hydrological science in natural and managed ecosystems:

- *Water Use.* Water use by crops is an important issue in our state, which has a strong agricultural base. The application of windbreak technology to water conservation has a long history at UNL and within the Great Plains; SNR scientists are collaborating with scientists at Iowa State University to study the influence of windbreaks and shelterbelts and their effects on crop water use. The research is being applied to organic crop farming (with colleagues in Agronomy and Entomology). Because of its role in reducing crop water use, windbreak technology has a potential role in adapting to climate change. Research on evapotranspiration in agricultural, grassland, forest, wetland, lake, and riparian ecosystems provides information on the most important components of the water budget and water use efficiency. Research on ecohydrological impacts of woody species expansion in semiarid grasslands has been conducted using isotope hydrology and remote sensing techniques. (Participating SNR tenured/tenure track state-funded faculty: Awada, Brandle, Harvey,

Hubbard, Irmak, Istanbuluoglu, Lenters, Verma, Wedin; nontenure-track faculty: Huddle, Suyker, Zhou)

- *Water flow.* Much work has been conducted to improve our understanding of hydrologic connections associated with several large river systems in central and eastern Nebraska, including the Platte, Elkhorn, Republican, and Blue River basins, for integrated management of stream water and groundwater resources as well as for the analysis of the effects of water flow on wildlife habitats, including the Missouri River paddlefish and other fish species. In addition, the role of naturally saline groundwater on the development and sustenance of eastern saline wetland ecosystems and especially the impact of contamination of salt flats and streams by freshwater runoff on the state endangered salt wort (*Salicornia rubra*) and the federally endangered Salt Creek tiger beetle (*Cicindela nevadica* var. *lincolniana*) have been investigated. Advanced technologies are being used (such as electrical resistivity imaging) to characterize and pinpoint saline groundwater presence and movement beneath eastern Nebraska's saline wetland complexes and to locate and map saline springs and seeps. The Rainwater Basin wetland ecosystems' role in recharging the underlying Ogallala Aquifer and naturally remediating agriculturally derived nitrates and pesticides has also been investigated. Hydrogeological and hydrochemical research on the historical and present-day relationships between groundwater and the glacial relict plant communities of the Nebraska Sand Hills fens, which include many more boreal species such as rush aster (*Aster junciformis*) and cotton grass (*Eriophorum polystachion*) and two unique and rare fish species—the northern redbelly dace (*Phoxinus eos*) and the finescale dace (*Phoxinus neogaeus*)—is aimed at quantifying evapotranspirative (ET) flux and the role of groundwater in meeting wetland ET demand to compensate for ongoing climate changes. (Participating SNR tenured/tenure-track state-funded faculty: Chen, Harvey, Pegg; adjunct faculty: Pope; soft-funded staff: Gilbert)
- *Hydrologic modeling.* Several hydrologic models are being developed, or have been developed, for groundwater, surface water, wetlands, and overland flow. The models enable us to study the hydrologic connectivity between streams and the High Plains Aquifer in Nebraska and analyze the impact of groundwater irrigation on streamflow. For example, WASH123D is a complex, integrated, physics-based model with capability for 1-D channel flow, 2-D overland flow, and 3-D groundwater flow (and it has been implemented in PC and high performance computing environments). The research directly impacts the development of integrated management of surface and groundwater resources in a number of major watersheds in Nebraska. The estimation of evapotranspiration at a grid spacing of about 1 km for the entire state of Nebraska with the help of satellite data is underway. Spatial distribution of mean annual recharge to groundwater is of importance to the state, especially with concerns regarding climate change. These projects are represented by a breadth of expertise in modeling, field sampling, aquifer pumping tests, streambed tests, geophysical characterization methods, and remote sensing, and include established monitoring networks related to climate variables, isotopes in precipitation, groundwater levels and groundwater quality. (Participating SNR tenured/tenure-track state-funded faculty: Ayers, Chen, Gosselin, Harvey, Irmak, Spalding, Wedin, Woldt; nontenure-track faculty: Burbach, Holz, Lackey, Ryu, Zilagyi; soft-funded staff: Gilbert)
- *Climate effects.* Stakeholders (e.g., agricultural producers, energy providers, water suppliers, natural resource managers, etc.) are anxious to know how to plan for the future given the impacts of climate variability and change on water resources. In this area, research has been conducted on climate forcing between soil water and groundwater interactions, along with

work to develop enhanced stream flow and drought forecasts. Also, researchers are using stable oxygen and hydrogen isotopes along with radioactive isotope dating methods to examine groundwater paleohydrology and past climate differences in several of Nebraska's aquifer systems. CSD within SNR has the statutory responsibility to characterize the architecture of the rocks composing the aquifer systems within Nebraska, monitor the hydrologic changes within these systems, and provide technical support to the public and management agencies for appropriate utilization of the water resources. Additionally, the HPRCC has numerous monitoring stations throughout the state, and the NDMC, one of the founding partners of the U.S. Drought Monitor (USDM), helps assess drought conditions across the country for the weekly USDM map. The NDMC also participates with agencies in both Mexico and Canada in preparation of a monthly North American Drought Monitor product. A detailed hydrologic analysis of the state will help natural resources managers and legislators allocate water. A rich database on the fate of water in numerous environments throughout the state along with detailed hydrologic models can help researchers develop more accurate predictions of the effects of climate variability and change in the state, as well as the Great Plains. (Participating SNR tenured/tenure-track state-funded faculty: Goeke, Harvey, Hubbard, Woldt; nontenure-track faculty: Knutson, Lackey, Ryu, Sibray, Svoboda, Szilagyi, You)

Measuring and mitigating agricultural and other anthropogenic impacts to surface and groundwater quality:

Based on land cover data, nearly 95% of the land use in the state of Nebraska is dedicated to agricultural production; thus, many of the research and extension-related activities focus on the impacts of agriculture and emerging contaminants on water quality. But because of the state's dependence on growth and economic community development as well as the healthy function of our natural resources, a coordinated activity in water science policy and law is needed.

- *Groundwater and surface water quality.* Lake, stream, and groundwater quality are main focal points of research in SNR, including assisting the state in establishing Total Maximum Daily Load (TMDL) requirements, better managing onsite wastewater treatment systems, and detecting contaminants such as nitrates, agrichemicals, and arsenic in groundwater and hormones, pharmaceuticals, pesticides, nutrients, sediments, and algal toxins in surface water. Faculty have worked with natural resource districts, Nebraska Game and Parks, and the Department of Environmental Quality (DEQ) on groundwater and surface water quality issues. Similar to hydrologic assessment, water quality intersects many disciplines and encompasses several entities within SNR, including the Water Center and Water Sciences Laboratory, the Surface Water Quality and Extension Program, and CALMIT. (Participating SNR tenured/tenure track state-funded faculty: Gosselin, Harvey, Hoagland, Merchant, Rundquist, Spalding, Woldt; SNR nontenure-track faculty: Barrow, Holz, Snow; participating soft-funded staff: Gilbert)
- *Watershed/surface water modeling.* Models are being developed to identify landscape watershed vulnerability to agrichemical contamination as well as to identify the impacts of nutrient and sediment runoff on water quality based on land use practices (e.g., various crops, Best Management Practices [BMPs], buffer strips, conversion of agricultural land to Conservation Reserve Program [CRP]). For instance, a watershed-based numerical

groundwater model was developed to identify wellhead protection areas for communities in northeast Nebraska and the lag time to see the impacts of BMPs. New techniques are being developed for the identification of algal toxins in the laboratory and through remote sensing. Historic water quality in the state is being examined through the use of algal toxins. Sand pit lakes; detection and remediation of munitions, pesticides, and nitrate contaminants; and cooperative work with Nebraska Game and Parks and DEQ on water quality issues are other areas of research interest. (Participating SNR tenured/tenure-track state-funded faculty: Comfort, Gitelson, Shea, Woldt; SNR nontenure-track faculty: Holz, Snow)

4.3.6 Teaching

- *Undergraduate major in water science.* The water science major is coordinated by an interdepartmental committee whose members include Aris Holz (chair; SNR), Dean Eisenhauer (BSE), John Lenters (SNR), Brad Lubben (Ag Econ), and Ed Harvey (ex officio). The major is designed to educate students in basic and applied sciences related to water resources. The goal is to educate individuals to gather and synthesize information from several disciplines, formulate ecologically and economically rational alternatives, and effectively implement various water-based programs. The curriculum is designed to meet the needs of students who intend to pursue careers in agencies that form or implement policy at all levels of government, in public and private organizations that manage water and land resources, in private consulting companies that offer water management services, and in a broad range of nonprofit institutions interested in water resources. The program also provides students the opportunity to prepare for advanced education in several areas of graduate study.

A minimum of 128 credit hours is required for the BS degree. Of these requirements, 25-29 credits are in an integrated water science curriculum designed to provide both breadth and depth in water resources. The water science major also requires 25 credit hours of science and mathematics. In addition, the student must select an option area (aquatic ecology, hydrology, water law and policy, water quality, watershed management) consisting of 18-26 credit hours. To complete the major, the student must take 24 credit hours of communication, humanities, and social science courses. See Table 4.3-3 for a list of courses that support the undergraduate water sciences program.

The Soil and Water Resources Club (advised by Mark Kuzila) brings graduate and undergraduate students together with the intent of stimulating interest in soil and water resources and promoting the art and science of good land and water use. Club members have the opportunity to participate in unique and educational activities, such as tours of saline wetlands and campus research facilities and attending the annual national SWCS meetings. Currently 6-8 students participate in the club.

Recent surveys of alumni and potential employers suggest that graduates from the water science program might find employment as research scientists, assistants, or technicians, or laboratory or field technicians with local, state, and federal agencies. Those agencies might include city water or planning departments, Department of Environmental Quality, Department of Natural Resources, Natural Resource Districts, Game and Parks Commission, Department of Roads, Environmental Protection Agency, U.S. Geological Survey, and

Bureau of Reclamation. Specific job titles might include water quality specialist, aquatic ecologist, watershed/GIS modeler, groundwater water quality specialist, environmental chemist, toxicologist, and surface water quality specialist. Similar positions are available at research universities, and more rarely at nonprofit organizations (e.g., The Nature Conservancy) or private consulting firms. Hydrologist or hydrogeologist positions with private consulting firms or local, state, and federal agencies (city water or planning departments, Department of Roads, U.S. Geological Survey, Bureau of Reclamation) are available. Opportunities also exist for water science graduates as water resource lobbyists, or as environmental lawyers after law school. Some undergraduates continue on to graduate school and may obtain faculty or research positions.

Table 4.3-3. Water-related Courses Supporting the Undergraduate Water Sciences Program.

Course Number	Course Title	Instructor
<i>Agricultural Economics</i>		
AECN 265	Resource & Environmental Economics I	Johnson
AECN 357	Environmental & Natural Resources Law	Aiken
AECN 456	Environmental Law	Aiken
AECN 457	Water Law	Aiken
AECN 465	Resource and Environmental Econ II	Supalla
<i>Biological Sciences</i>		
BIOS 473*	Freshwater Algae	--
<i>Civil Engineering</i>		
CIVE 353	Hydrology	Harvey ¹ /Istanbulluoglu ¹
<i>Geology</i>		
GEOL 498	Land and Water Dynamics	Weber
<i>Natural Resources</i>		
NRES 208	Applied Climate Science	Bathke & Walter-Shea ²
NRES 402 & 402L	Aquatic Insects and Lab	Danielson
NRES 408/808	Microclimate: The Biological Environment	Walter-Shea ² & Verma ²
NRES 415	Water Resources Seminar	Jess ¹
NRES 463	Fisheries Science	Pegg ²
NRES 470	Lake & Reservoir Restoration	Holz ¹
NRES 488	Groundwater Geology	Pederson
NRES 489	Ichthyology	Pegg ²
NRES 496#	River & Stream Ecology	Thomas ²
NRES 496#	Hydroclimatology	Lenters ²
<i>Water Sciences</i>		
WATS 281	Intro to Water Science	Skopp ²
WATS 354	Soil Conservation	Eisenhauer
WATS 361	Soils, Environment & Water Quality	Comfort ²
WATS 408	Microclimatology	Walter-Shea
WATS 418	Chemistry of Natural Waters	Harvey ¹ /Gates
WATS 452	Irrigation Systems Management	Eisenhauer
WATS 459	Limnology	Holz ¹
WATS 461	Soil Physics	Skopp
WATS 468*	Wetlands	SNR Lecturer
WATS 475	Water Quality Strategy	R. Spalding
WATS 498A & B	Senior Thesis	A. Holz ¹

*course is "on the books" but has not been taught for a number of years (WATS 468 is a course in demand by water science students); #new course since 2003; ¹SNR faculty who selected Water as their primary faculty area; ²SNR faculty who selected something other than Water as their primary faculty area

Other course needs include NRES 423 Integrated Resource Management; this course serves as a capstone course in water science (and other natural resource majors) and has not been consistently offered every spring semester. The course was taught during spring 2009 by a lecturer. This course will be taught again in spring 2010 by the same lecturer. The Wetlands course is valuable to many natural resources majors but has not been taught since 2003. We will be offering this course in spring 2010.

Environmental restoration science. Another undergraduate major developed within the last five years that has a significant components related to water resources is environmental restoration science. The curriculum was developed by faculty from SNR, Entomology, and Agronomy and Horticulture and is a revision of the environmental soil science major. According to the major description, environmental restoration initiates or accelerates the recovery of an ecosystem that has been degraded, damaged, or contaminated from human activity or natural agents. Environmental restoration begins with a thorough understanding of the soil-water environment. Students interested in environmental restoration science must declare an option and can choose either the soil science or lake and stream restoration option. Enrollment has increased from 5 (with the old major in 2006) to 13 since the start of the new major in fall 2007.

The soil science option provides students an understanding of soil as a natural resource and as a component of all terrestrial ecosystems. Students will learn how soils influence ecological processes above and below ground. An understanding of these processes will enable students to deal with environmental management problems such as groundwater protection, natural resource management, urban and rural development issues, waste management, and pollution abatement. Careers focus on environmental assessment, soil conservation, and remediation of soil contamination. Students interested in preparing for graduate work in soils can aim for a variety of special areas, including soil microbiology, fertility, chemistry, physics, mineralogy, and morphology.

The lake and stream restoration option is designed for students considering careers in water quality, aquatic ecology, or limnology. Students will learn the important biotic, physical, and chemical processes that occur within lakes and streams and be prepared to environmentally manage problems related to water quality. Students will also be prepared to implement pollution abatement procedures or management practices associated with lake and stream restoration. Careers focus on environmental assessment, water conservation, and remediation of lakes and streams. Completion of this program also provides excellent preparation for graduate study.

- *Graduate program.* Graduate students interested in water resources issues may declare specializations in hydrologic sciences at the MS and PhD levels and aquatic ecology at the MS level. Table 4.3-4 shows the water-related courses that contribute to these specializations. The hydrologic sciences specialization (Ed Harvey, coordinator) revolves around the many components and processes of the earth's hydrologic cycle, including atmospheric moisture transport, surface hydrology, groundwater, limnology, wetlands, water chemistry, isotope hydrology, soil water dynamics, contaminant transport, environmental geophysical methods, and numerical modeling. The aquatic ecology specialization (A. Holz,

coordinator) is designed to provide a rigorous, focused graduate program that draws on faculty expertise in aquatic sciences and ecology at UNL and the diversity of aquatic habitats in the Great Plains region. Four faculty currently advise the 18 hydrology students (hydrologic sciences specialization: 5 MS and 3 PhD; aquatic ecology: 10 MS). Ed Harvey also advises graduate students in the hydrogeology specialization graduate program in Geosciences. Harvey and Chen contribute to this Geosciences program by presenting their research in classes on field techniques in hydrogeology and groundwater modeling.

SNR also participates in the graduate minor in water resources planning and management. A water resources advisory committee coordinates the interdisciplinary aspects of this minor/specialization. The director of the Nebraska Water Center/Environmental Programs in SNR serves as chair with one member from each participating department. Approval of a student's program of studies, degree option, and thesis topics (if applicable) will have the concurrence of the student's major department and the chair of the advisory committee. One member of the student's examining committee will be appointed from the Water Resources Advisory Committee. New faculty that were hired or transferred under WRRRI are contributing to teaching and outreach in water quality and quantity through their focus on stream ecology (Thomas), climate modeling (Oglesby), water economics (Schoengold), hydroinformatics (Irmak), physical limnology/lake modeling (Lenters), and watershed modeling (Istanbulluoglu and Woldt).

Table 4.3-4. Water-related Courses Supporting the Graduate Specializations in Hydrologic Sciences and Aquatic Ecology.

Course Number	Course Title	Instructor
<i>Biological Systems Engineering</i>		
AGEN 954	Hydraulic Modeling Small Watersheds	Eisenhauer
BSEN 998	Modeling Vadose Zone Hydrology	Eisenhauer
<i>Geology</i>		
GEOL 870	Field Techniques in Hydrogeology	Zlotnik
<i>Geosciences</i>		
GEOS 898	Statistical Methods in Hydrological Sciences	Istanbulluoglu ¹
GEOS 898	Land and Water Dynamics	Istanbulluoglu ¹
GEOS 898	Physical Limnology	Lenters ²
<i>Natural Resources</i>		
NRES 802 & 802L	Aquatic Insects and Lab	Danielson
NRES 808	Microclimate: The Biological Environment	Walter-Shea ² & Verma ²
NRES 815	Water Resources Seminar	Jess ¹
NRES 819 & 819L	Chemistry of Natural Waters and Lab	Harvey ¹ /Gates
NRES 825	Geostatistics	Chen
NRES 853	Hydrology	Harvey ¹ /Istanbulluoglu ¹
NRES 859	Limnology	J. Holz ¹
NRES 863	Fisheries Science	Pegg ²
NRES 866	Advanced Limnology	Hoagland ¹
NRES 868*	Wetlands	Hoagland ¹ /Harvey ¹
NRES 875	Water Quality Strategy	R. Spalding
NRES 887	Hydrogeology	Pederson
NRES 888	Groundwater Geology	Pederson
NRES 889	Ichthyology	Pegg ²
NRES 917	Environmental Isotope Hydrology	Harvey ¹
NRES 920	Xenobiotics in the Environment	Shea ¹
NRES 918	Applied Groundwater Modeling	Chen

Course Number	Course Title	Instructor
NRES 954	Turbulent Transfer in the Atmospheric Surface Layer	Verma ²
NRES 896#	River & Stream Ecology	Thomas ²
NRES 896#	Hydroclimatology	Lenters ²
NRES 896#	Managed Aquatic Systems	Pegg ² and Pope ²
NRES 896#	Groundwater Contamination, Regulation, & Remediation	Harvey ¹
NRES 896#	Quantitative Fishery Assessment	Pegg ²

*course is on the books but is currently not taught (WATS 868 is a course in demand by water science students);
#new course since 2003; ¹Primary Faculty; ²Affiliated Faculty

Rigorous graduate level courses taught in Geosciences (GEOL 988 Introduction to Groundwater Modeling and GEOL 986 Contaminant Hydrogeology) are also taken by SNR students. Faculty from both programs serve on graduate committees for students in both units.

4.3.7 Future Goals and Directions

4.3.7.1 Research/Outreach/Extension. Four key water quality and quantity issues have been identified for future research, outreach, and extension activities. These activities will benefit from the addition of key faculty from WRRI. Potential opportunities may develop from the proposed Global Water for Food Institute. The issues are:

1. Global climate change (water quantity and quality): How do we improve regional predictions of climate impacts on local aquatic systems? SNR is now in a position to further integrate research in atmospheric sciences with surface and subsurface processes (Lenters, Oglesby) so that improved predictions can be made from which local impacts of climate on water quantity and quality can be addressed.
2. Hydrologic cycles (water quantity). How can we better understand complex dynamics of groundwater and surface water systems at multiple scales so that water availability can be better predicted? The dynamics of surface-water hydrologic systems at the watershed scale (or larger) will be realized only by using expertise in groundwater, groundwater-surface water interactions, and remote sensing in a collaborative way (Chen, Gosselin, Harvey, Irmak, Istanbuloglu, Lenters, Ryu, Szilagyi, Woldt).
3. Nonpoint source and emerging contaminants (water quality): What are the land use-nutrient cycle dynamics? What are the most important compounds, and what are their health and ecosystem risks, as well as their fate, transport, and biological impacts? Contamination of drinking water supplies and the potential contamination of surface and groundwater by “emerging” contaminants (e.g., steroid hormones, antibiotics, pesticides, surfactants, and disinfectants, from grain and livestock production, biosolids application, biofuel production, and municipal/residential wastewater sources) is an increasing concern within Nebraska that is being addressed at UNL (Comfort, Shea, Snow, Woldt).
4. Information transfer (monitory systems, data management, extension/education): How does SNR extend research to outreach/extension and teaching? What should SNR’s role be in gathering, compiling, and maintaining water resources data? Greater linkages with federal and state agencies (e.g., USGS, Nebraska Department of Natural Resources [NDNR]) are needed. For example, expertise in river/stream ecology (Thomas) will benefit programs in natural resources as well as forge links with government agencies that have programs in stream and river monitoring. This expertise also interfaces well with the Cooperative Fish

and Wildlife Research Unit (Allen). A data portal could provide information to run hydrologic models. Obtaining an NSF-Hydrologic Observatory would provide the framework to support data integration and availability. The Water Center would be a major player in this effort (Benson, Herpel).

4.3.7.2 Teaching. The number of water-related jobs is expected to increase because of the demands on water supply due to population increase and climate change. Thus, enrollment in the undergraduate and graduate water majors at UNL is expected to continue to increase. The main issues related to teaching water science at UNL are:

1. Undergraduate curriculum review. Should the water science curriculum committee review the needs for courses and curriculum? With new faculty hires and faculty affiliated with the program, a number of new courses, especially graduate courses, provide strength to the water sciences curriculum (Tables 4-3.2 and 4-3.3). Core courses are to be taught on a consistent schedule.
2. Strengthening the University's water program. How do we reach across departmental lines and cooperate to develop a strong water program? There is a desire to unify water science programs across campus by combining the efforts of the departments of Biological Systems Engineering, Civil Engineering, and Geosciences with efforts in SNR to form a cohesive program at UNL. WRRRI will aid in this effort, as will the proposed Global Water for Food Institute.

4.3.8 Challenges/Resource Needs

In addressing key water resources issues, SNR has identified several challenges:

- **Faculty Positions.** Several key faculty positions have been identified that will allow the water program to better address the issues in research, outreach, extension and teaching. Our funding strategy for these positions will be to redirect resources from SNR faculty retirements or from faculty attrition to other positions at universities or within government, collaborate with other departments on joint positions, attract external funding, or utilize adjunct faculty affiliations from other universities or federal/state agencies.
 - *Wetlands ecologist.* A wetlands ecologist is needed to teach NRES 211 Conservation Biology, which is a critical undergraduate course in the SNR curriculum, and NRES 468/868 Wetlands, which is an upper-level undergraduate/graduate course. The faculty member would train and supervise graduate students pursuing degrees in natural resources with specialization in applied ecology, aquatic ecology, wildlife ecology, and/or hydrological science, as well as undergraduate students pursuing degrees in environmental restoration sciences, environmental studies, fisheries and wildlife, and/or water science.
 - *Surface water hydrologist.* With the pending departure of Erkan Istanbuluoglu and the recent change in status of Joe Szilagyi to .33 FTE, there is a strong need for a surface water hydrologist. Dr. Istanbuluoglu's position is funded through the Water Resources Research Initiative and approval has been granted to conduct a search for a replacement. Currently, basic hydrology methodology (CIVE 353/853 - NRES 853 Hydrology) is being taught by Ed Harvey, who is a hydrogeologist by training. More advanced courses in statistical hydrology, surface flow, stream course modeling, and/or surface erosion, for example, are not available (except in some instances in Civil Engineering where engineering prerequisites prohibit SNR students from enrolling in the courses). As basic

hydrology is a critical part of several SNR undergraduate majors and specializations (water sciences, fisheries, environmental restoration, aquatic ecology, hydrologic sciences, forestry, etc.) and as more advanced hydrologic methods and modeling courses are needed by our graduate students, re-filling Dr. Istanbuluoglu's position is critical.

- *Environmental geophysicist.* With the retirement of Jerry Ayers, there is a need for an environmental geophysicist. Ayers taught two courses in this area (NRES 842 and 843) and had collected a great deal of geophysical equipment—including seismic, resistivity, caliper, gamma, and electro-magnetic tools for use in mapping the subsurface. Recent expansion of Ed Harvey's research into using Electrical Resistivity Imaging (ERI) to locate and map spatial and temporal changes in groundwater salinity has bolstered the need for such a specialist. The U.S. Geological Survey and the Natural Resources Conservation Service have also begun utilizing these tools in their research, improving the potential for future collaborations.
- *Environmental microbiologist.* Contamination of drinking water supplies and the potential contamination of surface and groundwater by "emerging" contaminants (e.g., steroid hormones, antibiotics, pesticides, surfactants, and disinfectants, from grain and livestock production, biosolids application, biofuel production, and municipal/residential wastewater sources) is an increasing concern within Nebraska. Microorganisms play major roles in the environmental fate of contaminants, in situ remediation of hazardous wastes, and subsurface pollution in soils, sediments, and wastewaters, and we need a better understanding of microbial functioning in natural settings, compromised environments at remediation and restoration sites, and the factors regulating such functioning. An environmental microbiologist position is one of the positions identified by SNR faculty in spring 2008; a person in this position would play a key role in scientific research to solve problems associated with contamination of soil and water and help educate students and the public about issues in water and soil quality and environmental health.
- *Hydroclimatologist.* This person would help fulfill the need to combine hydrology and climatology in addressing climate change impacts on water quantity at a variety of scales. The person could also serve a valuable role in a data portal and extension education, answering questions related to water and climate change for clients and the general public.
- **Data Accessibility.** Survey activity in water database development and management has diminished over the last five years, partly because of diminished USGS funding before the merger of CSD with SNR. As a result, groundwater data are not systematically collected; wells are not monitored. Yet, hydrologic models need such data to run simulations. A data portal could provide a central location for such data needs. Pennsylvania State University has a web site (<http://srbhos.psu.edu/>) presenting the Susquehanna River Basin Hydrologic Observing System, produced in cooperation with state agencies, which could be used as a model in developing a data portal to be managed by SNR. In addition, the Hydrologic Information System, an initiative supported by the National Science Foundation, has the potential to provide a framework to support data integration and availability. There is also a need to coordinate with other state agencies to maximize sampling efforts. Stream gauging data from Nebraska Natural Resource Districts is often not available online for up to three years after it is collected. SNR has been involved recently in making significant contributions to the development of a water portal for UNL (water.unl.edu). This effort has

been led by the Water Center and Extension specialists. We expect this portal to be a tremendous asset for UNL and SNR in publicizing the diversity of water programs in the unit and across campus.

- **Extension.** The public is asking about the impacts of water use and climate variability and change on our water resources. Several projects within SNR are addressing that need. Tad Barrow and John Holz work with the Nebraska Department of Environmental Quality in a water quality problem-solving framework. Steve Hu is working in the area of water and energy use efficiency by improving producers' effective use of weather predictions in primarily irrigation decisions/efficiency. A web-based training tool shows farmers weather information and predictions and how to use these effectively in decision making. Mark Svoboda, Cody Knutson, and Donna Woudenberg are developing a national Drought Ready Communities program to help communities reduce their risk of water shortages. Nebraska City, Nebraska, is participating as one pilot community in creating the program. Work is also underway by Cody Knutson, Jae Ryu, Mark Svoboda, and Donna Woudenberg to develop new web-based information outlets for water, drought, and climate change information, such as the Republican River Water and Drought Portal. The Water Center serves as the "public face" of water at UNL by organizing annual public events (i.e., water conference, seminar, tour, and colloquium) and publicizing research. The Water Center also maintains the NU Water-Related Research Database to give legislators, government officials, and constituents better access to research, especially research associated with a particular topic of interest or that impacts a particular district. But there is still a need to increase the transfer of information/technology to policy and resource managers. It is anticipated that groups such as the Water Center and the National Drought Mitigation Center can maintain and strengthen links here. For example, the Water Center has developed a water-related research and expertise database, available at <http://watercenter.unl.edu/PolicyIssues.asp>. Three former CSD faculty are involved in extension education in water quantity and quality issues: Susan Lackey in Northeast Nebraska, Jim Goeke in Central Nebraska, and Steve Sibray in the Nebraska Panhandle (there is no coverage in Southeast Nebraska). From a statewide perspective, Wayne Woldt is involved in surface/groundwater education using physical models, and also water quality education as related to drinking water and onsite wastewater systems. Historically, extension and outreach has been the role of CSD, but a stronger activity is now needed. SNR's position is that "survey" is a role to be assumed by many, not just by faculty of the former CSD, especially as these positions are now partitioned into research, teaching, and extension roles. What is SNR's role in survey for the state, for UNL? The program needs to be better defined.

Since the formation of SNR in 1997, it has, at times, been a challenge for programs in natural resources to fit into the structure of Extension because of the traditional emphasis on agriculture. With the shift in focus for Extension programming to the five Spires of Excellence previously mentioned (3.4.2), significant opportunities exist for greater involvement of SNR faculty with extension appointments, as well as for faculty with survey and research appointments. The substantial expertise of SNR faculty in water, climate, ecosystem science, earth science, and environmental science can be a resource for extension educators and specialists throughout the state. For example, clients and the general public are asking questions related to water and climate change. SNR faculty can also be engaged in providing more professional development opportunities for extension personnel. This

educational experience will place these specialists in a better position to answer questions from clientele more authoritatively. The Summer Institute on Climate Change scheduled for summer 2010 is one example of such a professional development opportunity. Packaged information is also needed that can be made available to the public. The addition of an Extension Educator for Climate Variability and Change is another example of how SNR can become more engaged and contribute in a greater way to extension programs. This person will be responsible for the development of educational programs for clientele throughout the state. In addition to scientific information, legal aspects and interpretation of laws are needed. Faculty have contributed numerous white papers to *NU Water-Related Research in Brief: Information for Nebraska's Water Resources Decision-Makers*, which is personally distributed to elected officials and available online. The Water Center also regularly facilitates education sessions for government officials by faculty. Beyond this, how do we get the information out to the public and policy makers? We may need to establish broader ideas that may operate within the existing framework. The water-related topics addressed in SNR seem to interact better with the media through promotional efforts of the Water Center. Key faculty members need to be in charge of extension efforts, to bring these efforts together (e.g., water quality, quantity with climate change) and deliver knowledge-based information to Nebraska citizens. The e-ARFAs should be helpful in identifying extension activities and projects. SNR faculty and staff need to be more involved in extension groups, such as the Nebraska Cooperative Extension Association. Our faculty have been making efforts to better understand extension programming and we are exploring opportunities for improved interactions with extension personnel. This interaction has already resulted in improved dialogue between extension personnel and SNR faculty and staff. Should SNR develop a newsletter to extension faculty and staff across the state? Does the University value and recognize the effort involved in developing and maintaining web pages as a legitimate means of communicating with the public?

- **Undergraduate program teaching FTE.** Although the water science undergraduate program has been one of five natural resources majors administered since SNR formed, coordination of the program has only recently been guided by SNR (Aris Holz as coordinator). SNR recruitment is now being focused on the water science major as well as other natural resources majors.
 - *Core courses.* Teaching FTE associated with faculty who list water resources as their primary program is lower (1.95) than it was in 2003 (2.7). However, with new faculty and a large number of faculty affiliated with the program (i.e., not their primary program; see Table 4-3.1, Faculty/FTE), we have a number of new courses, especially graduate courses, which are part of the water sciences curriculum. Nonetheless, there is a definite need for teaching in core courses; several critical courses have not been taught in the past several years (such as NRES 468 Wetlands and BIOS 473 Freshwater Algae).
 - *Introductory course.* There is a potential need for a new freshmen-level water course, thereby adding to the teaching demand. Concerns exist about NRES 281 (Introduction to Water Science), which serves a wide variety of students as an “integrative studies” qualified course. In addition, it supports the needs of a variety of natural resources students, along with water science majors (fisheries and wildlife, environmental studies and natural resources economics). Given such a broad-based demand, the course is not able to meet the needs of all the students, and is currently under reorganization. Some

thoughts are that it should be a strong introductory course for the water science major and needs to be strongly physics based. This would allow CIVE 353 (Hydrology) to become what it should be, an engineering-based hydrology course. An optional lab (required for water sciences majors) should be developed to provide students with “hands-on” laboratory and field experience with hydrological methodology and equipment. The water science community needs to discuss and decide the role of NRES 281 in the major; questions being asked include: Should the course be strictly physically based or a blend to address a variety of students? Should the course have modules taught by a team of faculty? Currently, NRES 281 does not prepare students for CIVE 353/853 (Hydrology) and other upper-level water science courses. Biological Systems Engineering has several courses related to hydrology, and any curriculum development should consider the needs of natural resources students compared with engineering majors. What role do SNR water hydrology courses play in educating water science majors? Each option in the undergraduate water sciences major has a distinct need; not all are strictly hydrology. If NRES 281 is redefined as an introductory course for water science majors emphasizing hydrology (i.e., a prerequisite for CIVE 353), then a number of students pursuing other natural resources tracks will not be exposed to basic water science (physical science and social science aspects on the topic). It is recommended that the water science major curriculum committee review the needs for the course and the curriculum. Should SNR have a course on hydrologic modeling at the undergraduate major level for students in water science?

- *Teaching Assistants.* Currently, teaching assistance is needed in WATS 459 (Limnology), NRES 498 (Stream Ecology), and NRES 220 (Principles of Ecology). NRES 220 (Principles of Ecology) is a required course in the water sciences curriculum (natural resources core), and within the last year, has been added to more than a dozen CASNR programs as either required or as a listed elective, putting added pressure on faculty teaching FTE in the Applied Ecology area. We experienced a 38% increase in enrollment from last year, which prompted additional lab sections. As the enrollment has grown, it has also placed a significant strain on SNR’s budget for teaching assistants to cover the additional labs necessary for the course.
- *Advising.* Should the sequence of courses be kept on a strict schedule so students have the fundamental courses needed by the time they take the 300/400 level courses?
- **Graduate Program.** Although some faculty coordinate the specializations (Harvey—hydrologic sciences; Holz—aquatic ecology), no single faculty member oversees the combined UNL graduate water programs. A positive development would be integrating the hydrologic specialization in SNR with the hydrogeology specialization offered in Geosciences (Zlotnik). This can be achieved by cross-listing classes that have not been cross-listed and increasing publicity by developing cross-references on each unit’s web sites.

4.4 Natural Resources Education

Address the growing concern about and limited understanding of environmental and natural resources issues through greater emphasis on collaborative and interdisciplinary natural resources and environmental education for undergraduate and graduate students and the general public to enhance informed decision making and policy formulation.

Executive Summary

The School of Natural Resources (SNR) aspires to be an international leader in natural resources and environmental education and the primary provider of natural resources and environmental information in Nebraska. SNR serves an academic audience, which consists of undergraduate and graduate students, and a public audience, which includes policy makers, professional audiences, and K-12 educators. Substantial growth and expansion of SNR educational programs has occurred since 2003. Recent funding of science education projects in the unit, the hiring of an extension educator in climate variability and change, and a Summer Institute on Climate Change are all excellent examples of new initiatives that will continue to enhance our programming in natural resources and environmental science education. As we look toward the future, SNR's long-term goals are to (1) enhance the natural resources educational program so that it is recognized for its up-to-date, high-quality educational experience; (2) establish a well-supported infrastructure that provides for the educational needs of undergraduate and graduate students; (3) strengthen the recruitment and retention program to increase the number, diversity, and retention of undergraduate and graduate students; and (4) build an integrated public education network within the SNR faculty and staff, students, and the community at large.

4.4.1 Overview

Natural resources education is a key component of the SNR vision statement, which states that SNR aspires to be an international leader in natural resources education and the primary provider of natural resources information. This aspiration is consistent with the comments of a growing number of professionals about the important role that natural resources and environmental education will play in the future:

—“...growing need for scientists, engineers, managers, and technicians who have the ability to work on multidisciplinary and cross-cultural teams; to use sophisticated new instrumentation, information systems, and models; and to interpret research results for decision makers and the general public. Fresh innovative approaches are needed to undertake interdisciplinary, collaborative and synthesis activities.” *NSF Advisory Committee for Environmental Research and Education, Jan. 2003*

—“It is the responsibility for colleges and universities to reach all students, not only those majoring in natural and social science fields, with a rich environment for integrating sustainability into their personal and professional lives.” *Education for a Sustainable and Secure Future, NCES, Jan. 2003*

—“What if... higher education were to take a leadership role, as it did in the space race and the war on cancer, in preparing students and providing the information and knowledge to achieve a just and sustainable society? ... The educational experience of students is a function of what they are taught, how they are taught, the way in which the university manages, conducts research, operates, purchases, designs facilities, invests and interacts with local communities.... All parts of the university are critical in helping to create transformative change in the individual and collective mindset. Everything that happens at a university and every impact, positive and negative, of

university activities shape the knowledge, skills and values of the students.” *Debra Rowe, President, U.S. Partnership for Education for Sustainable Development, 2008*

4.4.2 Current Status

SNR serves two primary educational audiences, academic and public. The academic audience consists of undergraduate and graduate students. Our public audience includes a range of stakeholders that include policy makers, state agencies, business and professional audiences, and K-12 educators. SNR faculty contribute in various ways to the School’s educational mission through classroom teaching, extension and survey activities, and the mentoring of both undergraduate and graduate students involved with research. Table 4-4.1 provides a summary of the current distribution of faculty FTE among teaching, research, and extension activities, which are funded through state-appropriated funds to the Institute of Agriculture and Natural Resources (IANR) and the College of Arts and Sciences (CAS). Seventeen percent and fourteen percent, respectively, of the state-funded faculty positions are allocated for teaching and extension/outreach activities. Since the last review (2003), the overall percentage of teaching and extension/outreach faculty lines has decreased.

In 2008, SNR became the home of both undergraduate and graduate programs for the faculty of Geography. This added additional educational expertise to SNR as well as increased the percentage of faculty involved in teaching (Table 4.4-1). Geography’s offering of fundamental courses strengthens the teaching component of SNR (adding to the existing teaching strength of the applied ecology faculty group).

Table 4.4-1. FTE Distribution for SNR Faculty, 2002-03 and 2008-09.

Year	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Total
<u>IANR State-funded Faculty</u>					
2002-03	7.46 (18.8%)	22.31 (56.1%)	9.99 (25.1%)		39.76
2008-09	7.36 (17.1%)	30.46 (68.7%)	6.3 (14.2%)		44.12
Percent Change	-1.7%	+12.6%	-10.9%		
<u>CAS State-funded Faculty</u>					
2008-09	4.58	2.17	1.08	.47	8.30
<u>Total</u>					
2008-09	11.94 23.2%	32.63 61.9%	7.38 14.0%	0.47 0.9%	52.42

Source: 2003 SNR 5-year Review document; 2008-09 Adjusted Budget

With the inclusion of Geography, SNR’s overall student credit hours (SCH)/FTE production is more than 700 (Table 4.4-2). Appendix W details the faculty teaching assignments with their FTE.

Table 4.4-2. Summary of Teaching-Related Activity by Faculty Area.

Faculty Area	Budgeted FTE (Adjusted Budget)				Student Credit Hours (SCH)		SCH/ Teaching FTE
	Teaching	Research	Extension/ Outreach	Scholarly/ Univ. Service	Undergrad	Grad	
Applied Climate Sciences	1.39	8.65	1.73	3.22	111	164	218
Applied Ecology	3.52	8.98	.80	.50	2051	419	718
Geography/GIScience	5.64	4.06	.05	2.49	6271	360	1287
Geology & Soils	1.06	2.92	.35	2.22	150	20	160
Human Dimensions	1.80	2.63	.48	1.54	614	33	301
Water	2.50	9.70	1.69	4.74	402	365	348
Total	15.91	36.94	5.10	14.71	9599	1361	718

Table 4.4-3 provides an example of education-related grants that have been funded (Chapter 3).

Table 4.4-3. Selected Grants for Natural Resources Education, 2003-09.

Title	Granting Agency	Term	Total Amt	Education
Masters Degree in Applied Sci Educ	Toyota USA Foundation	2007-11	540,345	Gosselin
Earth Science Institute for Elementary Educators	NASA	2005-09	356,094	Gosselin
Ensuring Student Success	Dept of Ag – HEC	2007-10	139,067	Burbach
UNO-NAA Space Grant – Literacy	UNO	2009-10	7,500	Larson-Miller, Gosselin

Source: NUGrants

4.4.2.1 Undergraduate education. In the College of Agricultural Sciences and Natural Resources (CASNR), seven majors are in natural resources: environmental studies, environmental restoration sciences, fisheries and wildlife, grassland ecology and management, natural resources and environmental economics, pre-forestry, and water science (Table 4.4-4).

Table 4.4-4. Summary of Information for Undergraduate Natural Resource Majors.

Major	Home Department	SNR FTE ¹	Enrollment		Average GPA ⁴	
			Fall 2003	Fall 2009	Fall 2003	Fall 2009
Fisheries and Wildlife	SNR	2.35	101	173	2.87	2.96
Environmental Studies ²	SNR	0.20	35	66	2.89	3.22
Environmental Restoration Science	SNR	0.10	2	13	2.89	3.05
Water Science	SNR	0.25 ³	3	12	2.96	3.21
Grassland Ecology and Management	Agronomy/ Horticulture	NA	3	5	3.31	3.31
Natural Resources and Environmental Economics	Agricultural Economics	NA	10	15	3.55	3.36
Pre-Forestry	SNR	NA	2	0		
Undeclared	SNR	NA	0	0		
Total		2.90	156	285		

Source: CASNR; SNR Database; 2008-09 Adjusted Budget

¹ FTE of faculty who advise students in major and teach undergraduate courses specific to the major. This also includes the major coordinator.

² Environmental studies is an interdisciplinary major that is supported by CASNR and CAS. Enrollment numbers are for CASNR only. Support is provided by CASNR and CAS for a 1.00 FTE academic advisor who supports the program and activities of the 0.20 FTE program director.

³ The 0.25 FTE is supported by UNL's Water Resources Research Initiative.

⁴ GPA calculated from SNR database by Dave Wedin.

Each major is led by a coordinator who works with a committee to develop curriculum objectives and course requirements. Specific options can be selected in the environmental restoration science, environmental studies, fisheries and wildlife, and water science majors to provide students with an enhanced focus on their specific academic and career interests (Table 4.4-5).

Table 4.4-5. Summary of Natural Resource Majors and Associated Option Areas.

Environmental Restoration Science Options: Soil science Lake and stream restoration Environmental Studies Option: Applied climate science Natural resources Water Science Option: Aquatic ecology Hydrology Water law and policy Water quality Watershed management	Fisheries and Wildlife Options: Aquatic ecology Conservation biology Fisheries ecology and management Geospatial Information Sciences Habitat management Law enforcement Wildlife damage management Wildlife disease Wildlife ecology and management Zoo animal care General Grassland Ecology and Management
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SNR is administratively responsible for fisheries and wildlife, environmental restoration science, water science, pre-forestry, grassland ecology and management, and natural resources undecided, and two emphasis areas in environmental studies (natural resources and applied climate science). Currently, 285 undergraduate majors are in the programs administered by SNR. The Natural Resources Undergraduate Curriculum Committee (NRUCC) is the administrative body for the natural resources program within CASNR. The NRUCC comprises the coordinators of each SNR major plus natural resources and environmental economics from the Department of Agricultural Economics, the director of Environmental Studies, and two elected SNR faculty members. The SNR teaching coordinator also serves as a member of this committee and currently is the chair. The NRUCC is responsible for all curricular matters related to the natural resources curriculum, including learning objectives and expected competencies, course approval, core curriculum, and movement of paperwork on to the CASNR Curriculum Committee. In addition, NRUCC facilitates assessment, recruitment, and retention. Appendix 4.4-1 at the end of this subchapter lists the learning objectives and expected competencies for students in the natural resources undergraduate program.

SNR is also the home of both BA and BS degrees in Geography. This undergraduate degree option is administered by an undergraduate faculty advisor in collaboration with the Geography faculty. The major in Geography consists of seven mandatory courses with a common core in human-environment relations. Currently, 40 undergraduate majors are in the Geography program.

4.4.2.2 Graduate Education. SNR offers an interdisciplinary graduate program that leads to an MS or a PhD in natural resources with emphasis in the areas of climate and bio-atmospheric interactions; ecosystems; biological, earth, and water resources; remote sensing and geographic

information systems (GIS); and human dimensions. Twelve and seven specializations, respectively, are available at the MS and PhD level (Table 4.4-6). The graduate program is governed by the SNR Graduate Committee (SNRGC), which consists of elected faculty members and the SNR teaching coordinator. The SNRGC is responsible for learning objectives, course approval, student admission, graduate assistantships, and assessment of the graduate program.

Table 4.4-6. Graduate Specializations in Natural Resources.

MS Specializations		PhD Specializations
Agroforestry	Human dimensions	Applied ecology
Aquatic ecology	Hydrologic sciences	Bio-atmospheric interactions
Bio-atmospheric interactions	Remote sensing	Climate assessment and impacts
Climate assessment and impacts	Soil science	Environmental studies
Environmental studies	Wildlife ecology	Human dimensions
Geographic Information Systems		Hydrologic sciences
Great Plains studies		Soil science

SNR faculty have worked in collaboration with colleagues from the College of Education and Human Sciences (CEHS), Extended Education and Outreach (EEO), and other CASNR units to develop an on-line masters program for science educators (<http://onlinegraduate.unl.edu/programs/masters/science/index.shtml>). As part of this collaboration, an on-line 12 credit hour Earth Systems Science for Educators certificate has been developed.

The graduate program in Geography offers several masters and doctoral degree options. Students can choose to specialize in cartography, GIS, historical geography, human-environment relations, regional studies, and remote sensing. The graduate program in Geography is administered by the faculty of Geography.

Currently, SNR faculty advise 135 graduate students: 50 MS, 17 MA, and 68 PhD, with 43 MS and 39 PhD students in the natural resource sciences major and 17 MA and 18 PhD students in the geography major, and 7 MS and 11 PhD are earning degrees in other programs while being advised by SNR faculty (Chapter 3).

4.4.2.3 Public Education. SNR provides research-based natural resource education and information for all Nebraskans, rural and urban. Educational information and programs are designed to enhance lives, families, and communities. SNR uses an interdisciplinary approach well suited to engage the university's strengths with partners and stakeholders in natural resource and environmental education. SNR has a wide range of public education activities and resources that include extension educational programs related to wildlife and birds; mapping and survey activities related to the acquisition of baseline geologic, hydrologic, biologic, climate, and soil data and information; a Cooperative Fish and Wildlife Research Unit (CFWRU) program to provide technical assistance and training to state and federal personnel and other natural resource managers; remote sensing and geospatial data and information; drought monitoring and

mitigation; and K-12 earth systems science education. SNR has a publication and data outlet through Nebraska Maps and More. Specific educational programs or units with substantial engagement with clientele include the Extension Educational Program Areas in Wildlife Damage and Conservation, Nebraska Cooperative Fish and Wildlife Research Unit, Tern and Plover Conservation Partnership, Conservation and Survey Division Mapping and Survey Program, UNL Water Center, Center for Advanced Land Management Information Technology, Nebraska Earth Systems Education Network, High Plains Regional Climate Center, and National Drought Mitigation Center.

Both graduate and undergraduate students are engaged in outreach activities that include several student-run K-12 activities. The Wildlife Club does Project Learning Tree activities and hunter education, among other projects. The SNR Graduate Student Association (GSA) provides a science enhancement program that focuses on natural resources education for pre-K through 5th graders in the Lincoln Public Schools at McPhee Elementary. During the school year, graduate students provide three unique programs. In the fall, they provide an after-school natural resources science program as part of the CLC (Community Learning Center). During the spring semester, they provide a science club that culminates with the school's annual science fair. In addition, graduate students visit classes in each grade level once or twice per year. The group was recognized last year by the University of Nebraska–Lincoln Recognized Student Organization for its efforts—SNR-GSA's McPhee Efforts Win Award, <http://www.snr.unl.edu/aboutus/what/newsarchive/GSAMcPhee2008.asp>.

4.4.2.4 Assessment. Both the undergraduate and graduate programs participate in the Program for Excellence through Assessment, Research and Learning (PEARL; <http://pearl.unl.edu>). This is a collaborative project involving CASNR and several other University of Nebraska–Lincoln (UNL) colleges. PEARL provides an online software program, structure, resources, and guidance to help programs collect, analyze, and use data on student learning outcomes to improve. As part of the PEARL-based assessment program, SNR collected data from alumni and employers regarding curricular needs, created the Writing Across the Curriculum in Natural Resources program, provided leadership to the Faculty Leadership in Writing Initiative (a UNL Program of Excellence), evaluated the critical thinking skills of its graduate students, and assessed graduate students' abilities to orally communicate information about their thesis project to an audience. Additional information can be provided if the review panel would like additional details.

4.4.3 Progress Since the 2003 Review

In response to the 2003 review, SNR faculty and staff, through facilitated discussions and a retreat, developed a set of priorities and objectives/actions. A joint faculty/staff committee prioritized the objectives/action items with an emphasis on those that they believed were most needed and/or would be of greatest value to SNR. Priority 1 stated that SNR needed to —provide a continuum of constructive and valuable learning experiences to undergraduates, graduates, and the public integrating the four functions (teaching, survey, research and outreach/extension).”

Three goals were identified for this priority:

Goal 1: Evaluate the undergraduate curriculum.

Goal 2: Increase the number of undergraduate and graduate majors.

Goal 3: Engage more faculty and staff in delivering learning experiences.

In July 2004, an associate director (0.50 FTE) was appointed to implement a plan to achieve the goals and objectives related to the SNR academic undergraduate and graduate programs and to serve as the SNR teaching coordinator. In August 2007, oversight and administrative guidance for the SNR academic programs was turned over to a 0.25 FTE teaching coordinator.

Progress on Goal 1: The first step taken to evaluate the undergraduate curriculum was to revisit and reestablish the foundation for the academic program through the examination of the learning objectives. This was accomplished by the NRUCC leading a faculty-driven process to get feedback on these objectives. The current learning objectives are included in Appendix 4.4-1.

In 2003, not a single course with its home in natural resources was required for all majors. Through the leadership of the NRUCC, Geographic Information Science (3 NRES choices, NRES 312 preferred), Principles of Ecology (NRES 220), Natural Resources Policy (NRES 323), Natural Resources and Environmental Economics (NRES 265), and an earth sciences course (3/8 NRES options listed) have been added to the core curriculum. Regarding our “service” courses that draw enrollment of first- and second-year students from a broad range of majors, more than a dozen CASNR programs have added NRES 220 as either required or as a listed elective over the last year. This course, which had an enrollment of 145 in 2008–09, will have an enrollment of more than 200 in 2009–10. A consequence of this success is that providing resources to cover the teaching assistants (TAs) for the labs associated with this course is significantly stressing the funds available in the unit for TAs. SNR has implemented a new formula for distributing TA funds based on the hours and type of work the TA is asked to do, and it seems like this will alleviate the stress on TA funds for the current year; additionally, SNR state-funded GRAs are required to TA one class per year. However, if enrollments continue to increase and our class offerings increase, the TA budget will not be able to sustain the TA need.

To increase the exposure of the UNL audience to natural resources and environmental issues, several new 100 and 200 level courses (NRES 104, 108, and 208) were developed for undergraduate students. NRES 108 is a service course for education majors. It serves as a science enhancement course for elementary education students and has been designated as a recruiting course for students who have a potential interest in teaching secondary science. NRES 108 is also provided online and is a required course in CASNR’s new online completion degree in applied science. An increased need for online courses at both the undergraduate and graduate levels raises some interesting questions and concerns regarding the funding and support of such courses.

Four CASNR programs are now listing NRES 208 (Introduction to Applied Climate Science) as an elective after faculty made individual visits to those CASNR programs. SNR has outstanding capabilities in climate/weather/drought, yet these areas of coursework are in general missing from CASNR outside natural resources. Advocacy by individual faculty is the key to adding our courses to other majors such as agronomy, horticulture, or entomology. Students in these departments and others could benefit greatly from a better understanding of climate.

Field experiences have been added to the curriculum since the last review, including, among four new field courses, international experiences in Puerto Rico and Namibia. Although research

experiences for undergraduates are encouraged, SNR has had only 33 UCARE (Undergraduate Creative and Research Experience) students in the last 4 years—28 of whom have been mentored by applied ecology faculty.

Another important activity related to the development of a high-quality curriculum is the use of assessment. In this context, SNR became a recognized leader in the PEARL assessment program at UNL. Data collected as part of this program have been invaluable to our undergraduate program.

As part of PEARL, the associate director in collaboration with the NRUCC developed the School of Natural Resources Academic Preparedness Survey in 2006 to address the question, “Does the interdisciplinary nature of the natural resources core provide sufficient background for the student to define and analyze environmental problems that includes the human dimension?” The primary conclusion from the survey was that the natural resources curriculum provided our alumni with sufficient background to address environmental problems that include the human dimension. Areas that the data suggested could be improved included enhancing educational opportunities in the areas of GIS and computer applications and audience-appropriate oral and written communication. In 2007, the SNR Employer Survey was conducted. These data supported the conclusion of the alumni survey that the natural resources program is providing our students sufficient background to address environmental problems that include the human dimension. The employer data, reviewed by the NRUCC, also indicated a need to continue to emphasize the development of audience-appropriate written communication and students’ abilities to function better in the professional environment. These abilities we refer to as essential or soft skills, and they include digital age literacy, inventive thinking, and interactive social and personal communication skills, including prioritizing, planning, and managing for results and effective use of real-world tools (from Twenty-First Century Skills, <http://www.metiri.com/21st%20Century%20Skills/PDFtwentyfirst%20century%20skills.pdf>). It is important that SNR continues to examine both student and employer needs as it continues its quest to improve the quality and quantity of its program.

Based on the results from the alumni and employer surveys, we developed Writing Across the Curriculum in Natural Resources (WAC_NR). The goal of this initiative has been to improve student writing by increasing the use of low- and high-stakes writing in all courses, promote the discussion of teaching practices, and create opportunities for faculty development.

A recent analysis of the outcomes of the WAC_NR project indicated that 94% of NRES courses include significant writing assignments. There was a relative increase in the use of low-stakes writing assignments. This suggests an increase in assessments for learning through required/assigned writing. There also seems to be more balance in the use of both writing-to-learn and writing-in-the-discipline writing assignments. For those faculty who participated, WAC_NR provided the opportunity to exchange ideas with other faculty, get new ideas to use in the classroom, and talk about ways faculty could improve or include the use of writing. Several faculty noted that they used different types of writing after hearing other faculty describe how they used these types in classes. Other UNL instructors have indicated that SNR WAC-NR activities had a significant effect on how they teach writing in their classrooms. The usefulness of our website has been identified as an important contribution to the UNL community.

A new set of learning objectives was developed to guide the revision of the environmental studies curriculum. This set of objectives was based on input that the environmental studies director and academic advisor obtained from the Environmental Studies Coordinating Committee (ESCC), discussions with the deans of CAS and CASNR, feedback from alumni and students, conversations with emphasis advisors, and reviews of national documents related to environmental literacy and essential skills for the twenty-first century. To help meet the new learning objectives and to create more cohesiveness in the program, three new courses have been developed and one has been modified. In addition, a new curriculum is in under review in both CASNR and CAS, and it should be ready for full implementation by January 2010.

Progress on Goal 2: The report from the 2003 review team indicated that the ~~two~~ most glaring issues (related to undergraduate education) are relatively low and dropping enrollment and the apparent mismatch between strengths of the faculty and the degree programs.” To address the low enrollment, we developed a recruitment/retention team that developed a recruiting and retention plan that emphasized the use of resources available through UNL admissions and CASNR. This plan involved the following:

- Identify and follow up with interested students as part of the CASNR campaign
- Send admitted students expressing interest in SNR a personal letter from the School
- Develop new recruitment materials that highlight the program and specific majors, as well as a brochure that highlights all the natural resources majors
- Develop a package of standard handout materials on natural resources materials for faculty use

During the initial phases of our recruitment campaign, it became clear that we needed a full-time recruitment coordinator, and SNR funds were allocated for this purpose. The coordinator was hired in the summer of 2005. Our recruitment activities also resulted in creating a more student-friendly interface to the undergraduate program website.

An outcome of these actions and the collaboration between the recruitment coordinator and affiliated faculty (defined as faculty that advise students in the major, teach undergraduate courses specific to the major, and/or serve as the major coordinator) is substantial growth in the number of students in natural resource majors, from 156 in 2003 to 285 in 2009 (Table 4.4-4).

The fisheries and wildlife and environmental studies majors have experienced the most growth. The average ACT scores for natural resources students in all six majors is 24.6. Although grassland ecology and management and environmental restoration science have low numbers, the quality of the students is generally high, as reflected by the average ACT scores for students in these majors (29.3 and 28.0, respectively). These average ACT scores also rank among the highest in CASNR. In addition, the average GPA for students in all natural resource majors administered by SNR has improved since the last review in 2003.

To potentially improve our ability to attract new students into majors that have been struggling with numbers, the curriculum and names of two of the majors were changed in an effort to better characterize the nature of the majors and their marketability to students. They are now

environmental restoration science (ENRS) and grassland ecology and management (GECM). ENRS has two options, a soil science option and a lake and stream restoration option. The water science major has developed a new approach to their curriculum and developed five specific options from which their students can choose. In addition, an applied climate science option has been developed for the environmental studies program. The purpose for developing this emphasis area was to establish a track record to document the need for an applied climate science major. The essentials of this major have been developed by the applied climate faculty and are being reviewed by our CAS colleagues, after which a formal proposal will be fully developed and submitted for review by the University of Nebraska. The name changes, addition of options, and potential addition of the applied climate major have helped to align faculty expertise with undergraduate curricular areas. Another action that would help improve faculty alignment as well as our ability to attract students is to take advantage of the strength of the SNR faculty in human dimensions. SNR needs to make this a more visible attribute of the undergraduate learning objectives as well as using it in recruiting and marketing materials for potential natural resource majors.

On a national scale, SNR will be contributing as a partner to phase 2 of a recently funded project by the National Aeronautics and Space Administration (NASA), “Creation and Dissemination of an Interdisciplinary Undergraduate General Education Course on Climate Change.” The National Council for Science and the Environment (NCSE) and its partners will create a robust curricular package that universities across the country can readily adopt and adapt in order to meet the need for high-quality general courses on climate change science and solutions for undergraduates who do not major in environmental sciences. UNL is one of 157 members of the NCSE’s Council of Environmental Deans and Directors that provide a unique venue for curricular development and dissemination.

The NRUCC administers several undergraduate scholarships (Kohrs, McGeachin, Regier), and the amount available for distribution has increased from \$19,440 in 2003–04 to \$27,081 in 2008–09, along with an increased number of recipients, from 26 to 37. However, the apparent increase in dollars available has been offset by the increase in the number of recipients and the increase in tuition over that same period.

These activities, among others, have increased student credit hour production from more than 2,000 in 2003 to more than 4,000 in 2009 (Table 4-4.6), and the number of majors has increased by about 100, from 143 in 2002–03 to 285 in fall 2008–09 (Table 4-4.2). The environmental studies and fish and wildlife majors have had the most dramatic increases and continue to grow. This growth has resulted in a variety of consequences and questions. As already noted, one of the consequences has been an increase in our student numbers and student credit hour production. Another consequence has been a number of questions related to (1) SNR’s capacity to have a regionally or nationally recognized undergraduate program considering the size of the undergraduate faculty, especially in fisheries and wildlife; and (2) SNR’s ability to provide enough class sections of required courses such as Principles of Ecology (NRES 220) and geospatial courses (NRES 312 and 412). These are considered to be “bottlenecks” in the progression of students through the various natural resources majors.

Table 4-4.6. Student Credit Hour (SCH) Production.

	2002–03	2008–09	
		Without Geography	With Geography
Total	2,295	4659	10960
SCH/FTE	347	495	718

Source: 2003 SNR 5-year Review, SNR Database

Graduate student funding was a preeminent issue in 2003 and continues to be in 2009. Since 2003, twelve new graduate assistantships (GAs) have been created to improve the recruitment of graduate students. This provides for four new assistantships to be offered each year. A new requirement, for the GAs to serve as TAs in at least one course during each year of their residence in SNR, has contributed some resources to help with growing lab sections. However, courses such as NRES 220 require 2 to 4 lab sections, so a system needs to be developed to support an adequate number of TAs.

SNR faculty provided leadership and received funding for a NSF-funded, multi-institutional Integrative Graduate Education and Research Traineeship (IGERT) program that will provide fellowships for 26 PhD students over five years. The IGERT program will integrate academic research and education with the needs of regional and national groups involved in watershed management, recovery, and policy. These agencies will participate actively in training and mentoring of students through externships and in shaping the UNL curriculum in natural science, policy, and law. This program will also finalize UNL efforts to develop a graduate-level adaptive management curriculum that integrates social sciences and natural sciences, computer science, structured decision making, and policy in graduate education. This comprehensive interdisciplinary training will prepare graduates to meet the established need for well-informed decision makers in water science, watershed management, and resilience at state, federal, and international levels.

Since 2005, SNR faculty in collaboration with CEHS, EEO, and CASNR faculty have expanded graduate course offerings through the Laboratory Earth Series (NRES 809, 814, 822, and 896) to support the professional development needs of teachers by obtaining grants from NASA and the Toyota USA Foundation. In addition, this collaborative venture has resulted in a new master of applied science (MAS) program in CASNR. More than 150 K-12 teachers from across the country have participated in Lab Earth courses. These courses also provided the framework for the recently proposed “Science for Educators” specialization within the MAS. To take advantage of SNR’s expertise in applied climate science, SNR was awarded a grant from NASA to support a project entitled “Global Climate Change Literacy for Educators: Using On-line Professional Development to Integrate Content and Pedagogy.” This project will develop four on-line, distance-delivered, scientifically and pedagogically relevant educational modules to improve climate and earth systems literacy among middle-level to high school teachers. SNR is participating in discussions being led by CEDD for the development of a professional science masters program in climate science and solutions that could be developed and jointly administered through distance education by a consortium of institutions.

Progress on Goal 3: The associate director in 2004 initiated an analysis of FTE allocation and the process for modifying these allocations to engage more faculty and staff in learning

experiences. As a result, several faculty and professional staff have stepped up to increase their participation in academic teaching programs. Policies related to FTE allocation are carried out at the deans level in IANR. The deans have been willing to discuss the modifications and accommodate some modifications related to educational responsibilities. An academic advisor has been hired to assist students in the development of their academic planning, which has reduced some of the pressure on faculty, especially in the applied ecology faculty area. This advisor has the additional responsibility of increasing the opportunities for internships and student employment.

The fact that only 17% of the IANR state-funded FTE and 23% of the total SNR state-funded budget (Table 4.4-1) are allocated for academic teaching does not necessarily allow adequate, sufficient, or flexible resources to be committed to continued expansion of the undergraduate teaching mission. Additional faculty FTE have been added since 2003, but these faculty lines have generally been in the area of research related to the Water Resources Research Initiative. These faculty appointments have not contributed substantially to the undergraduate teaching mission of SNR or UNL, and the future pursuit of large research centers needs to be reconciled with the increasing need for teaching faculty FTE to address the expectation for continued growth in undergraduate programs.

The recognition of the importance of providing information about climate change and potential solutions to a range of clientele has resulted in the creation of a 1.0 FTE, four-year, non-tenure track position to enhance climate change education across Nebraska. This position is expected to be filled by fall 2009.

4.4.4 Looking Toward 2014

Six listening sessions were conducted for SNR faculty and staff to provide their perspectives about the challenges and opportunities that face SNR over the next five years in the context of natural resources education. As a result of these listening sessions, a natural resources education plan was developed.

The plan consists of three parts: Long-term goals (require 3 to 5 years), short-term goals (achieved over the next 1 to 3 years), and a list of priorities.

4.4.4.1 Long-term Goals.

1. Enhance the natural resources educational program so that it is recognized for its up-to-date, high-quality educational experience.
2. Establish a well-supported infrastructure that provides for the educational needs of its undergraduate and graduate students.
3. Strengthen the recruitment and retention program so that it is recognized for its ability to increase the number, diversity, and retention of undergraduate and graduate students.
4. Build an integrated public education network within the SNR faculty and staff, students, and the community at large.

4.4.4.2 Short-term Goals. The short-term goals are presented in the context of achieving the long-term goals. They are not listed in order of priority.

1. Enhance the natural resources educational program so that it is recognized for its up-to-date, high-quality educational experience.

- a. Evaluate current FTE allocations to ensure that adequate and sufficient time and effort are committed to undergraduate teaching. This should include continuing to make teaching a priority in the FTE of all new positions; reviewing teaching needs and addressing these through priority hires; and developing opportunities (e.g., field trips, guest lectures, and field short-courses) for faculty and staff who have not traditionally been involved in the teaching mission of SNR.
- b. Define the characteristics of good teaching practices in natural resources. This would involve the development of best practices through peer-review, which would be highly recommended for inclusion in all natural resources courses, along with reinforcing efforts related to using writing across the curriculum in natural resources.
- c. Implement educational programs that use technology to meet the demands of current and future students in both the face-to-face and online environments. Anytime, anywhere, online, distance-delivered opportunities can provide important access to professional development opportunities for many disciplines.
- d. Develop access to new courses in collaboration with other UNL units that are aimed at improving natural resources and environmental literacy among UNL students plus introducing undergraduate students to important natural resources science and management issues by using both the UNL general education program and online undergraduate completion program.
- e. Provide professional opportunities to give faculty the tools to implement best practices and new technologies in their courses.
- f. Prioritize the development and maintenance of outdoor educational facilities.
- g. Develop curriculum requirements that enhance the development of essential soft skills needed to be successful in the twenty-first century.
- h. Coordinate efforts to enhance the human dimension components across the undergraduate program.
- i. Contribute to the creation of new online graduate courses and specializations related to CASNR's professional masters degree program, MAS. The Sloan Consortium Report, "Online Nation: Five Years of Growth in Online Learning", indicates that online enrollments are growing faster than total higher education enrollments. Online enrollment grew 9.7% between fall 2005 and fall 2006. Total enrollment growth increased 0.9%. Doctoral/research institutions have had a compound annual growth rate of 21.7% between fall 2002 and fall 2006 for distance education.

2. Establish a well-supported infrastructure that provides for the educational needs of its undergraduate and graduate students.

- a. Increase scholarship funds for undergraduate students from external sources in collaboration with the NU Foundation.
- b. Increase participation in Environmentors-Upward Bound research experience for high school students by 33%.

- c.* Enhance the process to assist students in the selection of an NRES major and their knowledge of career opportunities.
 - d.* Expand service and research-service learning requirements to improve the integration of research with the SNR educational mission.
 - e.* Develop new internship opportunities.
 - f.* Improve knowledge of undergraduate and graduate programs among all SNR faculty and staff.
 - g.* Educate the faculty about the process of curriculum development and changes so they can better engage in this process.
 - h.* Integrate the expertise of the faculty of Geography into the natural resources education program through a curriculum review process.
- 3. Strengthen the recruitment and retention program so that it is recognized for its ability to increase the number, diversity, and retention of undergraduate and graduate students.**
- a.* Develop focused recruiting plans to increase enrollment by 20% annually for environmental restoration science, grassland ecology and management, and water science. Develop a plan for the applied climate science major when it is approved.
 - b.* Develop a plan to support the delivery of courses to meet the demands of increased enrollment.
 - c.* Educate faculty about NRES-specific recruitment protocol and procedures. To increase the number of students in the program, recruiting is necessary. Because the program has limited financial and personnel resources, educating the faculty about procedures can take advantage of faculty and their activities as an important resource for recruiting.
 - d.* Increase racial and ethnic diversity by 10% annually. One mechanism for this is to increase exposure of financially challenged, first-generation, underrepresented high school students through enhanced faculty/staff participation in the UNL Environmentors-Upward Bound research experience.
 - e.* Expand advising services to ensure that at least 75% of NRES students are being mentored during each enrollment session. Retention rates are strongly influenced by advising, and this is one of the strategic priorities for both CAS and CASNR.
 - f.* Create a process for defining future growth areas and opportunities for educational programs.
 - g.* Build community among graduate/undergraduate/faculty to strengthen SNR.
- 4. Build an integrated, nationally recognized public education network that uses the expertise of SNR faculty, staff, and students, Extension, and the community at large to address current natural resources and environmental challenges.**
- a.* Lead the development of collaborative educational programs with other UNL departments and external groups to address the issue of environmental change.
 - b.* Promote the accomplishments and products of extension and survey programs to a broader network of audiences, both internal and external to UNL.
 - c.* Provide leadership for the development of UNL-based, innovative, integrative, collaborative, and interdisciplinary initiatives to increase literacy in climate, environmental, earth systems, and sustainability issues that engage the community.
 - d.* Define faculty and staff roles in the extension and survey mission of SNR.

Priority List—Top 10: Not in order of importance.

1. Evaluate current FTE allocations to ensure that adequate and sufficient time and effort is committed to undergraduate teaching.
2. Implement educational programs that use technology to meet the demands of current and future students in both the face-to-face and online environments.
3. Develop access to new courses in collaboration with other UNL units that are aimed at improving natural resources and environmental literacy among UNL students plus introducing undergraduate students to important natural resources science and management issues by using both the UNL general education program and online undergraduate completion program.
4. Develop curriculum requirements that enhance the development of essential soft skills needed to be successful in the twenty-first century.
5. Develop new internship opportunities.
6. Increase racial and ethnic diversity by 10% annually.
7. Expand advising services to ensure that at least 75% of NRES students are being mentored during each enrollment session.
8. Create a process for defining future growth areas and opportunities for educational programs.
9. Provide leadership for the development of UNL-based, innovative, integrative, collaborative, and interdisciplinary initiatives to increase literacy in climate, environmental, earth systems and sustainability issues that engage the community.
10. Promote the accomplishments and products of extension and survey programs to a broader network of audiences, both internal and external to UNL.

Appendix 4.4-1

Degree Objectives and Expected Competencies

DEGREE OBJECTIVES

The broad objectives for a person getting a B.S. degree in one of the Natural Resource Sciences majors is to:

1. learn and use the facts and concepts central to a specific field of study and future career options;
2. acquire skills to collect, analyze, summarize, synthesize, and interpret data relevant to their field of study;
3. develop the ability to work independently and in teams to propose solutions to natural resource questions using systems thinking or analysis; and
4. communicate information effectively to a variety of audiences.

EXPECTED COMPETENCIES

Natural Resource Specific Skills

- Describe and explain the basic characteristics of natural resource systems which include the atmosphere, hydrosphere, geosphere, and biosphere.
- Describe the physical and biological interactions among the various natural resource systems.
- Describe the impact of humans as stewards, managers, and components of natural resource systems.

Communication Skills

- Give an organized and professional oral presentation that uses appropriate visual aids on natural resources topics.
- Write to effectively communicate research results and opinions in a manner appropriate to an audience.

Problem Solving Skills

- Organize and conduct research using a systematic approach.
- Locate and use various data sources that are available for natural resource science, policy, management, and/or economics.
- Collect data using appropriate laboratory and field techniques.
- Use the following quantitative methods to evaluate applied problems in natural resources.
 - A. construct graphical and tabular summaries of quantitative data.
 - B. use mathematical concepts to represent the dynamics of physical biological, and socioeconomic processes.
 - C. construct a simple dynamic model that incorporates key pools, fluxes, and feedback mechanisms to represent a biological or physical system.
 - D. conduct simple statistical analysis of data.

4.5 Human-Environment Interaction (Human Dimensions of Natural Resources)

*The School of Natural Resources is committed to enhancing understanding of **human-environment interaction**, including social/human factors in natural resources management and policy that are critical for establishing and maintaining sustainable environmental systems.*

Executive Summary

The School of Natural Resources (SNR) has a substantial record of achievement in addressing the human dimensions of natural resources (HDNR). SNR faculty and staff are well recognized for their research and extension programs that address issues including ecological decision making, human-wildlife conflicts, water policy, human impacts of drought and other natural hazards, agroforestry, and natural resources economics. Yet, in many respects the SNR HDNR program today is not as “mature” as SNR’s other major focal areas, especially in the academic arena. During the past five years, SNR has established both a MS and PhD specialization in HDNR that has shown steady growth, but faculty teaching FTE has not kept pace. To enhance its HDNR programs, SNR should proceed as quickly as possible to create a new tenure-track faculty position in HDNR with funding through the College of Arts and Sciences (CAS), encourage the integration of Geography and Survey faculty in the HDNR program, improve coordination of the SNR HDNR program with other UNL academic units, improve the HDNR undergraduate program and develop a “marketing” plan to better engage prospective students and students from other units in SNR HDNR programs, initiate a graduate-level seminar in HDNR, enhance use of SNR field facilities in HDNR programs, and explore placing more emphasis on international concerns.

Introduction

Human beings impact, and are impacted by, their physical, biological, social, and cultural environments in myriad ways at multiple spatial and temporal scales. It is now widely recognized that a better appreciation and understanding of human-environment interaction is critical to improving management and sustainable use of natural resources (Committee on the Human Dimensions of Global Change and Committee on Global Change Research, National Research Council, 1999; Committee on the Human Dimensions of Global Change, National Research Council, 1994). SNR has a substantial record of achievement in addressing the human dimensions of natural resources (HDNR). SNR’s HDNR program focuses on enhancing understanding of how people perceive, affect, and are affected by natural and managed environments, and on developing ways to use such knowledge to improve stewardship and management of ecosystems and natural resources.

4.5.1 Overview and Definition of the Issue

One cannot effectively deal with natural resources management or policy without considering the human element. In fact, terms such as *management*, *conservation*, *stewardship*, *sustainability*, *policy*, and *risk* (all commonly used in discussing natural resources) have meaning only within the context of human societies. Increasingly, natural resources professionals are called upon to

facilitate collaboration between groups, help resolve conflicts, create policies that serve multiple stakeholders, serve as educators, and advocate for environmental issues. As a consequence, environmental scientists and natural resources managers need to have a broad appreciation of the human element critical in dealing with natural resources issues.

Studies of HDNR result in improved understanding of (1) how and why humans value natural resources, (2) how humans want resources managed, and (3) how humans affect or are affected by natural resources management decisions and actions (HD.gov). HDNR is inherently multidisciplinary in both scope and methodology, encompassing both social and environmental science perspectives, paradigms, and approaches operative at varying scales—interpersonal, community, and global. Human dimensions education and research involves study of cultural, social, and economic values; individual and social behavior; demographics; legal and institutional frameworks of management, communication, and education; and decision-making processes of management.

4.5.2 Status in 2003

The 2003 SNR external review identified HDNR as a key area of specialization needed in a comprehensive school of natural resources, and recognized that a substantial number of faculty were working in this area. On the other hand, it was suggested by the review team that the program needed focus and leadership. This issue has been addressed during the past year by formation of the SNR Faculty of Human Dimensions of Natural Resources and the appointment of Dr. Mark Burbach as coordinator for the HDNR faculty. Yet, in many respects the SNR HDNR program today remains a program that is arguably not as “mature” as SNR’s other major thematic focal areas. There is increasing recognition that HDNR is a central concern of most work in natural resources, spanning virtually all other areas of focus within SNR (e.g., ecology, climate, water); at the same time, the fact that HDNR is a topic that increasingly requires specialization in its own right appears to be less well understood.

4.5.3 Progress and Change (2003–09)

Many of the faculty and staff who affiliated with SNR when the School was initially formed had considerable records of achievement in the human dimensions of natural resources. During the past five years, SNR faculty, staff, and students have expanded and enhanced research, instructional, and outreach activities in HDNR. For example, SNR has established an overarching program in HDNR (<http://snr.unl.edu/humandim/research/index-research.asp>) that includes a graduate specialization for both the MS and PhD (<http://snr.unl.edu/gradstudent/special/spec-humandimensions.asp>). The graduate program has shown steady growth during the past five years (Table 4.5-1). In addition, several SNR HDNR faculty (e.g., Woudenberg, Knutson) have begun to offer new courses, although these may not have permanent course numbers and it is unclear how often such courses will be taught in view of the fact that most of the instructors do not have hard funding or teaching FTE (Table 4.5-2).

Table 4-5.1. Graduate Students Specializing in HDNR, 2004-09.

Year	MS	PhD
2004		1
2005		1
2006	3	1
2007	3	3
2008	4	5
2009	4	4

Working closely with other University of Nebraska–Lincoln (UNL) units (e.g., UNL’s Department of Agricultural Economics and the College of Law), SNR has continued to address issues important to Nebraska, the central Great Plains region, and other areas. Research and outreach programs, and associated key faculty and staff, currently include the following (f = SNR faculty; a = adjunct/courtesy faculty; s = SNR staff):

- Ecological decision-making/leadership—nontenure-track faculty: Burbach
- Drought mitigation, climate change—tenured/tenure-track state-funded faculty: Wilhite, Hayes, Hu, Hubbard; nontenure-track faculty: Knutson, Woudenberg, Svoboda, Dutcher; soft-funded staff: Fuchs, Wall, Bernadt
- Human-wildlife conflicts, damage, diseases, and safety—tenured/tenure-track state-funded faculty: Hygnstrom, Freeman; soft-funded staff: Vantassel
- Threatened and endangered species—tenured/tenure-track state-funded faculty: Tyre; soft-funded staff: Brown, Thody
- Environmental restoration/remediation—tenured/tenure-track state-funded faculty: Wedin; adjunct faculty: Allen
- Water policy and law—adjunct faculty: Zellmer, Aiken, Schutz
- Human impacts of severe weather, drought, and other natural hazards—tenured/tenure-track state-funded faculty: Dewey, Wilhite; nontenure-track faculty: Knutson, Woudenberg; soft-funded staff: Gutzmer, Widhalm, Scott, Smith, Wood
- Land use and land cover change—tenured/tenure-track state-funded faculty: Merchant, Guan; nontenure-track faculty: Wardlow
- Agroforestry, shelterbelt management—tenured/tenure-track state-funded faculty: Brandle
- Human diseases, paleoethnobotany, archaeoparasitology—tenured/tenure-track state-funded faculty: Reinhard
- Public demand for information about natural resources—tenured/tenure-track state-funded faculty: Kuzila, Goeke, Carlson, Merchant, Joeckel; nontenure-track state-funded faculty: Burbach, Lackey, Sibray; state-funded staff: Howard, Korus
- Natural resources economics—tenured/tenure-track state-funded faculty: Schoengold; nontenure-track faculty: Ding; adjunct faculty: Lynne, Shultz

In 2008, UNL’s Department of Geography became part of SNR. Several geographers are working in areas relevant to SNR’s HDNR program:

- Historical geography of Great Plains natural resources—tenured/tenure track state-funded faculty: Wishart
- Personal space and environmental perception—tenured/tenure track state-funded faculty: Amedeo
- Political ecology and urban geography—tenured/tenure track state-funded faculty: Archer

Efforts to better integrate the geography faculty into the HDNR program will be a high priority during the next five years. In addition, in 2008, Lisa Pennisi, a specialist in natural resources recreation and ecotourism, joined the Department of Agricultural Leadership, Education and Communication. She also is seeking to closely ally her teaching and research with SNR's HDNR program and currently has a courtesy appointment in SNR. We are pursuing opportunities for a joint appointment with Dr. Pennisi in the near future.

4.5.4 Challenges and Opportunities (2010–14)

During the next five years, SNR will need to continue to address important natural resources issues such as those noted above. However, SNR will also need to enhance its HDNR program to address a suite of new and emerging concerns, giving special emphasis to changes in human behavior that may stem from, or aid in ameliorating, impacts:

- What are the potential impacts of climate change on humans and natural resources (e.g., wildfires, water supply, drought, invasive species, severe weather), and how can these impacts be mitigated?
- How are human health issues (e.g., West Nile virus, Lyme disease, influenza, water-borne viruses, pharmaceuticals, toxic algae, protection of drinking/recreational water) related to natural resources management?
- How will growing demands for biofuels (corn, cellulosic feedstocks) affect land use change, wetlands, and surface and groundwater?
- What are the likely impacts of diversification of energy production (wind farms, pipeline construction, refineries, solar farms, nuclear, electrical transmission lines) on natural resources?
- What are the human (e.g., economic) and ecological impacts of invasive species such as phragmites, salt cedar, and emerald ash borer, and what can be done to mitigate impacts?
- How does demographic change (e.g., urbanization, aging population, cultural diversity, native peoples, demand for recreation, transportation) impact management of natural resources?
- Is the complement of parks, lakes, and protected areas sufficient to support recreational demands, eco-tourism, biodiversity, and other objectives for open spaces?
- How can we better employ technology and innovations (e.g., decision-support systems, risk analysis, GIS, Internet, as well as new paradigms such as resilience, adaptive management) in natural resources management?

To answer such questions, SNR must address a number of interrelated challenges, including the following:

- If one looks at the types of jobs that SNR graduates typically obtain, a large proportion involve working with land managers, political organizations, citizens groups, NGOs,

legislative bodies, and public agencies. Employers increasingly seek employees who understand conflict resolution, working in teams, dealing with economic issues and so forth. Yet, many students, especially undergraduates, do not appear to recognize the importance of HDNR in career development. The majority of undergraduates specialize in areas such as fish and wildlife, climate, soils, and water, where they are confronted with many required courses and few opportunities for electives. SNR needs to identify ways to convey to students, and their faculty advisors, the importance of a foundation in HDNR. Existing coursework in HDNR should be systematically evaluated, and consideration given to initiating a HDNR foundation course requirement for all NR students. Efforts need to be directed at both the undergraduate and graduate curricula. A coherent undergraduate program should be articulated and implemented.

- At the graduate level, student interest in HDNR has grown during the past five years (Table 4.5-1), yet at the 800-900 level, SNR has regularly offered only one course in HDNR (NRES 916 Water Law and Policy). As a consequence, SNR's HDNR students must currently take most coursework in affiliated departments. Prospective students have sometimes been turned away because there are few SNR HDNR faculty advisors and financial support (e.g., graduate assistantships) is insufficient. SNR needs to identify means to provide more courses for graduate students in HDNR and enhance financial aid to students seeking to specialize in HDNR at MS and PhD levels.
- SNR's HDNR program currently relies heavily on faculty and coursework in other departments. Only four of the SNR faculty who have their majority appointment in SNR and identify their primary affiliation as SNR's HDNR program are supported by state (~~hard~~) funds and have teaching appointments (Burbach, Reinhard, Schoengold [partial appointment in SNR] and Kuzelka [emeritus]). The total FTE devoted to teaching in HDNR is only 1.80. All others who identify their primary affiliation as SNR's HDNR program are funded on grants or contracts and obligate their time primarily to research. Of the twenty additional faculty who identify HDNR as their secondary or tertiary area of interest, sixteen are funded on state funds, but most focus the majority of their time on ancillary teaching and research (e.g., in applied ecology, GIS, water science, or geography). SNR needs to identify ways to increase the number of state-supported core teaching faculty whose primary specialization is HDNR. An important task is to identify ways in which the Geography program and faculty can best contribute to strengthening the HDNR program.
- Among faculty, competitive research grants increasingly require an HDNR component. SNR needs to develop incentives and strategies to build integrated teams that can better address demands for research that includes emphases on human dimensions. In addition, SNR should examine ways in which the SNR Survey program can contribute more effectively to an integrated approach to dealing with HD issues addressed by SNR. A better integrated program of outreach and survey could contribute significantly to SNR's competitive posture with respect to research funding.

4.5.5 Current Status (T, R, E/O, S)

4.5.5.1 Academic Programs. In January 2009, SNR's HDNR faculty included 8 faculty members who identified HDNR as their primary area of expertise, 13 who designated HDNR as a secondary interest, and 7 who noted HDNR to be a third area of interest (Appendix B). Yet, as

noted above, this seemingly large number of faculty is somewhat misleading. Note, for example, that of the 8 SNR faculty who identify HDNR as their principal specialization, 4 have teaching appointments and 4 are supported on grant or other soft funds (Table 4-5.1). Other SNR faculty are engaged in HDNR research and offer some instruction in HDNR, but have their primary affiliations with other program areas and/or centers. SNR needs to identify ways to engage these faculty more effectively in the core HDNR program.

Table 4-5.2. FTE of SNR Faculty in the Human Dimensions Area.

Name, Title	FTE	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Total	Soft- Funded
Mark Burbach, Associate Geoscientist	1.00 SNR	1	.35	.23		.42	1.00	
Ya Ding, Post Doctoral Research Associate	1.00 SNR	2		.70		.30	1.00	1.00
Cody Knutson, Research Assistant Professor	1.00 SNR	3		.50		.50	1.00	1.00
Cindy Larson-Miller, Lecturer ¹	1.00 SNR	4	1.00				1.00	1.00
Karl Reinhard, Professor	1.00 SNR	5	.05	.45	.48	.02	1.00	
Karina Schoengold, Assistant Professor	.30 SNR .70 AgEcon	6	.25	.05			1.00	
Donna Woudenberg, Post Doctoral Research Associate	1.00 SNR	7		.70		.30	1.00	1.00
TOTAL	6.45 SNR .70 AgEcon	7	1.80	2.63	.48	1.54	7.15	4.00
Human Dimensions Faculty by Tenure								
Tenured/Tenure-Track	1.30 SNR .70 AgEcon	2	.30	.50	.48	.02	1.30	
Nontenure-Track	6.15 SNR	5	1.50	2.13		1.52	5.85	4.00
TOTAL	6.45 SNR .70 AgEcon	7	1.80	2.63	.48	1.54	7.15	4.00

Source: 2008-09 Adjusted Budget

¹Only .20 FTE of this appointment is for instruction; the remaining .80 FTE is for course development, grant management, recruiting, and advising, all of which are considered teaching activities.

Except for NRES 916, no core human dimensions courses are currently offered in SNR; consequently, SNR students must take most coursework in affiliated units such as the Department of Agricultural Economics, Department of Community and Regional Planning, and School of Law. Faculty teaching these courses often have courtesy appointments in SNR, but their primary affiliations are elsewhere. Moreover, most HDNR courses taught in these other units are either introductory or for target audiences such as planners, agricultural economics majors, or law students.

Anecdotal reports from SNR students indicate that they currently see the HDNR curriculum, courses, and faculty as “fragmented”—too many courses in different departments, not sufficiently coordinated, not sufficiently “centered” in SNR. SNR needs at least a few core

courses in HDNR taught by SNR faculty. Efforts need to be directed at both the undergraduate and graduate curricula. A coherent undergraduate program should be articulated and implemented. Consideration should be given to development of a 400/800-level HDNR course required of all SNR students (e.g., see Table 4.5-3). Graduate students need an HDNR seminar that focuses on emerging areas (e.g., conservation psychology, political ecology) and a practicum/internship specific to SNR students' interests and career development.

Table 4.5-3, Sample Curriculum for HDNR Core Course (Virginia Tech).

Week	Topic
1	What is Human Dimensions and why is it important?
2	Natural Resource Law, Policy & Administration
3	History of Human Dimensions
4	Social Science Theories
5	Valuing Natural Resources
6	Demographic Change & Implications
7	Understanding the Stakeholder Approach
8	Effective Communication
9	Management as a Process
10	Policy Development
11	Stakeholder Participation in Policy Development
12	Conflict Resolution & Avoidance
13	HD Research Issues
14	Planning and Using HD Research
15	HD Research Methods

Source: Virginia Tech, www.vto.vt.edu/syllabus/nr5984w_sp08.pdf

HDNR is inherently a multidisciplinary subject in which SNR needs to collaborate closely with other UNL units; however, it is not currently clear what role SNR plays. SNR needs more concerted faculty leadership in HDNR—i.e., one or two faculty (at minimum) who identify HDNR as their principal area of specialization, have specific training in human dimensions of natural resources, and have position descriptions that focus on teaching and research in HDNR. These faculty would teach core courses in HDNR and collaborate with other UNL faculty in research.

As noted above, the Geography program provides SNR with new opportunities to address issues in HDNR. The MA degree in Geography now complements the MS in Natural Resources, and may be a better choice for some SNR graduate students specializing in HDNR, particularly those wishing to emphasize the social science aspects of such work. Moreover, geography faculty having interests in HDNR offer courses that complement those that have been offered heretofore. These faculty, and their areas of focus, include:

- Doug Amedeo—environmental perception and spatial dimensions of human behavior
- Clark Archer—political ecology and geodemography
- David Wishart—historical land use of the Great Plains and indigenous
- Steve Lavin—thematic mapping of human-impacted landscapes

In August 2009, a new geography faculty member, Gene Guan, joined SNR, adding expertise in both GIScience and land use. Dr. Guan's appointment is supported by both CAS and IANR. SNR has recently proposed a new faculty appointment with CAS that could add to this complement of faculty. If funded, this proposal would enable hiring of a faculty member who would develop and teach integrative core courses focusing on the forces that drive people's decisions, human behaviors that lead to change, and effects of change on natural resources and quality of life.

4.5.5.2 Research Programs. As noted, many SNR faculty, staff, and students are actively engaged in research that has an HDNR component (Table 4.5-4). This work will continue, but SNR also needs to be positioning itself to address a variety of other important emerging issues.

Funding agencies increasingly require a human dimensions component, and this component must be more than a simple "add-on" to proposals. Increasingly, HDNR faculty will be needed to serve on teams that will enable SNR to compete more effectively for external funding. It should be noted that some SNR faculty seem to misidentify HDNR as providing only "technical support" efforts such as conducting meetings and designing surveys (questionnaires), activities that simply support research in areas such as resource conservation and land/water management. On the one hand, SNR should consider hiring a staff person, trained in HD/social sciences, to assist faculty with technical support on research, but HDNR-trained faculty are needed to engage in basic research to address issues such as developing better HDNR research methodologies (quantitative, qualitative, and mixed methods), including ways in which social science data analysis approaches can be best used in dealing with natural resources questions. We will continue to pursue courtesy appointments for faculty at UNL with an interest in HDNR who are willing to support the SNR program. In addition, we will try to use SNR faculty retirements as a mechanism to redirect resources into the HDNR program area.

Table 4.5-4. Select Grants Awarded to SNR Faculty in Human Dimensions, 2003–09.

Title	Granting Agency	Total Amt	Term	Human Dimensions Faculty
Drought Prep Framework Tribal Govt	Dept of Interior-BIA	609,539	2007-10	Knutson
Drought Mitigation, NE Project	Dept of Agriculture-CSREES	437,244	2009-10	Knutson
Integrated Real-Time Groundwater-Level Monitoring Network to Support Drought Impact Assessment & Mitigation Programs	Dept of Agriculture-RMA	403,293	2005-09	Burbach Knutson
Drought Mitigation, NE Project	Dept of Agriculture-CSREES	347,246	2008-09	Knutson
Dev Seasonal Predictive Capability	Univ of Illinois-Urbana/Champaign	311,000	2008-11	Knutson
Dev Drought Ready Communities Prog.	Dept of Commerce-NOAA	288,670	2008-10	Knutson Woudenberg
Drought Decision Support Portal	Dept of Commerce-NOAA	223,524	2007-09	Knutson
Ensuring Student Success	Dept of Agriculture-CSREES-HEC	139,067	2007-10	Burbach
Aquifer Vertical Anisotropy & Streambed Conductance in Eastern Part of Central Nebraska	Upper Big Blue NRD	121,760	2004-07	Burbach

Source: NUGrants

4.5.5.3 Extension and Outreach Programs. SNR research and extension programs related to HDNR are strongly linked, and this linkage should be enhanced. The Central Plains Severe Weather Symposium, an event that attracts more than 3,000 people to SNR each spring, is an excellent example of SNR's success in enhancing public awareness of the impacts of natural hazards (<http://www.lincolnweather.org/cpsws2009.html>). Likewise, the work of Scott Hygnstrom and colleagues on matters pertaining to wildlife damage management, and the work of the National Drought Mitigation Center to help people manage effects of drought through vehicles such as the Drought Impact Reporter (<http://droughtreporter.unl.edu/>), should be emulated and expanded.

SNR should seek to develop additional outreach activities focused on influencing human behavior to better address issues such as environmental justice, climate change, water quality, sustainability of ecological systems, ecotourism, and natural resources recreation.

4.5.5.4 Survey programs. The relationship between SNR's Survey mission and the HDNR program needs to be better defined. Survey faculty and staff have a long history of outreach and service to land and water managers and the public. And SNR has several Survey staff in outstate offices—Jim Goeke (North Platte), Susan Lackey (Norfolk), Steve Sibray (Scottsbluff). An important focus in the next five years is to determine how Survey programs and staff can be better integrated into the HDNR program.

4.5.6 Goals for 2014 (T, R, E/O, S)

During the next five years, it is important that SNR continue to focus on the centrality of HDNR as the “integrator” of all other parts of SNR. Without a strong HDNR program, we have a “School of Climate, Soils, Wildlife and Water.” The human dimensions emphasis within SNR is a key factor in distinguishing the School from units such as the Department of Geosciences and the School of Biological Sciences. HDNR is the “lens” through which people interact with the physical environment, and SNR should foster a “person outward” view in students (as contrasted with a complementary physical/biological science view perhaps common in departments of geology and biology).

4.5.6.1 Actions to Meet Goals.

1. HDNR faculty should renew efforts to convey the centrality of HDNR to all SNR faculty, staff, and students. An important step in this direction is a recommended change to the SNR mission statement that will make the importance of HDNR more apparent. Discussion of this change has recently been initiated by the SNR director. Plans are to revisit the SNR vision and mission statement at the earliest possible time following the completion of the 5-year review.
2. SNR should proceed as quickly as possible to create a new faculty position in HDNR. Such a position has recently been proposed to CAS. The person hired should be well versed in the fundamentals of HDNR, including relevant social science theory and techniques required to better understand and address real-world natural resources issues (e.g., communication, collaborative decision making, conflict resolution, public policy, stakeholder investment). Advanced training in areas such as conservation psychology, risk psychology, ecological economics, belief systems, environmental ethics, and life-cycle assessment would also be

desirable. SNR's greatest need is for a person to work at the individual and community levels, but the School should not lose sight of the importance of future focus on global HDNR issues. In addition, HDNR faculty should outline the need and qualifications for a proposed staff position in HDNR.

SNR should also ensure that Dr. Lisa Pennisi, a specialist in natural resources recreation and ecotourism in the Department of Agricultural Leadership, Education and Communication, becomes affiliated with the HDNR program through a joint appointment.

3. In 2010, HDNR faculty will hold a series of workshops to address priority issues, including the integration of Geography and Survey faculty in the SNR HDNR program and enhancing integration and coordination of the SNR HDNR program with other units (e.g., Agricultural Economics, Law, Sociology, Community and Regional Planning, University of Nebraska Medical Center, Rural Sociology, Public Policy, Architecture, and UNL Extension). This will include a systematic review of ways in which Survey data sets, faculty, and staff can be used to better effect in the SNR HDNR program.
4. During 2010, HDNR faculty will revise materials on the SNR graduate specialization in HDNR and material on the SNR web site. In addition, a coherent undergraduate program will be articulated and implemented. HDNR faculty will also develop a "marketing" plan designed to better engage prospective students and students from other units in SNR HDNR courses and activities (e.g., Biological Systems Engineering, Animal Science, social science departments).
5. In order to verify the contention that a foundation in HDNR is important to students majoring in natural resources, SNR will, in 2010, develop statistics on where SNR graduates are employed and what types of work they do (i.e., to what extent are HDNR skills required in the workplace?). This should include specific statements from some key employers (e.g., Nebraska Game and Parks, USDA/Natural Resources Conservation Service, Nebraska Department of Natural Resources, Natural Resources Districts) regarding the types of skills new employees need.
6. During 2010, HDNR faculty will design and propose a new Achievement-Centered Education (ACE) course in HDNR (NRES/GEOG 3XX or 4XX/8XX), based on a course such as that outlined at http://www.vto.vt.edu/syllabus/nr5984w_sp08.pdf.
7. During 2011, HDNR faculty will develop a team-taught graduate-level seminar on HDNR (NRES/GEOG 4XX/8XX or 9XX), to be offered annually.
8. During 2011, HDNR faculty will develop plans to enhance use of field facilities in HDNR programs (e.g., Prairie Pines, Nine Mile Prairie). This effort will include a focus on human impacts on the environment, conservation ethics, stakeholder interaction, public education, and outreach to K-12 educators/students.
9. During 2011, HDNR faculty will begin to explore placing more emphasis on international concerns. As in other areas of natural resources, a global perspective is increasingly important and attention needs to be directed toward global human problems, developing countries, and

issues such as equity, environmental justice, gender, and poverty. In fact, HDNR faculty from SNR's National Drought Mitigation Center are already working in several countries, and HDNR faculty are developing a field school in Costa Rica, although both efforts are at this stage totally subsidized by grant funds, and thus their longevity is not assured.

4.5.7 References

Committee on the Human Dimensions of Global Change and Committee on Global Change Research, National Research Council, 1999. *Human Dimensions of Global Environmental Change: Research Pathways for the Next Decade*. National Academies Press, Washington, D.C. http://www.nap.edu/catalog.php?record_id=9641#toc

Committee on the Human Dimensions of Global Change, National Research Council, 1994. *Science Priorities for the Human Dimensions of Global Change*. National Academies Press, Washington, D.C. http://www.nap.edu/catalog.php?record_id=9175

HD.gov (<http://www.hd.gov/HDdotGov/intro.jsp>)

4.6 Current and Emerging Issues—Summary

Faculty Positions: Current Status and Future Priorities

During the period from January through April 2008, School of Natural Resources (SNR) faculty were engaged in a process to evaluate priorities for future faculty positions in SNR. This conversation was timely since the unit had not previously engaged in a discussion of priority faculty positions across the full range of disciplines that exist in SNR. (Note: This process was completed before the merger of Geography into SNR and thus did not include priority positions for this program.) Several criteria were established for evaluating each position proposed. First, does the position fit within the context of the current and emerging issues adopted by SNR faculty? Second, does the proposed position contribute to further integration of SNR programs? In other words, the faculty position should have a strong interdisciplinary component. Third, will the position's FTE distribution contribute to undergraduate teaching and graduate specializations, resulting in increased student credit hour production? Fourth, what is the potential for this position to generate significant external grant funds? Finally, how will the position contribute to our outreach mission (extension, survey)?

The outcome of this process was the identification of the following faculty positions as the highest priorities for SNR (listed in alphabetical order).

- Climate change scientist
- Environmental microbiologist
- GIScientist
- Natural resources educator
- Wetland ecologist

The natural resources educator position was eventually moved to a lower priority because the faculty concluded that some of the extension components of the climate change scientist position would address science education issues.

Following the merger of the Geography program into SNR, a faculty position with expertise in human-environment interactions was discussed and added to this list of priority faculty positions. It is expected that the human-environment interaction scientist would be funded through the College of Arts and Sciences (CAS) to strengthen the Geography program and enhance SNR's human dimension faculty area.

During spring 2009, SNR was able to fill both the climate change scientist and GIScientist positions. Martha Shulski, an applied climate scientist and the director of the High Plains Regional Climate Center, has filled the climate change scientist position. Her research, teaching, and extension program will focus largely on climate variability and change. The GIScientist position was recently filled through the hiring of Gene Guan. He will be conducting research on advanced GIS techniques and teaching GIS courses. The GIS position is funded 50/50 between the Institute of Agriculture and Natural Resources (IANR) and CAS. In addition, we have had approval from Elbert Dickey, dean of extension, to hire a climate change educator to develop a comprehensive extension program. This position largely addresses the priority of the natural resources educator position listed above. SNR has also recently submitted a request to Dean

David Manderscheid, CAS, for a new faculty position in human-environment interactions. If funded, this position would significantly strengthen our human dimensions program through a greater emphasis on teaching and research.

Two positions have yet to create any positive momentum for funding. These are the environmental microbiologist and the wetland ecologist. Both of these positions have obvious connections to other departments across campus and may require an interdepartmental effort to establish a joint appointment. The wetland ecologist position is expected to have a strong teaching and research component. The teaching component will significantly increase the teaching capacity of the applied ecology faculty area in SNR in response to the significant growth in demand for courses in this area and in support of the fisheries and wildlife major.

In the previous sections of this chapter that focused on issues in natural resources and environmental science, considerable discussion was directed at faculty and staff positions necessary to support continued enhancement of these issue areas. Our funding strategy for these positions is to redirect resources from SNR faculty retirements or from faculty attrition to other universities or positions, collaborate with other departments on joint positions, attract external funding, or utilize adjunct faculty affiliations from other universities or federal/state agencies. The new faculty positions identified in previous sections of this chapter have not yet been debated by SNR faculty in order to reach some consensus regarding on the priority for these positions. These positions will be discussed following our external review along with possible strategies for funding.

In the previous sections of this chapter, numerous staff positions were identified that are needed in support of continuing growth in each of these five issue areas. These positions could be funded from either state or external funding sources. In some situations, these positions may be created through the redirection of existing technician positions, although these opportunities are quite limited in the current budget climate. In addition to these staff positions, three staff positions in hydrogeology are critical to our ability to address the needs of clientele of SNR's Survey program. These positions were identified in Chapter 3 (Section 3.5.3). One such position is necessary to coordinate the delivery of field data and to implement automated geologic and hydrogeologic databases. A second hydrogeology position will be required to develop a smooth transition when our hydrogeologist at the West Central Research and Extension Center indicates his intent to retire. Although that retirement is not eminent, our intent is to have overlap with another hydrogeologist in order to continue to provide outstanding service to clientele. A third staff position is needed to conduct applied research on hydrogeologic issues pertaining to expanding development in southeast Nebraska. Without these three staff positions, SNR will be unable to adequately meet the needs of our diverse clientele throughout the state. Recent conversations that the SNR director has had with the leadership of the Nebraska Association of Resource Districts and IANR administration regarding developing a partnership for funding the three hydrogeologic positions mentioned above have been fruitful. We expect to be able to fill one of these positions this budget year and, perhaps, a second position next year.

5 RESOURCES AND INFRASTRUCTURE

5.1 Human Resources

Faculty: Faculty with full (100%) appointments in the School of Natural Resources (SNR) total 65. An additional 12 faculty positions, primarily lecturers, have part-time appointments, and 12 faculty positions have joint appointments with other University of Nebraska–Lincoln (UNL) departments, primarily the School of Biological Sciences, the Department of Geosciences, Biological Systems Engineering, Civil Engineering, and the Nebraska Forest Service. Total SNR faculty FTE is 74.96. The most current FTE breakdown by teaching, research, extension/outreach, survey, and administrative appointments for SNR and the other units (combined) is given in Table 5.1.

Staff: SNR has 85 staff totaling 81.28 FTE. Of these, 78 are 100% SNR, 1 has a split appointment with another department, and 6 have part-time appointments. A breakdown of staff FTE by faculty area can be found in Appendix L.

Table 5.1 SNR Faculty and Staff Appointments.

Appointment	Total FTE	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Administration/ Administrative Services
Faculty	74.96	15.93	36.95	5.10	14.68	2.30
Staff	81.28		46.78	17.25		17.25
Total	156.24	15.93	83.78	22.35	14.68	19.55

Courtesy and adjunct appointments within SNR have increased significantly since 1997. Courtesy appointments are given to UNL faculty at their request, subject to a vote of the SNR faculty. Currently, courtesy appointments have been extended to 48 faculty. Adjunct faculty appointments (39) are given to non-UNL faculty and represent scientists employed by state and federal agencies within and outside of Nebraska, consultants, and university faculty in other states. Both courtesy and adjunct appointments work on various research and outreach projects with SNR faculty. These appointments are reviewed periodically to determine if their continuation is in the best interest of SNR and the appointee. Courtesy and adjunct faculty offer a considerable resource for SNR faculty, staff, and students. Their level of involvement in SNR meetings and committees varies considerably. A complete list of courtesy and adjunct faculty is provided in Appendix O.

SNR faculty can generally be divided into disciplinary categories. Categories and FTE breakdown for each category are provided in Table 5.2. Joint appointments with other UNL units and courtesy and adjunct faculty in these disciplinary categories are not included. A complete list of faculty, grouped by faculty area, is provided in Appendix L. More detailed information on each faculty member is included in their vitae (see Appendix W).

Table 5.2 SNR Faculty and Staff by Discipline and Funding Source.

Faculty by Faculty Area	State-Funded FTE	Grant/Soft-Funded FTE	Total FTE
Applied Climate Science	10.29	6.00	16.29
Applied Ecology	9.36	4.44	13.80
Geography/GIScience	9.24	3.00	12.24
Geology & Soils	6.55	0	6.55
Human Dimensions	2.43	4.02	6.45
Water	15.28	4.35	19.63
Total	53.15	21.81	74.96

Staff by Faculty Area	State-Funded FTE	Grant/Soft-Funded FTE	Total FTE
Applied Climate Science	2.53	18.90	21.43
Applied Ecology	1.00	15.00	16.00
Geography/GIScience		6.80	6.80
Geology & Soils	3.00	1.00	4.00
Human Dimensions			0.00
Water	11.30	5.25	16.55
Services	16.10	.40	16.50
Total	33.93	47.35	81.28

5.1.1 Services. SNR provides internal services to its faculty and staff. These services range from helping new employees find their way around to offering assistance to faculty for teaching, field or lab research, or outreach/extension. Core services include, but are not limited to, setting up email accounts, assigning mail boxes and copy codes, readying offices, setting up computers, coordinating keys, providing an orientation to the building, event planning, and archive assistance. Services also include assistance when employees leave SNR/UNL. More information can be found at <http://snr.unl.edu/employeeinfo/supportservices.asp>

5.1.1.1 SNR computing resources. The SNR information technology (IT) support team provides technical and specialized computing services to SNR, NFS, Nebraska Statewide Arboretum, Nebraska LEAD Program, and NRBC. The IT support team includes the IT manager, Jim Hines, and two computer technicians, Gregg Hutchison and Ron Kruml. The IT support team is housed on the second floor in the south wing of Hardin Hall. The area consists of offices, support area, server room, and storage area.

The support team is responsible for maintaining almost 600 computers and 8-10 servers. The support team also supports laptops and audiovisual equipment that is available to all SNR faculty and staff on a checkout basis. SNR centers and program areas also have servers and other computer equipment housed within the facilities, primarily for use by faculty and staff within these groups. This equipment has, for the most part, been purchased from external funds designated to these centers or program areas.

The SNR IT support team supports a 24/7 computer lab used by undergraduate and graduate students and 3 computer teaching labs used by SNR faculty for teaching classes. (Funds will need to be found to replace these lab computers on a 4- to 5-year cycle). In total, the support team maintains/supports 13 rooms that contain audiovisual equipment and computers used by SNR and UNL personnel.

Financial resources for purchasing and maintaining computers within SNR come from two sources. State-appropriated funds are used to support administrative needs and to provide general computer support, server support, and audiovisual support. These funds are allocated by the SNR director to the IT manager. (In the very near future, these funds will need to increase to reflect the increase in personnel and number of computers). Other computer needs are funded by faculty through external project funds in research, extension/outreach, and teaching. Many of SNR's graduate students use computers supplied by their faculty advisors; these computers are usually located in the graduate students' offices.

It has been suggested that SNR provide portable computer carts with laptops. These could be deployed in classrooms to provide students with access to computers, especially when they are needed to analyze data for group projects or for activities that require a computer sporadically.

5.1.1.2 GIS, cartography, and graphic arts. The GIS, cartography, and graphic arts staff of Les Howard and Dee Ebbeka provide the following services for SNR:

- Produce maps, graphics, and high-quality illustrations and drawings
- Produce posters and slide presentations for professional meetings
- Produce flyers, brochures, handouts, and displays
- Develop and maintain survey-related GIS databases
- Develop GIS databases for faculty and staff research and projects
- Provide GIS support for faculty and staff research and projects
- Develop maps and graphics using GIS databases
- Provide technical support for GIS software
- Provide general and technical assistance for GPS
- Maintain handheld GPS units for general use
- Large format scanning and plotting
- Flat-bed scanning, slide scanning, lamination, foam board mounting, and comb binding

The GIS/Graphics Service Center charges \$12.00/hr. plus the cost of materials to cover operating expenses, equipment, materials, and supplies. The rate for these services has been determined based on equipment costs, depreciation, licensing fees, and replacement needs.

5.2 Financial Resources

Budgetary information: SNR receives funding from state appropriations, grants and contracts, indirect cost recovery, and revolving income. A summary for the past five years can be found in Table 5.3.

Table 5.3 SNR Budget Summary.

Funding	FY 2004–05	FY 2005–06	FY 2006–07	FY 2007–08	FY 2008–09	Total
Appropriations ¹	\$7,605,161	\$7,715,693	\$8,477,134	\$8,596,355	\$9,133,994	\$41,528,337
Facilities & Administration Overhead	210,205	257,778	285,346	251,320	200,039	1,204,688
Grants & Contracts ²	7,297,415	13,195,569	8,730,256	6,584,114	10,268,978	46,076,332
Total	\$15,112,781	\$21,169,040	\$17,492,736	\$15,431,789	\$19,603,011	\$88,809,357

Source: Adjusted Operating Budget

¹ Includes Hatch funds, salaries/benefits, permanent and one-time allocations.

² Includes Federal Formula Fund allocations, such as Regional Research, McIntyre-Stennis, and Integrated Pest Management.

5.3 Physical Infrastructure

The renovation of the Nebraska Center for Continuing Education (now Hardin Hall) has provided SNR with an excellent home facility. In January 2003, the NU Board of Regents approved a plan to renovate Hardin Hall to provide faculty, staff, and students in SNR with state-of-the-art laboratories, classrooms, and offices to support the university's teaching, research, and extension education programs in natural resources. SNR moved into Hardin Hall facilities in June 2006.

With the addition of the new laboratory space of 33,000 square feet, the total space available in the building comes to more than 177,000 square feet. A floor plan of the building can be found in Appendix Q. Hardin Hall houses most of the faculty, staff, and students and laboratories of SNR. In addition to SNR, Hardin Hall also houses the Department of Statistics in the north wing of the complex.

Some SNR faculty, staff, and students are housed in Kiesselbach Hall and the Water Sciences Laboratory on the East Campus of UNL. Three SNR faculty are stationed, one each, at the Northeast Research and Extension Center in Norfolk, Nebraska, the West Central Research and Extension Center in North Platte, Nebraska, and the Panhandle Research and Extension Center in Scottsbluff, Nebraska.

SNR faculty, staff, and students have the opportunity to work at numerous UNL off-campus facilities. SNR faculty have management responsibilities at the following facilities: Prairie Pines, Nine Mile Prairie, and the Agro-Forestry, Agrometeorology, Center for Advanced Land Management Information Technologies (CALMIT), and Conservation and Survey Division areas at the UNL IANR Agricultural Research and Development Center (ARDC). Activities at these facilities are explained below. The link to the SNR facilities website is <http://snr.unl.edu/facilities/HardinHall.asp>.

5.3.1 Hardin Hall Classrooms. Hardin Hall has excellent classroom facilities, including the auditorium (Room 107; 390 seats), Room 163 (50 seats), Room 228 (32 seats), and computer classrooms in Rooms 141 and 142 (24 seats each, 12 and 15 computers, respectively) and Room 200 (12 seats and computers). Hardin Hall also has four small- to medium-size meeting rooms that can be used for small classes. We also have two teaching wet labs, Rooms 23 and 24 (30 seats each). A floor plan of the building can be found in Appendix Q.

With the increase of students in SNR majors, addition/merger of programs into Hardin Hall, and use of classrooms by other departments, we have begun to struggle to schedule classes of varying sizes in the existing classrooms. At times, the number of classes scheduled exceeds the number of classrooms available in Hardin Hall. Ironically, classrooms sometimes sit empty because they cannot accommodate any of the scheduled classes. We have used some conference rooms for classes, but this practice eliminates the use of these rooms for meetings. As the number of student credit hours have increased it has become more evident that there is a need for additional or reconfigured classrooms in Hardin Hall.

5.3.2 *Hardin Hall Laboratory Space.* Hardin Hall has excellent laboratory facilities of approximately 33,000 square feet. A floor plan of the building can be found in Appendix Q. Six SNR faculty have laboratory space outside of Hardin Hall, in Kiesselbach Hall, the Water Sciences Laboratory, and the newly acquired Natural Resources Research Annex. A few faculty use space in the East Campus Service Building in addition to the space they use in Hardin Hall.

SNR's faculty numbers have grown since Hardin Hall opened, and faculty continue to increase their efforts related to research projects. All Hardin Hall laboratory space, which is shared by faculty, is fully utilized. Depending on the number of faculty of similar expertise, laboratory space can become crowded. The best example of a group of faculty with crowded laboratories is the applied ecology faculty, which includes the Nebraska Cooperative Fish & Wildlife Research Unit.

Laboratory space is a critical need to be addressed, especially as SNR faculty acquire grant funds to support research projects that require laboratory space. Laboratory space is directly linked to faculty and student recruitment and retention.

5.3.3 *Hardin Hall Office Layout.* Hardin Hall is an excellent facility. However, because it was not new construction, the layout of the building is not as functional as that of a newly constructed building. The current setup of offices in Hardin does not lead to increased communication; it seems that it leads to less communication. We have tried and will continue to try to increase the use of open areas and to provide the opportunity for faculty and staff to have frequent casual and formal discussions.

5.3.4 *Graduate Student Space.* The SNR graduate students have been allotted office space on the second floor of the north wing of Hardin Hall. Graduate students appreciate the excellent space that they have. The move of the Geography Department to Hardin Hall caused additional pressure on graduate student office space. As a result, the former graduate student lounge has been developed into additional office space. Visual inspection of the graduate student space has shown that a high percentage of the space is not used on a regular basis. It seems that many graduate students spend most of their time in the laboratories and some of the students spend a great deal of their time in the field. Currently, geography graduate students are not using the space. With time, we expect that they will make better use of the space. The acquisition of the IGERT grant, as well as other research grants, will increase the pressure on SNR graduate student space.

5.3.5 Hardin Hall Storage Space. SNR has approximately 1,980 square feet of storage in nine rooms in the basement of the north wing of Hardin Hall. Currently, the storage space in Hardin Hall is fully utilized. Reconfiguration of the space, and the materials stored in it, is necessary. SNR will implement a space allocation procedure (Appendix P) in the near future, which will result in better use of storage space.

5.3.6 Sustainability. A sustainability committee, chaired by Aris Holz, was formed by the SNR director in the 2008 spring semester. The committee is composed of faculty, staff, and student volunteers. The committee is focusing on short- and long-term sustainability-related goals, actions, and activities for Hardin Hall, but plans to expand the effort to all SNR properties in the future.

In an attempt to be a role model for the University as well as the state, the SNR Sustainability Committee has been working hard to reduce the carbon footprint of our building. A primary activity for the committee was to conduct a baseline energy audit, in order to chart progress in achieving this goal. The university-related Partners in Pollution Prevention (P3) Program assisted us in this project. We are waiting for the final results, which are nearly complete, and plan to make Hardin Hall residents aware of the places we could be saving energy and money.

Primary efforts of the Committee to date have focused on recycling and the reduction of energy consumption.

SNR has implemented a recycling program unlike that in place at any other UNL building. We are taking part in a single-line recycling program with an outside vendor that allows #1 and #2 plastics, aluminum, steel, paper, newspaper, magazines, and cardboard to be combined. SNR pays a small monthly fee to take advantage of this program. Currently, the university only collects paper, newspaper, and cardboard, and Pepsi, the university beverage vendor, collects the #2 plastics.

As a result of SNR's leadership in sustainability, UNL has provided funding to have occupancy sensors installed in nearly all offices and common areas. These sensors shut off the lights and adjust the temperature after the room has been vacated for 20 minutes. Sensors have also been installed in many of the laboratories to reduce the amount of air exchange in a lab (energy consumptive process) when the lab and fume hoods are not being operated. These sensors will dramatically reduce the amount of air turnover in labs when unoccupied.

We have implemented an optional automatic nightly computer shut-down for all Hardin Hall residents. Approximately 15 people have volunteered for this program, and there are about 15 more people that shut down their computers each night on their own. If SNR employees routinely access their computer remotely from another site after hours or on weekends, they cannot participate in this energy-savings activity. However, we continue to encourage participation in this program from SNR faculty and staff that do not use remote desktop.

The SNR Sustainability Committee has been exploring the possibility of having a wind turbine installed on the roof of Hardin Hall to provide most of the power for the building. Steps are being taken to have an anemometer installed on the roof to collect data to determine wind-power potential.

The SNR Sustainability Committee was responsible for organizing the UNL webcast for the “America’s Climate Choices” Summit on March 30–31, 2009. The summit, sponsored by the National Academy of Sciences, was held in Washington, D.C. It provided an opportunity for study participants to interact with major thought leaders and key constituencies to frame the questions and issues that the study will address.

The SNR Sustainability Committee was active in the organization of “Building Sustainable Partnerships”, an event attended by almost 200 university and community members. This event was held in February 2009. The event had the following goals: increase visibility of sustainability-related activities and research; identify organizations and individuals with an interest in sustainability; facilitate networking and initiate collaboration; and build effective partnerships between UNL, the city of Lincoln, and others. Another event is planned for fall 2009, with SNR sharing the sponsorship with the Mayor’s Environmental Task Force and the Nebraska Rural Initiative. The second event will be more action oriented, setting forth more specific goals for UNL, Lincoln, and community businesses.

5.4 Other On-campus Facilities Outside of Hardin Hall

5.4.1 CSD Annex. A floor plan of the building can be found in Appendix R. The CSD annex serves as the SNR field services headquarters. Three SNR staff have office space in the building. The building has space for receiving and preparing geologic samples that are retained for study and stored in Nebraska Hall. The drill rig and Geoprobe, as well as other field equipment, are housed and maintained there. The space is also used for fabrication of field project equipment.

5.4.2 Nebraska Hall. As a part of its statutory responsibilities, the Conservation and Survey Division maintains a core and sample library in Nebraska Hall. A floor plan of the building can be found in Appendix S. The library contains subsurface samples from a variety of test holes drilled across the state. The sample collection includes data from more than 17,000 oil and gas wells and more than 5,000 test holes (as many as any other state in the nation, drilled for geologic and hydrogeologic research). These geologic samples are maintained and available for study in Nebraska Hall. Other geologic samples are retained at the ARDC near Mead, Nebraska.

5.4.3 Natural Resources Research Annex. SNR recently acquired the former USDA Agro-forestry Greenhouse Building on UNL’s East Campus. A floor plan of the building can be found in Appendix T. Three SNR faculty members will use the building as research laboratory space. A large space in this annex will be available for use by SNR faculty and staff for fabrication of field research equipment.

5.4.4 Poultry Barn. SNR has storage space in the former poultry barn building on East Campus. Faculty have locked cages where they can store field equipment.

5.4.5 SNR Vehicles and Boats. SNR has a fleet of 50 vehicles. Most of these vehicles are trucks, including a Gus Pech drill rig. Also included in this number are ATVs. SNR has 14 boats on trailers, including 2 pontoon boats.

5.5 Off-campus Infrastructure

The SNR website at <http://snr.unl.edu/fieldsites/fieldsites.asp> identifies a number of field research sites. These include Prairie Pines, Nine Mile Prairie, and the Agro-Forestry research area at the UNL IANR ARDC.

5.5.1 *Prairie Pines.* Walt and Virginia Bagley have provided the Institute of Agriculture and Natural Resources a unique opportunity to address concerns of agricultural producers in rural Lancaster County as the city of Lincoln develops around their farms. The Bagleys' property, Prairie Pines, is located at 112th and Adams streets in northeast Lincoln and was gifted to the University of Nebraska Foundation in 1989. The Lower Platte South Natural Resource District has a conservation easement limiting the land use of the property to "aesthetic, scientific, educational and ecological functions compatible with its current status as agricultural land for the production of food and fiber crops." This conservation easement was the first such legal arrangement in the state of Nebraska, and the historical value of this pioneering donation by the Bagleys as well as the strong support of the late senator Jerome Warner in drafting key legislation can be celebrated by recognition of this landmark activity and the development of a fitting educational facility. The conservation easement allocates lands for hay or cultivated crops compatible with nearby urban housing, native woodland, tree crop plantations, wildlife habitat, a small area of "virgin prairie", and a farmstead area eligible for development as an education/outreach center.

The availability of Prairie Pines as a farm-scale laboratory in the heart of a future urban area provides the perfect setting to develop a "real world" laboratory to study the impacts of an active farm/forestry operation on the adjacent landscape as well as the impact of urban development on the environmental health of the farm. Successful development of the facility would provide many opportunities for faculty throughout IANR and UNL to address emerging issues related to sustainable development in the peri-urban environment. Twenty-five years from now, the "Prairie Pines Peri-Urban Agroforestry Center" could be a model for maintaining a successful sustainable agricultural operation in areas around growing urban centers. In addition, this facility could be part of a long-term plan by the city and county to provide natural areas for education near the city boundaries in each of the four quadrants, joining Nine Mile Prairie (northwest), Spring Creek Prairie (southwest), and a site yet to be identified (southeast).

Results of this project will provide local officials, developers, the agricultural community, and urban residents with specific examples of successful and compatible agricultural and forestry practices useful in guiding development in the rural/urban periphery of Lincoln. Expected impacts include a better understanding among both rural and urban community members of the limits and opportunities associated with development in the peri-urban environment. This could be a model center for the Midwest.

An innovative research initiative is planned at Prairie Pines on small scale agroforestry operations, including the organic production option for crops, timber, and animals, especially the integrated systems that will be compatible with the demographic changes and societal demands. This initiative should focus on the interactions between agricultural and forested landscapes and the peri-urban development surrounding the site, and how both of these influence water quality and biodiversity. What practices are compatible? What are the changes in wildlife species

density and diversity over time and in turn what are the impacts of these changes on production systems at Prairie Pines? Similarly, as wildlife changes occur, what are the impacts on the urban ecosystems of the surrounding neighborhoods? What amenities are provided for local residents? What are the best methods to involve neighbors in the development of Prairie Pines? What impact does development have on biological conservation efforts? What will be the overall impact on water quality? What are the impacts of open space and a research/education center on property values in the vicinity? These questions raise important challenges and represent the typical issues that could be addressed through the proposed development of a Prairie Pines Peri-Urban Agricultural Center.

5.5.2 *Nine Mile Prairie.* Nine Mile Prairie is a 230-acre (97-hectare) relict tall grass prairie owned by the University of Nebraska Foundation. It is located in on the northwest edge of Lincoln, in Lancaster County. The prairie was so named because it is five miles west and four miles north of the University of Nebraska campus in downtown Lincoln.

Three hundred and ninety-two vascular plant species and more than eighty species of birds have been observed on the prairie. Notable species include the federally threatened prairie white fringed orchid (*Platanthera praeclara*) and the rare regal fritillary butterfly (*Speyeria idalia*). The prairie is also used as a seed source of local genotypes of grasses and wildflowers for use in prairie restoration efforts in the region.

The Nine Mile Prairie Management Committee, composed of UNL faculty from several different departments plus resource people from several agencies and organizations, is charged with the stewardship of this biological treasure. Management consists of springtime burning on a 3-year fire-return interval (current burn plans: [2007](#), [2008](#)), along with periodic haying and weed/brush control using herbicides. The prairie has not been grazed since 1968.

Nine Mile Prairie provides many values to the UNL community. As one of the largest intact tracts of tall grass prairie left in the Midwest, it serves as a nationally important outdoor laboratory for the study of biological processes in grasslands. Nine Mile is the longest-studied natural area in Nebraska, serving as the site of pioneering research in plant ecology by Professor John E. Weaver, the father of grassland ecology, beginning in the 1920s, and seeing decades of continued use by researchers at UNL and UNO.

In addition to its exceptional research value, Nine Mile Prairie also is a major educational resource for the University as well as the citizens of Nebraska. Students from a diversity of UNL classes visit the prairie each year for experiences ranging from plant identification to writing poetry. The Prairie is also the setting for tours and special events for the general public aimed at fostering understanding and appreciation of Nebraska's prairie heritage.

5.5.3 *Cedar Point Biological Station (CPBS).* CPBS is a unique teaching and research facility located in western Nebraska about 8 miles northeast of Ogallala. It is near Lake McConaughy, the largest body of water in Nebraska, and is close to a variety of aquatic and terrestrial habitats, including floodplain forests, wet meadows, creeks, lakes, upland prairies, and sandhill lakes and grassland, and is located at the junction of four major grassland types, including Nebraska Sandhills Prairie (the largest area of vegetated sand dunes in the western hemisphere). Arapaho

Prairie and Crescent Lake Wildlife Refuge are nearby reserves available for University teaching and research use. Also, the Valentine and Ft. Niobrara National Wildlife Refuges are within 200 miles north of the station. The facility is used primarily for teaching, but faculty may also use it for research projects. The CPBS website: <http://cedarpoint.unl.edu>.

5.5.4 *Agricultural Research and Development Center (ARDC.)*

Agro-forestry Research Center: The windbreak/agroforestry area (400 acres) was established in the 1960s for the study of crop response to wind and wind protection under actual farm conditions. Six windbreak systems were established, each about 40 acres (4 acres of trees and 36 of cropland). In recent years, these systems have been modified to more closely mimic a typical farm operation. Most management decisions are made as if this is a commercially operating farm, and all farm operations and yield measurements are made with full-size equipment.

Agrometeorology Laboratory: The Agrometeorology Laboratory was established in the mid-1960s. In the 1970s, it became a world-renowned field facility for research on evapotranspiration (crop water use), carbon dioxide exchange (uptake/release), and remote sensing. Presently, the lab serves as a facility to support the tower carbon dioxide and water vapor flux, mast-based remote sensing, and soil water studies in the ongoing Carbon Sequestration Program (CSP) at the ARDC. In addition, monitoring stations for three monitoring networks (precipitation chemistry, weather, and ultraviolet-B radiation) are located at the laboratory.

A state-of-the-art field research facility has been established at the ARDC to quantify carbon sequestration (storage) in agricultural systems. Agricultural crops have the potential to offset a significant amount of anthropogenic carbon dioxide emissions by sequestering carbon in the soil. The facility includes three field sites (1/4 section each): a dryland corn-soybean rotation, an irrigated corn-soybean rotation, and an irrigated continuous corn system. These fields are instrumented with sophisticated tower eddy covariance instrumentation and supporting sensors to allow year-round measurements of carbon dioxide uptake and emission, evapotranspiration, and relevant meteorological variables. CSP is an interdisciplinary research effort that includes faculty, students, post-doctoral researchers, and technicians from six departments in UNL, focused on improving our understanding of processes controlling carbon sequestration (storage) in major dryland and irrigated ecosystems in the north-central United States. More details on CSP can be found at <http://csp.unl.edu/>.

The Agrometeorology Laboratory at ARDC is home to the longest continuously operated automated weather station (AWS) in the United States. In 1981, the AWS was established in the grassy area just east of the Agrometeorology Laboratory. This site served as a test bed for the Automated Weather Data Network (AWDN), where new sensors and operating procedures were tested. Once the testing was completed, the remaining stations in the AWDN were updated with the sensors and procedures that proved to give the best performance. Today more than 60 AWSs in Nebraska and another 110 in the surrounding states provide comprehensive data for use in agricultural decision making for our region. This is a unique nonfederal network formed by cooperation between climatologists in the various High Plains states. The sensors measure temperature, humidity, solar radiation, wind speed and direction, precipitation, soil temperature,

and soil moisture. These variables are required as input to crop growth models and as input to equations that estimate crop water use. The network data is used to update a series of maps on a daily basis so that weather patterns can be observed easily across the region; use your browser and point to <http://www.hprcc.unl.edu/products/awdn.html> to see these maps. More details on the AWDN can be found at <http://www.hprcc.unl.edu/awdn/home.html>. The data from the AWSs have proven valuable to a number of research projects conducted in nearby ARDC fields and as part of the state's drought monitoring activity, coordinated through SNR's State Climate Office and the NDMC.

One of 34 climatological UV-B (Ultraviolet-B) stations of the USDA UV-B Monitoring and Research Program is located at the Agrometeorology Laboratory at the ARDC. UV-B radiation is known to have damaging effects on plants. The severity of damage is related to how much radiation beyond the UV-B is present. Data from the monitoring program provides information important for assessing the local impact of UV-B radiation on human health, plants, the environment, and materials. Stations are located primarily in rural areas, particularly in agricultural and forested regions. The USDA UV-B Monitoring and Research Program was initiated in 1992 to provide information regarding the distribution of and trends in UV-B radiation in the United States. The ARDC UV-B station was set up in a grassy area east of the Agrometeorology Laboratory building. This area is also the location for the AWDN and National Atmospheric Deposition Program stations. UV-B data have been collected from the station since May 1996.

The station has five instruments, which measure incoming sunlight (in discrete wavebands over the ultraviolet, visible, and near infrared), temperature, humidity, and reflected light from the surface (the latter is reflected from the surface surrounding the station for determining the presence or absence of snow cover). The data are averaged every 3 minutes and retrieved daily via the Internet from the program's home at Colorado State University. The central focus of the instrument suite is two Multifilter Rotating Shadowband Radiometers (MFRSR), one measuring in the ultraviolet part of incoming sunlight (300, 305.5, 311.4, 317.6, 325.4, 332.4, and 368 nm) and the other measuring in the visible-near infrared part of sunlight (415, 500, 610, 665, 862, and 940 nm). The unique computer-controlled, automatic rotating shadow band on these two instruments permits the near-simultaneous determination of total sunlight, direct (sun's beam), and diffuse (skylight) at each waveband.

More details on the USDA UV-B Monitoring and Research Program can be found at http://uvb.nrel.colostate.edu/UVB/home_page.html. The data from the monitoring program has been valuable for UV-related research projects conducted in nearby ARDC fields and for classroom discussions and instruction regarding energy from sunlight at the earth's surface.

The lab constitutes a field facility where precipitation chemistry is monitored year-round as part of the National Atmospheric Program/National Trends Network (NADP/NTN). The purpose of this network is to provide information on the chemistry (e.g., sulphate, nitrate, ammonium) of precipitation to help monitor temporal and geographical trends. This ARDC site is one of the inaugural sites started in 1978. The network now consists of more than 250 sites nationally. Following a strict quality control, data from the ARDC and other sites are made available via the NADP website (<http://nadp.sws.uiuc.edu/>).

CALMIT Facilities and Equipment: CALMIT maintains a 20-hectare field research facility located at UNL's ARDC near Mead, Nebraska. This site has controlled wetlands and vegetation plots, offices, and storage facilities for CALMIT vehicles used to deploy boom-mounted sensor packages that allow measurements to be acquired from the ultraviolet through the microwave region of the electromagnetic spectrum. Included are two all-terrain motorized platforms ("Goliath" and "Hercules") for deploying spectroradiometer and other instrument systems to heights exceeding 25 meters above targets. From the ARDC base, CALMIT researchers also operate a 24-foot pontoon boat for collecting data in lakes, ponds, and reservoirs.

Conservation and Survey: As a part of its statutory responsibilities, the Conservation and Survey Division maintains a core and sample library containing subsurface samples from a variety of test holes drilled across the state. Some of these geologic materials are maintained at ARDC. This site serves as a storage and distribution center for all of the published soil surveys for Nebraska. It also serves as a storage facility for field equipment.

5.6 Goals (2009–14)

1. Improve procedures/documentation for space assignments and allocation.
2. Establish storage facilities that allow for rotating use, based on need.
3. Continue to seek additional storage facilities to accommodate growth in SNR.
4. Continue to work with administration to improve accessibility to Hardin Hall.

6 CHALLENGES AND QUESTIONS: 2009–14

6.1 Introduction

The University of Nebraska–Lincoln (UNL) School of Natural Resources (SNR) has made important and substantial progress since the last comprehensive review in 2003. Established in 1997 as a cross-campus enterprise spanning both the Institute of Agriculture and Natural Resources (IANR) and the UNL College of Arts and Sciences (CAS), SNR represents, in many respects, a new model for interdisciplinary research and education at UNL. SNR faculty, staff, and students come from many backgrounds, including ecology, climate science, geography, geology, soil science, water science, and the social sciences. Our diverse backgrounds are, however, focused on a single mission: to be an international leader in natural resources education, research, and outreach, and the primary provider of natural resources information to the citizens of Nebraska.

During the past five years, SNR has experienced substantial growth as public (and student) interest in natural resources and environmental issues has increased. SNR has now expanded to include more than 150 faculty and staff and more than 400 students, and each year serves hundreds of clients in Nebraska and elsewhere. To better address increasing demands for information about natural resources, SNR has developed new approaches to strategic planning and to improving internal integration and external collaboration. For example, the “issues-based” approach taken in this report is an outcome of strategic planning initiated in 2007 to focus SNR efforts on critical problems that must be addressed in the near future, problems that we are particularly well equipped to deal with. And to improve our ability to respond, in January 2009, SNR was restructured into “faculties,” a unique organizational model that sets SNR apart from most academic units. Our faculties are designed to maintain disciplinary strengths, but, at the same time, encourage and facilitate interdisciplinary teaching and research required to address important issues in climate science, water resources, applied ecology, geography, human-environment interaction, and natural resources education.

SNR has also counted many other significant achievements over the past five years. In 2004, for example, the U.S. Geological Survey (USGS) established the Nebraska Cooperative Fish and Wildlife Research Unit (CFWRU) within SNR. In 2006, SNR faculty, staff, and students moved to a new home in Hardin Hall, a modern research and classroom facility located on UNL’s East Campus. And in 2008, UNL’s geography program was integrated into SNR, adding new undergraduate and graduate degrees, faculty, and students. Today, SNR faculty, staff, and students are working together to address critical issues related to water quality and quantity, climate change, drought, severe storms, fisheries and wildlife management, invasive species, environmental restoration, energy, geologic resources, outdoor recreation, and land use.

6.2 Future Challenges for the School of Natural Resources

Although SNR has made much progress since 1997, and particularly in the past five years, we fully realize that our attention must be focused on 2014 and beyond. We seek your ideas and counsel on how best to achieve our vision and fulfill our mission over the next five years. In that regard, we request that the review team consider a number of specific issues, outlined below.

1. SNR engaged in an issue-based strategic planning process beginning in fall 2007 in preparation for the 5-year review. This process involved an assessment of current and future science and societal needs along with an evaluation of SNR strengths in natural resources and environmental science. That process identified five current and emerging issues in natural resources and environmental science: climate variability and change; water quantity and quality; ecological challenges; human-environment interaction; and natural resources and environmental science education. In early 2009, through a self-selection process, faculty were organized into six faculty areas based on their disciplinary strengths to further facilitate our ability to address these issues over the next 5 to 10 years.
 - a. Based on your understanding of science and societal needs and your assessment of SNR strengths, would you recommend any redirection of the unit's programs related to these five issues? If so, please include these recommendations in your report.
 - b. Was the organization of SNR's five year review document around these five issues effective in helping you understand the unit's programs, strengths, and future goals?
 - c. Resource needs have been identified in each of the "issue" chapters. How would the review team prioritize these requests to best enhance SNR's ability to achieve its vision?
2. In our view, SNR has been a successful experiment to develop an interdisciplinary unit that focuses on cross-cutting natural resources and environmental issues. Although principally based in the Institute of Agriculture and Natural Resources (IANR), the unit also has an increasing number of joint appointments and collaborations with the College of Arts and Sciences (CAS) and other colleges/units as well.
 - a. Should SNR pursue increased collaboration with other units/colleges and, if so, what would you recommend to be the goal of this collaboration? Current collaboration is with the Department of Geosciences (e.g., meteorology, climatology, geology and water), School of Biological Sciences (ecosystem science), and social science departments (e.g., Sociology, Political Science) pertaining to programs in human dimensions of natural resources and environmental science.
 - b. Based on your experience, does the review team recognize any administrative or institutional barriers or constraints to increased collaboration between SNR and other units/colleges? If significant barriers are identified, what recommendations does the review team have for helping to overcome these barriers or to find ways to work within them?
3. SNR currently houses five centers officially recognized by the NU Board of Regents: Water Center, National Drought Mitigation Center, Center for Advanced Land Management Information Technologies, High Plains Regional Climate Center, and Great Plains Regional Center for Global Environmental Change. Each of these centers contributes considerably to the unit's visibility and also attracts significant external resources.
 - a. Is SNR effectively integrating the mission and activities of these centers into its overall program of activities?

- b. Is there a need to enhance the synergy between these centers and other SNR programs and faculties? If so, how?
 - c. After reviewing the vision and mission of each of the centers, what is your assessment of the progress toward each center's vision and mission?
 - d. What recommendations do you have regarding the improvement of each center's programs and/or for monitoring progress toward achieving its vision and mission?
- 4. The Geography program merged into SNR in August 2008. In our opinion, SNR and the Geography program have benefited from this merger. This program has been integrated with faculty expertise in geography and GIScience that pre-existed in SNR. This merger has also enhanced SNR's human dimensions area. A new faculty position in GIScience was filled recently with funding from IANR and CAS.
 - a. Is SNR at an effective level of productivity in terms of its research and teaching capacity in GIScience, geospatial technologies, and human dimensions?
 - b. As we continue to enhance this merger, what disciplinary areas would you consider most advantageous to enhance our Geography/GIScience and human dimensions faculty program areas?
- 5. SNR offers MS and PhD degrees in natural resource sciences and MS and PhD degrees in geography. Offering degrees in natural resource sciences, as opposed to graduate degrees in all of the major disciplines in SNR, was the approach we followed in order to facilitate an expedited (2-year) approval process through the university system, including Board of Regents. Graduate students in natural resources have the option to select from a list of specializations that represent the disciplinary areas of expertise that exist in SNR. Alternatively, we could have chosen to pursue multiple graduate degrees in the various disciplinary areas represented in SNR.
 - a. Does the review committee have any recommendations regarding the alternatives of offering one graduate degree (i.e., the current approach) vs. multiple graduate degrees in the various disciplinary areas reflected in SNR? What has been the experience of other interdisciplinary units at other universities?
 - b. If we stay with the current degree program, should SNR graduate students (not including geography students) be required to select a specialization? This requirement does not exist currently.
 - c. Should a minimal set of core courses be required for all graduate students regardless of specialization?
 - d. Would you recommend developing other specializations to better match the strengths of SNR faculty and professional career opportunities?
- 6. The undergraduate majors currently available to students through SNR pre-date the development of the unit. These programs are advised by a Natural Resources Undergraduate Curriculum Committee (NRUCC) composed of major coordinators (not all of these coordinators are in SNR). Several majors have recently been revised to be more current and attractive for students. Some majors (natural resources and environmental economics, grassland ecology and management, water science, and environmental restoration science) have traditionally had a very low number of majors.
 - a. Even though the costs associated with majors with low numbers is minimal, should we continue to support these majors?

- b. Should the core curriculum be revised? If so, what courses, or perhaps more specifically, what skill sets would you recommend we focus on in a revised, core curriculum?
- 7. Following the merger of the Conservation and Survey Division (CSD) in 2003 into what became SNR, there have been significant challenges in meeting increasing stakeholder needs in the face of reductions in staffing and resources.
 - a. How can SNR maintain traditional survey activities that are in demand among stakeholders?
 - b. How should ecological and climate survey activities be better integrated with traditional geological, water, and soil survey activities now practiced in SNR?
 - c. How should SNR's extension FTE be used to enhance our overall survey/outreach mission?
 - d. What constructive strategies can we learn from the experience of Illinois and other states in which similar mergers or declines in staffing and resources for survey activities have occurred?
- 8. The vision of SNR is to become an international leader in natural resources and environmental science in areas of research, outreach, and teaching. Appendix I includes faculty collaborations and also a sampling of SNR's international programs and travel over the past 5 years.
 - a. What is the review team's assessment of the international activities of faculty members and centers in SNR?
 - b. What opportunities do you see for engaging SNR faculty in international activities to further the recognition of SNR's programs and the professional development of faculty?
- 9. SNR faculty have been competitive in attracting funding from state and federal sources. External funding in SNR was \$6.2 in 2007 and \$8.2 million in 2008. It will likely exceed the \$12 million threshold in 2009.
 - a. Can you recommend internal strategies or approaches that could enhance our responsiveness to RFPs and further increase funding of SNR programs in research, education, and outreach?
 - b. Can you suggest private foundations that could be targets for funding SNR's research, outreach, and teaching programs and its facilities?
- 10. With SNR's move to Hardin Hall in 2006, faculty and staff collaborations and the building of community within the unit was enhanced significantly. As program expansion continues, space is at a premium. Office, classroom, laboratory, and conference room space is becoming a significant constraint to further growth.
 - a. How big is too big? Administering SNR programs effectively is becoming an ever-increasing challenge.
 - b. How do we balance the desire for program growth without jeopardizing opportunities for enhancing current programs, given space constraints in Hardin Hall?
 - c. Is the current SNR administrative structure appropriate for program management and planning? If not, can you identify other models that might help with administrative oversight and communication?

SCHOOL OF NATURAL RESOURCES

SNR DIRECTOR
Don Wilhite

ASSOCIATE DIRECTOR
Ed Harvey

SECRETARY TO DIRECTOR
Sharon Kelly

ASSISTANT TO THE DIRECTOR
Christine Steggs

FACULTY LEADERSHIP COMMITTEE
Faculty Area Leaders

APPLIED CLIMATE SCIENCE - Shashi Verma
APPLIED ECOLOGY - Dave Wedin
GEOGRAPHY/GISCIENCE - Jim Merchant
GEOLOGY AND SOILS - Matt Joeckel
HUMAN DIMENSIONS - Mark Burbach
WATER - Dan Snow

ACAD/ADMIN OPERATIONS COORDINATOR - Christine Steggs
OUTREACH COORDINATOR - Matt Joeckel
SURVEY COORDINATOR - Mark Kuzila
TEACHING COORDINATOR - Betty Walter-Shea
5-YEAR REVIEW COORDINATOR - Jim Merchant

SNR SUPPORT SERVICES MANAGERS
snr.unl.edu/employeeinfo/supportservices.asp

COMPUTING
Jim Hines

EDUCATION, SERVICES, PLANNING
Christine Steggs

EVENTS, SALES, INFORMATION CENTER
Jacki Loomis

FIELD AND DRILLING SERVICES
Matt Marxsen

GIS/GPS AND CARTOGRAPHY
Les Howard

LAB SAFETY
Steve Hartung

LIAISON TO SAPDC
Sharon Kelly

SNR WEBSITE/DATABASE
Mark Mesarch

SCIENCE COMMUNICATOR
Kelly Smith

STUDENT SERVICES
Sue Ellen Pegg/Sara Winn

STANDING COMMITTEE CHAIRS

FACULTY ADVISORY
Jim Merchant

GRADUATE
Tala Awada

**NATURAL RESOURCE
UNDERGRADUATE CURRICULUM**
Betty Walter-Shea

NOMINATING
Jim Brandle

OUTREACH
Matt Joeckel

PROMOTION AND TENURE
Jim Brandle

RESEARCH
Ed Harvey

SAFETY AND FACILITIES
Dan Snow

STAFF PROFESSIONAL DEVELOPMENT
Les Howard

SURVEY
Mark Kuzila

FACULTY

<http://www.snr.unl.edu/aboutus/who/people/facultydirectory.asp>

STAFF

<http://www.snr.unl.edu/aboutus/who/people/staffdirectory.asp>

FACULTY AREAS

Applied Climate Science Geology and Soils
Applied Ecology Human Dimensions
Geography/GIScience Water

Conservation and Survey Division (CSD)
Nebraska State Geologist
Mark Kuzila
Nebraska State Climatologist
Al Dutcher

**Center for Advanced Land Management
Information Technologies (CALMIT)**
Jim Merchant, Director

**Great Plains Regional Center for Global
Environmental Change (GPCGEC)**
Shashi Verma, Director

**High Plains Regional Climate Center
(HPRCC)**
Martha Shulski, Director

**National Drought Mitigation Center
(NDMC)**
Mike Hayes, Director

Water Center
Bruce Dvorak, Interim Director

AFFILIATES/PARTNERS

Cooperative Ecosystems Studies Unit
Kyle Hoagland, Director

Department of Geosciences
Dave Watkins, Department Head

National Agroforestry Center
Greg Ruark, Director

Nebraska Fish & Wildlife Coop Unit
Craig Allen, Director

Nebraska Forest Service
Scott Josiah, Director

Nebraska Game & Parks Commission
Rex Amack, Director

Nebraska State Museum
Priscilla Grew, Director

Nebraska Statewide Arboretum
Jim Locklear, Director

School of Biological Sciences
Al Kamil, Director

IANR BUSINESS SERVICES
Carol Cartwright and staff

Appendix B – Current SNR Faculty and their Faculty Areas - 1

Employee Name	Primary Faculty Area	Secondary Faculty Area	Tertiary Faculty Area
Adams, Dennis	Applied Ecology	Water	Applied Climate Sciences
Akasheh, Sami	Geography/GIScience		
Allen, Craig	Applied Ecology	Water	
Amedeo, Doug	Geography/GIScience	Human Dimensions	
Archer, Clark	Geography/GIScience	Human Dimensions	Water
Awada, Tala	Applied Ecology	Water	Applied Climate Sciences
Baasch, David	Applied Ecology		
Barrow, Tadd	Water	Applied Ecology	
Bathke, Deborah	Applied Climate Sciences		
Bleed, Ann	Applied Ecology		
Boehner, Patti	Human Dimensions		
Brandle, Jim	Applied Ecology	Applied Climate Science	
Burbach, Mark	Human Dimensions	Water	
Carlson, Marv	Geology & Soils	Human Dimensions	Water
Chen, Xun-Hong	Water	Geology & Soils	Geography/GIScience
Comfort, Steve	Geology & Soils	Water	
Dewey, Ken	Applied Climate Sciences	Human Dimensions	
Ding, Ya	Human Dimensions		
Dutcher, Al	Applied Climate Sciences	Water	
Feng, Song	Applied Climate Sciences	Water	
Ferraro, Dennis	Applied Ecology	Human Dimensions	
Fontaine, TJ	Applied Ecology	Applied Climate Science	
Freeman, Trish	Applied Ecology	Geography/GIScience	
French, Kenny	Geography/GIScience		
Gitelson, Anatoly	Water	Applied Climate Science	Geography/GIScience
Goeke, Jim	Water	Geology & Soils	
Gosselin, Dave	Water	Human Dimensions	Geology & Soils
Guan, Qinfeng (Gene)	Geography/GIScience		
Hanson, Paul	Geology & Soils	Geography/GIScience	Water
Harvey, Ed	Water	Geology & Soils	
Hayes, Mike	Applied Climate Sciences	Human Dimensions	Water
Hiller, Tim	Applied Ecology		
Hoagland, Kyle	Water	Applied Ecology	
Holz, Aris	Water	Applied Ecology	
Holz, John	Water	Applied Ecology	
Hu, Qi (Steve)	Applied Climate Sciences	Water	Human Dimensions
Hubbard, Ken	Applied Climate Sciences	Geology & Soils	Applied Ecology

Appendix B – Current SNR Faculty and their Faculty Areas - 2

Employee Name	Primary Faculty Area	Secondary Faculty Area	Tertiary Faculty Area
Huddle, Julie	Applied Ecology	Water	Human Dimensions
Hygnstrom, Scott	Applied Ecology	Human Dimensions	
Irmak, Ayse	Water		
Istanbulluoglu, Erkan	Water	Applied Ecology	Applied Climate Sciences
Jess, Mike	Water	Geology & Soils	Human Dimensions
Joeckel, Matt	Geology & Soils	Geography/GIScience	Water
Johnson, Mel	Geography/GIScience		
Knops, Johannes	Applied Ecology	Geology & Soils	
Knotwell, Jim	Geography/GIScience		
Knutson, Cody	Human Dimensions	Geography/GIScience	Water
Kopplin, Bruce	Geography/GIScience		
Kuzila, Mark	Geology & Soils		
Lackey, Susan	Water	Geology & Soils	
Larson-Miller, Cindy	Human Dimensions		
Lavin, Steve	Geography/GIScience		
Lenters, John	Applied Climate Sciences	Water	
Lin, Xiaomao	Applied Climate Sciences		
Low, Rusty	Human Dimensions		
Merchant, Jim	Geography/GIScience	Water	Human Dimensions
Narumalani, Sunil	Geography/GIScience	Applied Ecology	Water
Nashleanas, Katherine	Geography/GIScience		
Oglesby, Bob	Applied Climate Sciences	Water	
Pegg, Mark	Applied Ecology	Water	Human Dimensions
Perk, Rick	Geography/GIScience	Water	
Peters, Al	Geography/GIScience		
Pope, Kevin	Applied Ecology	Water	
Powell, Larkin	Applied Ecology		
Ramirez, Juan	Geography/GIScience	Human Dimensions	Water
Reinhard, Karl	Human Dimensions		
Rundquist, Don	Geography/GIScience	Water	
Ryu, Jae	Water	Geography/GIScience	Applied Climate Sciences
Schoengold, Karina	Human Dimensions	Water	
Shea, Pat	Water	Geology & Soils	Applied Ecology
Shulski, Martha	Applied Climate Sciences		
Sibray, Steve	Water	Geology & Soils	
Singh, Ramesh	Water	Geography/GIScience	

Appendix B – Current SNR Faculty and their Faculty Areas - 3

Employee Name	Primary Faculty Area	Secondary Faculty Area	Tertiary Faculty Area
Skopp, Joe	Geology & Soils		
Snow, Dan	Water	Geology & Soils	Human Dimensions
Spalding, Mary	Water		
Suyker, Andy	Applied Climate Sciences		
Svoboda, Mark	Applied Climate Sciences	Human Dimensions	Geography/GIScience
Swinehart, Jim	Geology & Soils	Water	
Szilagyi, Joe	Water	Applied Climate Science	Applied Ecology
Tadesse, Tsegaye	Applied Climate Sciences	Geography/GIScience	Water
Thomas, Steven	Applied Ecology	Water	
Tyre, Drew	Applied Ecology	Human Dimensions	Water
Verma, Shashi	Applied Climate Sciences	Water	Applied Ecology
Walter-Shea, Betty	Applied Climate Sciences	Geography/GIScience	Human Dimensions
Wang, Tiejun	Water		
Wardlow, Brian	Geography/GIScience	Applied Ecology	
Wedin, Dave	Applied Ecology		
Weiss, Al	Applied Climate Sciences	Applied Ecology	
Wilhite, Don	Applied Climate Sciences	Human Dimensions	
Willson, Gary	Applied Ecology	Applied Climate Science	
Wishart, David	Geography/GIScience	Human Dimensions	
Woldt, Wayne	Water		
Woudenberg, Donna	Human Dimensions	Applied Climate Science	Water
You, Jinsheng	Applied Climate Sciences		
Zhou, Xinhua	Applied Ecology	Water	

Center for Advanced Land Management Information Technologies (CALMIT)

**School of Natural Resources
University of Nebraska–Lincoln
<http://www.calmit.unl.edu/>**

Director: James W. Merchant (2008–present); Donald C. Rundquist (1986–2008)

Vision and Mission

The principal mission of the Center for Advanced Land Management Information Technologies (CALMIT) is to conduct research and instruction of the highest quality in remote sensing, geographic information systems (GIS), and related technologies. Our vision is to be internationally recognized as a center of excellence for applications of geospatial technologies to issues in natural resources management.

Background

Established in 1986 by the Board of Regents of the University of Nebraska, CALMIT expanded the UNL Remote Sensing Center founded in 1972. CALMIT serves to focus the significant interdisciplinary expertise in advanced land management information technologies that exists at UNL and in the region. Especially strong programs exist in hyperspectral remote sensing of vegetation, surface water, soils, and coral reefs; remote sensing of water quality and aquatic vegetation; analysis of satellite image data for regional, continental, and global land cover characterization; and GIS-based spatial modeling for renewable resources management, environmental hazard assessment, and land use/land cover change. CALMIT's facilities, among the best in the United States, include:

- an indoor spectroscopy/water quality laboratory for teaching, controlled experiments, and sensor calibration,
- a 29-hectare field research station at UNL's Agricultural Research and Development Center near Ithaca, NE,
- several close-range remote sensing platforms to deploy sensor packages that operate from the UV through the microwave spectral bands over both land and water environments, and
- an aircraft outfitted with instruments that include an AISA Eagle hyperspectral (244-band) imaging system and a thermal-infrared camera.

Faculty and staff*

Faculty:

Dr. James W. Merchant, professor and director

Dr. Sunil Narumalani, professor and associate director

Dr. Donald C. Rundquist, professor

Dr. Anatoly Gitelson, professor

Dr. Ayse Irmak, assistant professor

Full-time staff:

Chad Boshart, research scientist

Karin Callahan, research scientist

Galina Keydan, research scientist

Bryan Leavitt, CALMIT facilities manager

Rick Perk, airborne remote sensing program manager
Dan Pfeffer, GIS web portal project manager
Ian Ratcliffe, research scientist
Cullen Robbins, research scientist
Milda Vaitkus, NebraskaView project manager

* *Italics* indicate state-funded positions

The CALMIT faculty and staff are complemented by the following affiliated Faculty Fellows:

Dr. Viachaslav Adamchuk (UNL, Biological Systems Engineering)

Dr. Merlin Lawson (UNL, Geosciences)

Dr. Yunwoo Nam (UNL, Community and Regional Planning)

Dr. Jeffrey Peake (UNO, Geography/Geology)

Dr. Larkin Powell (UNL, School of Natural Resources)

Dr. John Schalles (Creighton University, Biology)

Dr. Zhenghong Tang (UNL, Community and Regional Planning)

Dr. Brian Wardlow (UNL, School of Natural Resources)

In addition, CALMIT employs approximately 15 undergraduate and graduate research assistants.

Funding

Although the five core CALMIT faculty are state funded, all staff and student positions, technical equipment, and research support are supported through grants and contracts with federal and state agencies, and occasionally private firms. Principal sources of funding have included NASA, NOAA, USDA, EPA, USGS, NPS, NSF, the Nebraska Department of Natural Resources, the Nebraska Department of Environmental Quality, the Nebraska Department of Health and Human Services, the Nebraska Department of Agriculture, the Nebraska Emergency Management Agency, the Nebraska Military Department/National Guard, and the Nebraska Office of the Chief Information Officer.

Recent Grants

Since 2004, CALMIT external funding has totaled approximately \$4.6 million. Some representative recent grants:

Consequences of Institutional Change: Land Cover Dynamics in Kazakhstan, NASA, \$112,108, 2001–05.

Land Surface Data: Impacts on Mesoscale Meteorological Predictions, NSF, \$101,167, 2003–2007.

GIS Support for Nebraska Army National Guard, Nebraska Military Department, \$621,891, 2003–09.

Land Use/Land Cover Change Effects, NASA, \$597,799, 2006–09.

Geospatial Data Analysis/Support for the Nebraska Department of Health and Human Services, Nebraska Department of Health and Human Services, \$684,717, 2004–08.

Natural Resources Assessment of Mt. Rushmore National Park, National Park Service, \$125,341, 2007–09.

NebraskaView, USGS, \$253,989, 2004–09.

Quantifying Evapotranspiration, Nebraska Department of Natural Resources, \$271,664, 2008–11.
 Nebraska Geospatial Data and Web Network, Nebraska Office of the Chief Information Officer, \$260,870, 2008–11.

Major/Recent Publications

Since 2004, CALMIT faculty and staff have authored more than 100 refereed publications. Some representative examples:

- Bulley, H., Marx, D., Merchant, J., Holz, J., and Holz, A., 2008. A Comparison of Nebraska Reservoir Classes Estimated from Watershed-Based Classification Models and Ecoregions. *Journal of Environmental Informatics*, 11(2):90-102.
- Hatfield, J.L., Gitelson, A.A., Schepers, J. S., and Walthall, C.L., 2008. Application of Spectral Remote Sensing for Agronomic Decisions. *Agronomy Journal*, 100:S-117–S-131.
- Gitelson, A.A., Dall’Olmo, G., Moses, W., Rundquist, D.C., Barrow, T., Fisher, T.R., Gurlin, D., and Holz, J., 2008. A Simple Semi-analytical Model for Remote Estimation of Chlorophyll-a in Turbid Waters: Validation. *Remote Sensing of Environment*, 112:3582-3593.
- Dappen, P.R., Ratcliffe, I., Robbins, C., and Merchant, J.W., 2008. Mapping Agricultural Land Cover for Hydrologic Modeling in the Platte River Watershed of Nebraska. *Great Plains Research*, 18(1):39-52.
- Gitelson, A.A., Schalles, J., and Hladik, C.M, 2007. Remote Chlorophyll-a Retrieval in Turbid Productive Estuarine: Chesapeake Bay Case Study. *Remote Sensing of Environment*, 109:464-472.
- Gitelson, A.A., Wardlow, B. D., Keydan, G. P., and Leavitt, B., 2007. An Evaluation of MODIS 250-m Data for Green LAI Estimation in Crops. *Geophysical Research Letters*, 34, L20403.
- Bulley, H., Merchant, J., Marx, D., Holz, J., and Holz, A., 2007. A GIS-based Approach to Watershed Classification for Nebraska Reservoirs. *Journal of the American Water Resources Association*, 43:605-621.
- Narumalani, S., Mishra, D., Burkholder, J., Merani, P., and Willson, G., 2006. Remote Sensing of Invasive Species Using Airborne Hyperspectral Data. *GeoCarto International: A Multidisciplinary Journal of Remote Sensing*, 21(2):59-66.
- Lawson, M., Leavitt, B., Rundquist, D., Emanuel, N., Perk, R., Keck, J., and Hauschild, M., 2006. Compensating for irradiance fluxes when measuring the spectral reflectance of corals in-situ. *GIScience and Remote Sensing*, 43(2):181-197.
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- Mishra, D., Narumalani, S., Rundquist, D., and Lawson, M., 2006. Benthic Habitat Mapping in Tropical Marine Environments Using Quickbird Imagery. *Photogrammetric Engineering and Remote Sensing*, 72(9):1037-1048.

Gitelson, A.A., Vina, A., Rundquist, D.C., Ciganda, V., Arkebauer, T.J., 2005. Remote Estimation of Canopy Chlorophyll Content in Crops. *Geophysical Research Letters*, 32, L08403.

Future Prospects

Demand for research, instruction, and outreach in geospatial information sciences continues to increase nationwide, and this bodes well for CALMIT's future. CALMIT's research volume will, of course, depend on many factors, including federal and state budgets, but several developments are promising. For example, in 2008 Dr. Ge Lin, a GIS specialist, joined the faculty at the University of Nebraska Medical Center, and subsequently became a courtesy faculty member in SNR and a CALMIT affiliate. Dr. Lin's affiliation may lead to new research and teaching initiatives related to public health. In addition, SNR is in the midst of recruiting a new faculty member in GIS and environmental modeling who, when hired, will contribute further to CALMIT's mission. Finally, the addition of the geography program to SNR will provide CALMIT with new opportunities for collaboration and for recruitment of students.

Role of CALMIT in SNR

CALMIT faculty teach all SNR undergraduate and graduate courses dealing with remote sensing, GIS, and GPS. All SNR graduate students specializing in these technologies are advised by CALMIT faculty. CALMIT faculty and staff regularly serve on SNR committees, and several faculty (Merchant, Rundquist, Narumalani) have held positions as SNR coordinators and/or committee chairs. SNR staff provide outreach to the community through the NebraskaView program and, in this capacity, frequently assist colleagues in SNR in obtaining and using geospatial data in research and teaching.

Linkages

CALMIT faculty and staff collaborate regularly with colleagues affiliated with SNR's High Plains Regional Climate Center, National Drought Mitigation Center, Great Plains Regional Center for Global Environmental Change, USGS Cooperative Fish and Wildlife Unit, and UNL Water Center. Strong linkages also exist with the USGS Center for Earth Resources Observation and Science (EROS), NASA, NOAA, USDA, many state agencies, and the Nebraska GIS Council.

Great Plains Regional Center for Global Environmental Change
School of Natural Resources
University of Nebraska–Lincoln

Director: Shashi B. Verma

Vision

The Great Plains Regional Center for Global Environmental Change (GPRC) is devoted to interdisciplinary research that develops quantitative information on the role of key ecosystems as sources and sinks of carbon dioxide (CO₂). Through understanding gained by such research, the GPRC will provide scientific information required for accurate prediction of future CO₂ concentrations and the climate.

Background

The GPRC was established in 1993 by the Board of Regents of the University of Nebraska. It became one of the six regional centers of the National Institute for Global Environmental Change (NIGEC). The overall vision of NIGEC may be stated as the performance of (academic) research on the (regional) interactions between ecosystems and climate in support of the climate change program of the U.S. Department of Energy. This vision led to the development of a series of priority research goals that guided the areas to which NIGEC support was directed, the most enduring of which was the measurement of the exchanges of carbon and energy between the atmosphere and terrestrial ecosystems and the use of those observations to evaluate climate and carbon cycle models. Other goals that have been identified as relevant over the years include atmospheric radiation and aerosols, modeling of the response of regional ecosystems to climate change, and integrated assessment of the impacts of environmental and ecological changes. In order to better integrate environmental research programs, the DOE decided to terminate funding for NIGEC in 2007. As mentioned above, the GPRC is a UNL center approved by the Regents of the University of Nebraska and continues its operation with an updated focus, outlined in the previous section.

The GPRC was initially led by Dr. William Easterling as director and Dr. Blaine Blad as associate director. In 1997, Dr. Shashi Verma became the GPRC director after Dr. Easterling left the University of Nebraska. In July 2001, Dr. Blad retired.

Research Activity

A primary purpose is to support a research program that increases basic understanding of how agricultural and grassland ecosystems exchange CO₂ with the atmosphere and how environmental change is likely to impact these ecosystems in the region. Net ecosystem CO₂ exchange is measured year-round using tower eddy covariance flux systems. Faculty, students, and staff from several UNL departments (e.g., Agronomy and Horticulture, Biological Systems Engineering, Biological Sciences, Biochemistry, School of Natural Resources) collaborate with GPRC personnel on detailed process-level studies of soil carbon dynamics, vegetation growth and partitioning, soil moisture, soil gas exchange, and residue decomposition. A collaborative effort with CALMIT scientists is intended to provide regional extrapolation of CO₂ exchange using tower flux and satellite observations. Another collaborative project with scientists at the National Soil Tilth Laboratory (Ames, IA), NOAA-Atmospheric Turbulence and Diffusion

Division (Oak Ridge, TN), and the University of Minnesota and USDA-ARS (St. Paul, MN) focuses on a synthesis of tower CO₂ and water vapor flux observations in key agricultural systems in the North American Carbon Program MCI (Mid-Continent Intensive) region. Also, using the data from national and international carbon flux networks (e.g., AmeriFlux, CarboEurope, Fluxnet), GPRC personnel collaborate with several scientists in North America and Europe to help develop comparative information on processes controlling CO₂ and water vapor exchanges in a variety of ecosystems (e.g., agricultural crops, grasslands, forests).

Faculty and Staff

Shashi B. Verma, professor

Andrew E. Suyker, research assistant professor

Todd Schimelfenig, research technologist

Dan Hatch, data processing technician

Amy Rung, project assistant

Funding (Last 5 Years)

National Institute for Global Environmental Change, U.S. Department of Energy, \$4,575,686, 2003–07.

Consortium of Agricultural Soil Mitigation of Greenhouse Gases, U.S. Department of Agriculture, Cooperative State Research, Education and Extension Service, \$1,139,462, March 21, 2002–August 31, 2006. (S.B. Verma, K.G. Cassman, T.J. Arkebauer, A. Dobermann, K.G. Hubbard, D.T. Walters, H. Yang)

Carbon Sequestration and Global Climate Change, Department of Energy: EPSCoR, \$1,025,066, July 1, 2003–June 30, 2007. (S.B. Verma, K.G. Cassman, T.J. Arkebauer, A.A. Gitelson, K.G. Hubbard, D.C. Rundquist, D.T. Walters, E.A. Walter-Shea)

Carbon Sequestration in Dryland and Irrigated Ecosystems: Quantification at Different Scales for Improved Prediction, Department of Energy: Office of Biological and Environmental Research, \$900,000, September 15, 2003–September 14, 2006. (S.B. Verma, K.G. Cassman, T.A. Arkebauer, A. Dobermann, K.G. Hubbard, J.M. Knops, D.T. Walters)

Carbon Sequestration in Dryland and Irrigated Ecosystems: Quantification at Different Scales for Improved Prediction, Department of Energy: Office of Biological and Environmental Research, \$1,050,000, September 15, 2006–September 14, 2009. (S.B. Verma, K.G. Cassman, T.A. Arkebauer, A. Dobermann, K.G. Hubbard, J.M. Knops, A.E. Suyker, D.T. Walters, H. Yang)

A Satellite-based Quantification of Carbon Exchange of the Dominant Ecosystems (Maize-Soybean) in the NACP Mid-Continent Intensive (MCI) Region, National Aeronautics and Space Administration: Earth Sciences Research and Analysis Program, \$599,485, 2007–2010. (A. Gitelson, S.B. Verma, J. Masek, A. Suyker)

Linkages/Collaborations

GPRC personnel collaborate with a number of scientists within and outside SNR. A few examples are given below.

- School of Natural Resources: Drs. Anatoly Gitelson, Ken Hubbard, and Elizabeth Walter-Shea
- Department of Agronomy and Horticulture: Drs. Tim Arkebauer, Ken Cassman, and Dan Walters

- Department of Biological Systems Engineering: Dr. Derrel Martin
- Department of Biological Sciences: Dr. Johannes Knops
- Department of Biochemistry: Dr. S. Madhavan

Major Refereed Publications (Last 5 Years)

- Gilmanov, T.G., Verma, S.B., Sims, P.L., Meyers, T.P., Bradford, J.A., Burba, G.G., and Suyker, A.E., 2003. Gross Primary Production and Light Response Parameters of Four Southern Plains Ecosystems Estimated Using Long Term CO₂-flux Tower Measurements. *Global Biogeochem. Cycles*, 17(2):1071-1079. doi:10.1029/2002GB002023.
- Gitelson, A.A., Verma, S.B., Vina, A., Rundquist, D.C., Keydan, G., Leavitt, B., Arkebauer, T.J., Burba, G.G., and Suyker, A.E., 2003. Novel Technique for Remote Estimation of CO₂ Flux in Maize. *Geophys. Res. Lett.*, 30(9):1486-1489. doi:10.1029/2002GL016543.
- Suyker, A.E., Verma, S.B., and Burba, G.G., 2003. Interannual Variability in Net CO₂ Exchange of a Native Tallgrass Prairie. *Global Change Biol.*, 9:255-265.
- Suyker, A.E., Verma, S.B., Burba, G.G., Arkebauer, T.J., Walters, D.T., and Hubbard, K.G., 2004. Growing Season Carbon Dioxide Exchange in Irrigated and Rainfed Maize. *Agric. For. Meteorol.*, 124:1-13.
- Gu, L., Falge, E.M., Boden, T., Baldocchi, D., Black, T.A., Saleska, S.R., Suni, T., Verma, S.B., Vesala, T., Wofsy, S.C., and Xu, L., 2005. Objective Threshold Determination for Nighttime Eddy Flux Filtering. *Agric. For. Meteorol.*, 128:179-197.
- Hanan, N.P., Berry, J.A., Verma, S.B., Walter-Shea, E.A., Suyker, A.E., Burba, G.G., and Denning, A.S., 2005. Testing a Model of CO₂, Water and Energy Exchange in Great Plains Tallgrass Prairie and Wheat Ecosystems. *Agric. For. Meteorol.*, 131:162-179.
- Suyker, A.E., Verma, S.B., Burba, G.G., and Arkebauer, T.J., 2005. Gross Primary Production and Ecosystem Respiration of Irrigated Maize and Irrigated Soybean during a Growing Season. *Agric. For. Meteorol.*, 131:180-190.
- Verma, S.B., Dobermann, A., Cassman, K.G., Walters, D.T., Knops, J.M., Arkebauer, T.J., Suyker, A.E., Burba, G.G., Amos, B., Yang, H., Ginting, D., Hubbard, K.G., Gitelson, A.A., and Walter-Shea, E.A., 2005. Annual Carbon Dioxide Exchange in Irrigated and Rainfed Maize-based Agroecosystems. *Agric. For. Meteorol.*, 131:77-96.
- Burba, G.G., and Verma, S.B., 2005. Seasonal and Interannual Variability in Evapotranspiration of Native Tallgrass Prairie and Cultivated Wheat Ecosystems. *Agric. For. Meteorol.*, 135:190-201.
- Gitelson, A.A., Vina, A., Verma, S.B., Rundquist, D.C., Arkebauer, T.J., Keydan, G., Leavitt, B., Ciganda, V., Burba, G.G., and A.E. Suyker, A.E., 2006. Relationship between Gross Primary Production and Chlorophyll Content in Crops: Implications for the Synoptic Monitoring of Vegetation Productivity. *J. Geophysical Res.*, 111, D08S11, doi:10.1029/2005JD006017.
- Grant, R.F., Arkebauer, T.J., Dobermann, A., Hubbard, K.G., Schimelfenig, T.T., Suyker, A.E., Verma, S.B., and Walters, D.T., 2007. Net Biome Productivity of Irrigated and Rainfed Maize-Soybean Rotations: Modeling vs. Measurements. *Agron. J.*, 99:1404-1423.
- Gitelson, A.A., Viña, A., Masek, J.G., Verma, S.B., and Suyker, A.E., 2008. Synoptic Monitoring of Gross Primary Productivity of Maize using Landsat Data. *IEEE Geosci. Remote Sens. Lett.*, 5(2):133-137.
- Suyker, A.E., and Verma, S.B., 2008. Interannual Water Vapor and Energy Exchange in an Irrigated Maize-based Agroecosystem. *Agric. For. Meteorol.*, 148:417-427.

Suyker, A.E., and Verma, S.B., 2009. Evapotranspiration of Irrigated and Rainfed Maize-Soybean Cropping Systems. *Agric. For. Meteorol.*, 149:443-452.

NOAAⁱ High Plains Regional Climate Center
School of Natural Resources
University of Nebraska–Lincoln
<http://www.hprcc.unl.edu>

Director: Martha Shulski (2009–present); Kenneth G. Hubbard (1987–2009)

Vision

Since its inception in 1987, the High Plains Regional Climate Center (HPRCC) has provided climate services to federal, state, and local government agencies, commercial and noncommercial industries, students and researchers, and private citizens. The vision is for a science-based national climate service, with three tiers (national, regional, and state), that supports improved decisions to enhance industries, protect the environment, and promote public policy.

Background

Congress passed the National Climate Program Act in 1978 to promote an understanding of climate and to provide for climate service. The act directed the development of a network of regional climate centers (RCCs) to meet regional climate service needs. The HPRCC was established in 1987 at the University of Nebraska–Lincoln. The Coordinating Commission for Postsecondary Education in Nebraska approved the High Plains Regional Climate Center as an official University of Nebraska–Lincoln unit on April 26, 2005.

The HPRCC emphasizes:

- Providing services based on direct interaction with climate stakeholders
- Distributing accurate and unbiased climate data, data products, and information
- Enhancing climate services and developing decision support tools through applied research
- Educating stakeholders on emerging regional climate issues

Faculty and Staff

Martha Shulski, director
Kenneth G. Hubbard, regional research climatologist
Shellie Hanneman, climate assistant
Jensheng You, research assistant professor
Jun Li, programmer
Glen Roebke, weather monitoring specialist
William Sorensen, senior programmer/analyst
Natalie Umphlett, regional climatologist
Alan Curtis, intern: Service
TBA, intern: Products
TBA, ontern: Web

Funding (5 Years)

High Plains Climate Center Budget, NOAA, \$460,000, May 2004–April 2005.
High Plains Climate Center Budget, NOAA, \$383,000, May 2005–April 2006.
High Plains Climate Center Budget, NOAA, \$460,000, May 2006–April 2007.

High Plains Climate Center Budget, NOAA, \$325,000, May 2007–April 2008.
 High Plains Climate Center Budget, NOAA, \$525,000, May 2008–April 2009.
 Improvement of Instrumentation Record, NOAA CPO, \$169,000, July 2006–June 2009.
 Estimating Solar Radiation and Dew Point for COOP, NOAA CPO, \$67,000, June 2008–May 2010.

Linkages/Collaborations

HPRCC has participated in the following activities: weekly input to the U.S. Drought Monitor; NIDIS working groups; site surveys for CRN and HCN with NCDC and state climatologists; NOAA panels, work groups, and committees; AMS committees; NOAA Test Beds for Climate and Hydrometeorology; integration with NWS WFOs, Regions, and RFCs; development and management of NWS climate information systems; NOAA National Data Stewardship Team; National Climate Extremes Committee implementation and support of WeatherCoder 3 for NWS; creation of Datzilla for reporting errors; research with the National Climatic Data Center; research with the National Drought Mitigation Center.

Select Recent Publications (2006 to present)

- You, J., and Hubbard, K.G., 2006. Quality Control of Weather Data during Extreme Events. *J. Atmos. and Oceanic Technology*, 23(2):184-197.
- Hubbard, K.G., and Lin, X., 2006. Reexamination of Instrument Change Effects in the U.S. Historical Climatology Network. *Geophys. Research Letters*, 33, L15710, doi:10.1029/2006GL027069.
- Hu, Q., PytlíkZillig, L.M., Lynne, G.D., Tomkins, A.J., Waltman, W.J., Hayes, M.J., Hubbard, K.G., Artikov, I., Hoffman, S.J., and Wilhite, D.A., 2006. Improving Farmers' Forecast Use from Understanding Their Beliefs, Values, Social Norms, and Perceived Obstacles. *J. Appl. Meteorology and Climatology*, 45(9):1190-1201.
- Artikov, I., Hoffman, S.J., Lynne, G.D., PytlíkZillig, L.M., Hu, Q., Tomkins, A.J., Hubbard, K.G., Hayes, M.J., and Waltman, W., 2006. Understanding the Influence of Climate Forecasts on Farmer Decisions as Planned Behavior. *J. Appl. Meteorology and Climatology*, 45(9):1202-1214.
- Mahmood R., Pielke Sr., R.A., and Hubbard, K.G (Co-Editors), 2006. Land Use/Land Cover Change and its Impacts on Climate. *Global and Planetary Change*, 54(1-2):1-208.
- Mahmood, R., Foster, S., Keeling, T., Hubbard, K.G., Carlson, C., and Leeper, R., 2006. Impacts of Irrigation on 20th Century Temperature in the Northern Great Plains. *Global and Planetary Change*, 54:1-18.
- Sridhar, V., Hubbard, K.G., and Wedin, D.A., 2006. Assessment of Soil Moisture Dynamics of the Nebraska Sandhills using Long-Term Measurements and a Hydrology Model. *J. Irrig. Drainage*, 132(5):463-473.
- You, J., and Hubbard, K.G., 2007. Relationship of Flagging Frequency to Confidence Intervals in the Statistical Regression Approach for Automated Quality Control of Tmax and Tmin. *International J. Climatology*, 27(9):1257-1263. DOI: 10.1002/joc.1484
- Hubbard, K.G., Guttman, N.B., You, J., and Chen, Z., 2007. An Improved QC Process for Temperature in the Daily Cooperative Weather Observations. *J. Atmos. And Oceanic Tech.*, 24(2):206-213. (14540)
- You, J., Hubbard, K.G., S. Nadarajah, and K.E. Kunkel. 2007. Performance of quality assurance procedures on daily precipitation. *J. Atmos. and Oceanic Tech.* 24(5):821-834.

- You, J., Hubbard, K.G., and Goddard, S., 2007. Comparison of Spatial Estimators: A Case Study of Spatial Regression and Inverse Distance Weighting. *International J. Climatology*, DOI:10.1002/joc.1571.
- Melvin, M.J., Zygielbaum, A.I., Gutzmer, D., Rentschler, S., Bower, J., and Hubbard, K.G., 2007. Network Requirements for Sensor Accuracy and Precision: A Case Study to Assess Atmospheric Variability in Simple Terrain. *J. International Climatology*, DOI: 10.1002/joc.1565.
- Roy, S.S., Mahmood, R., Niyogi, D., Lei, M., Foster, S.A., Hubbard, K.G., Douglas, E., and Pielke, R. Sr., 2007. Impacts of the Agricultural Green Revolution-induced Land Use Changes on Air Temperatures in India. *J. Geophys. Res.*, 112, D21108, doi:10.1029/2007JD008834.
- Pielke, R. Sr., Davey, C., Angel, J., Bliss, O., Boyles, R., Cai, M., Doesken, N., Fall, S., Gallo, K., Hale, R., Hubbard, K.G., Li, H., Lin, X., Nielsen-Gammon, J., Niyogi, D., and Raman, S., 2007. Documentation of Uncertainties and Bias Associated with Surface Temperature Measurement Sites for Climate Change Assessment. *Bull. Amer. Meteorol. Soc.*, 88(6):913-928.
- Mahmood, R., and Hubbard, K.G., 2007. Relationship between Soil Moisture of Near Surface and Multiple Depths of the Root Zone under Heterogeneous Land Uses and Varying Hydroclimatic Conditions. *Hydrological Processes*, 21(25):3449-3462.
- Kunkel, K.E., Palecki, M., Hubbard, K.G., Robinson, D., Redmond, K., and Easterling, D., 2007. Trend Identification in 20th Century U.S. Snowfall: The Challenges. *J. Atmos. and Oceanic Technology*, 24(1):64-73.
- Chen, Z., Goddard, S., Hubbard, K.G., Sorensen, W., and You, J., 2007. A Serially Complete U.S. Climate Data Set of Temperature and Precipitation for Decision Support Systems. *J. Environmental Informatics*, 8(2):86-89.
- Pielke, R.A. Sr., Davey, C., Niyogi, D., Hubbard, K.G., Lin, X., Cai, M., Li, H., Neilsen-Gammon, J., Gallo, K.P., Hale, R., and Angel, J., 2007. Unresolved Issues with the Assessment of Multidecadal Global Surface Temperature Trends. *Journal of Geophysical Research*, 112, D24S08, doi: 10, 1029/2006JD08229.
- Mahmood, R., Pielke, R. Sr., and Hubbard, K.G., 2007. Effect of Human Activities on the Atmosphere. *Trans. American Geophysical Union*, 88(52), DOI:10.1029/2007EO520007.
- Grant, R.F., Arkebauer, T.J., Dobermann, A., Hubbard, K.G., Schimelfenig, T.T., Suyker, A.E., Verma, S.B., and Walters, D.T., 2007. Net Biome Productivity of Irrigated and Rainfed Maize-Soybean Rotations: Modeling vs. Measurements. *Agron. J.* 99(6):1404-1423.
- Lin, X., Pielke, R.A., Hubbard, K.G., Crawford, K.C., Shafer, M.A., and Matsui, T., 2007. An Examination of 1997–2007 Surface Layer Temperature Trends at Two Heights in Oklahoma. *Geophysical Research Letters*, 34(24):L24705. doi:10.1029/2007GL031652.
- Lin, X. and Hubbard, K.G., 2007. What Are Maximum and Minimum Temperature in Climatology. *J. Applied Climatol.*, DOI:10.1002/joc.1536.
- Kunkel, K.E., Palecki, M., Ensor, L., Hubbard, K.G., Robinson, D., Redmond, K., and Easterling, D., 2008. Trends in 20th Century Snowfall Using a Quality-controlled Data Set. *J. Atmos. and Oceanic Technology*, DOI: 10.1175/2008JTECHA1138.
- Sridhar, V., Hubbard, K.G., You, J., and Hunt, E., 2008. Development of a Soil Moisture Index to Quantify Agricultural Drought and Its ‘User Friendliness’ in Severity-Area-Duration Assessment. *J. Hydrometeorology*, 9(4):660-676.

- Mahmood, R., Hubbard, K.G., Leeper, R., and Foster, S.A., 2008. Increase in Near Surface Atmospheric Moisture Content Due to Land Use Changes: Evidence from the Observed Dew Point Temperature Data. *Monthly Weather Review*, 136(4):1554-1561.
- Hunt, E.D., Hubbard, K.G., Wilhite, D.A., Arkebauer, T.J., and Dutcher, A.L., 2008. The Development and Evaluation of a Soil Moisture Index. *Int. J. Climatol*, DOI: 10.1002/joc.1749.
- Hubbard, K.G. 2008. Agricultural Climatology. *J. of Service Climatology*, 1(2):1-9. www.journalofserviceclimatology.org/articles/2007/2.0-Hubbard.pdf.

¹ The National Oceanic and Atmospheric Administration

National Drought Mitigation Center
School of Natural Resources
University of Nebraska–Lincoln
<http://drought.unl.edu>

Director: Michael J. Hayes (2007–present); Donald A. Wilhite, (1995–2007)

Monitoring Program Area Leader: Mark Svoboda

Planning and Social Science Program Area Leader: Cody Knutson

GIScience Program Area Leader: Brian Wardlow

Vision and Mission

To reduce societal vulnerability to drought by promoting planning and the adoption of appropriate risk management techniques.

Background

The NDMC was established in 1995 around the drought management program built by Dr. Donald Wilhite from the early 1980s through the early 1990s. It was officially approved as a center by the University of Nebraska Board of Regents in March 2005. The NDMC's activities include promoting and conducting research and outreach activities on drought mitigation and preparedness technologies; improving coordination of drought-related activities and actions within and between levels of government; and assisting in the development, dissemination, and implementation of appropriate mitigation and preparedness technologies in the public and private sectors. Emphasis is placed on research and outreach projects and mitigation/management strategies and programs that stress risk management measures rather than reactive, crisis management actions.

Faculty and Staff

The NDMC started with six staff in 1995. That number has grown to twenty-four (six faculty, three post-docs, fourteen staff, and one visiting scientist). Four graduate students work with the NDMC as well. The staff have diverse backgrounds in climatology, meteorology, hydrology, remote sensing, geography, anthropology, public participation, economics, journalism, community and regional planning, GIS, computer science, history, human dimensions, agricultural leadership and education, environmental studies, and rural sociology.

Faculty:

Deborah Bathke, climatologist

Ya Ding, economist

Michael Hayes, director

Cody Knutson, water resources scientist

Jae Ryu, hydrologist/climate management specialist

Toshihiro Sakamoto, visiting scientist

Mark Svoboda, climatologist

Tsegaye Tadesse, climatologist

Brian Wardlow, remote sensing specialist

Donna Woudenberg, drought management specialist

Staff:

Tonya Bernadt, research/outreach specialist
 Karin Callahan, GIS/remote sensing specialist
 Ann Fiedler, administrative assistant
 Brian Fuchs, climatologist
 Denise Gutzmer, Drought Impact Reporter moderator
 Tonya Haigh, research specialist
 Jun Li, programmer
 Jeff Nothwehr, GIS and research specialist
 Chris Poulsen, geospatial analyst
 Soren Scott, GIS specialist
 Kelly Helm Smith, science communicator
 Nicole Wall, public participation specialist
 Melissa Widhalm, climatologist
 Deborah Wood, publications specialist

Funding

Support for the NDMC comes through a mix of competitive grants, special grants through the congressional earmark process, and state funding. Since 1995, the NDMC has received approximately \$10 million of funding from USDA. A majority of that has been received from competitive grants (\$7.5 million) and the rest has been through the special grants or earmarks (\$2.5 million). In addition, the NDMC has received competitive grant funding from the following agencies: NOAA, NASA, NSF, USGS, the Bureau of Indian Affairs, and the Bureau of Reclamation. The state pays for one faculty-funded position (Michael Hayes, director) and part of one staff person. The rest of the 24 staff are soft-money funded. The congressional earmarks have been very valuable in three ways: providing the initial funding to help sustain the NDMC, particularly in the early years; providing some base support for operating expenses; and supporting operational service-oriented activities not otherwise covered within competitive grants, such as the U.S. Drought Monitor map.

Recent Grants

In 2009, the NDMC is involved in projects totaling approximately \$5.8 million from USDA and approximately \$3.5 million from non-USDA agencies. Grants still pending, and involving the NDMC, have been submitted to NSF, NOAA, and the Centers for Disease Control.

Publications

NDMC staff have published 33 peer-reviewed journal articles since 2005. A sample of peer-reviewed articles from 2008–09 is included below. The NDMC has also produced 65 book chapters and other drought-related publications since 2005, and disseminates a quarterly newsletter called *DroughtScape* [<http://drought.unl.edu/droughtscape/droughtscapecurrent.htm>].

Brown, J.F., Wardlow, B.D., Tadesse, T., Hayes, M.J., and Reed, B.C., 2008. The Vegetation Drought Response Index (VegDRI): A New Integrated Approach for Monitoring Drought Stress in Vegetation. *GIScience and Remote Sensing*, 45(1):16-46.

- Dubrovsky, M., Svoboda, M.D., Trnka, M., Hayes, M.J., Wilhite, D.A., Zalud, Z., and Hlavinka, P., 2008. Application of Relative Drought Indices in Assessing Climate Change Impacts on Drought Conditions in Czechia. *Theoretical and Applied Climatology*, 96(1-2):155-171. DOI: 10.1007/s00704-008-0020-x.
- Illston, B.G., Basara, J.B., Fisher, D.K., Elliott, R., Fiebrich, C.A., Crawford, K.C., Humes, K., and Hunt, E.D., 2008. Mesoscale Monitoring of Soil Moisture across a Statewide Network. *Journal of Atmospheric and Oceanic Technology*, 25(2):167-182.
- Knutson, C.L., 2008. Adaptation to Water Stress in the Great Plains. *Water Resources IMPACT*, 10(4):18-21.
- Knutson, C.L., 2008. The role of water conservation in drought planning. *Journal of Soil and Water Conservation*, 63(5):154A-160A.
- Knutson, C.L., Jones, S., Sittler, M., Higgins, M., Svoboda, M.D., Kluck, D.R., and Wilhite, D.A., 2008. Development of a Low Flow Early Warning System for the NOAA National Weather Service, USA. *Stream Ecology and Low Flows (Special Issue), International Journal of Ecological Economics and Statistics*, 12(F08):44-57.
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Future Prospects

The issues surrounding drought, water, and climate change will only become more critical in the future locally, across the United States, and around the world. The NDMC is well positioned and experienced as an end-to-end organization emphasizing research, operations, and applications connecting the science with all stakeholders dealing with these issues. As an example, the NDMC has been a key participant in the process to define and implement the National Integrated Drought Information System (NIDIS), and will continue to play a major role within NIDIS. This involvement includes helping to organize NIDIS-sponsored workshops around the country and implementing several pilot projects. The NDMC also chairs the NIDIS Portal Development Committee and provides a help desk for portal users. The NDMC's Drought Impact Reporter tool exists on the cutting edge of a growing citizen science movement called Participatory GIS or Voluntary Geographic Information (VGI). Agencies like USDA and NOAA are realizing the importance of interacting with and understanding the wide range of stakeholders, and the expertise within the NDMC's planning and social science program area provides an excellent opportunity to develop these connections with stakeholders. One final

example of a developing need occurs within the topic of public health and how it relates to drought, water, and climate change. Several NDMC staff have been involved with recent projects related to the Centers for Disease Control and have participated in the development of a drought and public health document, soon to be released.

SNR Linkages

The NDMC has strong linkages with the other centers within SNR, particularly the High Plains Regional Climate Center (HPRCC). In addition, NDMC faculty have identified four different SNR faculties as their primary faculty (applied climate science, geography/GIScience, human dimensions, and water). Although the faculty concept is relatively new within SNR, the diversity of interests within the NDMC improves our interactions with other faculty and staff within SNR.

Additional Linkages

The work of the NDMC is widely recognized and respected nationally and internationally. This is reflected through the variety of linkages maintained locally, nationally, and internationally. The NDMC hosts the conversations held by the national drought community as part of the U.S. Drought Monitor process, and interacts closely with drought scientists and managers within NOAA (including RISAs and RCCs) and within many states (including Nebraska). For example, scientists and officials in North Carolina, Colorado, Arizona, and Hawaii are all teamed with the NDMC to help improve the local reporting of drought impacts for the Drought Impact Reporter tool. Internationally, the NDMC works directly with U.N. organizations such as the Food and Agriculture Organization (FAO), the International Strategy for Disaster Reduction (ISDR), the World Meteorological Organization (WMO), and the U.N. Convention to Combat Desertification (UNCCD), but also with officials and scientists in numerous countries. In 2008, the NDMC hosted scientists and officials from Portugal, Spain, the Czech Republic, India, Saudi Arabia, Tanzania, Ethiopia, and Australia. Since 2002, the NDMC has hosted 231 visitors. A Japanese scholar specializing in remote sensing and climate change applications is spending two years at the NDMC, beginning in October 2008. The NDMC has distributed the Standardized Precipitation Index (SPI) to more than 150 scientists in 60 countries around the world, and SPI training is one of the most requested topics when the NDMC participates in international workshops. Linkages also result from the NDMC's tradition of providing data and information on drought and water management issues for requests from local, state, and federal agencies; tribal governments; international organizations; and foreign governments. The NDMC staff also respond to more than 1,000 requests for data, information, and interviews per year, including 400-600 media requests. Media requests in 2008 included CNN, CBS News, CBS Radio, NBC News, Public Television, NPR (both local stations across the country and national), The Weather Channel, Associated Press, *USA Today*, *Washington Post*, *New York Times*, *Wall Street Journal*, *Atlanta Journal Constitution*, *Time Magazine*, *National Geographic*, *Reader's Digest*, and *Redbook Magazine*. NDMC staff give approximately 150 presentations per year to a variety of audiences around the world.

Water Center
School of Natural Resources
University of Nebraska-Lincoln
<http://watercenter.unl.edu>

Interim Director: Bruce Dvorak, Interim Director; Kyle D. Hoagland, Director (2000-2009)

Vision and Mission: The *Vision* of the UNL Water Center is to assist the University of Nebraska in becoming an international leader in water research, teaching, extension, and outreach. As part of that vision, we hope to facilitate and promote UNL programs that will result in UNL becoming a premiere institution in the world in the study of water use in agriculture.

Mission – The UNL Water Center implements and facilitates water-related research, extension, teaching, and public outreach/education on all aspects of water resources with a focus on Nebraska, in the context of the region, while addressing issues of national and global concern.

Background: Established in 1964 as part of the Water Resources Research Act, the UNL Water Center is one of 54 such water institutes nationwide, with one located in each of the 50 states plus its territories. Through three name changes and eight directors*, the fundamental goals of the Water Center have not changed, as reflected in the original charge from the WRRRA: (1) arrange for competent research that addresses water problems or expands understanding of water and water-related phenomena; (2) aid the entry of new research scientists into the water resources fields; (3) train future water scientists and engineers; and (4) distribute the results of sponsored research to water managers and the public. An independent panel appointed by the Secretary of Interior evaluates the performance of each institute (the UNL Water Center passed its last review in 2004).

The UNL Water Center has focused a majority of its efforts over the past five years on: (1) facilitating research by competitively awarding seed grants (\$15,000 to \$20,000 each for one year; weighted for younger faculty); (2) facilitating research and training of new scientists by holding, for example, an annual Water Research Colloquium, water summits, and a spring water seminar series*; (3) conducting extensive outreach education via, for example, an annual summer water tour.*

Faculty and staff: The Water Center does not oversee faculty appointments, although the director has a 50% administrative appointment to allow him/her to carry out duties related to the Water Center (see Specific Questions, in section V.), and currently, the manager of the Water Sciences Laboratory is partially evaluated by the Water Center director (final responsibility lies with the SNR director). There are more than 100 UNL faculty who work directly on water, including faculty from five colleges (Agricultural Sciences & Natural Resources, Architecture, Arts & Sciences, Engineering, and Law), and more than 15 academic units. In addition, there are several water faculty members located at other institutions in Nebraska who are affiliated with the Water Center, by inclusion in our annual USGS 104b RFA and *Water Current* (newsletter) mailing lists, having received 104b funding, or by their elective inclusion in the recently updated water faculty directory.*

Currently, there are six Water Center staff members.* These individuals are highly skilled, dedicated employees who each have many years of water-related program experience. It is worthy of note that the Water Center staff increased threefold over the past two years, in large part as a result of Water Resources Research Initiative activities and related funding. As the WRRRI now winds down, their duties remain much the same, as we strive to accomplish our vision.

Funding:

SOURCE	2004/05	2005/06	2006/07	2007/08	2008/09
Base Funding					
Federal (USGS*)	92,000	92,000	92,000	92,000	92,000
State					
IANR**	280,363	280,363	280,363	280,363	280,363
NRI***	275,000	275,000	275,000	275,000	275,000
Other					
WRRRI*†	282,600	302,555	385,844	409,638	150,000
NU Found.†	2,500	2,500	2,500	2,500	2,500
TOTAL	932,463	952,418	1,038,707	1,059,501	799,863

* USGS distribution: 60% seed grants, 21% tech. transfer/extension, 19% program administration

** \$235,000 Agricultural Research Division, \$45,000 Extension Division, \$363 College of Agricultural Science & Natural Resources, includes all non-Water Science Lab staff stipends

*** dedicated to the Water Science Laboratory

*† 2009/10 budget unknown, but likely less than 2008/09

† earmarked for spring water seminar series

Extramural Funding: The following is a summary of only WRRRI faculty grant proposals and awards, 2004-2007. *

Total Awards for 2004-2008	\$1,704,219
Total of All Proposals Submitted (incl. awarded, rejected, & pending) for 2004-2008	\$51,617,571

Through both the Water Center and WRRRI, several larger federal grant proposals were facilitated over the past five years, for example:

“Integrated Environmental Science, Engineering, and Policy in Impacted Watersheds” (NSF-IGERT) \$3,123,787 S. Fritz, K. Hoagland, B. Ramamurthy, A. Tomkins, S. Zellmer (not funded)

“Complex, Inter-related Natural and Human Dynamical Systems: Climate, Water, and Agriculture in the Great Plains” (NSF-Dynamics of Coupled Human and Natural Systems) \$1,475,799 R. Oglesby, S. Irmak, E. Istanbuloglu, K. Schoengold, D. Scott, J. Williams, S. Zellmer, V. Zlotnik (not funded)

“Natural Resource Regulation: Business Adaptations, Socio-Psychological Mediators, and Consequent Impacts on Resource Availability and Ecosystem Services” (NSF-Dynamics of Coupled Human and Natural Systems) \$1,483,000 A. Tomkins, A. Samal, K. Hoagland (Lead PI's) (not funded)

“Resilience and Adaptive Governance in Stressed Watersheds” (NSF-IGERT) \$3,200,000 C. Allen, S. Fritz, L. Gunderson, A. Samal, J. Sendzimir (Austria, International Institute for Applied Systems Analysis), A. Tomkins, A. Tyre (funded 6/30/09)

“Acquisition of a High Resolution Mass Spectrometer for studies involving emerging contaminants” (NSF Major Research Instrumentation) \$322,337 S. Bartelt-Hunt, S. Comfort, A. Kolok, P. Shea, K. Hoagland. (status: pending)

In addition, numerous other grants* have been supported directly via Water Center and/or WRII funds (e.g., partial support for a graduate student, small equipment grants), or simply by hosting a workshop that brought together a new team of interdisciplinary faculty. As part of WRII, a large number of facilitation activities have been conducted since 2004.* A cooperative work agreement was also signed by the Water Center with the Nebraska Department of Natural Resources, resulting in ten new projects (\$2,319,752) for UNL water faculty.

Publications: Again, no faculty members are directly administered by the Water Center, nevertheless papers were published only by Water Initiative faculty alone over the past five years. *

Future Prospects: As water availability and quality continue to grow in importance in Nebraska and globally, the importance of statewide coordination, facilitation, and advocacy for water research, education, and outreach/extension will continue to increase. The history, track record, and overall importance of many of the functions served by the Water Center in these three primary areas clearly justify not only continuing its current efforts, but also strongly suggest that its flat budget over the past ten years or more should be reexamined and likely enhanced.

Role of the Water Center as Part of SNR: Water Center staff have been and are well integrated into SNR since its initial merger, for example: (a) several staff members have served or continue to serve on SNR standing committees, (b) the WSL director is currently co-leader of the SNR water faculty group, and (c) the Water Center director served as interim then acting director for nearly two years, overseeing the second merger which included the Water Center and CSD. Six of the WRII water faculty new hires have full or partial appointment in SNR as well, who also serve to integrate SNR with other water-related units across campus. As other water-related units on campus come into being (e.g., the Global Water Institute), the role of the Water Center both in SNR and at UNL in general will undoubtedly evolve. Nevertheless, given that the water institutes nationwide continue to be reauthorized and appropriated by the US Congress, they will also continue to have a national role to play.

Linkages of the Water Center*

Water Sciences Laboratory Core Facility: A complete report of WSL-related activities, which was recently prepared as part of a campus-wide external review of NRI core facilities, has been prepared.

*additional information available on Water Center web site: <http://watercenter.unl.edu/>

Nebraska Cooperative Fish and Wildlife Research Unit

**School of Natural Resources
University of Nebraska–Lincoln
<http://snr.unl.edu/necoopunit/>**

Leader: Dr. Craig R. Allen

Vision and Mission

The national Cooperative Research Units Program is a unique collaborative relationship between the federal government, universities, states, and a nonprofit organization. The mission of the Cooperative Fish and Wildlife Research Unit Program is to:

1. train graduate students for professional careers in natural resource research and management,
2. conduct research that will create new information useful for management of natural resources,
3. provide technical assistance to cooperators.

Background

The USGS Cooperative Research Units Program has been in existence for more than 70 years. In 2004, the NE Cooperative Fish and Wildlife Research Unit became the newest unit through a cooperative agreement signed by the United States Geological Survey, University of Nebraska–Lincoln, Nebraska Game and Parks Commission, United States Fish and Wildlife Service, and Wildlife Management Institute. At that time, the unit was staffed by a unit leader and an administrative assistant. Additional research scientists (assistant unit leaders) were hired in 2005 and 2009, respectively. Graduate students advised by unit scientists have grown to ~16. External funding has grown from zero to \$8M. Research projects have increased from two to ~25. Research technicians/assistants will number ~25 during summer 2009. The unit is helping to establish a regional node of expertise in the area of adaptive management.

Faculty and Staff

Faculty:

Kevin L. Pope, assistant leader, Fisheries, 2005–present

Joseph (TJ) Fontaine, assistant leader, Wildlife, 2009–present

Staff:

Valerie Egger, administrative assistant, 2004–present

Caryl Cashmere, staff assistant (.5 FTE), 2009–present

Annabel Major, Invasive Species Project coordinator, 2007–present

Funding

The three unit scientists are federal employees supported by the U.S. Geological Survey. The administrative staff is supported by UNL IANR. The project coordinator is supported by a Nebraska Environmental Trust grant. The Nebraska Game and Parks Commission provides base funding for operating expenses. The unit has a “center” account. All research is externally supported. The unit covers its operating costs without adding to the SNR financial burden. These costs include office equipment/supplies, phones, fax, postage/FedEx, most copying and printing, computers, some furniture, etc. The RWO process simplifies the transfer of federal research funding to faculty partners. The unit provides job opportunities for >25 technicians/year.

Recent Grants (2004–present, selected only; >\$8 million in external funds since 2004)

Resilience and Adaptive Governance in Stressed Watersheds, National Science Foundation, \$2,966,035, 2009–14. (C.R. Allen, A. Samal, A. Tomkins, S. Fritz, A. Tyre)

Angler Behavior in Response to Management Actions on Nebraska Reservoirs, NE Game and Parks, \$3,147,776, 2009–14. (K.L. Pope)

Implementation of Amphibian Monitoring and Adaptive Management for Wetland Restoration Evaluation, US Army Corps of Engineers, \$590,000, 2009–14. (C.R. Allen)

Adaptive management of prairie remnants for legacy goals, USGS/NGPC, \$100,000, 2009–11. (C.R. Allen, C. Helzer, S. Taylor, J. Kuipers)

Assessing Local and Regional Variability in Productivity and Fidelity of Grassland Birds on National Park Service Units in the Great Plains, National Park Service, \$221,792, 2007–10. (L. Powell, C.R. Allen)

Population Assessment of Channel Catfish in Nebraska Reservoirs, NE Game and Parks, \$139,845, 2007–10. (K.L. Pope)

Geographic Trends in Contamination of Nebraska’s Surface Waters as Indexed by Sex Steroids of Common Carp, USGS/UNL Water Center, \$14,400, 2007–08. (K.L. Pope, A.S. Kolok, D.D. Snow)

Understanding Invasions and Extinctions, USGS, \$23,000, 2005–08. (C. R. Allen)

Recruitment of Walleye and White Bass in Irrigation Reservoirs, NE Game and Parks, \$475,176, 2006–10. (K.L. Pope)

Spatial Risk Analyses: Risk to Native Declining Species from Invasive Species, USGS/NE Game and Parks, \$74,000, 2005–08. (C.R. Allen)

Assessment of the Landowner Incentive Program for Species at Risk, USGS/NE Game and Parks (PI), \$77,000, 2004–07. (C.R. Allen)

Evaluation of the Impact of White Perch in Nebraska, USGS/NGPC, \$112,433, 2005–08. (K.L. Pope)

Monitoring, Mapping, Risk and Management of Invasive Species in Nebraska, Nebraska Environmental Trust, \$325,081, 2006–10. (C.R. Allen, J. Merchant)

Habitat Use by Otters, NE Game and Parks, \$68,000, 2006–10. (C.R. Allen, S. Wilson)

Cross-scale structure and scale breaks in complex systems, 21st Century Research Award—Studying Complex Systems, James S. McDonnell Foundation, \$382,500, 2002–09. (C.R. Allen)

Major/Recent Publications (2004 – present, selected only; N = 56 publications since 2004)

- Pope, K.L., Neumann, R.M., and Bryan, S.D. Warmwater Fish in Small Standing Waters. In: S.A. Bonar, D.W. Willis, and W.A. Hubert (eds). *Standard Methods for Sampling North American Freshwater Fishes*. American Fisheries Society, Bethesda, Maryland. In press.
- Robertson, B.A., Schwartz, B.A., Loomis, E., and Fontaine, J.J. Protracted Song Ontogeny in a Suboscine Passerine. *Wilson Journal of Ornithology*. In press.
- Wardwell, D., and Allen, C.R. Variability in Population Abundance is Associated with Thresholds between Scaling Regimes. *Ecology and Society*. In press.
- Garmestani, A.S., Allen, C.R., and Cabezas, H., 2009. Panarchy, Adaptive Management and Governance: Sustainable Options for Building Resilience. *Nebraska Law Review*. In press.
- Gunderson, L., Allen, C.R., and Holling, C.S., 2009. *Foundations of Resilience*. Island Press, New York.
- Allen, C.R., and Holling, C.S., 2009. Thresholds and the Generation of Novelty. *Ecology and Society*. In press.
- Fontaine, J.J., and Decker, K.L., 2009. Exploring Predation and Animal Coloration through Outdoor Activity. *Science Activities*, 45:3-7.
- McGrath, L.J., van Riper, C., and Fontaine, J.J., 2009. Flower Power: Tree Flowering Phenology as a Settlement Cue for Migrating Birds. *Journal of Animal Ecology*, 78:22-30.
- Allen, C.R., and Holling, C.S. (eds.), 2008. *Discontinuities in Ecosystems and other Complex Systems*. University of Columbia Press, New York.
- Chizinski, C.J., Huber, C.G., and Pope, K.L., 2008. Development and Validation of a Bioenergetics Model for Inland Silverside in Freshwater Systems. *Transactions of the American Fisheries Society*, 137:254-261.
- Chizinski, C.J., Sharma, B., Pope, K.L., and Patiño, R., 2008. A Bioenergetic Model for Zebrafish *Danio rerio* (Hamilton). *Journal of Fish Biology*, 73:35-43.
- Wilde, G.R., and Pope, K.L., 2008. A Simple Model for Predicting Survival of Angler-caught and Released Largemouth Bass. *Transactions of the American Fisheries Society*, 137:834-840.
- Pope, K.L., and Kruse, C.G., 2007. Condition. In: C.S. Guy and M.L. Brown (eds.). *Analysis and Interpretation of Freshwater Fisheries Data*. American Fisheries Society, Bethesda, Maryland, pp. 423-471.
- Pope, K.L., Wilde, G.R., and Knabe, D.W., 2007. Effect of Catch-and-Release Angling on Growth and Survival of Rainbow Trout, *Oncorhynchus mykiss* (Walbaum). *Fisheries Management and Ecology*, 14:115-121.
- Lotz, A., and Allen, C.R., 2007. Observer Bias in Anuran Call Surveys. *Journal of Wildlife Management*, 71:675-679.
- Chizinski, C.J., Higgins, C.L., Shavlik, C.E., and Pope, K.L., 2006. Multiple Hypotheses Testing of Fish Incidence Patterns in an Urbanized Ecosystem. *Aquatic Ecology*, 40:97-109.
- Garmestani, A.S., Allen, C.R., Mittelstaedt, J.D., Stow, C.A., and Ward, W.A., 2006. Firm Size Diversity, Functional Richness and Resilience. *Environment and Development Economics*, 11:533-551.
- Allen, C.R., Johnson, A.R., and Parris, L., 2006. A Framework for Spatial Risk Assessments: Potential Impacts of Nonindigenous Invasive Species on Native Species. *Ecology and Society*, 11(1):39. <http://www.ecologyandsociety.org/vol11/iss1/art39/>
- Allen, C.R. 2006. Discontinuities in Ecological Data. *Proceedings of the National Academy of Sciences, USA*, 103:6083-6084.

- Allen, C.R., Garmestani, A., Havlicek, T., Marquet, P., Peterson, G.D., Restrepo, C., Stow, C., and Weeks, B., 2006. Patterns in Body Mass Distributions: Sifting among Alternative Competing Hypotheses. *Ecology Letters*, 9:630-643.
- Allen, C.R., 2006. Predictors of Introduction Success in the South Florida Avifauna. *Biological Invasions*, 8:491-500.

Unit Future

Continuing growth is expected. Full staffing as of 2009 should provide for continued and improving productivity. Graduate students will increase to >20 in 2009. The unit advises/supports a relatively large portion of SNR graduate students. The unit provides undergraduate opportunities through employment as research technicians and by participation in the UCARE Program.

Partnerships

The unit actively and formally partners with the Nebraska Game and Parks Commission, USGS, USFWS, other national and regional units, and the Resilience Alliance (international). The unit is actively establishing partnerships with other units in the Great Plains, and is coordinating a collaboration retreat in 2009.

Major Faculty Collaborations & Linkages

(note: this list is a partial list)

Allen, Craig

- Research Collaboration, Sheri Fritz, Geosciences
- Research Collaboration, Ashok Samal, Computing Sciences
- Research Collaboration, Alan Tomkins, Policy Center
- IGERT Grant, Steven Goddard, UNL, Computer Sciences and Engineering, spatial decision support systems; Gary Lynne, UNL, Agricultural Economics, ecological economics, behavioral economics; Sarah Michaels, UNL, Political Sciences, environmental policy, knowledge transfer; Brigitte Tenhumberg, UNL, Biological Sciences, population modeling; J. Allen Williams, Jr., UNL, Sociology, environmental sociology, social change, social inequality; Sandra Zellmer, UNL, College of Law, environmental policy, law; Vitaly Zlotnik, UNL, Geosciences, hydrogeology, hydrological modeling.

Awada, Tala

- Walter Schacht, Agronomy and Horticulture, research, co-advising graduate students, Amalia Yiannaka, Agricultural Economics, research.
- Scott Josiah, NE Forest Service, research
- David Dunigan, Pathology, research
- Derrell Martin, BSE, research
- Tom Clemente, Agronomy and Horticulture, Beadle center, research, co-advising.
- Julie Stone, Biochemistry, Beadle Center, research, co-advising

Baasch, David

- Collaborating on a research grant (Sampson Range and Pasture Endowment) with Walter Schacht (UNL Dept. of Agronomy) and Jerry Volesky (UNL-WCREC) studying the effects of grazing management systems on distribution of grazing by cattle at the Platte Valley Whooping Crane Maintenance Trust. Impacts of this study could result in improved range-management practices that optimize diversity of habitats for wildlife and livestock.

Bathke, Deborah

- 3 courses in Geosciences and 2 in SNR. My official split is 41% Geosciences and 59% SNR.

Benson, Lorrie

- UNL Water Web Site: Co-led by Sharon Skipton and me. Sharon is UNL Extension faculty with Southeast Research and Extension Center. Sharon and I are the leadership team for the implementation of the web site. Other collaborators on the web site governance team include: Kyle Hoagland, Ron Yoder (Biological Systems Engineering), Roger Terry (IANR Communications and Information Technology). Other collaborators working on the site include individuals from all UNL departments with an interest in

water, including Civil Engineering, Law, Ag Econ, Agronomy and Horticulture, Biological Systems Engineering, SNR, Extension, Political Science, Public Policy Center, Geosciences, Biological Sciences, Chemistry, Entomology, Computer Science and Engineering.

- Conflict Management class development: I was the original proponent of a Conflict Management class for SNR that is being developed by Kelly Phipps, a professor of practice and current PhD student in AgLec. It will be offered fall of 2009 as a cross-listed SNR/AgLec class. Kelly is developing and will teach the class, but I've provided some assistance with the class design, selection of materials, and promotion of the class. The first discussion of the class included Dave Aiken, faculty in Ag Econ, and Jim O'Hanlon, faculty in Education.
- ENVR 189H--Humans, Water and the Environment. I'm creating a freshman honors seminar class for fall 09. The class is being created in response to a request to Dave Gosselin from the UNL Honors Program. I've worked with Karen Lyons, Associate Director of the Honors Program, and (a little bit) with Patrice Berger, the Honors Program Director, on their expectations for the class.
- All of our WRRI/Water Center events by definition involve other departments, so I work extensively with people outside of SNR. The list of departments would be that included is the list above. (We also work within the UN system with people at UNK, UNO, and UNMC.) Events include the Water Law, Policy and Science Conference; Water Colloquium; Spring Water Lecture Seminars; and (planned for this fall) the Platte River Basin Science and Resource Management Symposium.

Brandle, Jim

- I have joint efforts with the organic group which includes research, extension and teaching. The units are Entomology, Haskell Ag Lab, Panhandle Station, Agronomy Horticulture and SNR. We are submitting several new grants this year. The effort also includes Ron Johnson from Clemson. Project goals are to address the issues of transitioning from "conventional ag" to organic ag" Major emphasis on weed control and nutrient balance. Cover crops are a focus.
- John Quinn, Ron and I are focused on developing the healthy farm index to give a relative measure of environmental impact of a farm operation. Emphasis is on birds as pest predators.
- I have had projects with Stat and Entomology and a new one in development.. Again the emphasis is on non-crop habitat, insect populations and predator prey control of crop pests.
- National Agroforestry Center / USDA-NRCS and USDA-Forest Service on biomass of agroforestry practices. This work also involves Dr. Carl Mize retired from ISU and living in Mexico.

Burbach, Mark

- Cheryl Bailey, Biochemistry, Research
- Mark Balschweid, AgLEC, Teaching grant
- Mark Bernards, Agronomy & Horticulture, Research
- Dean Eisenhauer, Biological Systems Engineering, Research Collaboration
- Susan Fritz, IANR Vice Chancellors Office, Teaching Grant
- Kem Gambrell, AgLEC, Teaching Grant
- Heath Harding, AgLEC, Teaching Grant
- Robert Hayden, AgLEC, Dissertation Committee
- Stephen Linenberger, AgLEC, Dissertation Committee
- Gary, Lynne, AgEcon, Research Grant
- Gina Matkin, AgLEC, Teaching Grant, Co-teaching
- Maribeth Milner, Ag/Hort, Research Grant
- Kelly Phipps, AgLEC, Dissertation Committee
- Byrav Ramamurthy, CSE, Research Grant
- Joyce Schaben, AgLEC, Dissertation Committee
- Kim Todd, Ag/Hort, Research Collaboration
- Kenneth Weaver, AgLEC, Dissertation Committee
- Damien Westfield, AgLEC, Dissertation Committee

Comfort, Steve

- I advise and co-advise graduate students through the Civil Engineering (Ph.D) or Environmental Engineering (M.S) program.

Dewey, Ken

- My primary collaboration across campuses is the Central Plains Severe Weather Symposium and Family Weatherfest. This is an annual event each spring which involves the Geosciences Department, Geosciences Meteorology majors, the UNL AMS Student Chapter and of course several programs in SNR (NDMC, High Plains Regional Climate Center, IANR and SNR graduate students). It is an educational outreach event.

Diffendal, Bob

- Lincoln County Extension on their "Water Riches" Program. For the last few of these years Extension Educator Brenda Aufdenkamp has been the lead on this program. It is a two-day program for 4th grade kids in Lincoln, Keith, Arthur, and Perkins Counties. Over the two days I lead 8 short field trips and talk to the kids about the Ogallala and Brule formations exposed at Cedar Point Biological Station and how these formations are related to ground water resources in the area.
- Given a lecture on the geologic development of the Ogallala/High Plains Aquifer System each year in early December to the farmers and ranchers participating in the Nebraska LEAD Program run now by Terry Hejny.
- Lecturer for Chancellor Perlman's UNL Speakers Bureau.
- Editor of *Great Plains Research* in the Center for Great Plains Studies (2004-present).

Istanbulluoglu, Erkan

- Wayne Woldt and Suat Irmak in biological systems engineering on hydrological modeling and evapotranspiration respectively.
- David Loope at Geosciences on Sand hills geomorphology.

Freitas, Nathan

- Mel Johnson, School of Natural Resources, Geography Department, Currently teaching Geography 155 lab at Morrill Hall on Wednesdays and Thursdays.
- Jim Merchant, School of Natural Resources, Geography Department, Non thesis research, I am researching and collecting data for Prairie Pines, a property on Adams and 112th.

Gosselin, Dave

- Sherri Stenberg, English, Erin Blankenship, Statistics, and Ted Hamann, TLTE, CEHS, Faculty Leadership in Writing Initiative & Kelly Grant.
- NU Teach NRI Project: Dussault, Lewis, Arts and Sciences; Heng-Moss, Bell, CASNR; McGowan, Doll, Bonnsetters, CEHS, Grandgenett, UNO.
- Strategic Research Cluster Grant: Shaffer, UNK, A. Holz, Nickerson CASNR, Plantzl, Weber, A&S.
- Toyota Project/NASA: Heng-Moss, Lee, Don, CASNR, Strand EEO, Bonnsetter, Pederson, CEHS.
- POE Science Education: Dussault, A&S, Harnisch, CEHS, Heng-Moss, CASNR.

Harvey, Ed

- Leon Higley, Steve Spoomer, Tierney Brosius, Department of Entomology, Salt Creek Tiger Beetle Critical Habitat Project.
- Tim Arkebauer, Agronomy & Horticulture, Nebraska Wetlands ET
- Vitaly Zlotnik, Geosciences, Alkaline Lakes Project
- Darryll Pederson, Geosciences, Hawaii Stream Hydrology
- John Gates, Geosciences, Chloride mass-balance recharge estimations
- Dean Jack Oliva, Hixon Lied College of Fine and Performing Arts, and Mike Farrell NET, Justin Morrill Scholars Vermont Trip Documentary Video
- Dean Jack Oliva, Hixon Lied College of Fine and Performing Arts, Patrice Berger, UNL Honors Program, University Academy Program

Hayes, Mike

- Steve Goddard, Ian Cottingham; Department of Computer Science and Engineering; series of NSF and USDA/RMA grants to develop drought visualization tools for agricultural producers.
- Ashok Samal, Leen-kiat Soh: Department of Computer Science and Engineering; currently putting together a proposal for the NSF Partnerships for International Research and Education program.
- Alan Tompkins, UNL Public Policy Center, currently putting together a proposal for the NSF Partnerships for International Research and Education program.

- Ray Supalla, Karina Schoengold; Agricultural Economics; working on a NOAA grant to estimate the economic impacts of drought, and serve together on the thesis committee for a student advised by Karina.
- Charles Wortmann, Agronomy, provide training seminars for international guests (mainly from Africa) hosted by Dr. Wortmann.
- Bob Bolin, UNL Libraries, helped organize and host a guest for a Climate Change conference.
- Terry Hejny, Director of the Nebraska LEAD Program, Regular participant within the Nebraska LEAD Program's November conferences at UNL.
- I serve on the Board of Governors for the Center for Great Plains Studies and chair the Scholarship Committee. This service allows me to interact with a whole host of faculty at UNL, UNK, and UNO.

Herpel, Rachael

- Classroom presentations: Stacey Hawkey, Extension Engineer, Partners in Pollution Prevention (P3) Coordinator, UNL Biosystems Engineering - Presented Groundwater Guardian Green Site information, Zhenghong Tang, Assistant Professor, UNL Community and Regional Planning, Presented information about source water assessment and protection to CRP, Sandy Sattler-Weber, Lecturer, UNL Ag Leadership and Communication - Served as a panelist for a session of AECN/ALEC 388. Ethics in Agriculture and Natural Resources course
- NU Water-related Research Database (<http://watercenter.unl.edu/ResearchDB/ResearchDB.asp>): an interactive database that provides up-to-date information to Nebraska's water-related decision-makers and others about the water-related research being conducted by UNL faculty. Met face-to-face with UNL faculty members (outside of SNR) to solicit their feedback and suggestions for the research database. The database was modified in response to these suggestions; individuals were notified about how and when their suggestions were used.
- Briefing Booklet (<http://watercenter.unl.edu/WRRI/WRRIWaterResearchPapers.asp>): David Aiken, UNL Agricultural Economics – to update and add a *Water Management in Nebraska* diagram to the booklet
- Sustainability, Sandy Scofield, University of Nebraska Rural Initiative – participated in a series of meetings focused on university programming for “Sustainable Communities” in Nebraska, Cecil Steward, UNL Architecture (*professor emeritus*) - Served as a consultant to the Nebraska Sustainability Leadership Workshop in Lincoln.
- Water Resources Advisory Panel (WRAP) – organized by UNL Water Center in coordination with UNL Biological Systems Engineering and IANR Administration
- Member of NU Rural Initiative Staff.

Hu, Steve

- Prof. Gary Lynne, Dept of Ag Economics, two NOAA Grants on Human Dimensions in Global Change, studying farmer decision behavior related to use of climate information.
- Dr. Lisa PytlikZillg, Dept Educational Psychology, Center for Instructional Innovation, two NOAA Grants on Human Dimensions in Global Change, studying decision behavior of farmers in use of climate and weather forecasts.

Appendix I - Major Faculty Collaborations & Linkages - 6

- Prof. Roger Bruning, Dept Educational Psychology, Center for Instructional Innovation, a NOAA Grants on Human Dimensions in Global Change.
- Prof. Alan Tomkins, Dept Psychology, Public Policy Center, a NOAA grant on decision making related to using climate information.
- Prof. Terry Mader, Dept of Animal Science, collaborated on two DOE NIGEC grants studying climate change effects on grass growth and animal production and reproduction in the Great Plains.
- Prof. Gary Hein, Dept of Entomology, collaborating on a USDA grant to study climate role in spread of a wheat curl mite in western Nebraska.
- Profs. Clint Rowe and Mark Anderson, Dept of Geosciences, Collaborating on a NOAA Grant on developing a modeling system for storm predictions in the Great Plains.
- Prof. Luis Peon-Casanova, News-Editorial/Broadcasting/Advertising, College of Journalism, working on a manuscript on TV documentary.

Hubbard, Ken

- The modernization of ET services
 - Steve Melvin, West Central Research and Extension Center (Frontier Co.)
 - Steve Goddard, Computer Science and Engineering
 - Gary Zoubek, Southeast Research and Extension Center (York Co.)
- Modern Soybean irrigation scheduling tool
 - James Specht, Agronomy & Horticulture
 - Kenneth Cassman, Center for Energy Sciences
- Carbon Sequestration Project
 - Kenneth Cassman, Agronomy & Horticulture
 - Daniel Walters, Agronomy & Horticulture
 - Johannes Knops, Biological Sciences
 - Timothy Arkebauer, Agronomy & Horticulture

Huddle, Julie

- Estimation of Evapotranspiration from Riparian and Invasive Species Using Remote Sensing, Modeling and In Situ Measurements in the Republican River Basin with Drs. Derrel Martin, Irrigation and Water Resources Engineering (BSE), Suat Irmak, Soil and Water Resources Engineering (BSE), Tala Awada Physiological Plant Ecology (SNR), Shashi Verma, Bio-Atmospheric Interactions & Micrometeorology (SNR), Xinhua Zhou, Forest Meteorology and Ecology (SNR), Ayse Irmak, Hydrological Information Systems and GIS Applications in Water Resources (SNR), Sunil G. Narumalani, Remote Sensing and GIS Analysis (SNR).
- Monitoring evapotranspiration and growth of ponderosa pine and eastern red cedar stands in Halsey with Drs. Tala Awada Physiological Plant Ecology (SNR) and Dave Wedin Plant and Ecosystem Ecology (SNR).
- Water Use by Native and Invasive Woody Species Along the Republican River with Drs. Derrel Martin, Irrigation and Water Resources Engineering (BSE), Tala Awada Physiological Plant Ecology (SNR) and Xinhua Zhou, Forest Meteorology and Ecology (SNR)

Hygnstrom, Scott

- Teaching, Alan Doster, VBMS, Co-teach a course in wildlife diseases, NRES 496/896
- Teaching & Extension, Alan Doster, Scott McVey, Bruce Boderson, and Mike Carlson, VBMS. Presented a 1-day workshop on wildlife diseases.
- Research & Teaching, Gwen Bachman, SBS, Serve on a PhD Graduate Committee
- Extension, Robert Wright, Entomology, Nebraska Integrated Pest Management Program (IPM)
- Extension, Tom Hunt, Gary Hein, Keith Glewen, Mark Bernards, Agronomy, Nebraska IPM in Agronomic Crops Program
- Extension, Shripat Kamble, Entomology, Nebraska IPM in Housing Program and the Urban Pest Management Conference (UPMC)
- Extension, Clyde Ogg and Erin Bauer, Agronomy, Nebraska IPM in Schools Program
- Extension, Roch Gaussoin, Anne Streich, Agronomy, and Fred Baxendale, Entomology, Nebraska Commercial Horticulture IPM Program
- Extension, Shripat Kamble and Barb Ogg, Entomology, Clyde Ogg and Erin Bauer, Agronomy, Shirley Neimeyer, Consumer Science, Special Session on Public Health at the UPMC

Jess, Mike

- NRES 915 is a Graduate level seminar undertaken in collaboration with the Department of Civil Engineer (CIVE 915) and the College of Law (LAW 774). Each fall the interdisciplinary seminar is offered to Third-year Law School students and to Graduate students. Typically, Grad students come from the SNR, Engineering, Agron-Hort, Regional & Community Planning, Ag Econ, Geosciences, etc. Prof. Anthony Schutz (Law School) and I are co-instructors for the course.

Joeckel, Matt

- Chris Fielding, Geosciences, research collaboration
- Teach Geosciences Courses
- 2008 Schramm Field Trip in Geosciences (England)
- Serve on Geosciences graduate committee
- Advisor/Committee Member Geosciences PhD & MS students

Josiah, Scott (The Nebraska Forest Service)

- annually co-teaches and provides financial support for a Wildfire Suppression Red Card Certification course with Dave Wedin.
- serves on the Nebraska Invasive Species Council, of which SNR employee Annabel Major is Coordinator.
- provides forestry extension and outreach services to the public and natural resource professionals.
- provides financial support for Gregg Hutchison to provide computer support services to the NFS
- provides multiple facilities (Horning Farm State Demonstration Forest, Cedar Canyon State Demonstration Forest) to SNR faculty for forestry and soils education purposes (Jim Brandle)

Appendix I - Major Faculty Collaborations & Linkages - 8

- works with Kyle Hoagland and Tala Awada on research and outreach activities regarding tree and forest use of water.
- engage SNR faculty in teaching the Nebraska Forestry Shortcourse every other year to natural resource professionals (in the past Dave Wedin, Ron Johnson, Dave Lewis, Bill Zanner, etc. assisted). The course has been revived and will be taught in either 2009 or 2010.
- will be collaborating with SNR Climate Change Initiative in terms of tree/forest C sequestration and offsets, and via the production of energy via woody biomass.

Lenters, John

- Vitaly Zlotnik (Geosciences) - research project on water balance of Sandhills lakes.
- Erkan Istanbuluoglu (SNR) - research projects on riparian ET and land surface water balance of Nebraska watersheds.
- Jun Wang (Geosciences) - research project on trends in cloud cover, lake temperature, and evaporation
- Faculty members with whom I serve on thesis committees: Bob Oglesby (Geosciences / SNR), Sheri Fritz (Geosciences), Ken Dewey (SNR), Mike Hayes (SNR), Vitaly Zlotnik (Geosciences), Jun Wang (Geosciences), Erkan Istanbuluoglu (SNR), Ayse Irmak (SNR / Civil Engineering), Mark Anderson (Geosciences)

Major, Annabel

- Collaboration on Nebraska Invasive Species Posters, developed by Biological Invaders Undergraduate class, Dr. Tom Powers, Dept of Plant Pathology.

Merchant, Jim

- Jim Stubbendieck (Agronomy and Center for Great Plains Studies) - student committees and conference planning
- Charles Wortmann (Agronomy) - student committee/research
- Ashok Samal (Computer Science and Engineering) – research
- Bruce Dvorak (Civil Engineering) - student committee, search committee, research
- David Marx (Biometry/Statistics) - student committees and research
- Rodrigo Canterero (Community and Regional Planning) - student committees
- Steve Reichenbach (Computer Science and Engineering) - student committees and research
- Adonna Fleming (Libraries) - GIS extension
- Note that many of my collaborators (e.g., in Geography and Geosciences) have now moved into SNR or have partial appointments in SNR. An example of the former is Erkan, and the latter includes Bob Oglesby.
- I have also developing collaborations with two new faculty members who I have nominated for courtesy appointments in SNR: Ge Lin (University of Nebraska Medical Center) & Zhenghong Tang (Community and Regional Planning)

Oglesby, Robert

- Research Collaboration, Clint Rowe, Mark Anderson, Jun Wang and Dave Loope in Geosciences

Appendix I - Major Faculty Collaborations & Linkages - 9

- Research Collaboration, Byrav Ramamurthy in Computer Science and Engineering
- Research Collaboration, Dave Swanson, Research Computational Facility

Pabian, Roger

- Service - answer occasional requests in the areas of invertebrate fossils, minerals, and gemstones for CSD clientele and have maintained webpages on Nebraska's invertebrate fossils and gemstones.
- Service - curate the invertebrate fossil collections for the University of Nebraska State Museum, and these duties include processing incoming and outgoing loans of fossil specimens and working with visiting scholars who come here to examine specimens in the collections. Visiting scholars have included Tomasz Baumiller, University of Michigan, Ronald Lewis, Auburn University, and Peter Holterhoff, Texas Technical University.
- Service- refereed papers that have been submitted to several professional journals on invertebrate fossils and have continued to write on my own in this area. My own research area includes Late Pennsylvanian and Early Permian crinoids, paleoecology, and biostratigraphy.

Pegg, Mark

- CASNR International Studies Task Force
- PEARL Review Panel Member (Mostly CASNR, but some activities on the other campus as well)
- Teaching collaboration with Dr. Cal Borden (BIOS postdoc)
- Teaching collaboration (primarily guest lectures with Dr. Tom Powers)
- Research collaboration with Dr. Alan Kolok (UNO - if that counts as he is part of the Water Center)

Powell, Larkin

- Walter Schacht, Agronomy and Horticulture--research collaboration (grassland birds/Sandhills grazing systems), teaching collaboration (Puerto Rico field course)
- David Logan, Math, Research for Undergraduates in Theoretical Ecology (undergrad teaching/research collaboration)
- Adaptive Management IGEERT proposal--several departments (Craig Allen has complete list) including Law School

Quinn, John

- We submitted a EPA P3 grant represent 3 different programs at UNL. The programs are SNR (John Quinn, Mark Burbach, Katja Koehler-Cole), AgLEC (Courtney Quinn, Gina Matkin), and Agronomy (Chuck Francis, Justin VanWart). The grant title is - Development of an Urban Food Leadership Coop in Support of a Local Food System P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet **\$9945.00** 2008 – Pending
- In addition our McPhee outreach program has partnered with multiple departments across campus.

Rundquist, Donald

- Paul Read, Agronomy – Grant with NE Dept of Ag
- Suat Irmak, BSE – Environmental Trust Grant and dissertation committee
- Gary Hein. Entomology – dissertation committee and research
- David Admiraal, CE – research and Grant NE Energy
- Tim Arkebauer, Agronomy – research
- Walt Schacht, Agronomy – grant Sampson fund and research
- Brad Barker, 4H – workshops in summer
- Richard Ferguson, Agronomy – dissertation committees
- Dennis Alexander, EE – research over the years, past grants

Ryu, Jae

- Ray Supalla, IANR, Dept. of Ag. Econ., Proposal Development (NOAA): Development of a Shared Vision Education and Planning Tool for Water Resources Management – Pending
- Ken Cassman, IANR, Agronomy, Research collaboration and proposal development -- Preparation

Shea, Pat

- Mark Bernards and Maribeth Milner (Agronomy and Horticulture) - Research (USDA grant project)
- Gary Lynne (Agricultural Economics) - Research (USDA grant project)
- Marjorie Langell (Chemistry) - Research (publication from previous Nebraska Research Initiative project)
- Tian Zhang and John Stansbury (Civil Engineering), Yan Xia (Child, Youth and Family Studies) - Research (WRRRI grant project)
- Blair Siegfried (Entomology) - Teaching (PhD student committee)
- Roy Spalding (Agronomy and Horticulture) - Teaching (PhD student committee)
- James Takacs (Chemistry) - Teaching (PhD student committee)
- David Berkowitz (Chemistry) - Teaching (PhD student committee)
- David Hage (Chemistry) - Teaching (PhD student committee)
- John Bender (Journalism and Mass Communications) - Teaching (MS student committee)
- Mark Bernards (Agronomy and Horticulture), others - Extension (annual publication, other extension support as requested)
- Charles Wortmann (Agronomy and Horticulture), others - Extension (two special publications, Heartland Regional Water Coordination Initiative)
- Kimberly Barrett (UNL Wellness Coordinator), others - Service (Chancellor's Committee on Wellness)
- Senate Presidents Kathleen Prochaska-Cue (Child, Youth and Family Studies) and John Fech (Southeast Research and Extension Center), others - Service (Faculty Senate; currently Executive Committee member)
- Dana Boden (Libraries), others - Service (Academic Rights and Responsibilities Committee)
- John Lindquist (Agronomy and Horticulture), others - Service (Research Misconduct Policy and Procedures development)

Sibray, Steve

- Gave a talk [What Nebraskan's Need to Know About Ground Water] at "Women in Agriculture", a regional Extension program held in Sidney Nebraska.
- Demonstrated the interconnection of ground water and surface water with a physical model at the "Western Nebraska Groundwater Festival" and the Panhandle Research and Extension Center's "Field Day."

Snow, Dan

- Charles Wortmann, Agronomy and Horticulture, Co-PI emerging contaminants research proposal
- Martha Mamo, Agronomy and Horticulture, Method development soil microbiology
- Charles Shapiro, Agronomy and Horticulture, Co-PI EPA research project/proposal
- Roy Spalding, Agronomy and Horticulture, Co-PI USDA pesticides fate and transport, co-author
- Galen Erickson, Animal Sciences, Co-PI research proposals/student research support
- Phil Miller, Animal Sciences, Co-PI emerging contaminants research proposal
- Terry Mader, Animal Sciences, Co-PI EPA research project/proposal
- Tom Franti, Biological Systems Engineering, Co-PI USDA pesticide fate project
- Dean Eisenhauer, Biological Systems Engineering, Co-PI USDA pesticide fate project
- Bill Kranz, Biological Systems Engineering, Co-PI EPA research project/proposal
- David Shelton, Biological Systems Engineering, Co-PI EPA research project/proposal
- James Carr, Chemistry Department, Method development metals analysis
- David Hage, Chemistry Department, Co-PI emerging contaminants proposals/graduate student support
- Bruce Dvorak, Civil Engineering, Co-PI emerging contaminants proposals/graduate student co-advisor
- Shannon Bartelt-Hunt, Civil Engineering, Co-PI emerging contaminants proposal/student research/co-author
- Tian Zhang, Civil Engineering, Co-PI EPA research project/multiple proposals
- Xu Li, Civil Engineering, Proposal and methods development
- Sheri Fritz, Department of Geosciences, Metals analysis/student research support
- Blair Siegfried, Entomology, Pesticide analysis/method development/student research
- Susan Cuppett, Food Sciences, Method development volatile organics
- Vicki Schlegel, Food Sciences, Quality assurance/control
- Vitaly Zlotnik, Geosciences, Stable isotope analysis/water quality
- Tracy Frank, Geosciences, Stable isotope analysis carbonates/student research
- Karrie Webber, Geosciences/Biology, Co-PI research proposal/student research support
- Ming Kang, Plant Pathology Department, Metals analysis
- Michael Carlson, Veterinary Sciences, Laboratory support/toxins analysis/science teacher workshop

Spalding, Mary

- Research Grant. USDA-CSREES Conservation Effects Assessment Program, Roy Spalding, UNL Agronomy & Horticulture, Richard Ferguson, UNL Agronomy &

Horticulture, David Marx, UNL, Dept of Statistics, Peter Nowak, University of Wisconsin-Madison, Dept of Rural Sociology

- Research Grant. Nebraska Ethanol Board. Impact of 30,000 gallon ethanol spill on Equus Beds Aquifer, Roy Spalding, UNL Agronomy & Horticulture, Greg Hatton, Kansas Dept of Health & Environment, Michael Hyman, Dept of Microbiology, North Carolina State University
- Scholarly Service. Nebraska Department of Environmental Quality & Nebraska Department of Agriculture funded project. Ground water data management through the statewide clearinghouse, Roy Spalding, UNL Agronomy & Horticulture
- Member of SNR Ph.D. committee, Student: F. Wen
- Member of Geosciences. M.S. committee, Student: Sarah Foster

Szilagyi, Joe

- Vitaly Zlotnik from the Earth Sciences Dept on City Campus on Sand Hills lake evaporation.

Tyre, Drew

- Leon Higley, Entomology, Thesis committee
- Brigitte Tenhumberg, Biological Sciences, Transient dynamics and uncertainty in populations
- Richard Rebarber, Mathematics, dissertation committee and Transient dynamics and uncertainty in populations
- Sarah Michaels, Political Science, Uncertainty at the science-policy interface

Verma, Shashi

- Carbon Sequestration Project: I lead this interdisciplinary research project and collaborate with the following faculty outside SNR. Tim Arkebauer, Ken Cassman and Dan Walters, Department of Agronomy and Horticulture, Johannes Knops, School of Biological Sciences, M. Soundararajan, Department of Biochemistry
- Evapotranspiration Studies: I closely collaborate with the following faculty outside SNR. Darrell Martin and Suat Irmak, Biological Systems Engineering.
- Understanding Climate, Water, Carbon and Land Cover Dynamics in the Great Plains: An Integrated Strategy: Recently I collaborated on a research proposal with the following faculty outside UNL. Clint Rowe, Department of Geosciences, Byrav Ramamurthy, Department of Computer Science and Engineering

Walter-Shea, Betty

- Paul Reed, Agronomy and Horticulture, Student M.S. Thesis.
- Tim Arkebauer, Agronomy and Horticulture, Research – scaling from leaf to landscape level gas exchange.
- Deborah Bathke, Geosciences, Teaching – NRES 208

Wedin, Dave

- Dave Loope, Vitaly Zlotnik, Clint Rowe, Geosciences, Sandhills research
- Shea, Oglesby, Geosciences, research grant proposals

- Johannes Knops, Biosciences, teaching, research
- Walter Schacht, Jerry Volesky, Rhae Drijber, Agronomy / Horticulture, Sandhills research
- Tom Powers, Plant Path, Sandhills research
- Richard Sutton, Agronomy / Horticulture, Nine Mile Prairie management

Woudenberg, Donna

- Margaret Jacobs, Director, Women's & Gender Studies, W&GS will cross-list "Gender & Cultural Perspectives on the Environment"; I will co-teach "Women, Gender & Science" for W&GS in fall 2009; & I have been invited to become a W&GS faculty member
- Mary Anne Holmes, Geosciences; Director, ADVANCE-Nebraska, Part of my time has been bought out in year three of ADVANCE-Nebraska (\$3.8 million NSF grant to help UNL recruit, promote and retain female faculty in STEM fields) when it will be implemented on East Campus
- Sandra Scofield, University of Nebraska Rural Initiative, On a committee to develop a framework meet the goals of the Rural Initiative
- Brooke Levey, Tadd Barrow, & Beth Birnstihl, Cooperative Extension, Developing the following children's educational publications: "Discover the Waters of Nebraska" KIDs Activity booklet and "Discover Climate" KIDs Activity booklet (Project WET)
- Wayne Drummond, Dean, Architecture (Chair, Chancellor's Commission on Sustainability); Chuck Francis, Agronomy; Stacey Hawkey, Biological Systems Engineering; David Henderson, Philosophy (Chancellor's Commission on Sustainability); Gary Lynne, Agricultural Economics; Crystal Powers, Biological Systems Engineering; Sandra Scofield, NE Rural Initiative; W. Cecil Steward, Dean Emeritus, Architecture & President and CEO, Joslyn Institute for Sustainability; Ted Weidner, Facilities Management, Worked with the above, SNR faculty/staff, and community representatives to plan and facilitate the first sustainability forum held February 6, 2009; this will be a continuing collaborative effort – gatherings will occur at SNR at least once a year if not twice a year

International Collaborations/Project/Activities by Person/Center Name

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
Tala Awada	Water balance in a Mediterranean pine forest and potential impacts of projected climate change on these forests	We are assessing and using several techniques to measure ET and its components (micrometeorological, gas exchange, sap flow, and physiological). Measurements are conducted from needle (gas exchange, isotopes, water status) to tree (sap flow) and stand (eddy covariance) levels. We received a grant from EU (program: cooperation between Greek and US institutions) to support this research.	Forest Research Institute of Thermis, Greece (K. Radoglou, M. Fotelli, PIs) Aristotle University of Thessaloniki, Greece (E. Constantinidou, PI)	2006-Present
Tala Awada	Ice nucleation in naval oranges and physiological responses during winter	We determined the effects of the use of wind machines and copper sprays (used to control INA bacteria) on cold hardiness and winter physiological performance of citrus trees.	Forest Research Institute of Thermis, Greece (K. Radoglou, M. Fotelli, PIs) Aristotle University of Thessaloniki, Greece (E. Constantinidou, PI)	2006-2009
Tala Awada	Rose productivity in soil-less cultures	Physiology, growth, and production of roses were evaluated under various soil-less greenhouse cultures.	Forest Research Institute of Thermis, Greece (K. Radoglou, M. Fotelli, PIs) Aristotle University of Thessaloniki, Greece (E. Constantinidou, PI)	published in 2005
Tala Awada	The use of dendrochronological techniques to study the hydrology of riparian zone	We will be using dendrochronological techniques, and tree rings C, D, and O isotopes to study the hydrology of riparian zone along the Republican River in Nebraska, and to determine the impacts of tree expansion on the function of this ecosystem.	Swiss Federal Institute WSL, Zürich, Switzerland (Dr. Cherubini)	Started 2009
Tala Awada		Teach a graduate level week-long course (Plant Stress Physiology, 15hrs) at the Mediterranean Agronomic Institute of Chania-Greece.		Annually, since 2004
Tala Awada		I presented seminars at three institutions last year: - Aristotle University of Thessaloniki, Greece - Forest Research Institute, Thermis, Thessaloniki, Greece - University of Wageningen, The Netherlands.		2008 Sabbatical
Xun-Hong Chen, Wenke Wang, SNR; and others, Chang'an University, Xi'an, China	Mining of groundwater and protection of the environment in arid and semi-arid areas	This project can support Chinese scientists from Chang'an University to visit UNL for short-term research. One of the objectives is to create a center of international groundwater and environmental modeling in arid and semi-arid areas. Funding agency: Ministry of Education, China (Chang Jiang Scholars Innovation Team Project), ¥3,000,000 (Chinese RMB)	Chang'an University, China	1/1/2009-12/31/2011
Co-PI: Xun-Hong Chen, University of	Effect of the nutrients transported by submarine	Funding agency: China Natural Science Foundation, ¥400,000 (Chinese RMB)	Zhejiang University, Hangzhou, China	1/2006-12/2008

Appendix J – International Collaborations & Travel - 2

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
Nebraska-Lincoln; PIs: Weng Huanxin and R. X. Tian, Zhejiang University, Hangzhou, China	groundwater discharge on coastal ecoenvironment; project number 40572175			
X. H. Chen, Coordinator for the US and China teams	US-China workshop on hydroinformatics	A workshop was conducted at UNL in October 2007 and a delegation of five scientists from Hohai University attended this workshop. The second workshop was held at Hohai in April, 2008 and a delegation of 10 UNL faculty (including SNR director Don Wilhite) and graduate students attended this workshop. Top officials from Ministry of Water Resources, China also attended the workshop in China. UNL delegation members came from SNR, Computer Science and Engineering, Public Policy Center, and Department of Politics. Funding agencies: US National Science Foundation, \$49,716 and China Natural Science Foundation, ¥ 50,000 (Chinese RMB)	Hohai University, China; Ministry of Water Resources, China;	8/1/2007-7/31/2008
Xun-Hong Chen	MODFLOW	I provided series lectures and mini-workshop on MODFLOW, geostatistics and stream-aquifer interactions in 2006, 2007, and 2008. The objective was to increase UNL visibility and recruit graduate students (for those supported by China Scholarship Council).	Beijing Normal University, China	2006-2008
Xun-Hong Chen		Supervise a visiting Ph.D. student Mr. Tao Sun for his research on water quality modeling. Mr. Tao's visitation to SNR is supported by China Scholarship Council. After completion, he will return to Tianjin University to get Ph.D. degree.	Tianjin University, China	August 2008-February 2010
Xun-Hong Chen		Supervise a visiting Ph.D. student Mr. Chengpeng Lu for his research on geostatistics/stream-aquifer interactions. Mr. Lu's visitation to SNR is supported by China Scholarship Council. After completion, he returns to Hohai University to get Ph.D. degree.	Hohai University, China	September 2009-August 2010
Xun-Hong Chen		Arrange the visit of Professor Jinlin Kong and conduct collaborative research on evaluation of groundwater contamination risk. Dr. Kong's visitation to SNR is supported by China Scholarship Council. Dr. Kong is associate Dean, College of Earth Science and National Land Resources, Chang'an University.	Chang'an University, China	August 2009-August 2010
Xun-Hong Chen - Wenke Wang		Arrange the visit of Professor Wenke Wang and conduct collaborative research on	Chang'an University, China;	October 2008-October 2009

Appendix J – International Collaborations & Travel - 3

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
		groundwater-surface water interactions. Dr. Wang's visitation to SNR is supported by China Scholarship Council. We developed the long-term collaboration plans. Currently, we are organizing a groundwater forum in Xi'an, China that will be held on July 1-3, 2009.	China Scholarship Council	
Xun-Hong Chen		Arranged the visit of Professor Huanxin Weng and his wife to UNL and Lincoln in October, 2007. Their support was partially supported by a grant of China Natural Science Foundation in which I was a Co-PI. My collaboration with Professor Weng and other faculty members at Zhejiang University started in 1998 and it has continued for more than 10 years.	Zhejiang University, China	1998-Present
Xun-Hong Chen		I invited Dr. Jinxi Song from this university as a visiting scholar for 18 months (from 2006-2008). He participated in my research for characterization of stream-aquifer interaction in the Blue River Basin, the Platte River, and the Elkhorn River Basin. Dr. Song returned to China in 2008 but our collaboration continues for publishing research results.	Northwest University, Xi'an, China	2006-Present
Xun-Hong Chen		Collaboration with Dr. Xi Chen (chief scientist, State Key Lab of Water Resources-Hydrology and Hydraulic Engineering) and Dr. Longcang Shu (Associate Dean, College of Hydrology and Water Resources) has continued for about 10 years. Both were visiting scholars at UNL in 2000-2002. In recent years, my main contribution has been to provide advice to the research of their graduate students. My last visit to Hohai was in December, 2008.	Hohai University, China	2000-Present
Xun-Hong Chen	Pending project—The evolution and management of the hydrologic cycle affected by human activities in the Ordos Basin, China	China Ministry of Science and Technology, the Basic Research Program, ¥38 million (Chinese RMB). This project has 67 PI and Co-PIs from 6 universities and research institutions in China (Chang'an University, Hohai University, Northwest University, Jilin University, Nanjing Institute of Water Resources, and Xi'an Institute of Geology and Mineral Resources). I am the only international researcher in this group.	Chang'an University, Hohai University, Northwest University, Jilin University, Nanjing Institute of Water Resources, and Xi'an Institute of Geology and Mineral Resources	2010-2014
Xun-Hong Chen		Associate editor for international journal, Journal of Hydrology. The role of an associate editor is to invite reviewers, review reviewers' evaluation and make recommendation to the editor-in-chief.		2008-Present
Qi "Steve" Hu	Climate and Ecosystems in the Arid and Semiarid Regions in Central Asia		Xinjiang Institute of Geography and Ecological Sciences, Chinese Academy of Sciences	2008-2012

Appendix J – International Collaborations & Travel - 4

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
			Funded by the Chinese Academy of Sciences, Chinese National Science Foundation, and China Overseas Scientific Collaboration Unit	
Qi “Steve” Hu	Water Resources in the Yangtze River Basin under the Changing Climate		Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences Funded by the Chinese Academy of Sciences	2004-2009
Scott Hygnstrom	Management of Foreign Animal Diseases	Objectives: increase awareness and knowledge of emerging FADs, develop surveillance and monitoring programs, establish collaborations among international agencies and organizations, conduct research on the epidemiology and management of FADs. Accomplishments: We have hosted meetings with scientists from Bahrain, Israel, Nigeria, Yemen and others. We have hosted two professional meetings and one workshop on FADs, One World OneHealth, and diseases diagnostics, respectively. I have trained 5 graduate students in the area of disease ecology and epidemiology in preparation for the future emergence of FADs. I am the current chair-elect of The Wildlife Society, Wildlife Damage Management Working Group, and have been directing communication within and external to our Society regarding FADs.	The Wildlife Society, Wildlife Damage Management Working Group; USDA-APHIS-WS-Wildlife Disease Surveillance and Monitoring Program; USDA-APHIS-WS-National Wildlife Research Center; World Health Organization	2006-Present Program is still in the process of being developed.
National Drought Mitigation Center (NDMC) - Cody Knutson	FAO Near East Drought Planning Manual	Cody Knutson made an assessment of FAO's drought-related activities within the Near East region. This assessment has led to recommendations for action for countries in the region, and a guide or manual on drought risk management applicable to the region will be prepared.	United Nations Food and Agriculture Organization (FAO), Egypt	2007-2008
NDMC - Don Wilhite	National Drought Mitigation Strategy and Framework for Jordan	Don Wilhite served as the International Team Leader for this project and prepared a national drought mitigation strategy and framework for implementation by the Ministry of Agriculture. He also participated in two workshops and met with many governmental and non-governmental agencies/ organizations in the preparatory work that preceded development of the drought mitigation framework. The NDMC hosted 4 Jordanians for training on drought monitoring, mitigation, planning, and policy in November 2006.	United Nations Food and Agriculture Organization (FAO)	2006-2007

Appendix J – International Collaborations & Travel - 5

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
NDMC Don Wilhite	Drought Management Center for Southeast Europe (DMCSEE), based in Slovenia	Don Wilhite served as consultant for the World Meteorological Organization and the U.N. Convention to Combat Desertification in the preparation of a project proposal to initiate formation and implementation of a Drought Management Center for Southeast Europe (DMCSEE). Eleven countries are included in this center, which will be hosted by Slovenia. The NDMC is continuing to serve as a technical and planning resource for the DMCSEE. For 3 weeks in 2007, the Center hosted a visiting scientist from Slovenia with the focus on drought monitoring and early warning strategies.	World Meteorological Organization (WMO)	2007-2009
NDMC	Morocco National Drought Observatory	The NDMC has participated in several assessments of drought management activities in Morocco, leading to a report outlining the next steps in the country's efforts for proactive drought risk management.	USAID	2000-2008
NDMC - Don Wilhite	MEDROPLAN	Don Wilhite served as external advisor to the MEDROPLAN project funded by the European Commission. The purpose of this project was to develop drought preparedness guidelines for the countries in the Mediterranean region, including southern Europe and North Africa. Participating countries included Morocco, Tunisia, Italy, Spain, Greece, and Cyprus. These guidelines will now be transferred to all countries in the region.	European Commission	2003-2007
NDMC	UNISDR Drought Advisory Group	Development of drought risk reduction policy guides.	UN's International Strategy for Disaster Reduction	2007-2009
NDMC	North American Drought Monitor	The NDMC is participating with Canada, Mexico, and U.S. partner agencies to produce the monthly NADM map.	USDA, NOAA, Agriculture and AgriFood Canada, Environment Canada, Mexico's National Commission on Water, Mexico's National Meteorological Service	2003-2009
NDMC - Cody Knutson	Mahazat as-Sayd Wildlife Protected Area Drought Management Plan	Cody Knutson worked with local wildlife experts to develop a drought mitigation strategy of the Mahazat as-Sayd Wildlife Protected Area located near Taif, Saudi Arabia.		2008
NDMC - Cody Knutson	Indian Centre for Climate and Societal Impacts Research	Cody Knutson has served on the Scientific Advisory Committee for the development of the Indian Centre for Climate and Societal Impacts Research located in Ahmedabad, India.	Center for Research on the Changing Earth System	2008-2009
NDMC - Mark Svoboda - Cody Knutson	Drought Management Considerations for Climate Change Adaptation	Mark Svoboda and Cody Knutson provided technical guidance on the project, which focused on the Mekong Region of Vietnam and Cambodia.		2007

Appendix J – International Collaborations & Travel - 6

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
NDMC	Toshihiro Sakamoto	The NDMC is hosting a visiting scientist from the National Institute for Agro-Environmental Sciences in Japan. Dr. Sakamoto's interests involve remote sensing and climate change issues.	National Institute for Agro-Environmental Sciences	2008-2010
NDMC	Jinsong Wang	The NDMC is hosting a visiting scientist from the Institute of Arid Meteorology in Lanzhou, China. Dr. Wang's interests involve drought monitoring and impact issues.	Institute of Arid Meteorology	2009
NDMC - Jae Ryu - Mike Hayes	Development of a Pilot Drought Information System for National Drought Disaster Reduction	Jae Ryu and Mike Hayes are involved in a project to improve drought risk management activities for South Korea.	Kongju National University, Korea	2008-2010
NDMC	Standardized Precipitation Index	The NDMC has distributed the Standardized Precipitation Index to more than 150 scientists in 60 countries around the world, and SPI training is one of the most requested topics when the NDMC participates in international workshops.		1995-2009
NDMC	Impacts of Climate Change and Variability on European Agriculture	The NDMC has signed an agreement for the NDMC to participate within the European Union's Cooperation in the Field of Scientific and Technical Research program (COST 734) to help determine the impacts of climate change and variability on European agriculture.	European Union	2008-2010
NDMC - Mark Svoboda - Mike Hayes	Drought, Climate Change and Variability	Mark Svoboda and Mike Hayes continue to collaborate closely with a group of scientists in the Czech Republic and Austria. This interaction looks at a variety of issues including soil climates, drought, climate change, and climate variability.	Institute of Atmospheric Physics ASCR, Prague, Czech Republic and Institute for Agrosystems and Bioclimatology, Mendel University of Agriculture and Forestry, Brno, Czech Republic.	2004-2009
NDMC Staff	UNCCD Science and Technology Working Groups	Six staff from the NDMC will be serving on working groups for a project with the United Nations Convention to Combat Desertification (UNCCD).	United Nations Convention to Combat Desertification, USDA's Natural Resources Conservation Service.	2009-2010
Don Rundquist	Remote Sensing of Inland and Coastal Waters	Spectral reflectance is widely used for qualitative and quantitative assessment of constituents in water bodies, and scientists have explored a variety of techniques for collecting data by means of field radiometers. However, poor understanding of data-collection assumptions, techniques and limitations may lead to errors in the resulting data. The project is intended to demonstrate quantitatively the differences in results from various ways in which spectral reflectances are collected in/on surface waters.	CALMIT and Kochi University of Technology, Kochi, Japan	2007-Present
Pat Shea	Remediation of PCB, pesticide, and	This research involves the use of activated carbon materials and select plant species to	Institute of Physicochemical and	2002-Present

Appendix J – International Collaborations & Travel - 7

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
	munitions-contaminated soils	promote detoxification of PCB-, pesticide, and munitions-contaminated soils by reducing bioavailability and enhancing degradation. My role to date includes assistance in data interpretation, assessment in relation to previously published research, preparation of English language manuscripts, and assistance in the publication process. On-going; primarily supported by Russian agencies.	Biological Problems in Soil Science, Russian Academy of Sciences (Dr. Galina Vasilyeva and associates)	
Pat Shea	Enhanced phytoremediation using metal resistant and 1-aminocyclopropane-1-carboxylate deaminase from <i>Bacillus</i> species	This research involves isolating metal-resistant <i>Bacillus</i> species with ACC deaminase activity from heavy metal-contaminated soils. Multi-metal resistance allows proliferation of the bacteria in the rhizosphere and their ACC deaminase activity controls the ethylene level of plant cells, leading to enhanced phytoremediation. The initial research was conducted in Korea; a full collaborative project with our laboratory is planned. Under development; initial work funded by Korean agencies and additional funding is being sought.	College of Environmental and Bioresource Sciences, Chonbuk National University, Republic of Korea (Dr. Byung-Taek Oh and associates)	2009
Joe Szilagyi	CLAVIER (Climate Change and Variability: Impact on Central and Eastern Europe	At the Budapest University of Technology and Economics I am taking part in a 3-year project (ending August 2009) called CLAVIER (Climate Change and Variability: Impact on Central and Eastern Europe). In the framework of CLAVIER, ongoing and future climate changes are analyzed based on existing data and climate projections with very high detail to fulfill the need of local and regional impact assessment. Researchers from 6 countries and different disciplines investigate linkages between climate change and its impact on weather patterns, air pollution, extreme events, and on water resources. Furthermore, an evaluation of the economic impact on agriculture, tourism, energy supply and the public sector is conducted. The CLAVIER project is supported by the European Commission's 6th Framework Programme (contract number 037013) as a 3-year Specific Targeted Research Project from 2006 to 2009 under the Thematic Sub-Priority "Global Change and Ecosystems". Our task was to find out how evaporation rates from Hungary's great shallow lakes would be affected in the coming 40-50 years. Luckily no major increase in evaporation could be detected, so they will not dry out, thus millions of tourists can continue to come to their shores.	Budapest University of Technology and Economics	2006-2009

Appendix J – International Collaborations & Travel - 8

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
Steven A. Thomas	FIBR: From genes to ecosystems: How do ecological and evolutionary processes interact in nature?	Using a model organism in evolutionary biology, the guppy (<i>Poecilia reticulata</i>), this project investigates feedbacks between ecosystem-scale, ecological functions and evolutionary processes in streams of Trinidad and Tobago. Guppy translocations and riparian canopy treatments are being used to examine how changes in stream primary production influence nutrient cycling, foodweb structure, and guppy life history evolution. Ecological surveys of streams that vary in nutrient levels, light availability, and predation risk are also being characterized to identify links between phenotypic variation and ecological variables. Currently 1 PhD student (Tom Heatherly) and 2 MS students (David Owens and Tyler Kohler) are supported by this project and conducting research in Trinidad. In 2009-2010, a UCARE undergraduate student (Rachel Paseka) will work on this project and travel to Trinidad.	David Reznick (PI, UC-Riverside), Joseph Travis (Florida State Univ.), Cathy Pringle (Univ. of Georgia), Douglas Fraser (Sienna College), Regis Ferriere (Univ. of Arizona), Michael Kinnison (Univ. of Maine), Alex Flecker (Cornell Univ.), Cameron Ghalambor (Colorado State Univ.), Jim Gilliam (North Carolina State Univ.), Andrew Hendry (McGill Univ.), Paul Bentzen (Dalhousie Univ.), Don deAngelis (SP, USGS). In cooperation with: Mary Alkins-Koo and Dawn Phillip, Department of Biology, University of the West Indies at St. Augustine, Trinidad and Tobago Funding by: National Science Foundation, Division of Environmental Biology, Frontiers in Integrative Biological Research, \$5,000,000.	2006-2011
Steven A. Thomas	Collaborative Research: Nutrient Processing and Retention in Streams (NPARS2) – A Stoichiometric Approach to Coupled N and P Cycling	In 2008, Thomas received proof of concept funding from NSF to develop the use of $^{18}\text{O-PO}_4^{3-}$ as a tracer of phosphorus dynamics in stream ecosystems. Thomas has been collaborating with a Spanish colleague, Eugenia Marti, to refine analytical procedures involved in $^{18}\text{O-PO}_4^{3-}$ analysis and examining natural abundance patterns across a landuse gradient. In February, 2009, Thomas traveled to Blanes, Spain to work on method development and collect initial natural abundance samples. Currently 1 PhD student (Tom Heatherly) and 1 MS student (Tyler Kohler) have received partial support from this project and participated in research activities.	H. Maurice Valett (Virginia Tech) and Eugenia Marti (Centre d'Estudis Avangats de Blanes, Spain) Funding by: National Science Foundation, Division of Environmental Biology, Ecosystems. \$120,000.	2008-2009
Drew Tyre	Dam Uncertainty: Robust Water Management with Limited Ecological Information	Prudent water management of dammed rivers is critical to survival of many species. Yet considerable uncertainty surrounds both the ecological response to possible management strategies, and the future runoff regimes in the face of climate change. We examine the trade-off between human water	University of Melbourne, RMIT University, University of Montana, University of Nebraska-Lincoln	2006-Present

Appendix J – International Collaborations & Travel - 9

Person/Center Name	Project Name	Project Description	Collaborating Organizations	Dates
		demands (minimum base flow requirements and limited flood risks) and the ecological requirement of flooding for reproduction, and the effect of uncertainty on meeting these needs, using dams from three continents as heuristic examples.		
Don Wilhite	Member, Editorial Board	Book series, Advances in Natural and Technological Hazards Research, Book Series	Springer Publishers	2000-Present
Don Wilhite	Book Series Editor	Drought and Water Crises	Taylor and Francis Publishers	2009-Present
Don Wilhite	Forum on Socio-economic Benefits of Weather, Climate and Water Services	Chair of international group of scientists	World Meteorological Organization	2005-Present
Don Wilhite	Member, Editorial Board	Disaster Prevention and Management: An International Journal	Emerald Group Publishing, Ltd.	2001-Present
Don Wilhite	Conference planning committee	Serving as member of the planning team for an international conference on water scarcity and drought.	Spanish Ministry of Environment and Rural and Marine Affairs	2009-Present
Don Wilhite	Member, Scientific Advisory Committee	Planning for an international conference on food security and climate change.	Kingdom of Jordan, ICARDA	2009-Present
Don Wilhite	Drought Mitigation Training Workshops	Conduct of drought mitigation workshops in the Mediterranean Region.	Mediterranean Institute for Agronomic Research	2002-2008
Don Wilhite	Coping with Drought Risk in Agriculture and Water Supply Systems	Co-editor of a book with others editors from Spain and Italy on drought management and policy development in the Mediterranean region.	Polytechnic University of Madrid; University of Cantania; Canel de Isabel II, Madrid; and Springer Publishers	2007-2009
Don Wilhite	From Disaster Response to Risk Management: Australia's National Drought Policy	Co-editor of a book with Linda Botterill on Australian drought policy.	Australian National University and Springer Publishers	2004-2005
Don Wilhite	Drought and Water Crises: Science, Technology, and Management Issues	Editor of a book with international case studies in drought and water management.	CRC Press and Taylor and Francis Publishers	2003-2005
Don Wilhite	Member, Task Force on Assessment of Natural Disaster Impacts on Agriculture (ANADIA)	Develop a project proposal for ANADIA for submission to funding organizations and governments.	World Meteorological Organization	2006-2007
Don Wilhite	Agricultural Risk Management Project	To develop a project proposal on agricultural risk management and produce a book.	World Meteorological Organization	2006-2007

International Travel (by date)

Last Name	First Name	Date Leaving	Reason for Travel	Destination
Gitelson	Anatoly	12/24/2006	Workshop- Monitoring productive inland water quality	TelAviv, Israel
Wilhite	Donald	1/5/2007	Prepare a proposal for establishment of a drought monitoring center for SE Europe	Ljubljana,Slovenia, Switzerland
Thomas	Steve	1/9/2007	Research Trip to initiate our NSF-FIBR work	Arimo, Trinidad & Tobago
Knutson	Cody	2/2/2007	Present a lecture at the workshop on Monsoon Climate	India
Thomas	Steve	2/10/2007	Research Trip to initiate our NSF-FIBR work	Arimo, Trinidad & Tobago
Reinhard	Karl	2/17/2007	Mummy Congress in Spain, Fulbright conference in Panama & teach in Peru	Peru
Wilhite	Don	2/26/2007	To review book contents for publication and plan workshop	Madrid Spain
Wedin	Dave	3/8/2007	Presenter at seminar	Winnipeg
Steele	Mark	3/9/2007	Field course Data collection campaign	Sapelo Island
Powell	Larkin	3/9/2007	Travel to teaching research sites in Puerto Rico	San Juan, Pr
Wilhite	Don	3/16/2007	Attend WMO Conference	Amman, Jordan
Wilhite	Don	4/14/2007	Establishment of a drought monitoring center	Ljubljana, Slovenia
Hu	Steve	5/1/2007	Invited speaker @ East China Uni of Policy & Law	Shanghai, PRC
Pegg	Mark	5/6/2007	Lead NRES 315 course to Namibia for teaching & research	Windhoek, Namibia
Wilhite	Don	5/11/2007	Attend MEDROPLAN workshop	Marrakech, Morocco
Knutson	Cody	5/22/2007	Present lectures at the Canada National Drought Strategy	Kelowna,BC, Canada
Zhou	Xinhua	5/28/2007	International Project	Greece
Gitelson	Anatoly	5/30/2007	Visit experimental sites	Toronto,Montreal & Quebec
Knutson	Cody	6/2/2007	Present a Lecture	Geneva Switzerland
Sudmeyer	Robert	6/7/2007	Attend North Am Agroforestry Conference	Quebec
Brandle	Jim	6/9/2007	Attend North Am Agroforestry Conference	Quebec City
Thomas	Steve	6/12/2007	Research in Trinidad	Port of Spain, Trinidad

International Travel (by date)

Last Name	First Name	Date Leaving	Reason for Travel	Destination
Wilhite	Don	6/15/2007	Presentation at the International Forum on Drought	Sevilla, Spain
Knutson	Cody	6/18/2007	Conduct a review of UN-FAO	Cairo, Egypt
Reinhard	Karl	6/18/2007	Lead a Symposium at the North American Conference	Merida Mexico
Chen	Hong	6/19/2007	Continue existing collaboration research with three University	Beijing
Hu	Steve	6/25/2007	Collaborate w/Chinese Meteorological Bureau on Dust storms in China	Beijing, China
Allen	Craig	7/5/2007	Research collaboration with Graham Cumming at the Univ of Capetown	Capetown, So Africa
Thomas	Steve	7/6/2007	Attend the Society of European Freshwater Science Meeting	Palermo, Sicily
Wilhite	Don	7/7/2007	Chair WMO Task force and a Congressional Briefing	Switzerland & DC
Svoboda	Mark	7/7/2007	Expert Evaluator & Rapporteur for European Union's Research Council for Drought Research	Brussels, Belgium
Awada	Tala	7/15/2007	Forest Research	Athens, Greece
Verma	Shashi	7/23/2007	Invited Lecture at the AsiaFlux Workshop	Seoul, Korea
Lenters	John	8/12/2007	Participate in the 30th Congress of the International Assoc of Theoretical and Applied	Montreal, QC
Lotz	Aaron	8/20/2007	Attend fall semester at Catholic Univ of Chile doing research	Santiago, Chile
Svoboda	Mark	8/20/2007	To make an assessment for USAID of the drought management activities in Morocco	Rabat, Morocco
Hayes	Mike	8/20/2007	To make an assessment for USAID of the drought management activities in Morocco	Rabat, Morocco
Gitelson	Anatoly	8/24/2007	Don River watershed	Moscow Russia
Thomas	Steve	9/13/2007	Research	Trinidad
Allen	Craig	9/23/2007	Attend science mtg & annual board mtg, Craig is on the Board of Directors	Corsica France
Hoagland	Kyle	9/23/2007	Science Meeting	Corsica, France
Hu	Steve	9/29/2007	Symposium on Asian Larger River	Nanjing PRC
Gitelson	Anatoly	10/8/2007	Work on current NASA funded project in Ukraine	Tel-Aviv Simferopl
Reinhard	Karl	10/9/2007	Represent UNL at So Am Paleopathology mtg	Rio de Janeiro, Brazil
Comfort	Steve	10/14/2007	Present invited seminar	Chaozhon, China
Weiss	Albert	10/17/2007	Symposium on Intelligent Information Technology	Nanjing PRC

International Travel (by date)

Last Name	First Name	Date Leaving	Reason for Travel	Destination
Knutson	Cody	10/19/2007	Visit the United Nations Food & Ag Org and develop a drought planning guide	Cairo, Egypt
Wilhite	Don	10/27/2007	European Emergency Mgt and Response Conference	Budapest, Hungary
Reinhard	Karl	11/9/2007		Santiago, Chile
Tsegaye	Tadesse	11/11/2007	Attend Int'l drought workshop	Bauchi, Nigeria
Svoboda	Mark	11/14/2007	Invited speaker for Int'l Conference on Drought Mgt	Lisbon, Portugal
Gitelson	Anatoly	11/21/2007	Attend International symposium	Hanover, Germany,
Hu	Steve	11/24/2007	Attend Workshop	Berlin, Germany
Wilhite	Don	11/28/2007	Attend WMO Public Weather Symposium	Geneva Switzerland
Bihmidine	Saadia	12/1/2007	Research at the lab of Ag Biotechnology at the Agronomy institute	Chania Greece
Awada	Tala	12/1/2007	Teach at the Institute of Chania	Athens, Greece
Hayes	Mike	12/1/2007	Make assessment for USAID of the drought management activities	Rabat Morocco
Svoboda	Mark	12/1/2007	Make assessment for USAID of the drought management activities	Rabat Morocco
Freeman	Pat	12/15/2007	Bat Research at the William Beebe Research station	Port of Spain, Trinidad
Hu	Steve	12/20/2007	Speaker at National Climate Centre of China	Beijing PRC
Geluso	Keith	12/20/2007	Research	Trinidad
Lewis	Chris	1/2/2008	Canadian Conference for Fisheries Research	Halifax, Nova Scotia, Canada
Thomas	Steve	1/9/2008	Research associated with our NSF-FIBR grant	Trinidad
Kohler	Tyler	1/12/2008	Stream Ecology Research FIBR program	Trinidad, Port of
Owens	David	1/12/2008	Stream Ecology Research FIBR program	Trinidad, Port of
Wilhite	Don	2/2/2008	Lecture for Drought Mitigation	Zaragoza, Spain
Moses	Wesley	3/7/2008	Field Data Collection On Lake Kineret	Tel-Aviv
Leavitt	Bryan	3/7/2008	Research algae blooms in the Sea of Galilee	Degania Bet, Israel
Hu	Steve	3/13/2008	Speaker @ Water Science Form in Beijing	Beijing, PRC
Powell	Larkin	3/13/2008	Lead Puerto Rico field course	San Juan, PR
Winn	Sara	3/13/2008	Lead Puerto Rico field course	San Juan, PR
Awada	Tala	3/21/2008	Conduct forestry related research, present talks & work with forestry graduate students	Greece, Denmark
Chen	Hong	3/24/2008	To run a NSF-workshop at Hohai University	China
Wilhite	Don	4/10/2008	Participate in a workshop on Hydroinformatics & Water Policy	Nanjing, China
Holz	John	4/10/2008	Meet with faculty at HoHai University	Nanjing, China

International Travel (by date)

Last Name	First Name	Date Leaving	Reason for Travel	Destination
Allen	Craig	4/12/2008	Attend the Resilience 2008 Conference	Stockholm, Sweden
Thomas	Steve	4/14/2008	Stream Ecology Research FIBR program	Trinidad, Port of
Weiss	Albert	4/16/2008	Present paper at the International Symposium on Crop Modeling	Nanjing, PRC
Schoengold	Karina	4/20/2008	Participate in data collection on a project	Merida, Mexico
Joeckel	Matt	5/11/2008	Conduct class GEOL 495/895 "Economic & Exploration Geology"	London, England
Freeman	Pat	5/12/2008	Research on the bats of Tobago	Trinidad, Port of
Lenters	John	5/16/2008	Annual Mtg of the Intern Assoc for Great Lakes Research	Peterborough, On
Istanbulluoglu	Erkan	5/28/2008	conference	Gewatt, Switzerland
Swinehart	Jim	6/4/2008	Sample & describe sand dunes and loess in the Mu Us Dunefield of Inner Mongolia	China
Schoengold	Karina	6/9/2008	Present an invited paper and attend conference	Alicante, Spain
Wilhite	Don	6/10/2008	Present a paper at the International Conf on Drought Management	Zaragoza, Spain
Hu	Steve	6/10/2008	Invited Speaker at the National Climate Center	Beijing, PRC
Kohler	Tyler	6/19/2008	Stream Ecology Research FIBR program	Port of Spain,
Owens	David	6/19/2008	Stream Ecology Research FIBR program	Port of Spain,
Thomas	Steve	7/1/2008	Research	Arima, Trinidad
Holz	Aris	7/6/2008	Attend Aquatic Virus Meeting	Vancouver, BC
Chen	Hong	7/16/2008	Remediation of Soil and Groundwater Contamination	Xi An, China
Wilhite	Don	7/22/2008	Make presentation at the seminar on drought planning	Zaragoza, Spain
Knutson	Cody	7/26/2008	Drought Planning workshop	Spain & Saudi
Gitelson	Anatoly	8/6/2008	Work on MERIS satellite and experiments	Frankfurt, Germany
Keydan	Galina	8/6/2008	Work on MERIS satellite and experiments	Frankfurt, Germany
Svoboda	Mark	8/8/2008	Attend the American Meteorological Society's	Vancouver, BC
Bathke	Deborah	8/10/2008	Applied Climatology Conference	Whistler, Canada
Pope	Kevin	8/15/2008	Attend the Am Fisheries Society meeting	Ottawa, Canada
Martin	Dustin	8/15/2008	Attend annual American Fisheries Society	Ottawa Canada
Barada	Tony	8/15/2008	Attend and present at the Am fisheries Society	Ottawa, Canada
Hu	Steve	8/20/2008	Work with faculty at Urumqi University	Urumqi, China
Thomas	Steve	9/10/2008	Research Activities	Iariama, Trinidad
Gitelson	Anatoly	9/12/2008	Workshop	Wageningen,
Gitelson	Anatoly	10/9/2008	Remote sensing in agriculture workshop	Astana, Kazakhstan
Hu	Steve	10/9/2008	Invited speaker for National Climate Centre	Beijing, China

International Travel (by date)

Last Name	First Name	Date Leaving	Reason for Travel	Destination
Wilhite	Don	10/11/2008	Participate in a conference at Xi'an Jiaotong University	Xi'an China
Fuchs	Brian	10/14/2008	North American Drought Monitor Forum	Ottawa, Canada
Wardlow	Brian	10/14/2008	North American Drought Monitor Forum	Ottawa, Canada
Svoboda	Mark	10/14/2008	North American Drought Monitor Forum	Ottawa, Canada
Heatherly	Tom	11/11/2008	Research	Port of Spain,
Svoboda	Mark	11/13/2008	Attend a Drought Policy, Planning and Mitigation Workshop	Sydney, Australia
Hayes	Mike	11/13/2008	Attend a Drought Policy, Planning and Mitigation Workshop	Sydney, Australia
Wilhite	Don	11/13/2008	Attend a Drought Policy, Planning and Mitigation Workshop	Canberra, Australia
Hu	Steve	11/13/2008	International Symposium	Xinjiang, China
Allen	Craig	11/15/2008	Present Workshop	Luxemburg, Austria
Hiller	Tim	11/19/2008	Presentation at Australia's Wildlife Management Conference	Perth Australia
Major	Annabel	11/21/2008	Workshop in Discontinuities in complex systems	Vienna, Austria
Alai	Aaron	11/21/2008	Workshop in Discontinuities in complex systems	Vienna, Austria
Knutson	Cody	11/22/2008	Present a lecture at the Water Scarcity and Management	Girona, Spain
Narumalani	Sunil	11/28/2008	Present Keynote addresses at Two conferences in Thailand & Vietnam	Thailand & Vietnam
Awada	Tala	11/28/2008	Teach at the Mediterranean Agronomic Institute of Chania	Athens Greece
Chen	Hong	12/9/2008	Present a research proposal to the Ministry of Education	Beijing, Xian China
Thomas	Steve	12/23/2008	Research	Arima, Trinidad
Powell	Larkin	12/29/2008	Fulbright Program	Windhoek, Namibia,
Thomas	Steve	1/3/2009	Writing retreat	Itasca, Mn
Heatherly	Tom	1/15/2009	Research	Trinidad
Kohler	Tyler	1/15/2009	Research	Trinidad
Woudenberg	Donna	1/21/2009	Speak at Red River of the North Basin Conference	Winnipeg Canada
Thomas	Steve	1/23/2009	Am Society of Limnology	France and Spain
Svoboda	Mark	1/25/2009	Canadian Annual Drought Conference	Canada
Narumalani	Sunil	1/25/2009	Keynote address for GITNDM	Bangkok, Thailand
Hu	Steve	2/5/2009	Invited presenter and research	Beijing, China

International Travel (by date)

Last Name	First Name	Date Leaving	Reason for Travel	Destination
Thomas	Steve	2/23/2009	Research	Arima, Trinidad
Svoboda	Mark	3/4/2009	Invited presenter at Workshop	Mexico City, Mx
Gitelson	Anatoly	3/7/2009	Remote sensing conference	Israel
Hanson	Paul	3/13/2009	Assist with teaching the 492 Class	San Juan, Puerto
Hower	Rebecca	3/13/2009	Assist with teaching the 492 Class	San Juan, Puerto
Wilhite	Don	3/13/2009	Participate in the World Water forum	Istanbul, Turkey
Reinhard	Karl	3/17/2009	Present Paper at International meeting	Bolzano, Italy
Owens	David	3/19/2009	Research and field work	Arima, Trinidad
Pegg	Mark	5/10/2009	Lead NRES 492 Study abroad course	Windhoek, Namibia
Yendra	Sara	5/10/2009	Teaching assistant for the African Ecology course	Windhoek, Namibia
Feng	Song	5/11/2009	Work with Seoul University on climate physics	Seoul Korea
Comfort	Steve	5/29/2009	Invited speaker at an academic seminar	Bangkok, Thailand
Chen	Hong	6/25/2009	Attend Groundwater Forum	China
Powell	Larkin	7/1/2009	Fulbright Program	Windhoek, Namibia, Africa

School of Natural Resources Staff by Faculty Area
(FY 2008-09 Adjusted Budget)

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Appendix K – Staff FTE by Faculty Area - 2

Staff, Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin Services	SNR Total	Soft Funded
<u>Applied Ecology</u>									
Tony Barada, Research Technologist	1.00 SNR	1		1.00				1.00	1.00
Bruce Bolander, Farm Manager	1.00 SNR	2		1.00				1.00	1.00
Mary Brown, Partnership Coordinator	1.00 SNR	3		.50	.50			1.00	1.00
Mike Cieslik, Ag Research Technician	1.00 SNR	4		1.00				1.00	1.00
Greg Clements, Research Technologist	1.00 SNR	5		1.00				1.00	1.00
Dan Dobesh, Research Technician	1.00 SNR	6		1.00				1.00	1.00
Valerie Egger, Admin Assistant Coop Unit	1.00 SNR	7		1.00				1.00	
Marty Hamel, Research Technologist	1.00 SNR	8		1.00				1.00	1.00
Lucas Kowalewski, Research Technician	1.00 SNR	9		1.00				1.00	1.00
Jeremy Hiller, Research Technician	1.00 SNR	10		1.00				1.00	1.00
Carla Knight, Research Technician	1.00 SNR	11		1.00				1.00	1.00
Annabel Major, Program Coordinator	1.00 SNR	12			1.00			1.00	1.00
Alexis Maple, Research Technician	1.00 SNR	13		1.00				1.00	1.00
David Rempel, Research Technician	1.00 SNR	14		1.00				1.00	1.00
Chris Thody, Outreach Coordinator	1.00 SNR	15			1.00			1.00	1.00
Stephen Vantassel, Program Coordinator	1.00 SNR	16		.50	.50			1.00	1.00
SUBTOTALS	15.00 SNR	16		13.00	3.00			16.00	15.00
<u>Geography/GIScience</u>									
Chad Boshart, Project Manager	1.00 SNR	1		1.00				1.00	1.00
Galina Keydan, Research Specialist	1.00 SNR	2		1.00				1.00	1.00
Bryan Leavitt, Research Systems Analyst	1.00 SNR	3		1.00				1.00	1.00
Dan Pfeffer, GIS Web Portal Project Manager	1.00 SNR	4		1.00				1.00	1.00
Chris Poulsen, Geospatial Research Analyst	1.00 SNR	5		1.00				1.00	1.00
Cullen Robbins, GIS Research & Remote Sensing Specialist	1.00 SNR	6		1.00				1.00	1.00
Milda Vaitkus, Project Manager	.80 SNR	7		.80				.80	.80
SUBTOTALS	6.80	7		6.80				6.80	6.80
<u>Geology & Soils</u>									
Jesse Korus, Groundwater Level Coordinator	1.00 SNR	1		.25	.75			1.00	
Matt Marxsen, Drilling Manager	1.00 SNR	2		.75	.25			1.00	
Travis Porter, Drilling & Field Assistant	1.00 SNR	3		.75	.25			1.00	
Aaron Young, Research Technologist	1.00 SNR	4		1.00				1.00	1.00
SUBTOTALS	4.00 SNR	4		2.75	1.25			4.00	1.00

Appendix K – Staff FTE by Faculty Area - 3

Staff, Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin Services	SNR Total	Soft Funded
Water									
Lorrie Benson, Assistant Director Water Center	1.00 SNR	1		.25	.75			1.00	
Dave Cassada, Separations Chemist	1.00 SNR	2		1.00				1.00	
James Gilbert, Water Research Technologist	1.00 SNR	3		1.00				1.00	1.00
Rachael Herpel, Outreach Specialist	1.00 SNR	4			1.00			1.00	
Pat Jarecke, Admin Assistant Water Center	1.00 SNR	5		.50	.50			1.00	
Tricia Liedle, Program Assistant	1.00 SNR	6		.50	.50			1.00	
Christine Lockert, Admin Coordinator CESU	1.00 SNR	7		1.00				1.00	
Xianghua (Jenny) Luo, Research Technologist	1.00 SNR	8		1.00				1.00	
Duane Mohlman, Data Systems Coordinator	1.00 SNR	9		.50	.50			1.00	
Sathaporn (Tong) Onanong, Research Technologist	1.00 SNR	10		1.00				1.00	1.00
Teyona Powell, Research Technologist	1.00 SNR	11		1.00				1.00	
Gyanendra Prasai, Office Assistant	.25 SNR	12		.25				.25	.25
Pari Ranade, GIS Specialist	1.00 SNR	13		1.00				1.00	1.00
Ian Ratcliffe, GIS Research & Remote Sensing Specialist	1.00 SNR	14		1.00				1.00	1.00
Steve Ress, Communications Specialist	.80 SNR .20 CIT	15		.40	.40			.80	
Martha Rhoades, Xenobiotics Lab Manager	.50 SNR	16		.25	.25			.50	
Aaron Shultis, Research Technologist	1.00 SNR	17		1.00				1.00	
Jennifer Oltman Swanson, Research Technologist	1.00 SNR	18		1.00				1.00	1.00
SUBTOTALS	16.55 SNR .20 CIT	18		12.65	3.90			16.55	5.25
Administrative Services									
Elaine Connelly, Office Associate-Sales	1.00 SNR	1					1.00	1.00	
Dee Ebbeka, Cartographer/Graphic Designer	1.00 SNR	2					1.00	1.00	
Bernice Goemann, Office Associate-Department Operations	1.00 SNR	3					1.00	1.00	
Steve Hartung, Lab Safety Manager	.50 SNR	4					.50	.50	
Jim Hines, IT Manager	1.00 SNR	5					1.00	1.00	
Les Howard, GIS/Cartography Manager	1.00 SNR	6					1.00	1.00	

Appendix K – Staff FTE by Faculty Area - 4

Staff, Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin Services	<u>SNR Total</u>	Soft Funded
Joyce Hurst, Graduate Secretary – Geography	.50 SNR	7					.50	.50	
Gregg Hutchison, Computer Hardware/Software Technician	1.00 SNR	8					1.00	1.00	
Sharon Kelly, Administrative Secretary	1.00 SNR	9					1.00	1.00	
Ron Kruml, Computer Hardware/Software Technician	1.00 SNR	10					1.00	1.00	
Jacki Loomis, Sales & Event Manager	1.00 SNR	11					1.00	1.00	
Bev Martin, Office Associate-Support Services	1.00 SNR	12					1.00	1.00	
Mark Mesarch, Web/Database Specialist	1.00 SNR	13					1.00	1.00	.40
Sue Ellen Pegg, Recruiting Coordinator	1.00 SNR	14					1.00	1.00	
Christine Steggs, Assistant to the Director	1.00 SNR	15					1.00	1.00	
Susan Vosler, Office Associate-Academic Programs	1.00 SNR	16					1.00	1.00	
Sara Winn, Advising Coordinator	1.00 SNR	17					1.00	1.00	
Sara Yendra, Academic Advisor-Environmental Studies	.50 SNR .50 ES	18					.50	.50	
SUBTOTALS	17.50 SNR .50 ES	18					16.50	16.50	.40
TOTALS	81.28 SNR .50 ES .20 CIT			46.78	17.25		17.25	81.28	47.35

NOTE: FTE was split between Teaching, Research, Extension/Outreach, Administrative Services based on job title and description.

***Codes for Acronyms Used:**

SNR	= School of Natural Resources
CIT	= Communication and Information Technology
ES	= Environmental Studies

School of Natural Resources Faculty by Faculty Area
(FY2008-09 Adjusted Budget)

Faculty, Rank/Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	SNR Total	Soft Funded
<u>Applied Climate Sciences</u>									
Deborah Bathke, Assistant Professor of Practice	.59 SNR .41 Geos	1	.24	.35				.59	.35
Ken Dewey, Professor (AY appt)	1.00 SNR	2	.15		.83	.02		1.00	
Al Dutcher, State Climatologist	1.00 SNR	3			.70	.30		1.00	
Song Feng, Research Assistant Professor	1.00 SNR	4		1.00				1.00	.62
Mike Hayes, Associate Professor, NDMC Director	1.00 SNR	5	.10	.23		.37	.30	1.00	
Steve Hu, Professor	.70 SNR .30 Geos	6		.53		.17		.70	
Ken Hubbard, Professor	1.00 SNR	7	.10	.48	.20	.22		1.00	.03
John Lenters, Associate Professor	.70 SNR .30 Geos	8	.15	.50		.05		.70	
Xiaomao Lin, Research Assistant Professor	1.00 SNR	9		.97		.03		1.00	1.00
Robert Oglesby, Professor (AY appt)	.30 SNR .70 Geos	10		.28		.02		.30	
Andy Suyker, Research Assistant Professor	1.00 SNR	11		.60		.40		1.00	1.00
Mark Svoboda, Associate Geoscientist	1.00 SNR	12		.25		.75		1.00	1.00
Tsegaye Tadesse, Assistant Geoscientist	1.00 SNR	13		.50		.50		1.00	1.00
Shashi Verma, Professor	1.00 SNR	14	.15	.83		.02		1.00	
Betty Walter-Shea, Professor and SNR Teaching Coordinator	1.00 SNR	15	.35	.40		.25		1.00	
Al Weiss, Professor	1.00 SNR	16	.15	.83		.02		1.00	
Don Wilhite, Professor and SNR Director	1.00 SNR	17					1.00	1.00	
Jinsheng You, Research Assistant Professor	1.00 SNR	18		.90		.10		1.00	1.00
SUBTOTALS	16.29 SNR 1.71 Geos	18	1.39	8.65	1.73	3.22	1.30	16.29	6.00
<u>Applied Ecology</u>									
Dennis Adams, Forester	.30 SNR .70 NFS	1			.30			.30	
Tala Awada, Associate Professor	1.00 SNR	2	.25	.68		.07		1.00	
David Baasch, Post Doctoral Research Associate	1.00 SNR	3		1.00				1.00	1.00
Ann Bleed, Lecturer	.10 SNR	4	.10					.10	
Jim Brandle, Professor	1.00 SNR	5	.28	.70		.02		1.00	.29

Appendix L - Faculty FTE by Faculty Area - 2

Faculty, Rank/Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	<u>SNR Total</u>	Soft Funded
Dennis Ferraro, Extension Educator	.20 SNR .80 SREC	6	.20					.20	
Trish Freeman, Professor	1.00 SNR	7	.25	.48		.27		1.00	
Tim Hiller, Post Doctoral Research Associate	1.00 SNR	8		1.00				1.00	1.00
Julie Huddle, Research Assistant Professor	1.00 SNR	9		.98		.02		1.00	1.00
Scott Hygnstrom, Professor	1.00 SNR	10	.25	.25	.50			1.00	.15
Jean Knops, Associate Professor	.20 SNR .80 SBS	11	.10	.10				.20	
Mark Pegg, Associate Professor	1.00 SNR	12	.49	.49		.02		1.00	
Larkin Powell, Associate Professor	1.00 SNR	13	.60	.38		.02		1.00	
Steve Thomas, Assistant Professor	1.00 SNR	14	.20	.78		.02		1.00	
Drew Tyre, Associate Professor	1.00 SNR	15	.40	.58		.02		1.00	
Dave Wedin, Professor	1.00 SNR	16	.40	.58		.02		1.00	
Xinhua Zhou, Research Assistant Professor	1.00 SNR	17		.98		.02		1.00	1.00
SUBTOTALS	13.80 SNR .80 SREC .80 SBS .70 NFS	17	3.52	8.98	.80	.50		13.80	4.44
<u>Geography/GIScience</u>									
Sami Akasheh, Post Doctoral Research Associate	1.00 SNR	1		1.00				1.00	1.00
Doug Amedeo, Professor (AY appt)	1.00 SNR	2	.45	.45		.10		1.00	
Clark Archer, Professor (AY appt)	1.00 SNR	3	.60	.30		.10		1.00	
Kenny French, Lecturer (AY appt)	.25 SNR	4	.25					.25	
Mel Johnson, Lecturer (AY appt)	.50 SNR	5	.50					.50	
Jim Knotwell, Lecturer (AY appt)	.25 SNR	6	.25					.25	
Bruce Kopplin, Lecturer (AY appt)	.25 SNR	7	.25					.25	
Steve Lavin, Professor (AY appt)	1.00 SNR	8	.60	.30		.10		1.00	
Jim Merchant, Professor, CALMIT Director, and SNR 5-year Review Coordinator	1.00 SNR	9	.40	.33		.27		1.00	
Sunil Narumalani, Professor	1.00 SNR	10	.40	.25	.05	.30		1.00	
Katherine Nashleanas, Lecturer (AY appt)	.25 SNR	11	.25					.25	
Rick Perk, Assistant Geoscientist	1.00 SNR	12				1.00		1.00	1.00
Al Peters, Lecturer (AY appt)	.49 SNR	13	.49					.49	
Juan Ramirez, Lecturer (AY appt)	.25 SNR	14	.25					.25	
Don Rundquist, Professor (AY appt)	1.00 SNR	15	.35	.63		.02		1.00	

Appendix L - Faculty FTE by Faculty Area - 3

Faculty, Rank/Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	<u>SNR Total</u>	Soft Funded
Brian Wardlow, Research Assistant Professor	1.00 SNR	16		.60		.40		1.00	1.00
David Wishart, Professor (AY appt)	1.00 SNR	17	.60	.20		.20		1.00	
SUBTOTALS	12.24 SNR	17	5.64	4.06	.05	2.49		12.24	3.00
<u>Geology & Soils</u>									
Marv Carlson, Professor	1.00 SNR	1		.25		.75		1.00	
Steve Comfort, Professor	1.00 SNR	2	.20	.53	.15	.12		1.00	
Paul Hanson, Assistant Professor	1.00 SNR	3	.15	.50		.35		1.00	
Matt Joeckel, Professor and SNR Outreach Coordinator	.70 SNR .30 Geos	4		.30		.40		.70	
Mark Kuzila, Professor and SNR Survey Coordinator	1.00 SNR	5	.15	.30	.20	.35		1.00	
Joe Skopp, Associate Professor	1.00 SNR	6	.50	.50				1.00	
Jim Swinehart, Professor	.85 SNR .15 Geos	7	.06	.54		.25		.85	
SUBTOTALS	6.55 SNR .45 Geos	7	1.06	2.92	.35	2.22		6.55	
<u>Human Dimensions</u>									
Patti Boehner, Lecturer	.15 SNR	1	.15					.15	.02
Mark Burbach, Associate Geoscientist	1.00 SNR	2	.35	.23		.42		1.00	
Ya Ding, Post Doctoral Research Associate	1.00 SNR	3		.70		.30		1.00	1.00
Cody Knutson, Research Assistant Professor	1.00 SNR	4		.50		.50		1.00	1.00
Cindy Larson-Miller, Lecturer	1.00 SNR	5	1.00 ¹					1.00	1.00
Karl Reinhard, Professor	1.00 SNR	6	.05	.45	.48	.02		1.00	
Karina Schoengold, Assistant Professor	.30 SNR .70 AgEcon	7	.25	.05				.30	
Donna Woudenberg, Post Doctoral Research Associate	1.00 SNR	8		.70		.30		1.00	1.00
SUBTOTALS	6.45 SNR .70 AgEcon	8	1.80	2.63	.48	1.54		6.45	4.02
<u>Water</u>									
Tadd Barrow, Assistant Extension Educator	1.00 SNR	1		.49	.49	.02		1.00	.50
Xun-Hong Chen, Professor	1.00 SNR	2		.74		.26		1.00	
Anatoly Gitelson, Professor	1.00 SNR	3		.83		.17		1.00	
Jim Goeke, Professor	1.00 SNR	4		.05	.72	.23		1.00	
Dave Gosselin, Professor and Environmental Studies Director	1.00 SNR	5	.90			.10		1.00	
Ed Harvey, Professor and SNR Associate Director	1.00 SNR	6	.25	.13		.12	.50	1.00	

Appendix L - Faculty FTE by Faculty Area - 4

Faculty, Rank/Title	Current Appt.*	#	Teaching	Research	Extension/ Outreach	Scholarly/ University Service	Admin	<u>SNR</u> <u>Total</u>	Soft Funded
Kyle Hoagland, Professor and Water Center Director	1.00 SNR	7	.15	.35			.50	1.00	
Aris Holz, Research Assistant Professor	1.00 SNR	8	.25	.73		.02		1.00	.75
John Holz, Research Assistant Professor	1.00 SNR	9	.15	.70	.13	.02		1.00	
Ayşe Irmak, Assistant Professor	.60 SNR .40 CE	10	.15	.43		.02		.60	
Erkan Istanbuluoglu, Assistant Professor (AY appt)	.70 SNR .30 BSE	11	.30	.37		.03		.70	
Mike Jess, Geoscientist	1.00 SNR	12	.20	.15		.65		1.00	
Sue Lackey, Geoscientist	1.00 SNR	13		.25		.75		1.00	
Jae Ryu, Post Doctoral Research Associate	1.00 SNR	14		.70		.30		1.00	1.00
Patrick Shea, Professor and UNMC Vice Chair DEAOH	.75 SNR .25 UNMC	15	.10	.30	.10	.25		.75	
Steve Sibray, Geoscientist	1.00 SNR	16		.25		.75		1.00	
Ramesh Singh, Post Doctoral Research Associate	1.00 SNR	17		1.00				1.00	1.00
Dan Snow, Research Associate Professor	1.00 SNR	18	.05	.50		.45		1.00	.10
Mary Spalding, Professor	1.00 SNR	19		.40		.60		1.00	
Joe Szilagyi, Associate Professor	.33 SNR	20		.33				.33	
Tiejun Wang, Post Doctoral Research Associate	1.00 SNR	21		1.00				1.00	1.00
Wayne Woldt, Associate Professor	.25 SNR .75 BSE	22			.25			.25	
SUBTOTALS	19.63 SNR 1.05 BSE .40 CE .25 UNMC	22	2.50	9.70	1.69	4.74	1.00	19.63	4.35
TOTALS	74.96 SNR 2.16 Geos 1.05 BSE .80 SREC .80 SBS .70 NFS .70 AgEcon .40 CE .25 UNMC	89	15.91	36.94	5.10	14.71	2.30	74.96	21.81

*Effort is focused on grant management and course development.

*Codes for Acronyms Used:

SNR = School of Natural Resources
 CALMIT = Center for Advanced Land Management Information Technologies
 CE = Civil Engineering
 GEOS = Geosciences
 GPRC = Great Plains Regional Center for Global Environmental Change

HPRCC = High Plains Regional Climate Center
 NFS = Nebraska Forest Service
 SBS = School of Biological Sciences
 SREC = Southeast Research and Extension Center

Appendix M – Faculty, Teaching FTE, and Course Assignments - 1

2008-09 Faculty Teaching FTE and Course Assignments

Instructor	FTE	Course #	Course Title	Offered
Lecturers	1.25	GEOG 155 GEOG 271 GEOG 140 GEOG 155 GEOG 272 GEOG 120X GEOG 155X GEOG 271X GEOG 272X GEOG 120	Elements of Physical Geography Geography Of the United States Introductory Human Geography Elements of Physical Geography Geography of World Regions Introductory Economic Geography Elements of Physical Geography Geography of the United States Geography of World Regions Introductory Economic Geography	F odd/even F odd/even S odd/even F odd/even 1 st 5-week S odd/even 2nd 5-week F odd/even S odd/even S odd F odd F odd S odd/even S odd
Allen, Craig		NRES 492/892 NRES 810 NRES 898 NRES 898	Study Tours in Natural Resource Management – Resilience Australia Landscape Ecology Special Topics – Ecological Resilience Special Topics – Ecology of Biological Invasions	S odd
Amedeo, Douglas	.45	GEOG 283 GEOG 406/806 GEOG 940	Space, the Environment and You Spatial and Environmental Influences in Social Systems Seminar in Human Geography - Rsh Dsgn & Proposal Constuctn	F odd/even S odd/even S odd/even S odd/even F odd/even
Archer, Clark	.60	GEOG 272 GEOG 351 GEOG 444/844	Geography of World Regions Urban Geography Geodemographics: Theoretical Concepts and Practical Applications	F odd/even S off/even S odd/even F odd
Awada, Tala	.25	NRES 310 NRES 310 NRES 406/806 NRES 498/898	Introduction to Forest Management Introduction to Forest Management Lab Plant Ecophysiology: Theory and Practice Special Topics - Alternative Approaches to Ecosystem Management - Greece	F odd/even F odd/even F even F even
Bathke, Deborah	.24	NRES 208	Applied Climate Science	F even
Bleed, Ann	.10	NRES 423/823	Integrated Resource Management	S odd/even
Boehner, Patricia	.15	NRES 103	Introduction to Agriculture, and Natural Resource Systems	F odd/even

Appendix M – Faculty, Teaching FTE, and Course Assignments - 2

Instructor	FTE	Course #	Course Title	Offered
Brandle, James	.28	NRES 103	Introduction to Agriculture, and Natural Resource Systems Recitation	S odd/even
		NRES 103	Introduction to Agriculture, and Natural Resource Systems Recitation	F odd/even
		NRES 417/817 NRES 498/898	Agroforestry Systems in Sustainable Ag Special Topics - Outreach to the Elementary School Classroom	F odd/even S even
		NRES 891	Seminar in Natural Resource Sciences	F odd/even
Burbach, Mark	.35	NRES 428/828	Leadership in Public Organizations	
Chen, Xun-Hong		NRES 825	Geostatistics	F even
		NRES 918	Applied Groundwater Modeling	
Comfort, Steven	.20	NRES 361	Soils, Environment and Water Quality	
		NRES 451/851	Soil Environmental Chemistry	
Dewey, Kenneth	.15	NRES 370	Basic and Applied Climatology	F odd/even
Ferraro, Dennis	.20	NRES 211	Introduction to Conservation Biology	F odd/even
		NRES 474/874	Herpetology	S odd/even
Freeman, Patricia	.25	NRES 386	Vertebrate Zoology	F odd/even
		NRES 476/876	Mammalogy	F odd/even
Gitelson, Anatoly	0.00	NRES 898	Special Topics - Advance Remote Sensing of Carbon fluxes	2nd 5-week
		NRES 898	Special Topics - Non-Destructive Leaf Pigment Estimation	1st 5-week
		NRES 898	Special Topics - Remote Sensing of Crop Biophysical Characteristics	2nd 5-week
		NRES 898	Special Topics - Quantitative Remote Sensing	1st 5-week
Gosselin, David	.90 ¹	NRES 108	Earth's Natural Resource Systems Laboratory	F odd/even
		NRES 108X	Earth's Natural Resource Systems Laboratory	F odd
		NRES 422/822	Laboratory Earth: Earth and Its Systems	Pre-session
		NRES 809	Natural Resource Systems	
		NRES 814 NRES 898	Special Topics - laboratory Earth: Earth and Geospatial Technology Applications	F odd/even
		NRES 898	Natural Resource Systems	S odd/even
		NRES 898	Special Topics - Lab Earth: Earth's Changing Systems	S odd
Hanson, Paul	.15	GEOG 155	Elements of Physical Geography	F odd/even
		NRES 492	Study Tours in Natural Resource Management - Big Bend Texas Spring Break Field Trip	S odd/even S odd

Appendix M – Faculty, Teaching FTE, and Course Assignments - 3

Instructor	FTE	Course #	Course Title	Offered
Harvey, F.	.25	NRES 105 NRES 468/868 NRES 498 NRES 853 NRES 898 NRES 917	Justin Smith Morrill Scholars Seminar Wetlands Special Topics - Enviro Isotope Hydro Hydrology Special Topics - Groundwater Contamination, Regulation, & Remediation Environmental Isotope Hydrology	F odd/even F even S odd F even S odd
Hayes, Michael	.10	NRES 452/852	Climate and Society	
Hoagland, Kyle	.15			
Holz, Aris	.25	WATS498A WATS 498B	Senior Project I Senior Project II	F even F even
Holz, John	.15	NRES 459/859 NRES 459/859 NRES 470/870	Limnology Limnology - Cedar Point Lake & Reservoir Restoration	S odd Summer even
Hubbard, Kenneth	.10	NRES 469/869 NRES 898	Bio-Atmospheric Instrumentation Special Topics - Climate Analysis Techniques	
Hygnstrom, Scott	.25	NRES 348 NRES 448/848 NRES 498/898 NRES 498/898	Wildlife Damage Management Advanced Topics in Wildlife Damage Management Special Topics - Wildlife Diseases Special Topics - Urban Wildlife Damage	S odd S odd F odd/even S odd/even
Irmak, Ayse	.15	NRES 312	Introduction to Geospatial Information Sciences	F odd/even
Istanbulluoglu, Erkan	.30	NRES 898	Special Topics - Statistical Methods in Hydrological Sciences	F odd/even
Jess, J.	.20	NRES 415/815 NRES 916	Water Resources Seminar Environmental Law and Water Resource Management Seminar	F odd/even
Joeckel, R.M.		NRES 477/877	Great Plains Field Pedology	
Knops, Jean	.10			
Knutson, Cody		GEOG 498 GEOG 898	Advanced Special Problems - Nature & Soc: GEOG Perspective Advanced Special Problems - Nature & Soc: GEOG Perspective	F odd F odd
Kuzila, Mark	.15	NRES 108 NRES 279	Earth's Natural Resource Systems Laboratory Soil Evaluation	F odd F odd/even S odd/even

Appendix M – Faculty, Teaching FTE, and Course Assignments - 4

Instructor	FTE	Course #	Course Title	Offered
Lavin, Stephen	.60	GEOG 317 GEOG 425/825 GEOG 915	Cartography I: Introduction to Cartography Scientific Visualization in Cartography Seminar in Cartography	F odd/even S even S even
Lenters, John	.15	NRES 478/878 NRES 498/898 NRES 898	Regional Climatology Special Topics - Hydroclimatology Special Topics - Climatology Research Forum	S odd F even S odd
Merchant, James	.40	GEOG 217 NRES 399 GEOG 898 GEOG 902	Map and Air Photo Interpretation Independent Research- Mapping and Monitoring Natural Resources Advanced Special Problems - Prosmnr: Research Methods & Pro Devel General Seminar	F odd S odd F odd/even S odd/even
Narumalani, Sunil	.40	NRES 412/812 GEOG 420/820 GEOG 898	Introduction to Geographic Information Systems Remote Sensing III - Digital Image Analysis Special Programs - Proseminar: Research Methods in Remote Sensing and GIS	S odd/even S even F even F odd/even
Nashleanas, Katherine	.25	GEOG 140 GEOG 181 GEOG 370	Introductory Human Geography Quality of the Environment Geography of Nebraska	S odd even F odd/ S even S odd/even
Pegg, Mark	.49	NRES 404 NRES 463/863 NRES 489/889 NRES 492/892 NRES 898	Forestry, Fisheries and Wildlife Seminar Fisheries Science - July 2 - July 20, 2007 Fisheries Science Ichthyology Study Tours in Natural Resource Management - Southern Africa Ecology Special Topics - Managed Aquatic Systems	F odd/even S odd/even F odd/even S even Pre-session S odd
Peters, Albert (Al)	.49	GEOG 155	Elements of Physical Geography	F odd/even S odd/even
Pope, Kevin		NRES 898	Special Topics - Quant Fishery Assessment	
Powell, Larkin	.60	NRES 311 NRES 433/833 NRES 492 NRES 498 NRES 498/898 NRES 862 NRES 898 NRES 898 NRES 898 NRES 898 NRES 898 NRES 898 NRES 898	Wildlife Ecology and Management Wildlife Management Techniques Study Tours in Natural Resource Management Special Topics - Wildlife Mngt Lab Special Topics - Disturbance Ecology: MN BWCA Seminar Conservation Biology Special Topics - Avian Ecology Seminar Special Topics - Abundance Estimation Special Topics - Density/HR Estimation - Jan 10 - Feb 10, 2006 Special Topics - Mark-recapture analyses Special Topics - Multi State Mark-Recap Anal Special Topics - Survival Estimation - March 28 - April 27, 2006 Special Topics – Study Abroad	S odd/even F odd/even Spring Even Spring Even Spring Even Spring Even Spring Even Spring Even Spring Even Spring Even Spring Even Spring Even

Appendix M – Faculty, Teaching FTE, and Course Assignments - 5

Instructor	FTE	Course #	Course Title	Offered
Ramirez, Jan	.25	GEOG 378 GEOG 378X	Geography of Latin America Geography of Latin America	S odd/even F odd
Reinhard, Karl	.05	NRES 445/845 NRES 446/846 NRES 498 NRES 498 NRES 891	Human Remains in Forensic Science Pollen Analysis for Behavioral, Biological, and Forensic Science Special Topics - Pollen Anlys: Forensic & Natural Sciences Special Topics - Palynology Seminar in Natural Resource Sciences	F odd/even F odd/even S odd F odd/even
Rundquist, Donald	.35	GEOG 498/898 NRES 418/818 NRES 420/820 NRES 421/821 NRES 498/898 NRES 498/898	Special Programs - Field Techniques in Remote Sensing Introduction to Remote Sensing Applications of Remote Sensing in Agriculture and Natural Resources Field Techniques in Remote Sensing Special Topics - Global Pos Systems GPS Special Topics - Integrating GPS Data With GIS	S even F odd/even S odd/even S odd S odd
Schoengold, Karina	.25	NRES 323	Natural Resources Policy	F odd/even
Shea, Patrick	.10	NRES 898 NRES 898 NRES 898 NRES 920	Special Topics - Readings in Environmental Remediation and Restoration Special Topics - Herbicide Chem: Mtblsm&Mode Special Topics - Pesticides in the Environment Xenobiotics in the Environment	S even F odd S odd
Skopp, Joe	.50	NRES 281 NRES 458/858 NRES 461/861 NRES 961	Introduction to Water Science Soil Physical Determinations Soil Physics Advanced Soil Physics	F odd/even S odd/even F even F odd/even S odd
Snow, Dan	.05			
Swinehart, James	.06	NRES 104	Climate in Crisis	S even
Thomas, Steven	.20	NRES 498/898 NRES 498/898 NRES 898	Special Topics - Ecology Seminar Special Topics - Stream and River Ecology Special Topics - Readings: Applied Ecology	F odd/even F even F odd/even
Tyre, R. Andrew	.40	NRES 101 NRES 220 NRES 450/850 NRES 803 NRES 898 NRES 898	Natural Resources Orientation Principles of Ecology Biology of Wildlife Populations Ecological Statistics Special Topics - Ecological Detection Special Topics - Ecological Statistics	F odd/even S even F odd/even F even F odd/even
Verma, Shashi	.15	NRES 954	Turbulent Transfer in the Atmospheric Surface Layer	

Appendix M – Faculty, Teaching FTE, and Course Assignments - 6

Instructor	FTE	Course #	Course Title	Offered
Vrtiska, Mark		NRES 498/898	Special Topics - Waterfowl Ecology and Management	
Walter-Shea, Elizabeth	.35	NRES 208 NRES 408 NRES 808 NRES 908	Applied Climate Sciences Microclimate: The Biological Environment Microclimate: The Biological Environment Solar Radiation Interactions at Earth's Surface	F odd/even F odd/even F odd/even S odd
Wardlow, Brian		NRES 898	Special Topics - A Survey of Drought Monitoring Techniques	1st 5-week
Wedin, David	.40	NRES 220 NRES 222 NRES 222 NRES 222 NRES 222 NRES 424/824 NRES 492/892 NRES 898 NRE 898	Principles of Ecology Ecology Laboratory Ecology Laboratory Ecology Laboratory Ecology Laboratory Forest Ecology Study Tours in Natural Resource Management - Wildland Fire Recovery Study Tours in Natural Resource Management - BWCA Trip Study Tour in Natural Resource - Wilderness Ecology: BWCA Trip	F odd/even F odd/even F odd/even F odd/even F odd/even F odd/even S odd/even
Weiss, Albert	.15	NRES 898 NRES 906 NRES 907	Special Topics - Plt. Org & Crop Sim/Mdl Crop Growth & Yield Modeling Agricultural Climatology	S odd
Wishart, David	.60	GEOG 140 GEOG 334 GEOG 399 GEOG 497 GEOG 497 GEOG 497 GEOG 497 GEOG 497 GEOG 897 GEOG 897 GEOG 897 GEOG 897 GEOG 897 GEOG 903 GEOG 935	Introductory Human Geography Historical Geography of the Great Plains Independent Study in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography Internship in Geography History and Philosophy of Geography Seminar in Historical Geography	Pre-session F odd F odd/even S odd/even Pre-session 8-week 1st 5-week 2nd 5-week F odd/even S odd/even Pre-session 8-week 1st 5-week 2nd 5-week F odd/even S odd/even F odd S even
Woudenberg, Donna		NRES 498/898	Special Topics - Gender & Cult: Environment	F odd/even
Zellmer, Sandra		NRES 898	Special Topics - Environmental Ethics	S odd
Total	14.91 ²			

¹ includes .250 FTE as Environmental Studies Program Director

² excludes Cindy Larson-Miller whose time is focused on grant management and course development

X = online

The Conservation and Survey Division (CSD) was constituted by the Nebraska State Legislature in 1921 (Section 85-163) of the Nebraska Statutes. CSD is unique among state geological surveys in having very specific state statutes related to its mission, which demonstrates the importance the Legislature attached both to defining the organization and designating it as a unit within the University of Nebraska. CSD is mentioned in 24 sections of the Revised Statutes of Nebraska, but three of these sections are especially important. Sections 85-164 and 85-165 passed in 1921; and Section 85-1.104 passed in 1973. Section 85-163 pertains to the creation and duties of the CSD.

Section 85-163 pertains to the creation and duties of the Conservation and Survey Division:

There is hereby created the Conservation and Survey Division of the University of Nebraska, which shall include the following state surveys: Soil, geological, water and water power, forest, road materials, and industrial. The Conservation and Survey Division shall perform the duties hereinafter defined:

- (1) Survey and describe the natural resources of the state, including soil, water, water power, potash, forests, road materials, and cement;
- (2) Study the climate, physical features, geology, and mineral resources of the state;
- (3) Study and describe the operations, production, and importance of the leading industries of the state;
- (4) Investigate and report upon conservation problems of the state;
- (5) Study the water-bearing formations of the state, and assist the citizens in locating water supplies;
- (6) Secure and preserve the logs of wells drilled in the state, and preserve specimens from each stratum, member, formation penetrated in said drillings, and inspect such drillings at any time during their progress, and require the person or persons in charge of drilling or prospecting to submit full data in regard to the specimens and logs of the wells;
- (7) Prepare and show lantern slides or pictures, including motion pictures, of the state's resources, industries, institutions and development, to be used for educational and industrial purposes within the state and for publicity purposes without the state, and secure and distribute other educational films and slides in Nebraska for educational purposes;
- (8) Compile and record, or publish information with reference to, the state's resources, industries and development, and when called upon to do so by an interested party, investigate and report upon oil, mineral, and gas structures and properties situated outside the state and leases or interests therein or thereon being sold or offered for sale in Nebraska. In cases or propositions wherein said investigations show that mineral, oil, or gas properties are misrepresented, or that fraud is practiced in selling same, their officers or agents shall be notified by the Conservation and Survey Division, and if they continue to so operate the same in Nebraska after said notice is given, the division shall report its findings to the Attorney General for action;
- (9) Serve the citizens as an information bureau in regard to the resources, industries and development of Nebraska

Section 85-164 pertains to the powers, director and expenses of the Conservation and Survey Division:

The Conservation and Survey Division is given police power and authority for the purpose of carrying into effect and performing the duties defined in Section 85-163. The Board of Regents shall appoint a chief or director of the division, who shall direct the work of the division, subject to the approval of the regents. All expenses to 85-165 shall subject to the approval of the regents of the University of Nebraska, and paid out of appropriations made from time to time by the Legislature.

Section 85-165 pertains to Conservation and Survey Division agreements with federal departments:

The Conservation and Survey Division may enter into such agreements with federal departments as may be necessary to carry on cooperative surveys and investigations in the state, the agreements to be subject to the approval of the Board of Regents of the University of Nebraska.

Section 85-1.104 pertains to the establishment of the Institute of Agriculture and Natural Resources, of which the division was made a part:

A University of Nebraska Institute of Agriculture and Natural Resources shall be established at the University of Nebraska-Lincoln, which shall embrace, but not be limited to, the following divisions or administrative units:

- (1) College of Agriculture;*
- (2) Agricultural Experiment Station;*
- (3) Cooperative Extension Service;*
- (4) Conservation and Survey Division; and*
- (5) Water Resources Research Institute*

The University of Nebraska Institute of Agriculture and Natural Resources shall be headed by a vice chancellor, and each division or administrative unit shall have a dean, director, or other chief administrative officer.

In the other 20 sections, numerous division functions are specified to include:

participation in the Nebraska cooperative soil survey program;

membership on the State Water Management Board (no longer in existence);

membership on various natural-resource related boards;

- A. providing of research information and services to various state agencies and governments and agencies; involvement in the certification of well drillers;
- B. responsibilities in the management of Nebraska Educational Lands; and cooperation with the Nebraska State Forester.

Faculty with Courtesy Appointments in the School of Natural Resources

J. David Aiken, Professor, Department of Agricultural Economics, University of Nebraska-Lincoln.

Mark R. Anderson, Associate Professor, Department of Geosciences, University of Nebraska-Lincoln.

Timothy J. Arkebauer, Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Ezekiel Bahar, Professor, Department of Electrical Engineering, University of Nebraska-Lincoln.

Erin Blankenship, Associate Professor, Department of Statistics, University of Nebraska-Lincoln.

Istvan Bogardi, Professor, Department of Civil Engineering, University of Nebraska-Lincoln.

Ron Bonnstetter, Professor, Department of Teaching, Learning, and Teacher Education, University of Nebraska-Lincoln.

Mary Bomberger Brown (Instructor), Coordinator, Tern and Plover Conservation Partnership, School of Natural Resources, University of Nebraska-Lincoln.

David Carter, Assistant Professor of Forensic Sciences, Department of Entomology, University of Nebraska-Lincoln.

Scott DeWald, Associate Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

Jeremy Dillon, Professor, Department of Geography and Earth Science, University of Nebraska at Kearney.

Dean E. Eisenhauer, Professor, Department of Biological Systems Engineering, University of Nebraska-Lincoln.

Kent M. Eskridge, Professor, Department of Biometry, University of Nebraska-Lincoln.

Charles A. Francis, Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Thomas G. Franti, Associate Professor, Department of Biological Systems Engineering, University of Nebraska-Lincoln.

Mark Harrell, Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

Leon Higley, Professor, Forensic Sciences Degree Program, Department of Entomology, University of Nebraska-Lincoln.

Laurie Hodges, Associate Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Scott Josiah, Director and Nebraska State Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

Shripat T. Kamble, Professor, Department of Entomology, University of Nebraska-Lincoln.

Appendix O – Courtesy & Adjunct Faculty - 2

Alan C. Kamil, Professor, School of Biological Sciences, University of Nebraska-Lincoln.

Steve Karloff, Associate Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

Dr. Alan S. Kolok, Professor, Department of Biology at University of Nebraska at Omaha; and Department of Environmental Agricultural & Occupational Health, University of Nebraska Medical Center (UNMC).

Merlin P. Lawson, Professor, Department of Geosciences, Dean (Emeritus) of Graduate Studies and Dean (Emeritus) International Affairs, University of Nebraska-Lincoln.

Ge Lin, Associate Professor of GIS and Public Health, Department of Health Services Research and Administration, College of Public Health, University of Nebraska Medical Center (UNMC).

Richard J. Lodes, Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

William R. Lovett, Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

Gary D. Lynne, Professor, Department of Agricultural Economics, University of Nebraska-Lincoln.

Dennis L. McCallister, Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

John McCarty, Professor, Department of Biology, University of Nebraska at Omaha.

H. Doak Nickerson, Forester, Nebraska Forest Service, Upper Niobrara-White NRD, Chadron, NE.

Guillermo Ortí, Professor, School of Biological Sciences, University of Nebraska-Lincoln.

Darryll Pederson, Professor, Department of Geosciences, University of Nebraska-Lincoln.

Lisa Pennisi, Assistant Professor, Hospitality, Restaurant and Tourism Management Program; Department of Agricultural Leadership, Education and Communication, University of Nebraska-Lincoln.

Thomas O. Powers, Professor, Department of Plant Pathology, University of Nebraska-Lincoln.

Steven D. Rasmussen, Forester, Nebraska Forest Service, Extension Office, Wayne, NE.

Clinton M. Rowe, Professor, Department of Geosciences, University of Nebraska-Lincoln.

Walter H. Schacht, Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Steven Shultz, Associate Professor, Department of Economics, University of Nebraska at Omaha.

James Stubbendieck, Director of Center for Great Plains Studies; Professor of Range Ecology, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Raymond J. Supalla, Professor, Department of Agricultural Economics, University of Nebraska-Lincoln.

Dale Swartzendruber, Professor (Emeritus), Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Appendix O – Courtesy & Adjunct Faculty - 3

Zhenghong Tang, Assistant Professor, Department of Community and Regional Planning, College of Architecture, University of Nebraska-Lincoln.

Daniel Walters, Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln.

Donald Westover, Forester, Nebraska Forest Service, University of Nebraska-Lincoln.

L. LaReesa Wolfenbarger, Associate Professor, Department of Biology, University of Nebraska at Omaha.

Sandra Zellmer, Professor, College of Law, University of Nebraska-Lincoln.

Vitaly Zlotnik, Professor, Department of Geosciences, University of Nebraska-Lincoln.

Faculty with Adjunct Appointments in the School of Natural Resources

Craig Allen, Professor and Leader, NE Fish & Wildlife Research Coop Unit, University of Nebraska-Lincoln

John Allen III, Professor and Director, Western Rural Development Center, Utah State University @ Logan.

Ann S. Bleed, Consultant, CDR Associates, Lincoln, NE.

Georgiy (George) Burba, Senior Applications Scientist, LI-COR Biosciences, Lincoln, NE.

Felipe Chavez-Ramirez, Executive Director, Platte River Whooping Crane Maintenance Trust, Inc., Wood River, NE.

Paolo Cherubini, Senior Research Scientist, Head of *Tree Physiology* and Deputy Head of *Dendro Sciences* research groups, Swiss Federal Institute WSL, Zürich, Switzerland.

Barbara J. Clement, Associate Professor of Biology, Division of Natural Sciences, Mathematics and Information Technology, Doane College, Crete, NE.

John W. Doran, USDA-ARS Soil Scientist, USDA-ARS Soil & Water Conservation Research Unit, University of Nebraska-Lincoln.

Michael G. Dosskey, Research Riparian Ecologist, USDA National Agroforestry Center, Lincoln, NE.

William E. Easterling, Dean, College of Earth and Mineral Sciences, Pennsylvania State University, University Park, PA.

Joseph J. Fontaine, Assistant Professor and Assistant Unit Leader, NE Fish & Wildlife Research Coop Unit, University of Nebraska-Lincoln.

Kevin P. Gallo, Physical Scientist, USGS EROS Data Center, NOAA/NESDIS, Sioux Falls, SD.

Lance Gunderson, Associate Professor, Department of Environmental Studies, Emory University, Atlanta, GA.

Mace Hack, State Director of Conservation Programs, Nebraska Chapter, The Nature Conservancy, Omaha, NE.

LeRoy Hahn (Emeritus), Professor, USDA-ARS MARC, Clay Center, NE.

Rick Holland, Assistant Professor, Nebraska Game and Parks Commission, Lincoln, NE.

Keith Koupal, Irrigation Reservoir Specialist, Nebraska Game and Parks Commission, Kearney, NE.

Gary Krapu, Research Biologist, USGS Northern Prairie Wildlife Research Center, Jamestown, ND.

Theodore (Ted) LaGrange, Wetland Program Manager, Wildlife Division, Nebraska Game and Parks Commission, Lincoln, NE.

Appendix O – Courtesy & Adjunct Faculty - 5

Wayne Landis, Director and Professor, Institute of Environmental Toxicology, and Chair, Department of Environmental Sciences, Huxley College of the Environment, Western Washington University, Bellingham, WA.

Cliff Lemen, Lecturer, School of Natural Resources, Lincoln, NE.

Jeffrey Lusk, Upland Game Program Manager, Nebraska Game and Parks Commission, Lincoln, NE.

Rezaul Mahmood, Associate Professor, Department of Geography and Geology, Western Kentucky University, Bowling Green, KY.

Pablo Marquet, Professor, Departamento de Ecología, Pontificia Universidad Católica de Chile, Santiago.

Linda O. Mearns, Senior Scientist, National Center for Atmospheric Research, Director of the Institute for the Study of Society and Environment (ISSE), Boulder, CO.

Kevin Pope, Associate Professor and Assistant Unit Leader, NE Fish & Wildlife Research Coop Unit, University of Nebraska-Lincoln.

Gregory A. Ruark, Director/Program Manager, USDA National Agroforestry Center, Normal, Alabama.

Bridget Scanlon, Senior Research Scientist, Bureau of Economic Geology, Jackson School of Geosciences, University of Texas at Austin.

Rick Schneider, Coordinator for Nebraska Natural Heritage Program, Nebraska Game and Parks Commission, Lincoln, NE.

Michele Schoeneberger, Research Program Leader/Soil Scientist, USDA National Agroforestry Center, Lincoln, NE.

Gerry Steinauer, Nebraska Game and Parks Commission, Lincoln, NE.

Scott Stephens, Director of Conservation Planning, Ducks Unlimited, Inc., Great Plains Regional Office, Bismarck, ND.

David E. Stooksbury, State Climatologist/Assistant Professor, Department of Biological and Agricultural Engineering, Driftmier Engineering Center, University of Georgia, Athens, GA.

J. Scott Taylor, Upland Game Program Manager, Nebraska Game and Parks Commission, Lincoln, NE.

Kurt VerCauteren, Research Wildlife Biologist, USDA/APHIS/WS, National Wildlife Research Center, Fort Collins, CO.

Mark P. Vrtiska, Water-fowl Program Manager, Nebraska Game and Parks Commission, Lincoln, NE.

Gary D. Willson, Research Coordinator for Great Plains Cooperative Ecosystem Studies Unit, National Park Service, Lincoln, NE.

Warren Wood, Professor, Integrative Studies, Department of Geological Sciences, Michigan State University, East Lansing.

Appendix O – Courtesy & Adjunct Faculty - 6

Shuhai Zheng, Chief, Floodplain Management, Department of Natural Resources, State of Nebraska, Lincoln.

Policy:

The School of Natural Resources will help facilitate space needs in an effort to provide its faculty and staff the resources needed to be successful in their careers/position.

Procedures:

1. Request for New space (office or storage)

Faculty member and/or supervisor is to prepare a written request and submit it to the Assistant to the Director and Hardin Hall Facilities Coordinator. The request must include the following:

Office request

- Description of intended use
- Who will be assigned the space, rank of his/her position
- How often the space will be used
- How many additional people will need access to the items stored in the room
- How the use of that space will benefit the School
- Any special needs/requirements, e.g., proximities to consider

Storage request

- Description of the request (e.g., number of cabinets, square footage)
- Description of intended use
- Name of project
- Length of time space will be needed
- Expected frequency that stored items will be accessed
- Count/names/contact information of people who will need access to the stored items
- How the use of that space will benefit the School
- Any special needs/requirements, e.g., proximities to consider

2. Retention of existing space assignment (including, but not limited to, office, storage, computer lab, drafting table room)

Once each year, the department will confirm space use. Any faculty member, center, or work group may be asked by the Director, Associate Director, Assistant to the Director, or Hardin Hall Facilities Coordinator to provide justification for any space they have been authorized to use in Hardin Hall, the CSD Annex, NRR Annex, Poultry Building, Forestry Hall, and other spaces within the University. This justification is to include the following elements, and may play a part in determining if the assignment will continue.

Office space

- Description of experienced and intended use
- Who has been/will be using the space, rank of his/her position
- Additional people who have been accessing the space (e.g., for items stored in the room), rank of each person's position
- Frequency of use
- How the use of that space has and will benefit the School
- Any special needs/requirements, e.g., proximities to continue to consider

Storage space (all other spaces)

- Inventory of items stored, including number of cabinets, boxes or square footage
- Description of use
- Name of project(s), and cost objects if projects are grant-funded
- Length of time space has been used and will be needed in the future
- Expected frequency that stored items will be accessed
- Number of people (with names and contact information) who are expected to access to the stored items
- How the use of that space has and will benefit the School
- Any special needs/requirements, e.g., proximities to consider

Basement East



Hardin Hall Basement

- Lab
- Classroom
- Storage
- Rest Room
- Mechanical
- Elevator
- Custodial
- Stairs
- Open
- Hall
- Walls

Basement West



First Floor East



First Floor West



Second Floor East



Second Floor West



Third Floor



Fourth Floor



Fifth Floor



Sixth Floor



Seventh Floor



Eighth Floor



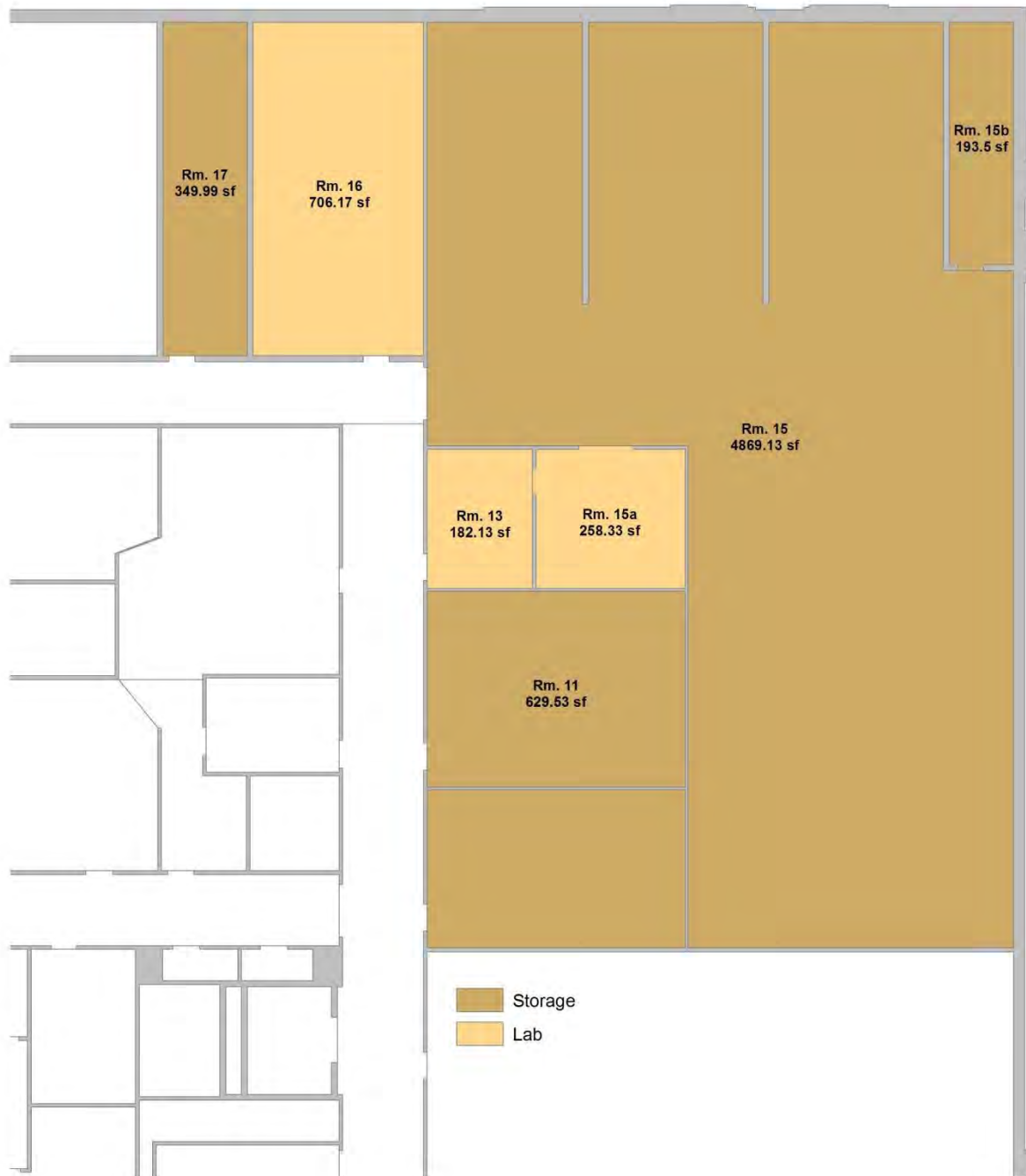
Ninth Floor



CSD Annex

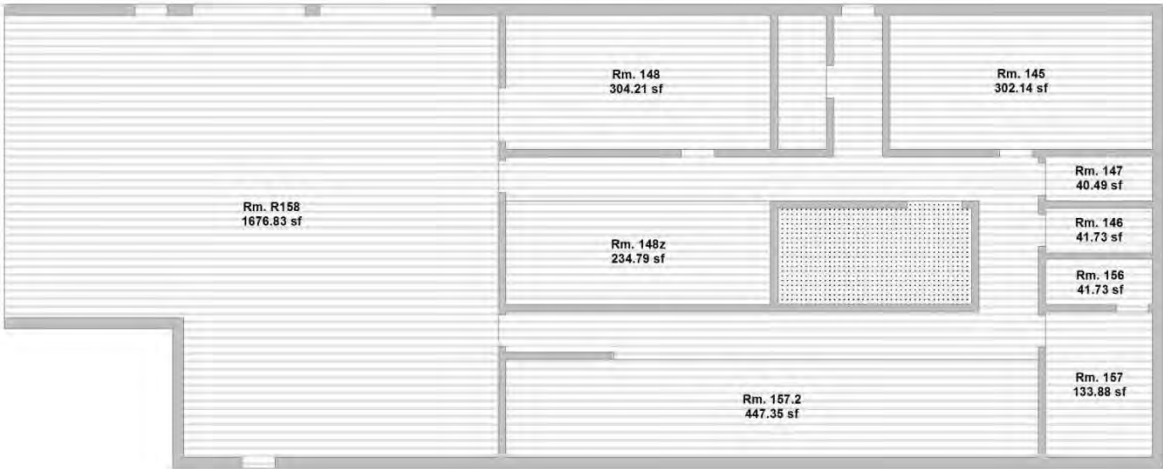


Nebraska Hall (basement)





Natural Resources Research Annex



Appendix U – Staff Age by Faculty Area & Funding - 1

**SNR Staff by Age and Faculty Area
(FY09 Adjusted Budget)**

Faculty Area, Tenure	21-25	26-60	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66+	Total
Applied Climate Science	1	4	3	5	2	1	4	1	1		22
Applied Ecology	2	5	2	1	1	2	2	1			16
Geology & Soils		2	2								4
Geography/GIScience			1	1	2	1		1	1		7
Human Dimensions											
Water		4	3	4	1	3	2	1			18
Administrative Services			2	2	1	4	2	2	3	3	18
Total	3	15	13	13	7	11	10	6	5	3	85

SNR Staff Age by Funding and Faculty Area.

Description	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66+	Total
Applied Climate Science											
State-funded	1						1		1		3
Soft-funded		4	3	5	2	1	3	1			19
Subtotal	1	4	3	5	2	1	4	1	1		22
Applied Ecology											
State-funded								1			1
Soft-funded	2	5	2	1	1	2	2				15
Subtotal	2	5	2	1	1	2	2	1			16
Geology & Soils											
State-funded		1	2								3
Soft-funded		1									1
Subtotal		2	2								4
Geography/GIScience											
State-funded											
Soft-funded			1	1	2	1		1	1		7
Subtotal			1	1	2	1		1	1		7
Human Dimensions											
State-funded											
Soft-funded											
Subtotal											
Water											
State-funded			1	4	1	3	2	1			12
Soft-funded		4	2								6
Subtotal		4	3	4	1	3	2	1			18
Administrative Services											
State-funded			2	2	1	4	2	2	2	3	18
Soft-funded											
Subtotal			2	2	1	4	2	2	2	3	18
Total											
State-funded	1	1	5	6	2	7	5	4	3	3	37
Soft-funded	2	14	8	7	5	4	5	2	1		48
Grand Total	3	15	13	13	7	11	10	6	4	3	85

Appendix V – Faculty Age by Faculty Area & Tenure - 1

SNR Faculty by Age and Faculty Area (FY09 Adjusted Budget)

Faculty Area, Tenure	21-25	26-60	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66+	Total
Applied Climate Science				4	4	2	2	2	3	1	18
Applied Ecology				3	5	2	3		2	2	17
Geology & Soils				1		2	1	1		2	7
Geography/GIScience			1	1	2		2	2	4	5	17
Human Dimensions			2	2		2	1	1			8
Water			2	5	2	3	3	3	2	2	22
Total			5	16	13	11	12	9	11	12	89

SNR Faculty by Faculty Area and Funding (FY09 Adjusted Budget)

Faculty Area, Tenure	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66+	Total
Applied Climate Science											
Tenured/Tenure Track				1	1		2	2	3	1	10
Non-tenure Track				3	3	2					8
Subtotal				4	4	2	2	2	3	1	18
Applied Ecology											
Tenured/Tenure Track				1	4	1	2		1	1	10
Non-tenure Track				2	1	1	1		1	1	7
Subtotal				3	5	2	3		2	2	17
Geology & Soils											
Tenured/Tenure Track				1		2	1	1		2	7
Non-tenure Track											
Subtotal				1		2	1	1		2	7
Geography/GIScience											
Tenured/Tenure Track							1		3	3	7
Non-tenure Track			1	1	2		1	2	1	2	10
Subtotal			1	1	2		2	2	4	5	17
Human Dimensions											
Tenured/Tenure Track			1				1				2
Non-tenure Track			1	2		2		1			6
Subtotal			2	2		2	1	1			8
Water											
Tenured/Tenure Track			1	1		2	2	2	1	2	11
Non-tenure Track			1	4	2	1	1	1	1		11
Subtotal			2	5	2	3	3	3	2	2	22
Total											
Tenured/Tenure Track			2	4	5	5	9	5	8	9	47
Non-tenure Track			3	12	8	6	3	4	3	3	42
Grand Total			5	16	13	11	12	9	11	12	89

DENNIS M. ADAMS, Forester, 30% Extension/Outreach, 70% Nebraska Forest Service

Areas of Interest: Forest Management, Forest Products Marketing & Utilization, Economic Development

Contact: dadams2@unl.edu, 402/472-5822

EDUCATION

B.S. Forest Management, Iowa State University (1968)

M.S. Horticulture & Forestry, University of Nebraska-Lincoln (1977)

PROFESSIONAL EXPERIENCE

1992-present Rural Forestry Program Leader, Nebraska Forest Service, UNL

1977-1992 District & Extension Forester, Dept. of Forestry, Fisheries, & Wildlife, UNL

1976-1977 Regional Fire & Community Forestry Planner, Dept. of Forestry, Fisheries, & Wildlife, UNL

1974-1976 Forestry Project Planner, Dept. of Forestry, UNL

1973-1974 Forestry Field Manager, Dept. of Forestry, UNL

HONORS AND AWARDS

Award of Merit for “contribution to Nebraska Envirothon”, Nebraska Association of Resources Districts (2008)

Society of American Foresters Certified Forester, CF#3097 (2003)

Epsilon Sigma Phi Certificate of Achievement (2003)

Tree Planters State Award, Nebraska Statewide Arboretum (1997)

Selected as member of Rotary International Foundation's Group Study Exchange Program Team to India (1980)

TEACHING

N/A

RESEARCH

N/A

EXTENSION/OUTREACH

My Extension program emphasis is in two areas: 1) Forest Management and 2) Forest Products Marketing & Utilization. Examples of Forest Management activities include serving as Superintendent for 4H State Tree ID Contest, Superintendent for 4H Forestry Exhibits Judging at the Nebraska State Fair, coordinator for the State and Regional Nebraska Envirothon annual competitions, and coordinating annual Forestry Field Days around the state. Examples of marketing & utilization activities include editing the quarterly Nebraska forest industry newsletter entitled “Timber Talk” and serving as a clearinghouse for marketing and utilization inquiries. .

SURVEY

N/A

UNIVERSITY SERVICE

Chair, Conservation Forestry Specialist Search Committee, 2008

Member, West Central District Forester Search Committee, 2005

Member, Community Forestry Program Leader Search Committee, 2005

Member, Education & Outreach Specialist Search Committee, 2005

Chair, Conservation Forestry Specialist Search Committee, 2004

SELECTED GRANTS AND CONTRACTS

Spatial Analysis Project, USDA Forest Service, \$54,000; Oct 2005 – Dec 2007

Secondary Wood Products Manufacturing Directory, USDA Forest Service, \$19,800; Dec 2005- Dec 2007

Technical Service Provider, USDA Natural Resources Conservation Service, ~\$180,000 per year; 2003 – present

Small Diameter Wood Primary Processor Feasibility Study, USDA Forest Service, \$26,000; 2002

Demonstration Portable Sawmill, USDA Forest Service, \$20,000;

SELECTED PUBLICATIONS

Adams, D. 2008 Nebraska Timber Buyers Directory.

Adams, D. 2008. Nebraska Forestry Consultants Directory.
Adams, D. 1998-2008. Nebraska Christmas Tree Growers Directory.
Adams, D. 2007. Nebraska Wood Products Manufacturers-Primary Processors Directory.
Piva, R. and D. Adams. 2006. Nebraska Timber Industry-An Assessment of Timber Product Output and Use.
Adams, D. 2004. A Nebraska Log Cabin.
Adams, D. 1978 – present. Editor, Timber Talk – Nebraska Forest Industry Newsletter.

OTHER PROFESSIONAL ACTIVITIES

Member, NARD Native Vegetation & Forestry Subcommittee (1992-present)
Chairman, Nebraska Forest Stewardship Coordinating Committee (1991-present)
Member, Nebraska Envirothon Committee (1992-present)
Member, NRCS State Technical Committee 1995-present)
Member, Central Region Woodland Stewardship Conference Committee (1998-2006, Chair 1998, 2002, 2006)
Member, Carbon Sequestration Advisory Committee
Chair, Conservation Trees Work Group (2008-present)
Member, Society of American Foresters and Great Plains SAF (1973-present)
Newsletter Editor, Plains & Prairie Forestry Association (1997-2003)
Member, Nebraska Christmas Tree Growers Association (1983-Present)
Member, Nebraska Nut Growers Association (1975-present)
Honorary Member, Nebraska Arborists Association (1977-present, Chair 1982)

SAMI Z. AKASHEH, Research Associate, 100% Research

Areas of Interest: Land-Atmosphere Interaction, Evapotranspiration, Land cover mapping, Remote Sensing and Geographic Information Systems applications

Contact: oakash2@unlnotes.edu, 402/472-3497

EDUCATION

B.S. Soil & Irrigation, University of Jordan (1992)

M.S. Soil & Irrigation, University of Jordan (1995)

Ph.D. Irrigation Engineering, Utah State University (2008)

PROFESSIONAL EXPERIENCE

2009-present Post-doctorate Research Associate, School of Natural Resources, University of Nebraska-Lincoln

2008-2009 Post-doctorate Research Scientist, Jackson School of Geosciences, University of Texas at Austin

2008-2008 Visiting Scientist, ARS-USDA-CPRL, Bushland, Texas

2001-2008 Research Assistant, Biological and Irrigation Eng. Dept., Utah State University

1996-2000 Research Assistant, Soil and Irrigation Dept., University of Jordan

1992-1996 Irrigation Engineer, Consulting Engineering, Amman, Jordan

HONORS AND AWARDS

First Author Achievement Award, Bureau of Economic Geology, University of Texas at Austin (2008)

Dean's List, Biological and Irrigation Engineering Department, Utah State University (2001)

Full Scholarship Award, Utah State University (2002-2006)

RESEARCH

Research encompasses evapotranspiration (ET) modeling using remote sensing techniques. I am focusing on river riparian vegetation diversity, distribution and water use. Middle Rio Grande River was my Ph.D. research main focus. By producing a very high resolution map for the Middle Rio Grande River riparian vegetation (0.5m) using Multispectral airborne remote sensing I was able to study the riparian vegetation distribution and pattern along the river. I built a hydrologic model in a GIS environment to establish relationships between water flow, water table fluctuations, evapotranspiration, and water availability to the riparian vegetation by reach in the Rio Grande River Basin based on remotely sensed data. I estimated the riparian evapotranspiration using the Modified Penman-Monteith and Ball-Berry stomatal conductance model with consideration for the advection conditions caused by the adjacent arid region. My research in the last year in UT-Austin focused on modeling ET in the irrigated and dry land areas in the Texas High plains using remote sensing technique and energy balance based-models like SEBAL and METRIC. I applied satellite and airborne remote sensing to evaluate those models and make the proper modification for the advection conditions in Texas high plains. My future research will focus mainly on the subject of Land-Atmosphere interaction and the processes involved in it, like evapotranspiration, heat and gas transfer.

REMOTE SENSING APPLICATIONS PROJECTS

Land Cover Mapping

Riparian Vegetation Mapping, Middle Rio Grande River, New Mexico.

Riparian Vegetation Mapping and Habitat Identification, Washington Rivers, Washington State.

Riparian Vegetation Mapping, Idaho Rivers (Pack, South, Priest and Lightning Creek), Idaho

Evapotranspiration Studies

Rush Valley, Utah

Bosque, New Mexico

Middle Rio Grande River, New Mexico

Texas High Plains

City Planning and Management

Water resources distribution and management, Layton, Utah

Utah State University Thermal Project, Utah

Pre-Emptive Measures

Potato Fields, Idaho

Yellowstone park thermal features monitoring

SELECTED PUBLICATIONSPeer Review Journals

Akashch, O. Z., Neale, C. M. U., Harikishan J., 2008. *Detailed mapping of riparian vegetation in the Middle Rio Grande River using high resolution multi-spectral airborne remote sensing.* **Journal of Arid Environments** 72, 1734-1744.

Akashch, O. Z. and A. M. Abu-Awwad. 1997. *Irrigation and Soil Surface Management in Arid Soils with Surface Crust.* **Journal of Arid Environments**, 37: 243-250.

Abstracts and Presentations

Akashch, O.Z., Gowda, P.H., Scanlon, B.R., Howell, T.A., French, A.N., 2008. *Comparison of estimated surface energy fluxes using METRIC and Two-Source algorithms for advective conditions.* [GSA-ASA-CSSA-SSSA](#) joint meeting.

Akashch, O.Z., Gowda, P.H., Howell, T.A., Scanlon, B.R., Howell, T.A., French, A.N., 2008. *Monitoring ET Over Texas High Plains Using Two-Source Model and High Resolution ASTER Data.* [GSA-ASA-CSSA-SSSA](#) joint meeting.

Chávez, J. L., Gowda, P. H., Howell, Terry A., Neale, C. M.U., Colaizzi, Paul D.¹, and Akashch, O. Z., 2008. *ET Mapping with METRIC Algorithm Using Airborne High Resolution Multispectral Remote Sensing Imagery.* [GSA-ASA-CSSA-SSSA](#), 2008 Joint meeting.

Akashch, O.Z., and Neale, C.M.U., Gowda, P.H., Scanlon, B.R., Howell, T.A. 2008. *Estimating Shortwave Solar Radiation Using Net Radiation and Meteorological Measurements.* **American Geophysical Union.**

Gowda, P.H., Howell, T.A., Scanlon, B.R., Basu, S., Akashch, O.Z., 2008. *Sensible Heat Flux Measurements Using a Large Aperture Scintillometer Over Irrigated Cotton.* **American Geophysical Union**

Akashch, O.Z., 2007. *Remote Sensing Applications in Land Surface Processes.* Guest Speaker at Jackson. School of Geosciences. University of Texas at Austin.

Akashch, O.Z., and Neale, C.M.U., 2007. *Modeling the Water Table in the Middle Rio Grande River Riparian Corridor.* **American Geophysical Union.**

Akashch, O.Z., and Neale, C.M.U., 2006. *A Study of Hydraulic and Hydrological Processes interaction of the Middle Rio Grande River Using High Resolution Multispectral Airborne Imagery.* American Water Resources Association (AWRA).

Akashch, O.Z., and Neale, C.M.U., 2004. *An Assessment of Meso-scale Hydraulic and Vegetation Characteristics of the Middle Rio Grande River Using High Resolution Multispectral Airborne Imagery.* **American Geophysical Union.**

Akashch, O.Z., C.M.U. Neale, and F. Farag. 2003. *Spatial Mapping of Riparian Vegetation of the Middle Rio Grande River, New Mexico.* 19th Biennial Workshop on color photography and videography in resource assessment.

Technical reports

Reedy, R.C., Davidson, S., Crowell, A., Gates, J., Akashch O.Z., and Scanlon, B.R. 2009. *Groundwater Recharge in the Central High Plains of Texas: Roberts and Hemphill counties, Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin, Austin, Texas Panhandle Groundwater Conservation District, White Deer, Texas.* Funded by the Texas Water Development Board through the Panhandle Water Planning Group, 80p.

Akashch, O.Z., and Neale, C.M.U. 2004. *Riparian vegetation mapping and classification in the Middle Rio Grande River, Utah State University, Remote Sensing Services Lab.* Funded by Bureau of Reclamation, NM., 50p.

CRAIG R. ALLEN, Adjunct Professor, 0% Teaching, 0% Research, 0% Extension/Outreach

Areas of Interest: Invasion Biology, Resilience, Adaptive Management, Landscape Ecology

Contact: allencr@unl.edu, 402/472-0229

EDUCATION

B.S. Biology, University of Wisconsin – Green Bay (1989)

M.S. Wildlife Science, Texas Tech University (1993)

Ph.D. Wildlife Ecology, University of Florida (1997)

PROFESSIONAL EXPERIENCE

2004-present Leader, Nebraska Cooperative Fish and Wildlife Research Unit; Adjunct Professor (2009), School of Natural Resources, University of Nebraska-Lincoln

2002-2004 Leader, South Carolina Cooperative Fish and Wildlife Research Unit; Associate Professor, Department of Biological Sciences and Department of Aquaculture, Fisheries and Wildlife, Clemson University

1998-2002 Assistant Leader, South Carolina Cooperative Fish and Wildlife Research Unit; Assistant Professor, Department of Aquaculture, Fisheries and Wildlife, Clemson University

1998-1998 Assistant-in-Zoology (non-tenure track faculty), Department of Zoology, University of Florida

HONORS AND AWARDS

Superior Performance Award, US Department of Interior (USGS-CRU) (December 2008)

Star Award, USGS (May 2008)

Superior Performance Award, US Department of Interior (USGS-CRU) (December 2007)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 898 Ecology of Biological Invasions (S06, S08)

NRES 898 Foundations of Resilience (S09)

NRES 898 Foundations of Ecology (S08)

NRES 810 Landscape Ecology (S07)

Masters and Doctoral Students Advised

19 MS Students since 1998 (9 current)

9 Ph.D. Students since 1998 (6 current)

RESEARCH

Current research focuses on resilience of systems of people and nature, and on biological invasions.

UNIVERSITY SERVICE

Most University service is focused on collaborative research efforts, including the USGS – UNL climate change research center, and the UNL NSF-IGERT proposal.

SELECTED GRANTS AND CONTRACTS

Resilience and Adaptive Governance in Stressed Watersheds, National Science Foundation, (Allen, C.R. (PI); with A. Samal, A. Tomkins, S. Fritz and A. Tyre), \$2,966,035.00; 2009–2014.

Nebraska Invasive Species Council, Nebraska Game and Parks Commission, Allen, C.R. (PI), 175,000.00; 2009–2014.

Implementation of Amphibian Monitoring and Adaptive Management for Wetland Restoration Evaluation, Grant, US Army Corps of Engineers, Allen, C.R. (PI), \$590,000.00; 2009–2014.

Southeast Prairies Biologically Unique Landscape and Sandstone Prairies Biologically Unique Landscape Research, Grant, Nebraska Game and Parks Commission, Helzer, C. and C.R. Allen (Co-PIs), \$80,000.00; 2008-2010.

Adaptive Management of Prairie Remnants for Legacy Goals, USGS, Allen, C.R. (PI) (with C. Helzer, S. Taylor and J. Kuipers, \$20,000.00; 2009–2011.

- Assessing Local and Regional Variability in Productivity and Fidelity of Grassland Birds on National Park Service Units in the Great Plains*, National Park Service, L. Powell and C. R. Allen (Co-PIs), \$221,792.00; 2007–2010.
- Monitoring, Mapping, Risk and Management of Invasive Species in Nebraska*, Nebraska Environmental Trust, C.R. Allen (PI) and J. Merchant, \$325,081.00; 2006–2010.
- Relationship Between Diversity and Function*, Research Contract, NE Game and Parks, C.R. Allen (PI), \$30,000.00; 2006–2008.
- Habitat Use by Otters*, NE Game and Parks, C.R. Allen (PI) and S. Wilson, \$68,000.00; 2006–2010.
- Understanding Invasions and Extinctions*, USGS, C.R. Allen (PI), \$23,000.00; 2005–2008.
- Spatial Risk Analyses: Risk to Native Declining Species from Invasive Species*, USGS/NE Game and Parks, C.R. Allen (PI), \$74,000.00; 2005–2008.
- Assessment of the Landowner Incentive Program for Species at Risk*, USGS/NE Game and Parks C. R. Allen (PI), \$77,000.00; 2004–2007.
- Cross-scale Structure and Scale Breaks in Complex Systems*, 21st Century Research Award – Studying Complex Systems, James S. McDonnell Foundation, C.R. Allen (PI), \$382,500.00; 2002–2009.

SELECTED PUBLICATIONS

- Garmestani, A. S., C. R. Allen and H. Cabezas. 2009. *Panarchy, adaptive management and governance: sustainable options for building resilience*. **Nebraska Law Review**: in press.
- Gunderson, L., C. R. Allen and C. S. Holling. 2009. *Foundations of Resilience*. **Island Press**, New York, NY. ~450pp.
- Epperson, D. and C. R. Allen. 2009. *Red imported fire ant impacts on upland arthropods in southern Mississippi*. **American Midland Naturalist**: in press.
- Wardwell, D. and C. R. Allen. 2009. *Variability in population abundance is associated with thresholds between scaling regimes*. **Ecology and Society**: in press.
- Allen, C. R. and C. S. Holling. 2009. *Thresholds and the generation of novelty*. **Ecology and Society**: in press.
- Garmestani, A. S., C. R. Allen and L. Gunderson. 2009. *Panarchy: discontinuities reveal similarities in the dynamic system structure of ecological and social systems*. **Ecology and Society** 14 (1):15. [online] URL: <http://www.ecologyandsociety.org/vol14/iss1/art15/>
- Wardwell, D., C. R. Allen, G. D. Peterson and A. D. Tyre. 2008. *A test of the cross-scale resilience model: functional richness in Mediterranean-climate ecosystems*. **Ecological Complexity** 5:165–182.
- Allen, C. R., and C. S. Holling, Editors. 2008. *Discontinuities in Ecosystems and other Complex Systems*. **University of Columbia Press**, New York, NY. 272 pp.
- Garmestani, A. S., C. R. Allen and C. M. Gallagher. 2008. *Power laws, discontinuities and regional city size distributions*. **Journal of Economic Behavior and Organization** 68:209–216.
- LaBram, J. A., A. E. Peck and C. R. Allen. 2007. *Monitoring-based assessment of Gap Analysis models*. **Southeastern Naturalist** 6:633–656.

OTHER PROFESSIONAL ACTIVITIES

- Board of Directors*, The Resilience Alliance (<http://www.resilience.org/>)
- Board of Editors*, **Ecology and Society** (<http://www.consecol.org/Journal/>)
- Guest Editor*, **Southeastern Naturalist**. 2008/2009
- Ad-hoc Editor*, **Conservation Biology**. 2008/2009
- Session Chair*, Resilience: Complex systems, resource management and economic development (Stockholm, Sweden), 2008 session
- Member*, Missouri River Mitigation Herpetofauna Monitoring and Evaluation Subcommittee, 2007–present
- Member*, SE NE Flagship Initiative, Research and Evaluation Steering Committee. December, 2007–present
- Elected*, *Nebraska Partnership for All-Bird Conservation Steering Committee*, October 2006–present
- Co-organizer*, Third Annual Water Law, Policy and Science Conference —“Adaptive Management for Resilient Water Resources”, Nebraska City NE, 2008 session
- Fellow*, Center for Great Plains Studies, April 2006, Member: Scholarship Committee 2006–2008
- Member*, Planning Committee, Threats to Nebraska Rivers Conference
- Invited Commentary*, **Proceedings of the National Academy of Sciences**, February 2006
- Core Team*, Invasive Plants State Technical Committee, NRCS 2006–present
- Member*, Nebraska Midwest Fish and Wildlife Board of Directors, February 2006–present

DOUGLAS M. AMEDEO, Professor, 60% Teaching, 30% Research, 10% University Service (9-Month, Academic Year Appointment)

Areas of Interest: Environment and Behaviour, Spatial Theory, Research Methods and Design, Planning

Contact: damedeo1@unl.edu, 402/472-1943

EDUCATION

B.S. Economics from Wisconsin State University at Eau Claire, Wisconsin (1962)

M.A. Economic Geography with minor emphasis in Economics from University of Iowa (1965)

Ph.D. Economic Geography with minor emphasis in Economics from University of Iowa (1967)

Post-doctoral in Regional Science from Graduate School of Design, Harvard, Cambridge, MA. (1968-69)

PROFESSIONAL EXPERIENCE

2008-present Professor, School of Natural Resources and Arts and Sciences, University of Nebraska

1992-2007 Professor Department of Geography (and also Anthropology), University of Nebraska

1993-1996 Chair and Professor Department of Geography, University of Nebraska,

1992-1993 Interim Chair and Professor, Department of Geography, University of Nebraska

1974-1991 Associate Professor, Department of Geography, University of Nebraska

1967-1972 Assistant Professor, Formal Models Cluster, School of Social Sciences, University of California-Irvine, Irvine, California

TEACHING

Courses Taught (Fall and Spring)

#283 Space, the Environment and You

#406/806 Spatial and Environmental Influences in Social Systems

#483/883 Cognitive Processes in Map Comprehension and Use

#983 Behavioral Processes in Person-Environment Relations

#940 Seminar in Human Geography: Proposal Construction and Research Design

Doctoral Students Advised

Greg Fetterman (PhD Geography) (Chair; current)

Cynthia Williams (PhD Geography) (Chair; current)

Molly Boeka Cannon (PhD Geography) (Chair; current)

Mary Hallin (Ph.D. Geography and Anthropology) (Member; current)

Ray Hubbard, (An Analysis of Consumer Spatial Behavior in an Urban Area ...) (Dissertation)

Tom Doring, (Modeling Travel by Recreationists and Tourists in a Pass-Through Region...) (Dissertation)

John Roy, (The Simulation of Dry Spell Frequencies ...)

Michael Hill, (Spatial Structure and Decision-Making Aspects of Pedestrian Route Selection...) (Dissertation)

Aria Tazzgi, (The Viability of the Eritrean Economy) (Dissertation)

Steve Devere, (A Relational Analysis of the Interpersonal Communication of New Product Influence) (Dissertation)

Peter Longo, (Water Policy-Making by the Courts in Nebraska), (Ph.D. Dissertation)

Stan Madsen, (Conflict Awareness on Interspousal Decision Making In Highly Involving Purchases) (Dissertation)

David Chin, (Exploratory Shopping Behavior...Emotional Response, Shopping Orientation...) (Dissertation)

Ken Engelbrecht, (American Residential Structure: Testing the Adams Model in Omaha, Nebraska) (Dissertation)

Ruth York, (Examining Responses to Environments for Evidence of Environmental Prototypes) (Dissertation)

Deborah Woodcock, (Use of Wood-Anatomical Variables of Burr Oak ... Reconstruction of Climate) (Dissertation)

RESEARCH

My research during this period is almost entirely interdisciplinary and consists of manuscripts and an upper-level research oriented book. In general, the research deals mainly with behavioral and experiential situations involving, and dependent upon, person-environment-behavior relationships. The environments focused on are usually built places, settings, or surroundings; and the questions investigated about social and behavioral situations occurring in them are heavily spatial and cognitive in nature. All research topics entertained in my research are from the perspective of humans transacting with, and/or responding to, environments. Research is usually published in planning, and/or environment, and behavior outlets.

UNIVERSITY SERVICE

Professional Conduct Committee, September, 1991 to September 1992, an Academic Senate Representative.

Appointed member of Academic Freedom and Tenure Committee, through 1993 +.

Appointed member of Academic Rights and Responsibilities Committee, 1999; and on the Special Committee of ARRC.

Member of the Judicial Committee from 2003 and continuing.

Elected to the Academic Rights and Responsibilities Panel for a 3-year term beginning 2007-08 to end of 2010.

SELECTED PUBLICATIONS

Amedeo, D. and R. Golledge. 1975 and 1986. *Introduction to Scientific Reasoning in Geography*, **John Wiley and Sons**, 1975 and **Krieger Publishing**, 1986.

Amedeo, D. and S. Grabinger. 1988. *CRT Text Layout: Perceptions of Viewers*. **Computers in Human Behavior**, Vol. 4, No. 3, pp.189-205.

Amedeo, D., D. Pitt, and E. Zube. 1989. *Landscape Feature Classification As A Determinant of Perceived Scenic Value*. **Landscape Journal: Design, Planning, and Management of the Land**, Vol. 8, #1, pp. 36-50.

Amedeo, D. and R. York. 1990. *Indications of Environmental Schemata from Thoughts About Environments*. **Journal of Environmental Psychology**, Vol. 10, No. 3, pp. 219-253.

Amedeo, D. and P. Kramer. 1991. *User Perceptions of Bi-symbol Maps*. **Cartographica**, Vol. 28, No.1, pp. 28-53.

Amedeo, D. 1993. *Emotions in Person-Environment-Behavior Episodes*. Golledge and Garling (Eds.), **Behavior and Environment: Psychological and Geographical Approaches**, Elsevier Science Publishers.

Amedeo, D. and K. Speicher. 1995. *Essential Environmental and Spatial Concerns for the Congenitally Visually Impaired*. **Journal of Planning Education and Research**, Vol. 14, #2, pp. 101-110.

Amedeo, D. 1999. *External and Internal Information in Versions of Scenic-Quality Perceptions*, **Journal of Architectural and Planning Research**, Vol. 16, #4, Winter, pp. 328-352.

Amedeo, D. and J. Dyke. 2003. *Activity-Enhancing Arenas of Designs: A Case Study of the Classroom Setting*, **Journal of Architectural and Planning Research**, 20, 4 (Winter), pp. 323-343.

Amedeo, D, R. Golledge, and R. Stimson. 2009. *Person-Environment-Behavior: Investigating Activities and Experiences in Spaces and Environments*, **The Guilford Press**, New York: N.Y. 467 pages.

OTHER PROFESSIONAL ACTIVITIES

Editorial Review Board 2007 and ongoing: for the **Journal of Architectural and Planning Research**, 1989 and ongoing.

Editorial Review Board for the **Journal of Environment and Behavior**.

Numerous research papers presented at **EDRA, AAG, IAPS, and Planning Conferences**.

J. CLARK ARCHER, Professor, 60% Teaching, 30% Research, 10% Service
(9-Month, Academic Year Appointment)

Areas of Interest: Political Geography, Population Geography, Settlement Geography, Geographic Information Systems (GIS), Cartography, Spatial Analysis

Contact: jarcher1@unl.edu, 402/472-1945

EDUCATION

B.A. Political Science, Indiana University (1964)

M.A. Geography, Indiana University (1968)

Ph.D. Geography, University of Iowa (1974)

PROFESSIONAL EXPERIENCE

2008-present Professor, Geography Program, School of Natural Resources, University of Nebraska-Lincoln
2001-2008 Professor, Department of Geography, School of Arts & Sciences, University of Nebraska-Lincoln
1989-2001 Associate Professor, Department of Geography, School of Arts & Sciences, University of Nebraska-Lincoln
1985-1989 Assistant Professor, Department of Geography, School of Arts & Sciences, University of Nebraska-Lincoln
1982-1985 Visiting Assistant Professor, Department of Geography, University of Oklahoma
1975-1982 Assistant Professor, Department of Geography, Dartmouth College
1974-1975 Assistant Professor, Department of Economics and Geography, University of Missouri-St. Louis

HONORS AND AWARDS

Best Single-Volume Reference in Humanities & Social Sciences for 2006, **Historical Atlas of US Presidential Elections**, Association of American Publishers, Professional and Scholarly Publishing Division

Best Reference List for 2006, **Historical Atlas of US Presidential Elections**, Library Journal

Choice Outstanding Academic Title for 2003, **Atlas of American Politics**, Association of College and Research Libraries

Journal of Geography Best Content Article Award for 1999, National Council for Geographic Education

Andrew McNally Award for Best Article in American Cartographie, American Cartographic Association, 1985

TEACHING

Courses Taught (Fall, Spring)

GEOG 140 Introductory Human Geography (F04, F05, F06)

GEOG 272 Geography of World Regions (S04, S05, S06, F07, S08, F08, S09, F09)

GEOG 361 Urban Geography (S05, S06, S07, S08, S09)

GEOG 414/814 Quantitative Methods in Geography (S04, S06, S08)

GEOG 444/844 Geodemographics and GIS (S07, F09)

GEOG 447/847 Political Geography (F04, F05, F06, F07, F08)

Doctoral Students Advised

Paul A. Kelley (Ph.D. Geography, 2005) Thesis title –~~P~~Population Change in the Upper Midwest and Northern Plains, 1960-2000”

Katherine Nashleas (Ph.D. Geography, 2005) Thesis title –~~M~~etageographic Communities: Structuring the Non-Place Place”

Kenneth N. French (Ph.D. Geography, 2008) Thesis title: —~~P~~atterns and Consequences of Segregation: An Analysis of Ethnic Residential Segregation at Two Geographic Scales”

Ryan Douglas Weichelt (Ph.D. Geography, 2008) Thesis title: –~~S~~cale Factors in Hispanic Voting Behavior”

UNIVERSITY SERVICE

I served on the Academic Rights and Responsibilities Committee Member (2004), the Academic Rights and Responsibilities Special Grievance Committee Member (2009), Academic Senate Department of Anthropology & Geography Representative (2004-2007), Arts & Sciences College Assessment Committee Member (2004), Center for Great Plains Studies Finance & Personnel Committee Member (2005-2006), Center for Great Plains Studies Board of Governors Member (2007-2010) and the University Commencement Marshals Corp (2004-2007).

SELECTED PUBLICATIONS

- S. J. Lavin, F. M. Shelley and J. C. Archer, **Atlas of the Great Plains** (Lincoln, Nebraska: University of Nebraska Press; expected publication 2010)
- J. C. Archer, "Geography of Public Policy" and "Urban Spatial Structure", in B. L. Warf, ed., **Encyclopedia of Geography** (Thousand Oaks, California: Sage Publications; expected publication 2009)
- J. C. Archer, S. J. Lavin, K. C. Martis, and F. M. Shelley, **Historical Atlas of U.S. Presidential Elections, 1788-2004** (Washington, D.C.: Congressional Quarterly Press; 2006) ISBN-10: 1-56802-955-1
- J. C. Archer and F. M. Shelley, "Civil Divisions of Government," "Democratic Party," "Republican Party," and "Voting Patterns," in D. Wishart, ed., **Encyclopedia of the Great Plains** (Lincoln, Nebraska: University of Nebraska Press; 2004) ISBN 0803247877, pp. 657-658, 659-660, 686-687, and 693-694
- J. C. Archer and R. E. Lonsdale, "Geography of Population Change and Redistribution within the Post-Frontier Great Plains," **Great Plains Research**, Vol. 13, No. 1 (2003) pp. 43-61
- L. A. Duram and J. C. Archer, "Contemporary Agriculture and Rural Land Use," in G. L. Gaile and C. J. Willmott, eds., **Geography in America at the Dawn of the 21st Century** (New York, New York: Oxford University Press; 2003) ISBN 0-19-823392-2, pp. 326-238
- J. C. Archer, S. J. Lavin, K. C. Martis and F. M. Shelley, **Atlas of American Politics, 1960-2000** (Washington, D.C.: Congressional Quarterly Press; 2002) ISBN 1-56802-665-X
- J. C. Archer, "The geography of an interminable election: Bush vrs. Gore, 2000," **Political Geography** Vol. 21, No. 1 (2002) , pp. 71-77
- J. C. Archer and R. E. Lonsdale, "Patterns of Population Sustainability in the U.S. Midlands," in H. Jussila, R. Majoral, and C. Cullen, eds., **Sustainable Development and Geographical Space: Issues of Population, Environment, Globalization and Education in Marginal Regions** (Aldershot, United Kingdom: Ashgate; 2002), pp. 25-36
- J. C. Archer and R. E. Lonsdale, "Great Plains settlement: Globalization and deregulation," in H. Jussila, R. Majoral, and F. Delgado-Cravidao, eds., **Globalization and Marginality in Geographical Space: Political, Economic and Social Issues of Development in the New Millennium** (Aldershot, United Kingdom: Ashgate; 2001), pp. 37-52
- R. E. Lonsdale and J. C. Archer, "Demographic Factors in Characterizing and Delimiting Marginal Lands", in H. Jussila, R. Majoral and C. Mutambirwa, eds., **Marginality in Space: Past, Present and Future: Theoretical and Methodological Aspects of Cultural, Social, and Economic Parameters of Marginal and Critical Regions** (Aldershot, United Kingdom: Ashgate; 1999), pp. 135-149
- R. E. Lonsdale and J. C. Archer, "Emptying Areas of the United States, 1990-1995," **Journal of Geography** Vol. 97, No. 3 (1998), pp. 108-122
- J. C. Archer and R. E. Lonsdale, "Geographical Aspects of U.S. Farmland Values and Changes During the 1978-1992 Period," **Journal of Rural Studies** Vol. 13, No. 4 (1997), pp. 399-414
- F. M. Shelley, J. C. Archer, F. M. Davidson and S. D. Brunn, **Political Geography of the United States** (New York, New York: Guilford Press; 1996) ISBN 1-57230-047-7
- R. E. Lonsdale and J. C. Archer, "Changing Employment Patterns on the Northern and Central Great Plains," **Great Plains Research**, Vol. 5, No. 1 (1995), pp. 47-70
- J. C. Archer, F. M. Shelley, P. J. Taylor, and E. R. White, "The Geography of U.S. Presidential Elections," **Scientific American**, Vol. 259, No. 1 (1988), pp. 18-25

OTHER PROFESSIONAL SERVICE

Member, Constitution and Bylaws Committee, **Association of American Geographers** (2004-2006, Chair 2006)

Panelist, Geography and Regional Science Doctoral Dissertation Research Improvement Award Advisory Panel, **National Science Foundation** (2006-2008)

Reviewer for several journals including:

Annals Association of American Geographers
Cartography and Geographic Information Science
Great Plains Research
Journal of Geography
Journal of Rural Studies
National Geographic
Political Geography
Professional Geographer
Urban Geography

TALA AWADA, Associate Professor, 25% Teaching, 68% Research, 5% Scholarly Service, 2% University Service (9-Month, Academic Year Appointment)

Areas of interest: Grassland/Forest Ecology, Plant Ecophysiology, Water Relations, Gas Exchange.

Contact: tawada2@unl.edu, 402/472-8483

EDUCATION

B.S. Agricultural Engineering, Lebanese University, Lebanon (1992)

M.S. Environmental and Renewable Resources, Mediterranean Agronomic Institute of Chania, Greece (1995)

Ph.D. Department of Plant Sciences, University of Saskatchewan, Canada (2000)

PROFESSIONAL EXPERIENCE

2007-present Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
2008 Visiting Professor, Aristotle University of Thessaloniki-Greece, and Forest Research Institute, Thessaloniki-Greece.
2001- 2007 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
Maternity Leaves: October through December 2002; June through September 2005
1999 – 2001 Research Assistant Professor (0.5 FTE), Department of Agronomy and Horticulture, University of Nebraska-Lincoln

HONORS AND AWARDS

Dinsdale Family Faculty Award for Outstanding Teaching, Research and Outreach, IANR, UNL (2006)

Member of the Board of Governors, Center for Great Plains Studies (2004-2007)

Fellow, Center for Great Plains Studies (2003)

TEACHING

Courses taught (Fall, Spring, Summer)

NRES 310 Introduction to Forest Management (F04, F05, F06, F07, F08)

NRES 406/806 Plant Ecophysiology: Theory and Practice (F04, F06, F08)

NRES 404 Forestry, Fisheries and Wildlife Seminar (S04, S05, S07)

NRES 896 Advanced Topics: Plant Ecophysiology (F04)

NRES 399 Independent Studies (S04, F07)

International

Plant Stress Physiology short course (15hrs.), Mediterranean Agronomic Institute of Chania-Crete, Greece (November-December 04, 05, 06, 07, 08)

Master and Doctoral Students Advised

Kathy Eggemeyer (M.S. Natural Resource Sciences 2005) Thesis title –Ecophysiology of Trees and Grasses in the Nebraska Sandhills”

Neal Bryan (Ph.D. Agronomy and Horticulture, expected 2009) Thesis topic –Woody Species Encroachment in the Nebraska Sandhills: Impacts on Species Diversity, Forage Quality and Water Relations”

Saadia Bihmidine (Ph.D. Natural Resource Sciences, expected 2010) Thesis topic –Physiological and Molecular Effects of Abiotic Stresses (Salt, drought & cold) -Responsive Transgenes in Economically Important Crops”

Joseph Msanne (Ph.D. Natural Resource Sciences, expected 2011) Thesis topic –Characterization and Evaluation of Abiotic Stress-Responsive Transgenes in Economically Important Crops”

RESEARCH

The main focus of my current research has been on determining the ecological impacts of woody species expansion into semi-arid grasslands and riparian areas in the Great Plains. I have been conducting studies on the functional characteristics of grasses, trees and shrubs in the region. A number of my graduate students have also been focusing on the development of broad-spectrum stress-tolerant plants. I have also been collaborating with researchers in Greece to determine the impacts of climate change on Mediterranean pine forests.

UNIVERSITY SERVICE

I have served as the Graduate Committee Chair, SNR (2006-2009), Member of the UNL Research Council (2008-2011), Member of the Agricultural Research Division Faculty Advisory Council (2004-2007), Faculty Advisor to

the CASNR Student Advisory Council (2005-2007), Member of the Board of Governors, Center for Great Plains Studies (2004-2007) and as a Member on numerous Faculty Search Committees at UNL.

SELECTED GRANTS AND CONTRACTS

- Effects of eastern redcedar invasion on the hydrology of cottonwood stands in the republican river basin* (with J. Huddle, D. Martin, and X. Zhou), Burlington Northern Endowment, \$20,000; 2008-2010.
- Estimation of evapotranspiration from riparian invasive species using remote sensing, modeling and in situ measurements in the Republican River basin* (with D. Martin, S. Verma, A. Irmak, S. Irmak, J. Huddle, and Zhou), Nebraska Department of Natural Resources, \$1,045,478; 2007-2011.
- Trees in the Great Plains: water and carbon uses, grasslands health and economic ramifications*, McIntire Stennis Funds, \$120,000; 2007-2011.
- Leadplant utilization and response to timing and intensity of grazing* (with W. Schacht, and J. Volesky), Sampson Range and Pasture Management Endowments, \$17,160; 2007-2009.
- Physiological effects of drought stress-responsive transgenes in soybeans* (with J. Stone, J. Lin, T. Clemente, J. Specht and S. Bihmidine), Interdisciplinary Funds, ARD-UNL, \$39,300; 2007-2009.
- Application and evaluation of advanced technologies for assessing the water balance of a forest ecosystem in Greece* (with K. Radoglou, Greece), Scientific and technological cooperation between RTD organizations in Greece and RTD organizations in the US, €60,000 (~\$70,000); 2006-2008.
- Impacts of Pinus ponderosa establishment on ecosystem functions in the Sandhills of Nebraska*. McIntire Stennis Funds, USDA, \$234,571; 2001-2007.
- Woody Species Expansion in the Nebraska Sandhills: Ecological and Socio-Economic Consequences*, Interdisciplinary Funds, ARD-UNL, \$40,000; 2004-2007.

SELECTED PUBLICATIONS

- Eggemeyer, K.D., Awada, T., Harvey, F.E., Wedin, D., Zanner, R. and Zhou, X. 2009. *Seasonal Changes in depth of water uptake for encroaching trees Juniperus virginiana and Pinus ponderosa and two dominant C₄ grasses in a semi-arid grassland*. **Tree Physiology**, 29,157-169.
- Awada, T. and Josiah, S. 2007. *Physiological responses of four hazelnut hybrids to water availability in Nebraska*. **Great Plains Research**, 14,193-202.
- Zhou, X.H., Brandle, J.R., Schoeneberger, M.M. and Awada, T. 2007. *Developing above-ground biomass equations for open-grown multiple-stemmed tree species: Shelterbelt grown Russian-olive*. **Ecological Modelling**, 202, 311-323.
- Eggemeyer, K.D., Awada, T., Wedin, D., Harvey, F.E. and Zhou, X. 2006. *Physiology of two native invasive woody species and two dominant warm-season grasses in the semiarid grasslands of the Nebraska Sandhills*. **International Journal of Plant Sciences**, 167, 991-999.
- Samartzidis, C., Awada, T., Maloupa, E., Radoglou, K. and Constantinidou, H. 2005. *Rose productivity and physiological responses to different substrates for soil-less culture*. **Scientia Horticulturae**, 106, 203-212.
- Awada, T., Henebry, G.M., Redmann, R.E. and Sulistiyowati, H. 2004. *Picea glauca dynamics and spatial pattern of seedlings regeneration along a chronosequence in the mixedwood section of the boreal forest*. **Annals of Forest Science**, 61,789-794.
- Awada, T., Dunigan, D.D. and Dickman, M.B. 2003. *Animal anti-apoptotic genes ameliorate the loss of turgor in water-stressed transgenic tobacco*. **Canadian Journal of Plant Science**, 83,499-506.
- Awada, T., Radoglou, K., Fotelli, M. and Constantinidou, H. 2003. *Ecophysiology of seedlings of three Mediterranean pine species in contrasting light regimes*. **Tree Physiology**, 23, 33-42.
- Awada, T., Moser, L.E., Schacht, W.H. and Reece, P.E. 2002. *Stomatal variability of native warm-season grasses from the Nebraska Sandhills*. **Canadian Journal of Plant Science** 82, 349-355.
- Awada, T. and Redmann, R.E. (2000). *Acclimation to light in planted and naturally-regenerated populations of white spruce seedlings*. **Canadian Journal of Botany**, 78, 1495-1504.

OTHER PROFESSIONAL ACTIVITIES

- Professional Development Leave* in Greece, Denmark, and the Netherlands, 2008.
- Ad Hoc Reviewer*, **Canadian Journal of Botany**, **Environmental and Experimental Botany**, **Forest Ecology and Management**, **Forestry**, **International Journal of Plant Sciences**, **Journal of American Society for Horticultural Science**, **Journal of Arid Environment**, **Plant and Soil**, **Plant Biology**, **Tree Physiology**.

DAVID M. BAASCH, Post-doctoral Research Associate, 100% Research

Areas of Interest: Applied Ecology, Wildlife Management

Contact: dbaasch2@unl.edu, 402/472-0508

EDUCATION

B.S. Biological Sciences, University of Nebraska-Kearney (1996)

M.S. Biological Sciences, University of Nebraska-Kearney (2003)

Ph.D. Natural Resource Sciences, University of Nebraska-Lincoln (2008)

PROFESSIONAL EXPERIENCE

2008-present Post-doctoral Research Assistant, School of Natural Resources, University of Nebraska-Lincoln

2006-2008 Graduate Student, School of Natural Resources, University of Nebraska-Lincoln

2002-2006 Research Technician II, West Central Research and Extension Center, University of Nebraska

RESEARCH

The past several years I have studied habitat or resource selection by white-tailed deer, mule deer, and elk in Nebraska. Specifically, I examined the effects of converting cropland to cool-or warm-season grasslands on white-tailed deer; studied the relationship between mule deer and white-tailed deer and the role this relationship may have on the distribution and spread of CWD in an endemic area of Nebraska; identified important landscape characteristics for elk in Nebraska and provided a course of action to minimize elk-human conflicts in Northwestern Nebraska. I have also studied the effects of many grazing-management systems on Nebraska rangelands. I managed GPS-collar tracking aspects of many studies and evaluated livestock movements and plant responses to management practices on upland range and sub irrigated meadow vegetation types. I have also conducted research on the effects of grazing and irrigation on alternative forages that could be incorporated into grazing-management systems.

EXTENSION/OUTREACH

I developed and implemented range and forage management programming for both youth and adult clientele. I presented information at the GSL Youth Field Day and Open House; designed, presented materials, and provided technical assistance at the Nebraska Ranch Practicum; assisted with regional and state Range Judging Contests; developed appropriate educational materials for youth range camp and range workshops; and consulted with area producers and other government agencies about various range related issues.

SELECTED GRANTS AND CONTRACTS

Resource Selection by Cattle in the Central Platte River Valley of Nebraska, Sampson Range and Pasture Endowment, \$20,000; July, 2007–June, 2009

SELECTED PUBLICATIONS

Baasch, D.M. 2003. *Population estimation and efficacy of bait selection by *Odocoileus virginianus* on the Cottonwood Ranch*. Thesis, University of Nebraska, Kearney, USA.

Baasch, D.M. 2008. *Resource selection by white-tailed deer, mule deer, and elk in Nebraska*. Dissertation, University of Nebraska, Lincoln, USA.

Frost, C.J., S.E. Hygnstrom, A.J. Tyre, K.C. VerCauteren, K.M. Eskridge, **D.M. Baasch**, J.R. Boner, G.M. Clements, J.W. Gilsdorf, and T.C. Kinsell. 2009. *Probabilistic movement model with emigration simulates movements of deer in Nebraska, 1990–2006*. **Ecological Modeling** (Accepted).

Baasch, D.M., J.W. Fischer, S.E. Hygnstrom, K.C. VerCauteren, A.J. Tyre, J.J. Millsaugh, J.W. Merchant, and J.D. Volesky. 2009. *Resource Selection by Elk in Nebraska*. **Environmental Management** (Submitted).

Walter, W.D., D.M. Baasch, S.E. Hygnstrom, B.D. Trindle, A.J. Tyre, J.J. Millsaugh, C.J. Frost, and K.C. VerCauteren. 2009. *Space use of sympatric deer in an area endemic for chronic wasting disease*. **Wildlife Monographs** (Submitted).

Hefley, T.J., S.E. Hygnstrom, K.C. VerCauteren, J.M. Gilsdorf, G.M. Clements, M.J. Clements, A.J. Tyre, and D.M. Baasch. 2009. *Effects of density and crop conversion on mass of white-tailed deer: Implications for biofuel production*. **Journal of Wildlife Management** (Submitted).

VerCauteren, K.C., J.W. Fischer, D.M. Baasch, G.E. Phillips, and M.J. Lavelle. 2009. *Adding electric fence to woven-wire to reduce contacts between wild and captive elk*. **Journal of Wildlife Management** (Submitted).

Frost, C.J., S.E. Hygnstrom, A.J. Tyre, K.C. VerCauteren, K.M. Eskridge, **D.M. Baasch**, J.R. Boner, G.M. Clements, J.W. Gilsdorf, and T.C. Kinsell. 2009. *An individual-based model of chronic wasting disease in deer in Nebraska, 1997–2006*. **Ecological Modeling** (Submitted).

RESEARCH PRESENTATIONS

VerCauteren, K.C., J.W. Fischer, D.M. Baasch, G.E. Phillips, M.J. Lavelle. 2008. *Adding electric fencing to woven-wire to reduce contacts between wild and captive elk*. The Wildlife Society's Annual Conference, Miami, FL, Nov 8-12, 2008.

OTHER PROFESSIONAL ACTIVITIES

Safe-Capture – Chemical Immobilization of Animals

University of Nebraska–Lincoln, Institutional Animal Care and Use Committee

Workshop: New Approaches to Studies of Home Range, Habitat Selection, and Space Use

Workshop: Demystifying Geospatial Data: Applications for Agronomic Outreach and Research

Member, The Wildlife Society

Certification Committee, Nebraska Chapter of The Wildlife Society

EEO/AA and ADA training and served on search committees, UNL-WCREC

Farm & Beef Operations Committee, UNL-WCREC

Professional Improvement Planning Committee, UNL-WCREC

TADD M. BARROW, Extension Educator, 98% Extension/Outreach, 2% University Service

Areas of Interest: Aquatic Ecology, Surface Water Quality, Toxic Algae

Contact: tbarrow2@unl.edu, 402/472-7783

EDUCATION

B.S. Forestry, Fisheries and Wildlife, University of Nebraska (1996)

M.S. Natural Resources, University of Nebraska (1998)

PROFESSIONAL EXPERIENCE

2005-present Assistant Extension Educator, University of Nebraska-Lincoln

1999-2005 Water Resources Specialist, School of Natural Resources, University of Nebraska-Lincoln

HONORS AND AWARDS

Environmental Council of the States Program Innovation Award in recognition of the accomplishments of the Community Lake Enhancement and Restoration (CLEAR) Program (2001)

Outstanding 100 Rural Development Initiatives. Nebraska Rural Development Commission. In Recognition of the CLEAR program (2001)

RESEARCH

In an effort to reduce toxic algae and remove Fremont State Lake #20 from the EPA's Impaired Waters 303 (d) list, I led collaborative efforts as part of UNL's water quality program with state agencies (NGPC & NDEQ) to adopt suggested lake restoration techniques and long term management practices to restore and maintain water quality in Fremont Lake #20. Several entities contributed staff time and/or cash to complete this project including NGPC, UNL, NDEQ, NETF and USEPA. I managed and assisted personnel with field data collection and subsequent laboratory analysis on over 350 individual samples. Results of the project are as follows: an 85% decline in Total Phosphorus concentration, a 92% reduction in Chlorophyll a (algae abundance), an increase in average water clarity by 2.46 meters (8 feet), the algae toxin (microcystis) that led to beach closings was eliminated to below detection limits. By mid-Summer of 2008 word on the improvements at Fremont Lake #20 had reached the public and lake use on a typical non-holiday Friday-Sunday time period was back to pre toxic algae numbers of 5000-9000 users. By July 2008, overall park permit sales had met 2007 permit sales.

EXTENSION/OUTREACH

As the primary contact for Nebraska's lake water quality issues, I annually assist over 2500 citizens with water quality improvement through the development of a volunteer monitoring program and sampling kit, conducting personal on-site lake visits to address water quality, assessing water quality problems and make useful recommendations on these issues. Invited keynote speaker at numerous lake association meetings. Survey results from program participants revealed: Water quality is "very important" to an overwhelming majority of lake owners (93%). 70% of the audience were "definitely willing" to begin making changes around their lake to improve water quality. Over half of those in attendance (52%) felt their knowledge of water quality was impacted "considerably" or greater, thanks to the Extension presentations. Since the inception of CLEAR over \$4.97 million from the Nebraska Environmental Trust, the Environmental Protection Agency, USEPA and local community partners has been applied. Improving water quality and increasing recreational opportunities for 23 communities across Nebraska impacting nearly 400,000 residents of those communities. Water quality results are as follows: Total Phosphorus decreased 62%, Total Nitrogen decreased 65%, Chlorophyll a (algae) decreased 17%, Turbidity decreased 42%, Water clarity increased 515%.

UNIVERSITY SERVICE

I was Co-Leader for University Nebraska-Lincoln Community and Residential Environment Team, elected to a 2-year term position, 2007-2009. I am also a member of School of Natural Resources Outreach committee, elected 3 year position, 2007-2010.

SELECTED GRANTS AND CONTRACTS

Water Quality Extension and Outreach (w/J. Holz), Nebraska Department of Environmental Quality, \$54,560; July 1, 2008-June 30, 2009.

Algae Monitoring and Assessment (w/J. Holz), Nebraska Department of Environmental Quality, \$29,744; July 1, 2008-June 30, 2009.

- Alum Treatment Evaluation* (w/J. Holz), Nebraska Department of Environmental Quality, \$201,700; January 1, 2007-June 30, 2009.
- Water and Environment-based Education for Nebraska's Educators, Youth and Families*, \$183,170; on October 1, 2008, I assumed the role as Principal Investigator for this grant.
- Toxic Algae Extension and Outreach* (w/J. Holz), Nebraska Department of Environmental Quality, \$29,744; July 1, 2007-June 30, 2008.
- Blue-green algae control at Fremont State Lake #20* (w/J. Holz), Nebraska Environmental Trust Fund, \$82,055; July 1, 2006-June 30, 2007.

SELECTED PUBLICATIONS

- Gitelson, A.A., G. Dall'Omo, W. Moses, D.C. Rundquist, T. Barrow, T. R. Fischer, D. Gurlin, and J. Holz. 2008. *A simple semi-analytical model for remote estimation of chlorophyll-a in turbid waters: Validation, Remote Sensing of Environment*, 112 (2008), 3582-3593.
- Janssen, D. and T.M. Barrow. 2008. [*Stormwater Management: Yard Waste Management*](#), University of Nebraska-Lincoln, **NebGuide**, G1855.
- Walker, S., J.C. Lund, D.G. Schumacher, P.A. Brakhage, B.C. McManus, J.D. Miller, M.M. Augustine, J.J. Carney, R.S. Holland, K.D. Hoagland, J.C. Holz, T.M. Barrow, D.C. Rundquist, and A.A. Gittleson. 2008. *Nebraska Experience*, Cyanobacterial Harmful Algal Blooms: State of the Science and Research Needs. In K. Hudnell (ed.), **Advances in Experimental Medicine and Biology**, 619:135-148.
- Barrow, T.M. 2008. [*Aquatic Plant Control with Herbicides*](#), **Acreage & Small Farm Insights** Monthly Newsletter, University of Nebraska Lincoln - Extension.
- Barrow, T.M. 2008. *Pond Management Tool: Surface Area and Volume Calculators*, Webpage development, University of Nebraska-Lincoln. <http://water.unl.edu>
- Eades, R., L. Richters, T. Barrow, J. Holz, P. Brakhage, and E. Traylor. 2007. ***Improving Nebraska lakes via the Community Lakes Enhancement and Restoration (CLEAR) program*** (R. Eades, J. Neal, T. Lang, K. Hunt, and P. Pajak, eds.), **Proceedings of the 2007 Urban Fishing Symposium**, American Fisheries Society Special Publication. Bethesda, Maryland.
- Dall'Omo, G., A.A. Gitelson, D.C. Rundquist, B. Leavitt, T.M. Barrow, and J.C. Holz. 2005. *Assessing the potential for SeaWiFS and MODIS for estimating chlorophyll concentration in turbid productive waters using red and near-infrared bands*, **Remote Sensing of Environment**, 96(2):176-187.

OTHER PROFESSIONAL ACTIVITIES

- Member* of team charged with developing website housing "All things water at UNL" , <http://water.unl.edu>
- Team Leader* for content development and maintenance on "Lakes, Ponds, Streams Protection" page within the site.
- Member*, North American Lake Management Society (NALMS) since 1999, attendance at annual conference and occasional presentations

DEBORAH J. BATHKE, Assistant Professor of Practice, 24% Teaching, 35% Research,
41% Department of Geosciences (Teaching)

Areas of Interest: drought planning and mitigation, drought monitoring, and climate decision support
Contact: dbathke2@unl.edu, 402/472-6199

EDUCATION

B.S. Meteorology/Climatology, University of Nebraska – Lincoln (1995)
M.S. Geosciences, University of Nebraska – Lincoln (1998)
Ph.D. Atmospheric Science, The Ohio State University (2004)

PROFESSIONAL EXPERIENCE

2008-present Assistant Professor of Practice, School of Natural Resources/National Drought Mitigation Center/Department of Geosciences, University of Nebraska-Lincoln
2005-2008 Assistant Professor/Assistant State Climatologist, Department of Plant and Environmental Sciences, New Mexico State University
2005 Program Specialist, Nebraska Department of Environmental Quality
1998-2004 Graduate Research Fellow/Graduate Teaching Assistant, Department of Geography/Byrd Polar Research Center/ The Ohio State University

HONORS AND AWARDS

NASA Earth System Science Fellowship Recipient, NASA Training Grant to support doctoral research

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 898 Graduate Research Forum, enrollment 11 (S09)
METR140 Severe and Hazardous Weather, enrollment 100-125 per section (S09 x 2 sections, F08)
NRES 208 Applied Climate Science, enrollment 16 (F08)

RESEARCH

Research topics include investigating climate science and drought monitoring to improve decision support for stakeholders.

EXTENSION/OUTREACH

Outreach activities include presenting and interpreting climate information to a variety of stakeholder groups including growers and producers, golf course superintendents, flood plain managers, water planners, the media, university researchers, state and federal government agencies and K-12 students. Additional outreach efforts have focused specifically on drought planning and monitoring. I have chaired, or co-chaired, several state level climate/drought/water related committees in New Mexico and serve on the Implementation Team for the National Integrated Drought Information System (NIDIS).

UNIVERSITY SERVICE

At New Mexico State University, I served as a reviewer for internal grant proposals and technical/research reports.

SELECTED GRANTS AND CONTRACTS

Integrating Climate Science for Decision-Support, Mitigating Risk and Promoting Resilience, NOAA RISA Program, co-PI with J. Overpeck and collaborators from University of Arizona, funded at approximately \$1.2 million per year; 2007–2012.
Tree-ring Reconstructions of Hydroclimatic Variability in the Rio Grande Basin, NOAA Commerce Coping with Drought Program, co-PI with C. Woodhouse and others from the University of Arizona and the University of Colorado, funded at \$59,845 for 1 year; 2007-2008.
Drought Index Tools to Improve Drought Monitoring and Preparedness, NOAA Commerce Coping with Drought Program, co-PI with K. Dow and others from the University of South Carolina and the University of Arizona, funded at \$149,359 for 1 year; 2007-2008.

Reducing New Mexico's Agricultural Drought Vulnerability through Stakeholder Assessment, co-PI with C. Fraisse and others from the University of Florida, the University of Georgia, and the University of Arizona, funded at \$153,777 for 1 year; 2007-2008.

Development of a Fine-Scale GIS System for Modeling Monsoon Season Flash Flood Events in the Lower Rio Grande of New Mexico, New Mexico Student Water Research Program, New Mexico Water Resources Research Institute, funded at \$5,000 for approximately 1 year; 2007-2008.

Support for climate monitoring and education, New Mexico Flood Plain Manager's Association, \$2500. Travel funds, New Mexico Water Task Force, \$5000 per year; 2006-2007.

Instrumentation support, New Mexico Water Task Force, \$24,000; 2006.

SELECTED PUBLICATIONS

DeMouche, L., D.J. Bathke, and N. Doesken, *Master Gardeners Role in Encouraging Water Conservation Using a Rain Gauge Network*, **Journal of Extension**, 45 (4), 2007.

Rogers, J.C., D.J. Bathke, E. Mosley-Thompson, and S-H. Wang, *Atmospheric circulation and cyclone frequency variations linked to the primary modes of Greenland Accumulation*, *Geophysical Research Letters*, 31, L23208, 2004.

New Mexico Climate Change Work Group, *The Impact of Climate Change on New Mexico's Water Supply & Ability to Manage Water Resources*, 2006.

New Mexico Drought Monitoring Work Group, *Monthly Drought Status Reports*, available (<http://www.nmdrought.state.nm.us/>).

OTHER PROFESSIONAL ACTIVITIES

Member, "Engaging the Preparedness Community" workgroup for the National Integrated Drought Information System (NIDIS) Implementation team (2006-present)

Chair, *Drought Monitoring Workgroup of the Governor's Drought Task Force* (member since 2005, chair from 2006-present)

State Coordinator, *New Mexico Community Collaborative Rain, Hail, and Snow Network* (2005-present)

Co-Chair, *Workgroup on Hydrometeorological Data for the Governor's Coordinated Resource Management Initiative* (2005-2006)

PATRICIA R. BOEHNER, Lecturer, 15% Teaching

Areas of Interest: Environmental science education, global sustainable agriculture and development

Contact: pboehner3@unl.edu, 402/467-1957

EDUCATION

B.S. Range Resources Management, Oregon State University (1983)
M.S. Forestry, Fisheries and Wildlife, University of Nebraska-Lincoln (1986)
Agricultural Intern The Land Institute (private educational and research program on sustainable agriculture and sustainable society), Salina, KS (1987)
Ph.D. Agronomy, University of Nebraska-Lincoln (2001)

PROFESSIONAL EXPERIENCE

1994-present Lecturer, School of Natural Resources, University of Nebraska-Lincoln
1990-1993 Assistant Instructor, Agronomy, University of Nebraska-Lincoln

HONORS AND AWARDS

Irvin A. and Agnes E. Nelson Fellowship (1994)
Teaching Award, Parent's Recognition (1995)

TEACHING

Courses Taught (Fall, Spring, Summer)
NRES 103 Food, Agriculture and Natural Resource Systems, Lecture (F04, F05, F06, F07, F08)
NRES 103 Food, Agriculture and Natural Resource Systems, Recitations (F04, S 04, S05, S06, S07, S08)
NRES 498/898 Gender and Cultural Perspectives on the Environment (F07, S08, S09)

UNIVERSITY SERVICE

I was the State Contest Director for the Agricultural Issues Section 2004-2009 for the Future Farmers of America. I was on the Natural Resources Undergraduate Curriculum Committee from 2007-2009.

OTHER PROFESSIONAL ACTIVITIES

Fellow, Great Plains Studies, University of Nebraska-Lincoln, 2007-2009

JAMES R. BRANDLE, Professor, 28% Teaching, 70% Research, 2% University Service

Area of interest: The role of woody plants in sustainable agricultural systems, specifically the mechanisms associated with windbreak technology, agroforestry and biological control, and the economic benefits of woody plants in our agricultural landscapes

Contact: jbrandle@unl.edu 402/472-6626

EDUCATION

B.S. Botany (minor – mathematics), University of Tennessee, Knoxville, 1966

M.S. Forest Biology, University of Missouri, Columbia, 1970

Ph.D. Tree Physiology, University of Missouri, Columbia, 1974

PROFESSIONAL EXPERIENCE

1997 - Present Professor, School of Natural Resources, UNL

1981 - 1997 Associate Professor, Dept. Forestry, Fisheries and Wildlife, UNL

1975 - 1981 Assistant Professor, Dept. Forestry, Fisheries and Wildlife, UNL

1974 - 1975 Post-doctoral Fellow, Range Science, Utah State University

HONORS AND AWARDS

College Distinguished Teaching Award, CASNR, UNL (2009)

Gold Star Award for service to Lincoln Public Schools Foundation, Lincoln Public Schools (2009)

Holling Family Senior Faculty Teaching Excellence Award, CASNR, IANR (2009)

Entomology Educational Project Award for the Extension Publication: Lady Beetles of Nebraska; A.P.

Cunningham, J.R. Brandle, S.D. Danielson, and T.E. Hunt (2008)

TEACHING

Courses Taught (Fall, Spring, Summer)

AGRIC/NRES 103 Introduction to Agriculture and Natural Resource Systems, Recitation , F07,F08,F09

AGRIC/NRES 103 Introduction to Agriculture and Natural Resource Systems, Lecture, F09

NRES 310 Introduction to Forest Management with T. Awada , F07, F08

NRES 417/817 Agroforestry Systems in Sustainable Agriculture, S08, S09

NRES 849 (Hort 849) Woody Plant Growth and Development with E. Paparozzi, F08

NRES 891 Seminar in Natural Resources, with P. Shea, S08, S09

NRES 896 Outreach: Elementary School Classroom Experience, F07, S07, F08, S08, F09, S09

Masters and Doctoral Students Advised or Co-Advised

Ariana Jones (M.S. in Natural Resources, current student), Topic: Leaf Tatters in Hackberry.

John Quinn (Ph.D. Natural Resources with Ron Johnson, current student) Topic: Development of a healthy farm index as part of our research program in organic agriculture.

Katja Kohler-Cole (M.S. Natural Resources, May, 2008; current Ph.D. student) Topic: Attitudes toward agricultural greenspace of rural and urban Lancaster County residents.

Kerry Maline (M.S. non-thesis option, December, 2007)

Heidi Puckett (M.S. Natural Resources with R. Johnson, December, 2006). Topic: Windbreaks and Wildlife. (currently a Ph.D. student at Mississippi State)

Alex Cunningham (M.S. Entomology with S. Dannielsen, May, 2006) Synchronizing habitat enhancement practices with predator mobility for control of alfalfa insect pests.

Juxiang Liu (M.S. Statistics with E. Blankenship and S. Danielson, May, 2006). Modeling lady beetle development in an alfalfa production system.

Peter Skelton, (Ph.D. Natural Resources, 2004 ,with S. Josiah) Towards cleaner water: understanding riparian forest buffer adoption in Nebraska. (currently faculty member at New Mexico State)

James C. Kriz (M.S. Entomology with Steve Dannielsen, 2004) Predaceous insect abundance as affected by landscape structure and temporal distribution in alfalfa fields in east central Nebraska.

Jeremy Hiller (M.S. Natural Resource Sciences, 2004) Woody species succession in field windbreaks in East Central Nebraska. (currently a research technician at UNL)

RESEARCH

Our current research efforts have moved toward interdisciplinary efforts with a focus on the ecology of shelterbelts at the landscape scale. Working with colleagues in the Departments of Animal Science, Agronomy and Horticulture and Entomology, we have a number of cooperative efforts to define and evaluate the role of woody plants in biological control of pests, diversification of production systems, carbon sequestration in woody species, the reduction of carbon dioxide emissions from agriculture and the enhancement of wildlife habitat, all as a part of an integrated agricultural system.

UNIVERSITY SERVICE

I serve on the UNL Academic Rights and Responsibilities Committee, the IANR Committee on Policy for Promotion and Tenure, the ARD Advisory Committee, the ARDC Advisory Committee, the SNR Promotion and Tenure Committee, and the SNR Undergraduate Curriculum Committee.

SELECTED GRANTS AND CONTRACTS

- Improving organic farming systems across Nebraska's agroecoregions*, USDA-CSREES-NRI [with C. Shapiro (Agronomy) and colleagues from UNL], \$762,949; 2005-10.
- Biomass equations for shrubs*, USDA National Agroforestry Center. \$5,000; 2008-09.
- Biomass equations for Montana*, University of Montana (with X. Zhou), \$19,000; 2004-05.
- Synchronizing habitat enhancement practice with predator mobility for control of Alfalfa insect pests*, [with S. Danielson (Entomology) and E. Blankenship (Statistics)], Agriculture Research Division Interdisciplinary grant, \$39,000; 2003-05.
- Integrated crop/livestock/agroforestry research for sustainable systems in Nebraska*, USDA-CSREES (with colleagues in Agronomy, Animal Science, and Horticulture); 1995-2004.

SELECTED PUBLICATIONS

- Brandle, J.R., L. Hodges, J. Tyndal, and R.A. Sudmeyer (in press, due 2009). *Windbreak Practices*, In: (Garrett, H.E., W.J. Rietveld, and R.F. Fisher, eds.) **An Integrated Science and Practice, 2nd edition, North American Agroforestry**, ASA, Madison, WI.
- Hygnstrom, S.E., S.J. Josiah, P.D. Skelton, J.A. Gilsdorf, D.R. Virchow, J.A. Brandle, A.K. Jayaprakash, K.M. Eskridge, and K.C. VerCauteren. 2009. *White-tailed deer browsing and rubbing preferences for trees and shrubs that produce non-timber forest products*, **HortTechnology**, 19:204-211.
- Puckett, H.L., J.R. Brandle, R.J. Johnson, and E.E. Blankenship. 2009. *Avian foraging patterns in crop field edges adjacent to woody habitat*, **Agriculture Ecosystems and Environment**, 131, 9-15.
- Quinn, J.E., J.R. Brandle, and R.J. Johnson. 2009. *Development of a healthy farm index to assess ecological, economic, and social function on organic and sustainable farms in Nebraska's four agroecoregions*, in (A. Franzluebbers, eds.) **Farming with Grass: Achieving Sustainable Mixed Agricultural Landscapes**, Pages 56-170.
- Mize, C., J.R. Brandle, M. Schoeneberger, and G. Bentrup. 2008. *Ecological function, development, and design of shelterbelt systems in North America*, in (Jose, S. and A.M. Gordeon, eds.) **Toward Agroforestry Design – An Ecological Approach**, Springer, NY. p. 27-54.
- Zhou, X.H., J.R. Brandle, C.W. Mize, and E.S. Takle. 2008. *Relationship of three-dimensional structure to shelterbelt function: A theoretical hypothesis*, in (D.R. Batish, R.K. Kohli, S. Jose, and H.P. Singh, eds.) **Ecological Basis of Agroforestry**, Taylor & Francis, Boca Raton, FL. p. 273-285.
- Mize, C.W., J. Colletti, W. Batchelor, S.S. Kim, E.S. Takle, and J.R. Brandle. 2008. *Modeling a field shelterbelt system with the shelterbelt agroforestry modeling system*, in (D.R. Batish, R.K. Kohli, S. Jose, and H.P. Singh, eds.) **Ecological Basis of Agroforestry**, Taylor & Francis, Boca Raton, FL. p. 273-285.
- Zhou, X.H., J. Brandle, M. Schoeneberger, and T. Awada. 2007. *Developing above ground biomass equations for open-grown multiple-stemmed tree species: Shelterbelt grown Russian olive*, **Ecological Modeling**, 202, 311-323.
- Dosskey, M.G., K.D. Hoagland, and J.R. Brandle. 2007. *Change in filter strip performance over ten years*, **Journal of Soil and Water Conservation** 62 (1), 21-32.
- D.S. Zhang, A. Samal, and J.R. Brandle. 2007. *A Method for estimating fractal dimension of tree crowns from digital images*, **International Journal of Pattern Recognition and Artificial Intelligence**, 20, 1-11.
- Sauer, T.J., C.A. Cambardella, and J.R. Brandle. 2007. *Soil carbon and tree litter dynamics in a red cedar-scotch pine shelterbelt*, **Agroforestry Systems**, 71, 163-174.

MARK E. BURBACH, Associate Geoscientist, 35% Teaching, 27% Research, 35% Scholarly Service, 3% University Service

Areas of Interest: Human Dimensions, Environmental Planning, Geographic Information Systems
Contact: mburbach@unl.edu, 402/472-8210

EDUCATION

B.S. Natural Resources, University of Nebraska-Lincoln (1985)
M.C.R.P. Community & Regional Planning, University of Nebraska-Lincoln (1988)
Ph.D. Community & Human Resources (Leadership Studies), University of Nebraska-Lincoln (2004)

PROFESSIONAL EXPERIENCE

2008-present Associate Geoscientist, School of Natural Resources, University of Nebraska-Lincoln
2003-2008 Assistant Geoscientist, School of Natural Resources, University of Nebraska-Lincoln
1989-2003 Project Coordinator, Water Center, University of Nebraska-Lincoln

HONORS AND AWARDS

Bessey Award for best natural science article, **Great Plains Research** (2007)
Fellow, Center for Great Plains Studies (2005)
Certificate of Recognition for Contributions to Students, University of Nebraska-Lincoln Parents Association (2002)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 428/828 Leadership in Public Organizations (S08, S09)
NRES 896 Independent Study (F07, S08, Su08, F08, S09)
NRES 388 Employment Seminar (S06)
ALEC 102 Interpersonal Skills for Leadership (F99, S00, F00, S01, F02)
ALEC 904 Seminar in Leadership (S08, S09)
NRES 399 Independent Research (F08)
NRES 323 Natural Res. Policy (F04, S05, F05)

Masters and Doctoral Students Advised

Courtney E. Quinn (M.S. Natural Resource Sciences 2009) Thesis title: Personal Characteristics Preceding Pro-Environmental Behaviors that Improve Surface Water Quality
Chelsea D. West (M.S. Natural Resource Sciences 2009) Thesis title: Connection to Nature in Park Visitors: A Look at Structured and Unstructured Recreational Activities

RESEARCH

I have conducted research and published in the area of personal characteristics associated with conservation practices. Conducted research and published in the area of groundwater-level trends in Nebraska. Over \$1,000,000 in funding.

EXTENSION/OUTREACH

I have developed leadership development programs for natural resource organizations. Completed extension programming, media interviews, and press releases on groundwater-level issues in Nebraska.

SURVEY

I have produced over 50 maps on groundwater-level conditions in Nebraska.

UNIVERSITY SERVICE

I have served on the Graduate Committee, from 2008 to present, the Survey Committee, from 2007 to present, the Social Committee, from 1999 to present, all in the School of Natural Resources; and the Publications Committee from 2006 to present, for the Center for Great Plains Studies.

SELECTED GRANTS AND CONTRACTS

Ensuring Student Success: Increasing Faculty Capacity to Teach Team Building and Critical Thinking Skills. U.S. Department of Agriculture, \$139,067; September 2007-August 2010.

Integrated Real-Time Groundwater-Level Monitoring Network to Support Drought Impact Assessment and Mitigation Program. U.S. Department of Agriculture, \$403,293; October 2005-September 2009.

Targeting Watershed Vulnerability and Behaviors to Adoption of Conservation Management Practices. U.S. Department of Agriculture, \$570,000; October 2006-September 2009.

Max McGraw Foundation Teaching Grant. Max McGraw Foundation, \$1,400; January 2008–June 2008,

Research Leading Toward a Great Plains Environmental and Hydrologic Observatory. UNL Office of Research, \$5,000; June 2007-December 2007.

Aquifer Vertical Anisotropy & Streambed Conductance in Eastern Part of Central Nebraska, Part II. Upper Big Blue NRD, \$16,000; July 2006-June 2007.

Aquifer Vertical Anisotropy & Streambed Conductance in Eastern Part of Central Nebraska, Part I. Funded by Upper Big Blue NRD, \$14,760; September 2005-June 2006.

Vadose Zone Sampling within the Tri-Basin NRD. Tri-Basin NRD, \$3,941; February 2005-December 2006.

Preliminary Hydrologic Investigation of the Groundwater Flow Regime in the Crescent Lake Wildlife Refuge. UNL Nebraska Research Initiative, \$12,000.; May 2004-June 2005.

Soil Coring in the Nebraska Sand Hills, UNL Sponsored Programs, \$4,000; June 2004-May 2005.

Vadose Zone Sampling within the Upper Niobrara-White NRD. Upper Niobrara White NRD, \$5,295; April 2003-December 2003.

SELECTED PUBLICATIONS

Tang, Z. and M.E. Burbach. Submitted. *Bridging the gap between environmental planning education and practice*. **Environmental Education Research**.

Phipps, K.A. and M.E. Burbach. Accepted. *Strategic leadership in the nonprofit sector: Opportunities for research*. **Journal of Behavioral and Applied Management**.

Burbach, M.E. 2008. *Emotional intelligence in professional and personal settings: An experiential learning exercise*. **Journal of the Academy of Business Education**, 9, 98-110.

Chen, X. M.E. Burbach and C. Cheng. 2008. *Electrical and hydraulic vertical variability in channel sediments and its effects on streamflow depletion due to groundwater extraction*. **Journal of Hydrology**, 352, 250-266.

Quinn, C.E. and M.E. Burbach. 2008. *Personal characteristics preceding pro-environmental behaviors that improve surface water quality*. **Great Plains Research** 18(1), 103-114.

Zlotnik, V.A., M.E. Burbach, J.B. Swinehart, D. Bennett, S.C. Fritz, D.B. Loope, & F. Olaguera. 2007. *Direct push methods for aquifer characterization in dune-lake environments: The Nebraska Sand Hills*. **Environmental and Engineering Geosciences**, 13, 205-216.

Burbach, M.E., and R.M. Joeckel. 2006. *A delicate balance: Rainfall and groundwater in Nebraska during the 2000-2005 drought*. **Great Plains Research**, 16(1), 5-16.

Barbuto, J.E., Jr. and M.E. Burbach. 2006. *The emotional intelligence of transformational leaders: A field study*. **Journal of Social Psychology**, 146, 51-64.

Lunde, J. Povlacs and M.E. Burbach. 2005. *Responding with empathy*, in (Fritz, S.M., Povlacs Lunde, J., & Banset, E.A., eds.), **Interpersonal Skills for Leadership**, Upper Saddle River, NJ: Pearson Prentice Hall, 260-284.

OTHER PROFESSIONAL ACTIVITIES

Director, Human Dimensions Program, School of Natural Resources (2008-present)

Reviewer, Center for Great Plains Studies Book Award (2008-Present)

Reviewer, U.S. Geological Survey 104G grant proposals (2004, 2009)

Reviewer, Great Plains Research Journal (2005, 2008)

Advisor, Little Blue NRD, Bruning Area Hydrogeologic Investigation (2008)

UNL Representative, Proposed Northern Great Plains Hydrologic Obs. Network (2007- present)

Reviewer, Journal of the Academy of Business Education (2004-present)

Consultant, Wann Basin Ground Water Level Monitoring Network (2003–present)

Advisor, Technical Advisory Committee, Nebr. Dept. of Environmental Quality (2005-present)

Advisor, Nebraska Ground Water Monitoring Advisory Committee, NGWMAC (2003-present)

Judge, Nebraska Junior Science Academy (2006-present)

Reviewer, Inst. of Behavioral and Applied Management, Student & Org. Behaviors Papers Division (2002–06)

Session Chair & Discussant, Institute of Behavioral and Applied Management, (2003–06)

MARVIN P. CARLSON, Professor-Research Geologist, 25 % Research, 73% Scholarly Service, 2% University Service

Areas of Interest: Stratigraphy and tectonic framework of the Precambrian and Lower-Middle Paleozoic, provide natural resource data and impacts of development for decision-makers and general public

Contact: mcarlson1@unl.edu, 402/472-7549

EDUCATION

B.S. Geology, University of Nebraska (1957)

M.S. Geology, University of Nebraska (1963)

Ph.D. Geology, University of Nebraska-Lincoln (1969)

PROFESSIONAL EXPERIENCE

Registered Geologist State of Nebraska.

2004-present Professor, School of Natural Resources, University of Nebraska-Lincoln

1976-2004 Professor/Research Geologist, Conservation and Survey Division, UN-L

1970-1986 Assistant Director, Conservation and Survey Division, UN-L

1963-1984 Principal Geologist, CSD, UN-L

1958-1963 Stratigrapher, CSD, UN-L

HONORS AND AWARDS

Presidents Award for outstanding contributions to the Division of Environmental Geosciences, American Association of Petroleum Geologists (2008)

Robey H. Clark Award for Continuing Service to the Profession, American Association of Petroleum Geologists (2005)

Honorary Membership Division of Environmental Geosciences, AAPG (2004)

Senior Fellow Geological Society of America

RESEARCH

I have been involved in basic research, publications, and presentations related to Paleozoic lithostratigraphy, Precambrian tectonics, and mineral resources of northern Midcontinent. I have also been involved in a major publication on plate tectonic processes for growth of North America in the Nebraska region and the rejuvenation of this framework during the Phanerozoic and compilations and presentations on the potential for petroleum exploration and the potential for deeper groundwater reservoirs.

SURVEY

I have given presentations and workshops on aspects of earth science for teachers, elementary-college classes, councils, and general public groups. I have had significant activity in advising on policy for state and local regulatory and management agencies and participated in numerous committees/groups interested in resource development, environmental impacts, waste disposal, stress on natural resource systems - public perceptions of earth science.

UNIVERSITY SERVICE

I have served on the SNR Safety and Facility Committee. I maintain the SNR Library and maintain, interpret and integrate over 20,000 records of deep wells drilled in Nebraska as mandated by Statute.

SELECTED PUBLICATIONS

Carlson, M.P., S. Sibray and F. Mills. 2009. *Older Groundwater Reservoirs in Nebraska*, **Open File Report, Conservation and Survey Division**, 35 pages.

Carlson M.P. 2007. *Precambrian Accretionary History and Phanerozoic Structures – a Unified Explanation for the Tectonic Architecture of the Nebraska Region, USA*, in Hatcher, R.D., Jr., Carlson, M.P., McBride, J.H., and Martinez Catalan, J.R., eds., 4-D Framework of Continental Crust: **Geological Society of America Memoir** 200, Chapter 16.

- Carlson, M.P., R Joeckel and B. Nicklen, 2007. *Low-accommodation detrital apron alongside a basement uplift, Pennsylvanian of Midcontinent North America*; **Sedimentary Geology** 197, 165-187.
- Carlson, M.P. 2007. *Some Keys to Exploration in the Forest City Basin*; Mid-Continent Section, **American Association Petroleum Geologists Abstracts with Program**, p. 36.
- Carlson, M.P. 2005. *The Application of Basement Tectonic Research to the Development of Natural Resources – Example Midcontinent North America*; **Natural Resources Research**, V. 14, No. 2, p. 125-128.
- Carlson, M.P. 2005. *Preservation of Cores and Samples*; **Geological Society of America Abstracts with Programs** V. 37, No. 7, p. 487.
- Carlson, M.P. and W. Sydow. 2005. *Reinterpreting Nebraska's Structures – New Geometry, New Exploration, New Reservoirs*; **Poster Abstract, American Association of Petroleum Geologists**, Mid-Continent Section, p. 34.
- Carlson, M.P. and W. Sydow, 2005. *Redefinition of the Tectonic Features in Portions of Nebraska and Adjoining Areas: New Approaches to Exploration*; **Oral Abstract. American Association of Petroleum Geologists** Mid-Continent Section. p. 13.
- Carlson, M.P. and S. Treves. 2005. *The Elk Creek Carbonatite, Southeast Nebraska – An Overview*; **Natural Resources Research**, V. 14, No. 1, p. 39-45.
- Carlson, M.P. 2004. *Common Ground – An Emerging Societal Role for Geoscientists*; **Geological Society of America Abstracts with Programs** V. 36, No. 5, p. 73.

OTHER PROFESSIONAL ACTIVITIES

President, Nebraska Geological Society (2004-2006)

Chief Trustee, International Basement Tectonics Association (2003-2005)

Associate Editor, Geological Society of America (2005-2007)

Chair, Preservation of Geologic Data Committee, American Association of Petroleum Geologists (2002-2005)

Nebraska Technical Representative, Interstate Oil and Gas Commission (1971-)

Member Advisory Board, Division of Environmental Geosciences American Association of Petroleum Geologists (1999-2007)

XUN-HONG CHEN, Professor, 74% Research, 24% Scholarly Service, 2% University Service

Areas of Interest: Hydrogeology, Stream-aquifer Interactions, Regional groundwater model development

Contact: xchen2@unl.edu, 402/472-0772

EDUCATION

B.S. Geology, Zhejiang University, China (1982)

M.S. Geology, California State University-Northridge (1988)

Ph.D. Hydrogeology, Department of Geology and Geophysics, University of Wyoming (1994)

PROFESSIONAL EXPERIENCE

2005-present Professor, School of Natural Resources, University of Nebraska-Lincoln

1998-2005 Associate Professor, School of Natural Resources, University of Nebraska-Lincoln

1994-1998 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln

1992-1994 TriHydro Corporation. (Environmental consulting company), Laramie, Wyoming

1982-1985 Instructor, Department of Geology, Zhejiang University, China

HONORS AND AWARDS

Chang Jiang Scholars Professor, Ministry of Education, People's Republic of China (2007)

Outstanding World Visiting Professor, Zhejiang University, China (2004)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 918 Applied Groundwater Modeling (F07)

NRES 825 Geostatistics (F05, F08)

Masters and Doctoral Students Advised

Deming Wang (M.S. Natural Resource Sciences 2008) Thesis title: Impacts of Water Pumping on Base Flow Trends in Selected Streams of Nebraska (employed by Schlumberger).

Fujian Wen (Ph.D. Natural Resource Sciences, expected 2009) Thesis title: Part I-- Spatial and Temporal **Trends of Groundwater Nitrate-N Contamination in South-Central Platte Valley of Nebraska, Part II—Evaluation of the Impact of Groundwater Irrigation on Streamflow in Nebraska.**

Cheng Cheng (Ph.D. Natural Resource Sciences, expected 2009) Thesis title: Understanding of the Hydrologic Connections between Wide-channel and Adjacent Aquifers using Numerical and Field Techniques.

Gengxin Ou (Ph.D. started Spring 2009); Tao Sun, a visiting Ph.D. student from China.

RESEARCH

I developed field techniques for determination of streambed hydraulic conductivities and applied these methods to three river basins of Nebraska, constructed a regional groundwater flow model in the eastern Platte River valley for the analysis of the impact of groundwater irrigation on stream flow, developed a finite element numerical model (with computer source codes) to analyze the interactions of stream-aquifer-riparian zone vegetation in South-Central Platte River Valley and established international collaborative research programs with four Chinese universities.

EXTENSION/OUTREACH

I provided assistance to Nebraska Department of Natural Resources (NDNR) and eight Nebraska's Natural Resources (NRD) Districts for the analysis of stream-aquifer interactions induced by groundwater irrigation and for development of integrated management plans of surface and groundwater resources. NDNR and eight NRDs provided research grants to my research. I also co-organized groundwater modeling workshops for NRD staffs.

SURVEY

I conducted streambed tests in the Blue River Basin, the Elkhorn River Basin, and the Platte River (Kearney to Ashland) to characterize the hydrologic connectedness between streams and the High Plains Aquifer with a total length of channel of 700 km. I, also, conducted four pumping tests (including construction of observation wells at each test site) to determine the hydraulic properties of the High Plains Aquifer.

UNIVERSITY SERVICE

I am a member of SNR's Promotion and Tenure Committee (2006-2009), and have been a member of several search committees for hydrology-related positions

SELECTED GRANTS AND CONTRACTS

- US-China workshop on hydroinformatics*, National Science Foundation, (with Ashok , Samal, L. Soh, A. Tomkins, and S. Zellmer), \$49,716; 8/1/2007-7/31/2008.
- Development of regional groundwater flow model in the Lower Platte area*, The Lower Platte North Natural Resources District, \$220,428; 3/1/2007-12/31/2010.
- Building knowledge discovery and information fusion tools for collaborative systems to adaptively manage uncertain hydrological resources*, National Science Foundation (with Ashok Samal, L. Soh, A. Tomkins, and S. Zellmer), \$552,100; 8/1/2006-7/31/2009.
- Streambed tests for the Elkhorn River Basin*, The Upper and Lower Elkhorn NRDs and the Nebraska Department of Natural Resources (with Sue Lackey), \$84,666; 7/2007-7/2009.
- Investigation of water and chemical movement in the vadose zone of the High Plains aquifer in the Central Platte area*, Central Platte Natural Resource District, \$48,150; 7/2004-6/2007.
- Characterization of aquifer hydraulic conductivities of an alluvial aquifer and streambed conductance in the eastern part of central Nebraska*, Upper Big Blue Natural Resource District, \$121,760; 7/ 2004-6/2007.
- Mining and exploration of groundwater and protection of the environment in arid areas* (collaborative research with a Chinese University), Ministry of Education, China, 3 million Chinese dollars; 1/2009-12/2012.

SELECTED PUBLICATIONS

- Chen, X.H., J. Song, C. Cheng, D. Wang, and S. Lackey. 2009. *A new method for mapping variability in vertical seepage flux in streambeds*. **Hydrogeology Journal** (10.1007/s10040-008-0384-0).
- Chen, X. H., M. Burbach, and C. Cheng. 2008. *Electrical and hydraulic vertical variability in channel sediments and its effects on streamflow depletion due to groundwater extraction*. **Journal of Hydrology** 352(3-4): 250-266.
- Song, J., X. Chen, C. Cheng, S. Summerside, and F. Wen. 2007. *Effects of hyporheic processes on streambed vertical hydraulic conductivity in three rivers of Nebraska*, *Geophysical Research Letters*, 34(7), L07409, doi:10.1029/2007GL029254.
- Cheng, C. and X. H. Chen. 2007. *Evaluation of methods for determination of hydraulic properties in an aquifer-aquitard system hydrologically connected to a river*. **Hydrogeology Journal** 15(4), 669-678.
- Chen, X. H. 2007. *Hydrologic connections of a stream-aquifer-vegetation zone in south-central Platte River Valley, Nebraska*. **Journal of Hydrology** 333(2-4): 554-568.
- Wen, F. J. and X. H. Chen. 2006. *Evaluation of the impact of groundwater irrigation on streamflow depletion in Nebraska*. **Journal of Hydrology** 327: 603-617.
- Chen, X, Y. Q. Chen, and X. H. Chen. 2006. *Separation of baseflow accounting for the effect of bank storage*. **Journal of Hydrology** 327(3-4): 539-549.
- Chen, X.H., and L. Shu. 2006. *Groundwater evapotranspiration captured by seasonally pumping wells in river valleys*. **Journal of Hydrology** 318(1-4): 334-347.
- Chen, X.H., and Y. Yin. 2006. *The Flexible Tolerance Method for estimating the evapotranspiration and infiltration in the root zone*. **Journal of the American Water Resources Association** 42(2): 495-512.
- Chen, X.H., and X. Chen. 2004. *Simulating the effects of reduced precipitation on groundwater and streamflow in the Nebraska Sand Hills*. **Journal of the American Water Resource Association** 40(2): 419-430.

OTHER PROFESSIONAL ACTIVITIES

- Associate Editor*, **Journal of Hydrology**, 2008-present.
- Member of Organizing Committee*, 4th Cross-strait (Taiwan-mainland China) Symposium on Soil and Groundwater Contamination and Remediation, Xi'an, China, August 2-6, 2008.
- Invited abstract*, The Geological Society of America Annual Meeting, Houston, Texas, October 4-9, 2008.
- Invited speaker*: China's Beijing Normal University, Zhejiang University, Hohai University, Chang'an University, and Nanjing Institute of Geography and Limnology of China Academy of Sciences, Beijing Institute of Atmospheric Physics of China Academy of Sciences, 2006-2008.
- Member of Organizing Committee*, Hydrological Sciences for Managing Water Resources in the Asian Developing World, Guangzhou, China, June 8-10, 2006.

STEVE D. COMFORT, Professor, 20% Teaching, 53% Research, 15% Extension/Outreach,
10% Scholarly Service, 2% University Service

Areas of Interest: Soil and Water Chemistry, Remediation of contaminated soil and water
Contact: scomfort@unl.edu, 402/472-1502

EDUCATION

B.S. Soil Science and Agricultural Extension Education, University of Wisconsin-Madison (1981)
M.S. Soil Science, University of Minnesota (1984)
Ph.D. Soil Science, University of Wisconsin-Madison (1988)

PROFESSIONAL EXPERIENCE

2004-present Professor, School of Natural Resources, University of Nebraska-Lincoln
1997-2004 Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
1992-1997 Assistant Professor, Department of Agronomy, University of Nebraska-Lincoln
1989-1992 Postdoctoral Research Associate, Montana State University
1988-1989 Postdoctoral Research Associate, Oregon State University

HONORS AND AWARDS

Recognition of Junior Faculty for Excellence in Research Award, University of Nebraska (1996)
Editor Citation for Excellence in Manuscript Review, **Journal of Environmental Quality** (1996)
Honorary Faculty Member, Hanshan Normal University, Chaozhou, China (2007)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 361 Soils, Environment and Water Quality (S05, S06, S07, S08, S09)
NRES 451/851 Soil Environmental Chemistry (S07)

Masters and Doctoral Students Advised

Jeffery Albano (M.S. Natural Resources Sciences, 2009). In Situ Chemical Oxidation of RDX-Contaminated Groundwater with Permanganate at the Nebraska Ordnance Plant
Chanat Chokejaroenrat (M.S. Environmental Engineering, 2008). Laboratory and Pilot-Scale Investigations of RDX Treatment by Permanganate.
Manmeet Waria (M.S. Natural Resource Sciences, 2007). Field-Scale Remediation of Pesticide-Contaminated Soil by a Combined Chemical-Biological Approach.
Boparai, H.K. (Ph.D., 2006). Evaluating In Situ Redox Manipulation for Remediating Pesticide- and Explosive-Contaminated Groundwater.
Onanong, S. (Ph.D., 2006). Using Gas Phase and Quantum Molecular Descriptors to Predict Dehalogenation Rates of Chlorinated Alkanes by Zerovalent Iron.
Park, J. (Ph.D., March, 2004). Remediating Munitions-Contaminated Soil with Zerovalent Iron and Surfactants.
Adam, M. (M.S. Environmental Engineering, 2003). Evaluating in-situ permanganate oxidation and biodegradation of RDX in a perched aquifer.
Santapanajaru, T. (Ph.D., 2002). Iron Mediated Destruction of Metolachlor: Roles of Surface Oxides.
Singh, J. (Ph.D., 1997). Natural and Accelerated Detoxification of Atrazine and RDX in Contaminated Soil and Water.
Bier, E.L. (M.S., 1997). Remediating RDX-Contaminated Soil by Abiotic Oxidation and Reduction Treatments.
Li, Z.M. (Ph.D., 1996). Remediating TNT-Contaminated Water and Soil by Fenton Oxidation.
Tyess, D.L. (M.S., 1996). Relationships Between Atrazine Mineralization and Soil Characteristics in the Presence of Atrazine-Degrading Microorganisms.
Martin, J.L. (M.S., 1995). Metabolism of 2,4,6-Trinitrotoluene (TNT) by *Pseudomonas savastanoi*.

RESEARCH

My interests are in understanding the fate and transport of organic chemicals in the environment and devising remediation strategies for contaminated soil and water, accidental spills and discharges of farm chemicals and industrial solvents take place each year. When these events occur, normally beneficial chemicals become sources of contamination for ground and surface water. Although the soil-water environment has an enormous potential to

naturally attenuate (adsorb, degrade) these foreign substances, this capacity can be exceeded when chemicals are deliberately or inadvertently released to localized areas. To combat these point sources of contamination, our research attempts to devise treatments that can remove these contaminants or alter their chemical structure so that natural attenuation can proceed. Examples of our work include both field-scale treatment of pesticide-contaminated soils and the use of chemical oxidants to treat contaminated groundwater. Our recent efforts are focusing on developing techniques to remove volatile organic compounds from low permeable zones in aquifers.

EXTENSION/OUTREACH

I provide in-depth training on the fate of chemicals in soils and groundwater to individuals associated with pesticide application or installation of septic systems in the state of Nebraska.

UNIVERSITY SERVICE

I coordinate Undergraduate Degree in Environmental Restoration Science at UNL.

SELECTED GRANTS AND CONTRACTS

A Solute Transport System for Systematically Evaluating Remedial Technologies for Chlorinated Solvent-Contaminated Groundwater (with Y. Li), USGS 104(b), \$11,000; March 2009-March 2010.

Using Electrical Resistivity Imaging (ERI) to Evaluate Permanganate Performance during an In Situ Treatment of a RDX-Contaminated Aquifer (with T. Halihan and V. Zlotnik) Environmental Security Technology Certification Program (ESTCP), \$98,777; January 2007- January 2008.

Field-scale demonstrations of innovative remediation techniques for contaminated soil and water. EPA Federal Earmark Appropriation, \$994,100; June 2005 –June 2009.

Bench testing for in situ ozone oxidation of high explosives. BWXT Pantex, LLC, \$44,739; 2004.

Enhancement of in situ bioremediation of energetic compounds by couple abiotic/biotic processes (with S.Comfort plus others), SERDP (Strategic Environment Research and Development Program), \$845,000 (\$186,457 to UNL); 2004.

SELECTED PUBLICATIONS

Satapanajaru, T., S. Onanong, S.D. Comfort, D.D. Snow, and D.A. Cassada, and C. Harris. 2009. *Remediating dinoseb-contaminated soil with zerovalent iron*, **Journal of Hazardous Materials** (in press).

M. Waria, S.D. Comfort, S. Onanong T. Satapanajaru, H. Boparai, C. Harris, D. D. Snow, and D.A. Cassada. 2009. *Field-Scale Cleanup of Atrazine and Cyanazine Contaminated Soil with a Combined Chemical-Biological Approach*, **Journal of Environmental Quality** (in press).

Boparai, H.K., P.J. Shea, S.D. Comfort, and T.A. Machacek. 2008. *Sequencing zerovalent iron treatment with carbon amendments to remediate agrichemical-contaminated soil*, **Water, Air and Soil Pollution**, 193, 189-196.

Boparai, H.K., S.D. Comfort, P.J. Shea, and J.E. Szecsody. 2008. *Remediating explosive-contaminated groundwater by in situ redox manipulation (ISRM) of aquifer sediments*, **Chemosphere**, 71, 933-941.

Onanong, S. S.D. Comfort, P.D. Burrow, and P.J. Shea. 2007. *Using gas-phase molecular descriptors to predict dechlorination rates of chloroalkanes by zerovalent iron*, **Environmental Scientific Technology**, 41, 1200-1205.

Onanong, S., P.D. Burrow, S.D. Comfort, and P.J. Shea. 2006. *Electron capture detector response and dissociative electron attachment cross sections in chloroalkanes and chloroalkenes*, *The Journal of Physical Chemistry A*, 110, 4363-4368.

Adam, M.A., S.D. Comfort, D.D. Snow, D. Cassada, M.C. Morley, and W. Clayton. 2006. *Evaluating ozone as a remedial treatment for removing RDX from unsaturated soils*, **Journal of Environmental Engineering**, 132, 1580-1588.

Boparai, H.K., P.J. Shea, S.D. Comfort, and D.D. Snow. 2006. *Dechlorinating chloroacetanilide herbicides by dithionite-treated aquifer sediment and surface soil*, **Environmental Scientific Technology**, 40, 3043-3049.

Park, J., S.D. Comfort, P.J. Shea, and J.S. Kim. 2005. *Increasing Fe^0 -mediated HMX destruction in highly contaminated soil with didecyltrimethylammonium bromide surfactant*, **Environmental Scientific Technology**, 39, 9683-9688.

KENNETH F. DEWEY, Professor, 15% Teaching, 83% Extension/Outreach, 2% University Service (9-Month, Academic Year Appointment)

Areas of Interest: Regional Climatology, climate variation, severe storms climatology, severe weather education and preparedness

Contact: kdewey1@unl.edu, 402/472-2908

EDUCATION

B.S. Geography, Elmhurst College, Elmhurst, IL (1969)

M.S. Geography-Meteorology, Northern Illinois University, DeKalb, IL (1970)

Ph.D. Geography-Climatology, University of Toronto, Toronto, ON (1973)

PROFESSIONAL EXPERIENCE

1999-present Professor, School of Natural Resources, University of Nebraska-Lincoln

1988-1998 Professor, Department of Geography, University of Nebraska-Lincoln

1980-1987 Associate Professor, Department of Geography, University of Nebraska-Lincoln

1978-1980 Assistant Professor, Department of Geography, University of Nebraska-Lincoln

1976-1977 Research Associate, Techniques Development Lab, NWS, Washington, D.C.

1973-1976 Assistant Professor, Department of Geography, University of Nebraska-Lincoln

TEACHING (last five years)

Courses Taught (Fall, Spring, Summer)

METR 351 Applied Climatology (F04, F05, F06, F07)

NRES 351 Applied Climatology (F08)

NRES 299 Climate in Crisis (S09)

Masters and Doctoral Students Advised

Jeremy Bower (M.S. SNR, Summer 2009) Thesis title –“The potential Impact of a Major Tornado Passing through Lincoln, NE”.

RESEARCH

I do not have a research appointment.

EXTENSION/OUTREACH

The annual Central Plains Severe Weather Symposium and Family Weatherfest has over 3,500 people of all ages attend each spring. This event is the largest attended non-athletic event at UNL and there is also extensive media coverage of this event. The websites that I maintain and create content for have been used extensively by the local media and have also been featured on ABC National News, “Good Morning America” and The Weather Channel. The outreach focus on severe weather preparedness in SNR has created important partnerships with the National Weather Service, various Emergency Management Agencies and the media. Having been appointed to the UNL Chancellor’s Speaker’s Bureau gives me the opportunity to showcase UNL and bring climate education to the general public.

UNIVERSITY SERVICE

As advisor to the, Environmental Studies, Applied Climate Sciences major I have recruited new students to IANR and SNR. As a Member of the UNL-CASNR Teaching and Learning Council. I have worked to improve the teaching community in IANR. As the UNL representative at the annual University Corporation for Atmospheric Research meeting, I have represented the Chancellor’s office and helped bring national attention to UNL. As a member of the SNR Outreach Committee, there has been a greatly increased emphasis on the important role of outreach to the community.

SELECTED PUBLICATIONS

- Dewey, K.F. 2005. *The Troposphere*, **The Encyclopedia of Climatology**, Springer Publishing, New York.
- Dewey, K.F. 2004. *Blizzards*, **The Encyclopedia of The Great Plains**, University of Nebraska Press, Lincoln, NE.
- Dewey, K.F. 2004. *Tornadoes*, **The Encyclopedia of The Great Plains**, University of Nebraska Press, Lincoln, NE.
- Dewey, K.F. 2001. *Climate and the West*, **Journal of the West**, p. 6-9.
- Dewey, K.F. 2001. *Weather of the West*, **Journal of the West**, p. 31-38.
- Dewey, K.F. 2000. *Active Learning in Introductory Climatology*, **Journal of College Science Teaching**, Vol. 29, p. 265-272.

OTHER PROFESSIONAL ACTIVITIES

- Chair*, American Meteorological Society, National Board, Local Chapters Committee, 2007-2009
- Member*, American Meteorological Society, National Board, Local Chapters Committee, 2004-2009
- Planning Committee*, Annual Meeting of the American Meteorological Society, 2007-2009
- Chair*, Planning Committee, Central Plains Severe Weather Symposium and Family Weatherfest, 2001-2009
- Advisor*, Environmental Studies, Applied Climate Sciences, 2007-2009
- Member*, UNL-CASNR Teaching and Learning Council, 2005-2008
- Academic Senate Representative* for SNR/IANR, 2003-2009
- UNL representative* at the annual University Corporation for Atmospheric Research meeting 1997-2009
- Member*, SNR Outreach Committee, 2005-2009
- Chancellor's Speakers Bureau*, UNL, 2008-2009
- Webmaster* —"Incoln Weather and Climate", —"Nebraska Weather Photos", —"Nebraska Weather and Climate"
- Member* Storm safety preparedness workshops given to numerous regional agencies and businesses
- Member* Storm Spotter Training workshops offered annually in Southeast Nebraska
- Invited Keynote speaker* Rivers and Wildlife Celebration, Kearney, NE, March 21, 2009
- Invited Keynote speaker*, Focus the Nation Climate Change Symposium, January 30, 2008.
- Invited Keynote speaker* „Lincoln —On a City One Book" Community Series,, Lincoln, NE, October 28, 2007
- Invited Keynote speaker*, Annual REASON Forum, Omaha, NE, September 17, 2007
- Invited Keynote speaker*, —"Grassland Days" festival, Milligan, NE, March 7. 2006
- Invited Keynote speaker*, National Severe Storms Workshop, Oklahoma City, OK, March 2-4, 2006.
- Invited Keynote speaker*, Pennsylvania Geographic Society, Pittsburgh, PA, October 28, 2005.
- Invited Keynote speaker*, High Plains National Weather Association, North Platte, NE, Oct. 5-7, 2005
- Invited Keynote speaker*, Nebraska Emergency Management, Grand Island, NE, April 16, 2005.

YA DING, Post-doctoral Research Associate, 70% Research, 30% Scholarly Service

Areas of Interest: Environmental and Natural Resource Economics, Drought Impact Assessment

Contact: yding2@unl.edu, 402/472-6740

EDUCATION

B.S. International Trade, Renmin University of China, Beijing, China (1999)

Ph.D. Agricultural Economics, Kansas State University, Manhattan, Kansas (2005)

PROFESSIONAL EXPERIENCE

2006-present Postdoctoral Research Associate, School of Natural Resources, University of Nebraska-Lincoln

2005-2006 Postdoctoral Research Associate, Department of Agricultural Economics, Kansas State University

2000-2005 Graduate Research Assistant, Department of Agricultural Economics, Kansas State University

RESEARCH

I have conducted research on the economic impacts of drought to improve both qualitative and quantitative assessment of drought impacts. Develop and update databases in relation to drought economic impacts, drought mitigation strategies, and government policies. Analyze the adaptation of farming practices in response to climate change.

UNIVERSITY SERVICE

I have promoted and disseminated the importance of drought mitigation and preparedness as well as effective mitigation strategies. Introduce National Drought Mitigation Center (NDMC) publications and tools to economic colleagues and the general public.

SELECTED GRANTS AND CONTRACTS

Hawaii Drought Plan, Investigator. Funded by Commission on Water Resource Management, State of Hawaii, \$100,000; June 23, 2008-June 22, 2010.

Estimating the impacts of complex climatic events: The economic costs of drought in Colorado, Nebraska and New Mexico, Co-Investigator. Funded by U.S. Department of Agriculture/Risk Management Agency and National Oceanic and Atmospheric Administration, \$300,000; July 01, 2006-June 30, 2009.

The Impact of Weather Extremes on Agricultural Production Methods: Does Drought Increase the Adoption of Conservation Tillage Practices?, Primary Investigator. Funded by Agricultural Research Division, University of Nebraska-Lincoln. \$19,9330; July 01, 2007-June 30, 2008.

SELECTED PUBLICATIONS

Ding, Y., K. Schoengold, and T. Tadesse, 2008. *The Impact of Weather Extremes on Agricultural Production Methods: Does drought increase adoption of conservation tillage practices?* Submitted to **Journal of Agricultural and Resource Economics**.

Ding, Ya and Hua Fang. *Climate Risks and the Adoption of Conservation Tillage Systems: An application of Growth Mixture Model*. Abstract, **Journal of Agricultural and Resource Economics**, forthcoming.

Ding, Ya and Kelly Helm Smith. 2008. *2007 Drought Economic Impacts*, Crop Insurance Today, **Publication of National Crop Insurance Services**, Vol. 41, No. 1 February 2008, 7-9.

Ding, Ya. 2007. *Economic Impacts of Drought in 2006*. DroughtScape, the **Newsletter of National Drought Mitigation Center**, issue of 2007 winter.

Ding, Ya and Jeffrey Peterson. 2006. *The Choice of Irrigation Technologies and Groundwater Conservation: Impacts of Cost-share Programs in the Kansas High Plains*, Abstract, **Journal of Agricultural and Resource Economics** 31(3) (December 2006): 693.

Peterson, Jeffrey and Ya Ding. 2005. *Economic Adjustments to Groundwater Depletion in the High Plains: Do Water-Saving Irrigation Systems Save Water?* **American Journal of Agricultural Economics** 87(1) (February 2005): 147-159.

ALLEN L DUTCHER, Associate Geoscientist – State Climatologist, 70% Extension/Outreach,
25% Scholarly Service, 5% University Service

Areas of Interest: Applied Climate Sciences, Water Resources

Contact: adutcher1@unl.edu, 402/472-5206

EDUCATION

B.S. Meteorology, Iowa State University (1985)

M.S. Agricultural Climatology, Iowa State University (1989)

PROFESSIONAL EXPERIENCE

2006-present Associate Geoscientist - State Climatologist, School of Natural Resources, University of Nebraska-Lincoln

1991-2006 State Climatologist, Department of Agricultural Meteorology – School of Natural Resources, University of Nebraska-Lincoln

1989-1991 Research Climatologist, High Plains Regional Climate Center, University of Nebraska-Lincoln

RESEARCH

My current research involves identifying the impacts of station moves and time of observation changes on long term climatic temperature trends across Nebraska. Before quantifying the degree of temperature increase during the past 100 years, it is necessary to correct for these influences have on historical records. A second area of research is centered on identifying the influence of short and long term trends on agricultural and hydrological drought. These triggers will assist the Water Availability Outlook Committee in identifying the drought risk heading into the growing season so that state officials can put contingency plans in place based upon the degree of risk.

EXTENSION/OUTREACH

My current extension/outreach commitments include providing real time climatic analysis and graphics of predefined variables to Nebraska Ag Statistics and CropWatch. In addition, the Nebraska State Climate Office provides climatic data and analysis to an average of 750 users per year. Approximately 250 media interviews are given on topics including seasonal forecasts, drought risk, soil moisture analysis, and climatic tendencies. An average of 15-20 news articles, print news releases, and radio tapings are provided through UNL's Communications Information Technology department to media outlets to keep them abreast of pressing climate issues. Bi-monthly weather forecasts are provided to Heartland Express, as well as weekly forecasts for Market Journal and the World Wide Agricultural Network.

SURVEY

I am currently upgrading the Nebraska State Climate Office website to conform to UNL standards. When this site is completed, approximately 22,000 graphic and tabular files will be available to public covering topics such as climatic probabilities for selected temperature and precipitation variables, historical temperature and precipitation summaries, daily maps of temperature and precipitation variables at defined time scales, and monthly state climatic summaries using National Weather Service and High Plains Regional Climate Center observational networks.

UNIVERSITY SERVICE

My current activities include serving on the SNR Survey committee and the Applied Climate Sciences monthly faculty meetings. Recent ACS activities include the development of an undergraduate major/minor and a proposed summer institute on Climate Change. I, also, have been the UNL Extension representative to the Nebraska governors Climate Assessment Response Committee which is responsible for analyzing current climate patterns and recommending actions that state agencies should consider based upon recent and expected trends.

SELECTED PUBLICATIONS

Dutcher, A. L. 2009. *Spring Precipitation could have Varying Effects with some Extremes*, **IANR, Communications and Information Technology News Release**. April 3.

Dutcher, A.L. 2009. *General Weather Outlook for the Next Two Weeks*, **Farm-and-Ranch's Heartland Express**, April 2 edition.

Dutcher, A.L. 2009. *March 2009 Nebraska Preliminary Climatic Update*, **High Plains Regional Climate Center**, March Newsletter. <http://www.hprcc.unl.edu/>.

- Dutcher, A.L. 2009. *Flood Potential: Soils in Central, Eastern Nebraska Near Saturation*, **CropWatch**, March 27 edition.
- Dutcher, A.L. 2009. *A Summary of Current Climate Conditions and Drought Risks Facing Nebraska*, **Water Availability and Outlook Committee Assessment**. Report to the Nebraska Climate Assessment and Response Committee (CARC) Dutcher, A.L. 2009. *A Summary of Current Climate Conditions and Drought Risks Facing Nebraska*. **Water Availability and Outlook Committee Assessment**. Available on the Nebraska Climate Assessment and Response Committee (CARC) website. <http://carc.agr.ne.gov/>.
- Hunt, E., K. Hubbard, D. Wilhite, T. Arkebauer, and A. Dutcher. 2009. *The Development and Evaluation of a Soil Moisture Index*, **International Journal of Climatology** 29: 747-759.
- Dutcher, A. L. 2008. *A Climatic Analysis of the November, 2005 Blizzard Event*, Research Report for Federal Court Case: Adams Cattle Company vs Prudential Insurance Company. 158 pages.

OTHER PROFESSIONAL ACTIVITIES

- Member*, American Association of State Climatologists (1991- present)
- Member*, Membership Committee, American Association of State Climatologists (2008-present)
- Operator*, American Association of State Climatologists List-Server (1998-present)
- Chairman*, Water Availability and Outlook Committee, sub-committee of Nebraska's Climate Assessment and Response Committee (2001-present).

SONG FENG, Research Assistant Professor, 100% Research
(9-Month, Academic Year Appointment)

Area of Interest: Regional and global climate variations; climate modeling; Paleoclimate change

Contact: sfeng2@unl.edu, 402/472-6660

EDUCATION

B.S. Meteorology, Yunnan University, Kunming, China, July 1993

B.S. Economics (minor), Yunnan University, Kunming, China, July 1993

M.S. Meteorology, Lanzhou Institute of Plateau Atmospheric Physics, Chinese Academy of Sciences, China, July 1996

Ph. D. Atmospheric Physics, Lanzhou Institute of Plateau Atmospheric Physics, Chinese Academy of Sciences, China, July 1999

PROFESSIONAL EXPERIENCE

2007-present Climatologist/Research Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln.

2001-2008 Research specialist, School of Natural Resource, University of Nebraska-Lincoln.

1999-2001 Visiting scholar, School of Natural Resource Sciences, University of Nebraska-Lincoln.

1993-1999 Graduate research assistant, Lanzhou Institute of Plateau Atmospheric Physics, Chinese Academy of Sciences.

Graduate students' advisees/committee

Ryan Ruhge (M.S., Meteorology, current)

Kristen Fox (M.S., Meteorology, current)

RESEARCH

My main research interests involve regional climate change and impacts; regional and global climate modeling, and paleoclimate changes. During the past several years my research has focused on understanding precipitation variations in the central United States and the variability of summer monsoon rainfall in the North America using advanced diagnostic tools and the regional climate models, identifying physical mechanisms causing the inter-annual and longer climate variations in North America, understanding the physical processes that caused the persistent drought (e.g. the medieval megadrought) in the Great Plains using atmospheric models and atmosphere-ocean coupled models, evaluating and understanding land surface-atmosphere interactions on climate prediction on seasonal timescales and meteorological data quality assessment. I'm interested in using global and regional climate models to help understand the physical processes that cause the past and present-day climate changes. I'm also involved in studying the impact of climate changes on regional agriculture and hydrology.

SELECTED GRANTS AND CONTRACTS

Understanding the role of Atlantic sea surface temperatures on persistent drought in the U.S. Great Plains. Office of Research, University of Nebraska-Lincoln, \$10,000; June 2009-May. 2010.

SELECTED PUBLICATIONS

Feng S., R.J. Oglesby, C. Rowe, D. Loope and Q. Hu, 2008. *Atlantic and Pacific SST influences on Medieval drought in North America simulated by the Community Atmospheric Model.* **Journal of Geophysical Research** 113, D11101, doi:10.1029/2007JD009347.

Hu Q. and S. Feng, 2008. *Variation of North American summer monsoon regimes and the Atlantic multidecadal oscillation.* **Journal of Climate** 21: 2371-2383.

Feng S. and Q. Hu, 2008. *How the North Atlantic Multidecadal Oscillation may have influenced the Indian summer monsoon during the past two millennia?* **Geophysical Research Letter** 35, L01707, doi:10.1029/2007GL032484.

Feng S., S. Nadarajah and Q. Hu, 2007. *Modeling annual extreme precipitation in China using generalized extreme value distribution.* **Journal of Meteorologic Society** Japan, 85: 599-613.

Hu Q., and S. Feng, 2007. *Decadal variations of the Southwest U.S. summer monsoon circulation and rainfall in a regional model.* **Journal of Climate**, 20: 4702-4716.

- Feng S. and Q. Hu, 2007. *Changes in winter snowfall/precipitation ratio in the contiguous United States*. **Journal of Geophysical Research** 112, D15109, doi:10.1029/2007JD008397.
- Feng, S., and Q. Hu, 2005: *Regulation of Tibetan Plateau heating on variation of Indian summer monsoon in the last two millennia*. **Geophysical Research Letters**. 2004GL021246.
- Feng, S. and Q. Hu, 2004: *Variation in teleconnection of ENSO and summer rainfall in northern China: A role of the Indian summer monsoon*. **Journal of Climate** 17: 4871-4881.
- Feng, S., Q. Hu, and W. Qian, 2004: *Quality control of daily meteorological data in China 1951-2000: A new dataset*. **International Journal of Climatology** 24: 853-870.
- Feng, S. and Q. Hu, 2004: *Changes in the agro-meteorological indicators in the contiguous United States: 1951-2000*. **Theoretic Application of Climatology** 78: 247-264.

OTHER PROFESSIONAL ACTIVITIES

Member, American Geophysical Union

Member, International Association of Hydrological Sciences

Reviewer for manuscripts submitted to: Journal of Climate (since 2005), Climatic Change (since 2008), Journal of Geophysical Research-Atmospheres (since 2005), Geophysical Research Letter (since 2008), Earth and Planet Science Letter (2008), Quaternary international (since 2008), Theoretical and Applied Climatology (since 2005), International journal of climatology (since 2005), Meteorology and atmospheric physics (since 2005), Journal of Arid Environment (since 2005), Hydrological Science (since 2005) Journal, Advances in Atmospheric Sciences (since 2008)

DENNIS M. FERRARO, Extension Educator and Herpetologist, 20% Teaching,
80% Extension/Outreach (Southeast Research and Extension Center)

Areas of Interest: National Herpetological Conservation, International Amphibian Decline, Sustaining Herpetofauna
Biodiversity

Contact: dferraro1@unl.edu, 402/472-8248

EDUCATION

B.S.	Zoology (Wildlife Biology), Iowa State University (1978)
M.S.	Graduate Research in Herpetology, Iowa State University (1978)
Associate Certified Entomologist	Purdue University Distance Education (1981)
M.S.	Biology (Herpetology), University of Nebraska-Omaha (1993)

PROFESSIONAL EXPERIENCE

1990-present	Faculty, University of Nebraska-Lincoln
1982-1989	Operations Manager, Atlas Pest Management Incorporated

RESEARCH

I have conducted herpetological surveys and monitoring projects in five states in the past 25 years. I conducted annual Herpetofauna surveys across Nebraska and have collected data on over 3,700 snakes, 3,400 amphibians, 410 turtles and lizards in the past 19 years. I maintain the university's live animal lab of native Herpetofauna for research and educational purposes. I have developed health and medical protocol for their care. I maintain the state's herpetological website, "Reptiles and Amphibians of Nebraska". I am a consultant on Herpetofauna for the Nebraska Game and Parks Commission's Natural Legacy Project. I do radio tracking and telemetry in reptiles, plus surgically implanting transmitters in snakes. I have an ongoing nine-year Prairie Rattlesnake study in the Sand Hills of Nebraska and conduct amphibian disease and malformality tests in Nebraska.

SELECTED PUBLICATIONS

- Ferraro, Dennis. 2008. *Frog Calls of Nebraska* (Developed and created)
- Ferraro, Dennis, S. Hygnstrom and S. Vantassel. 2006. *Bats in and around Structures*. **NebGuide**, University of Nebraska-Lincoln.
- Ferraro, Dennis. 2005. *Congenitally divided subcaudal ventral scales in Crotalus viridis*. **Herpetology Natural History** 23:2.
- Ferraro, Dennis. 2005. *Cannibalism in the Smooth Green snake (Liophorophis vernalis)*, **Bulletin Herpetology Notes**, 3:23-24.
- Ferraro, Dennis and S. Hygnstrom. 2004. *Moles and their Control*. **NebGuide**, University of Nebraska-Lincoln.
- Ferraro, Dennis. 2002. *Basics: Bats are a gardener's best friend*. **Fine Gardening**, May 2002, No. 85: pages 34-36.
- Ferraro, Dennis. 1995. *The Efficacy of Naphthalene and Sulfur Repellents to Cause Avoidance Behavior in the Plains Garter Snake*. Pages 116-120 in R.E. Master and J.G. Huggins, editors, Twelfth Great Plains Wildlife Damage Workshop Proceedings, Published by **Noble Foundation**, Ardmore, Oklahoma.
- Ferraro, Dennis. 1984. *Observations of prey luring in the Argentine Horned Frog (Ceratophrys ornata)*. **Herpetology Review** 15(1):23.
- Ferraro, Dennis. 1983. *The Smallmouth Salamander (Ambystoma texanum) in Iowa and Nebraska*. **Bulletin Nebraska Herpetologist Society** Vol. 5.

OTHER PROFESSIONAL ACTIVITIES

- American Society of Ichthyologists and Herpetologists
- Center for North American Herpetology
- Center of Great Plains Studies
- Conservation Biology Society
- Herpetofauna Conservation Society
- Herpetological League
- Kansas Herpetological Society
- Nebraska Herpetological Society
- Society for the Study of Amphibians and Reptiles
- Wildlife Society

JOSEPH J. “TJ” FONTAINE, Adjunct Assistant Professor, 0% Teaching, 0% Research,
0% Extension/Outreach, 0% University Service

Areas of Interest: Evolutionary Ecology, Life History Theory, Conservation Biology

Contact: jfontaine2@unl.edu, 402/472-0339

EDUCATION

B.S. Wildlife Biology, The University of Montana (1997)

Ph.D. Fish and Wildlife Biology, The University of Montana (2006)

PROFESSIONAL EXPERIENCE

2009-present Assistant Unit Leader, USGS Nebraska Coop. Fish and Wildlife Research Unit

2009-present Adjunct Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln

2007-2009 Senior Research Specialist, USGS Sonoran Desert Research Station and the School of Natural Resources, University of Arizona

HONORS AND AWARDS

Best Student Presentation, University of Montana Research Conference (2006)

Best Student Presentation, Montana Chapter of the Wildlife Society (2006)

Best Student Presentation, American Ornithological Union (2005)

Student Travel Award, American Ornithological Union (2005)

GK-12 Graduate Fellowship, National Science Foundation (2005)

EPSCOR Graduate Fellowship, National Science Foundation (2004)

EPSCOR Graduate Fellowship, National Science Foundation (2003)

EPSCOR Graduate Fellowship, National Science Foundation (2000)

Student Membership Award, Cooper Ornithological Society (1997)

TEACHING

Courses Taught (Fall, Spring, Summer)

BIOC 623 Biology Update II – Ecology and Evolution (Su 08, University of Arizona)

WBIO 370 Wildlife Habitat Conservation and Management (F06, University of Montana)

BIOL 110 Principles of Biology (Su06, University of Montana)

RESEARCH

Dr. Fontaine’s research focuses on ecological and evolutionary sources of variation in phenotypic expression, particularly as it applies to the conservation and management of species. In particular, his research has addressed questions concerning how changes in ecological signals affect the process and associated costs of habitat decisions in birds. His research is initiated in response to the needs of Cooperators associated with the Nebraska Cooperative Fish and Wildlife Research Unit and are designed to provide information useful in improving the conservation and management of wildlife.

EXTENSION/OUTREACH

Dr. Fontaine has a strong interest in improving natural science education for K-12 students and educators, and has participated extensively in local and regional K-12 science. This has included participating in a National Science Foundation GK-12 program at the University of Montana, leading a National Wildlife Society field exercise for students and teachers from the San Carlos Apache Reservation High School, Arizona, and teaching courses in the Science Teacher Preparation Program at the University of Arizona. Dr. Fontaine has also published several exercises and articles focused on public (USGS Factsheet, In press) and K-12 (Science Activities 45:3-7, Science Teacher 74:38-42) education.

SELECTED GRANTS AND CONTRACTS

The impacts of dewatering and sewage effluent on a desert riparian ecosystem, T&E Inc., Grant for Conservation Biology Research, \$2,475; January 2009–January 2010.

- Flooding and contaminants in the Santa Cruz Watershed* (with J. Callegary, C. van Riper, F. Gray, and L. Norman), USGS Border Environmental Health Initiative, \$1.1 million; September 2008–September 2013. (Award transferred to C. van Riper upon departure from the University of Arizona).
- Desert monitoring program U.S. Marine Corps Air Station Yuma* (with C. van Riper and L. Graumlich) Cooperative Ecosystem Studies Agreement US Marine Corps, \$70,000; September 2008–January 2010. (Award transferred to C. van Riper upon departure from the University of Arizona).
- Climate change as a challenge to bird conservation in arid and semi-arid regions* (with S. Skagen, A. Farmer, M. Anderson, G. Delin, M. Drummond, M. Scott, J. Smith, C. Stricker, and C. van Riper), USGS Global Change, \$99,191; January 2007–July 2009.

RELEVANT SCIENTIFIC PUBLICATIONS

- Robertson, B.A., B.A. Schwartz, E. Loomis and J.J. Fontaine. In Press. *Protracted song ontogeny in a suboscine passerine*. **Wilson Journal of Ornithology**.
- McGrath, L.J., C. van Riper, and J.J. Fontaine. 2009. *Flower power: Tree flowering phenology as a settlement cue for migrating birds*. **Journal of Animal Ecology** 78:22-30.
- van Riper, C., III, K. Paxton, C.J. van Riper, K.A. van Riper, L. McGrath, and J.J. Fontaine. 2008. *The role of protected areas as bird stop-over habitat*. Pp. 312-320, In: **Rethinking Protected Areas in a Changing World**. (S. Weber and D. Harmon, Eds.). The George Wright Society, Hancock, MI.
- Fontaine, J.J., M. Martel, H.M. Markland, A.M. Niklison, K.L. Decker and T.E. Martin. 2007. *Testing ecological and behavioral correlates of nest predation*. **Oikos** 116:1887-1894.
- Auer, S.K., R.D. Bassar, J.J. Fontaine, and T.E. Martin. 2007. *Breeding biology of passerines in a subtropical montane forest in Northwestern Argentina*. **Condor** 109:321-333.
- Fontaine, J.J., and T.E. Martin. 2006. *Habitat selection responses of parents to offspring predation risk: an experimental test*. **American Naturalist** 168:811-818.
- Fontaine, J.J., and T.E. Martin. 2006. *Parent birds assess nest predation risk and adjust their reproductive strategies*. **Ecology Letters** 9:428-434.
- Martin, T.E., R.D. Bassar, S.K. Bassar, J.J. Fontaine, P. Lloyd, H. Mathewson, A. Niklison, and A. Chalfoun. 2006. *Life history and ecological correlates of geographic variation in egg and clutch mass among passerine species*. **Evolution** 60:390-398.
- Martin, T.E., P.R. Martin, C.R. Olson, B.J. Heidinger, and J.J. Fontaine. 2000. *Parental care and clutch sizes in North and South American birds*. **Science** 287:1482-1485.

OTHER PROFESSIONAL ACTIVITIES

- Student Award Committee*, Cooper Ornithological Society, April 2009–present.
- Local Committee Chair*, 79th Annual Meeting of the Cooper Ornithological Society, Tucson, AZ, April 17, 2009.
- Invited speaker*, Symposium on Climate Change: Consequences For Birds, Cooper Ornithological Society Annual Meeting, Tucson, AZ, April 17, 2009.
- Invited Speaker*, Williams Memorial Lecturer, School of Natural Resources Spring Water Series, University of Nebraska-Lincoln., Lincoln, NE, March 4, 2009.
- Invited Speaker*, Ramsey Canyon Preserve. The Nature Conservancy of Arizona. Sierra Vista, AZ, April 24, 2008.
- Invited Speaker*, The Smithsonian Tropical Research Institute. Barro Colorado Island, Panama, September 7, 2005.
- Invited Speaker*, The Percy Fitzpatrick Institute, University of Cape Town. Cape Town, South Africa, October 17, 2002.
- Journal Referee*, Behavioral Ecology, Condor, Ethology, Functional Ecology, Ibis, Journal of Field Ornithology, Wilson J. Ornithology, J. Ornithology, Oecologia, Journal of Animal Ecology, Oikos.
- Academic press Referee*, University of Arizona Press.
- Research Grant Referee*, National Science Foundation CAREER Grant Cluster 2008, National Science Foundation Ecological Biology Cluster, 2007.

PATRICIA —Trisli FREEMAN, Professor, 25% Teaching, 48% Research, 25% Scholarly Service, 2% University Service

Areas of Interest: Mammalian Biology, Functional Morphology, Evolution and Systematics, Vertebrate Zoology
Contact: pfreeman1@unl.edu, 402/472-6606

EDUCATION

A.B. Biology, Randolph-Macon Woman's College (1969)

Ph.D. Biology, University of New Mexico (1977)

PROFESSIONAL

2003-present Professor, School of Natural Resources, University of Nebraska-Lincoln (UNL)
2000-2002 Associate Director of Research, University of Nebraska State Museum (UNL)
1998-2003 Professor and Curator of Zoology, University of Nebraska State Museum (UNL)
1990-1998 Associate Professor and Curator of Zoology, University of Nebraska State Museum (UNL)
1981-1990 Assistant Professor and Curator of Zoology, University of Nebraska State Museum (UNL)
1977-1981 Assistant Curator and Head, Division of Mammals, Field Museum of Natural History, Chicago, IL

HONORS AND AWARDS

Maude Hammond Fling Award, UNL Research Council (2008)

"Certificate of Recognition for Contributions to Students." UNL Parents Association (2005)

Gerritt S. Miller Award for Contributions to Bat Biology by North American Symposium on Bat Research (2001)

Phi Beta Kappa, Keynote Speaker, Randolph-Macon Woman's College, Lynchburg, VA. (1988)

Albert M. and Alma Shadle Fellowship in Mammalogy given by the American Society of Mammalogists (1974)

TEACHING

NRES 492	Field Course, Big Bend National Park (S09)
NRES 404	Senior Seminar (S08)
NRES 476/876, BIOS 476/876 and lab	Mammalogy (S07, F 08, F09)
BIOS 386, NRES 386 and lab	Vertebrate Zoology, (F04, F05, F06, F07, S08, S09)
NRES 211	Introduction to Conservation Biology (F04, F05)

Masters and Doctoral Students Advised

Justin Hoffman (Ph.D. Applied Ecology School of Natural Resources 2008) Evaluation and application of predictive habitat modeling in ecology.

Amanda B. Goudy (MS School of Biological Sciences 1998) Facial Morphology and Echolocation in Chiroptera.

Russell A. Benedict (PhD School of Biological Sciences 1997) Morphological and genetic analyses of hybrid zone between short-tailed shrews (*Blarina*) in Nebraska.

Scott C. Pedersen (PhD School of Biological Sciences 1993) Ontogenetic basis of head posture in Chiroptera.

Michael Roedel, MS School of Biological Sciences 1991) The increase of woody vegetation and associated expansion of range of *Peromyscus leucopus* (Rodentia) along the Republican River in southwest Nebraska.

RESEARCH

I am interested in the evolution, biomechanics, and function in the teeth, jaws and skull of small mammals.

Particularly I explore the tooth/food interface. I am in the process of gathering experimental data on bite forces in bats. How these forces may affect the kinds of prey captured and eaten will be the critical question. Field work and feeding experiments with insects of different cuticle "toughness" will help me answer how distinct forms are functioning.

SURVEY

Much of my background has been as Curator of Zoology of the University of Nebraska State Museum. I supervise collections of mammals, birds, amphibians, reptiles and fish and oversee a collections manager for those collections. Databases in zoology are captured electronically. Collections continue to grow, between 250 and 300 visitors use the collections each year, and it is a net lender of specimens. Further, I study the distributions of mammals in Nebraska and am contributing to a large project that will update a previous study from the 1960's. My co-authors and I have

found that the distribution of 25% of the species in the state have significantly changed in the past 50 years. Before/after studies such as this are critical in understanding expansion and contractions of distributions and what external forces including climate may be affecting them.

UNIVERSITY SERVICE

I was a member of the University Fulbright Committee in 2008 and a member of the Search Committee for Vertebrate Paleontologist, Geosciences, from 2007 to 2008. I was the Library Book Chair and SNR liaison with the University Library from 2007 to 2012. I was the Chair of the Scholarship Committee, Board of Governors, for the Center for Great Plains Studies. I was a member of the Accreditation Committee for the University of Nebraska Museum in 2005. In 2005 I was elected to the Board of Governors for the Center for Great Plains Studies. I was a member of the Search Committee for the Director, SNR, from 2005 to 2007 and a member of the Museum Grants Committee from 2005 to 2009.

SELECTED GRANTS AND CONTRACTS

Development of a Distributed Information Network of North American Herpetological Databases (HerpNet), NSF (collaborative project with KU), \$5,723; 2002-2008.

Quantifying the bite forces in live insectivorous bats, Maude Hammond Fling, UNL, \$6,500, January 1, 2007 to March 31, 2008.

SELECTED PUBLICATIONS

Freeman, P.W., and Cliff A. Lemen. 2009. *Puncture resistance of gloves for handling bats*. **Journal of Wildlife Management**. In press.

Genoways, H. H., J. Hoffman, P. W. Freeman, K. Geluso, R. A. Benedict, and J. J. Huebschman. 2008. *The Mammals of Nebraska: Checklist, Key, and Bibliography*. **Bulletin of the University of Nebraska State Museum** 23: 1-92.

Freeman, P.W., and Cliff A. Lemen. 2008. *A simple morphological predictor of bite force in rodents*. **Journal of Zoology (London)** 275: 418-422.

Freeman, P.W., and Cliff A. Lemen. 2008. *Material properties of coyote dentin under bending: gradients in flexibility and strength by position*. **Journal of Zoology (London)** 275: 106-114.

Freeman, P.W., and Cliff A. Lemen. 2008. *Measuring bite force in small mammals with a piezo-resistive sensor*. **Journal of Mammalogy** 89: 513-517.

Freeman, P.W., and Cliff A. Lemen. 2007. *The tradeoff between strength and tooth penetration: Predicting optimal shape of canine teeth*. **Journal of Zoology (London)** 273:273-280.

Freeman, P. W., and Cliff A. Lemen. 2007. *Using scissors to quantify hardness of insects: Do bats select for size or hardness?* **Journal of Zoology (London)** 271:469-476.

Freeman, P.W., and Cliff A. Lemen. 2007. *An experimental approach to quantifying strength of canine teeth*. **Journal of Zoology (London)** 271:162-169.

Freeman, P.W., and C.A. Lemen. 2006. *Puncturing ability of idealized canine teeth: edged and non-edged shanks*. **Journal of Zoology (London)** 269: 51-56.

OTHER PROFESSIONAL ACTIVITIES

Referee for 7 journal articles in Journal of Zoology, Journal of Mammalogy, Zoological Journal of the Linnean Society, Biological Journal of the Linnean Society, Anatomical Record; 4 chapters in 2 books; 2 proposals for NSF; and one full professor file for U. Mass.

Referee for 4 journal articles in Acta Chiropterologica, Integrative and Comparative Biology, Journal of Zoology; and 2 proposals for NSF. (2008)

Referee for 4 journal articles in Proceedings of the Biological Society of Washington, Acta Chiropterologica, Great Plains Research, Prairie Naturalist; 1 proposal for NSF and 10 proposals for National Graduate Women in Science (2006)

Referee for 7 journal articles in Acta Chiropterologica, Journal of Mammalogy Southwestern Naturalist, Prairie Naturalist, Fieldiana; 2 proposals for NSF; and one tenure review for the University of Massachusetts.

Panelist. Expanding Your Horizons Conference. Sponsored by UNL for 8th grade girls interested in careers in math and science. (2005)

Board of Directors, North American Symposium on Bat Research (2004)

Host, Thirty-third North American Symposium on Bat Research (2003)

ANATOLY GITELSON, Professor, 83% Research, 15% Scholarly Service, 2% University Service

Areas of Interest: Remote Sensing, Water, Applied Climate Sciences

Contact: agitelson2@unl.edu, 402/472-8386

EDUCATION

M.S. Radio Electronics, The Institute of Radio Technology, Taganrog, Russia (1964)

Ph.D. Radio Physics, The Institute of Radio Technology, Taganrog, Russia (1972)

PROFESSIONAL EXPERIENCE

2000-present	Professor, School of Natural Resources, University of Nebraska-Lincoln
1996-2000	Chairman, Dept. for Environmental Physics and Energy Research, J. Blaustein Institute for Desert Research, Ben-Gurion University, Israel
1990-1996	Professor, Department of Geological and Environmental Sciences, Ben-Gurion University, Israel
1981-1989	Head, Remote Sensing Lab, Hydrochemical Institute, Environmental Protection Agency, Rostov-on-Don, USSR
1977-1981	Scientist, Institute for Nuclear Research, Academy of Sciences, Moscow, USSR
1973-1977	Scientist, Physical Institute, Rostov-on-Don State University, USSR
1964-1972	Scientist, Institute for Microwave Electronics, Krasnodar, USSR

HONORS AND AWARDS

USSR Academy of Sciences Award for best work of the year in Solid State Physics (1977)

USSR Academy of Sciences Award for best work of the year in Physics of High Energy particles (1981)

Germany Academy of Sciences Fellowship (1996)

State Prize "50th Israeli Anniversary" for outstanding contribution to Israeli scientific development (1998)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 898 Quantitative Remote Sensing (F01 through F09)

Masters and Doctoral Students Advised

Andrés Viña (Ph.D. Natural Resource Sciences, 2004), Remote Estimation of Leaf Area Index and Biomass in Crops.

Giorgio Dall'Olmo (Ph.D. Natural Resource Sciences, 2004), Isolation of optical signatures of phytoplankton pigments in turbid productive waters: remote assessment of chlorophyll-a.....

Verónica S. Ciganda (Ph.D. Agronomy) Vertical profile of chlorophyll in maize canopy: Technique, quantification and implications for remote sensing.

R. Stark (Ph.D. Geology and Environmental Sciences, 2001), Remote sensing technique for monitoring vegetation fraction, Ben Gurion University, Israel.

Yoav Zur (Ph.D. Geology and Environmental Sciences, 2003), Non-destructive estimation of carotenoid content as indicator of plant stress. Ben Gurion University, Israel.

RESEARCH

My main interest is in remote sensing of water quality and vegetation. Conceptual model for non-destructive estimating pigments in plant leaves and phytoplankton was developed and used for monitoring water quality and plant pigment content. Scientific basis and techniques were developed for remote estimating vegetation biophysical characteristics such as vegetation cover, fraction of absorbed photosynthetically active radiation, leaf area index, biomass, chlorophyll content and gross primary production.

EXTENSION/OUTREACH

The techniques developed were used by Nebraska Department of Environmental Quality for monitoring water quality and presence of toxic blue-green algae in Fremont State Lakes in Nebraska. They have been used also for monitoring phytoplankton distribution in Chesapeake Bay, Delaware Bay, as well as in lakes and reservoirs in Russia, Ukraine and Israel.

UNIVERSITY SERVICE

I am a member of SNR Promotion and Tenure Committee (2008-present) and Research (2005-2008) committees.

SELECTED GRANTS AND CONTRACTS

Consequences of institutional change: land-cover dynamics in Kazakhstan 1960-2000, NASA, \$538,571; 2001-2005.

Responses of coastal waters to terrestrial inputs of elemental CNP in urbanizing coastal regions, NASA (T. Fisher, PI; A. Gitelson, Co-PI), \$550,000, UNL share is \$275,000; 2005-2009.

Land cover land use change effects on surface water quality: Integrated MODIS and SeaWiFS assessment of the Dnieper and Don River basins and their reservoirs, NASA, \$597,970; 2005-2009.

A Satellite-Based Quantification of Carbon Exchange of the Dominant Ecosystems (Maize-Soybean) in the NACP Mid-Continent Intensive (MCI) Region, NASA, \$496,000; 2008-2011.

SELECTED PUBLICATIONS

Gitelson, A.A., Viña, A., Masek J.G., Verma, S. B., and A. E. Suyker. 2008. *Synoptic Monitoring of Gross Primary Productivity of Maize Using Landsat Data*, **IEEE Geoscience and Remote Sensing Letters**, Vol. 5, No. 2, April 2008, 10.1109/LGRS.2008.915598.

Gitelson, A.A. G. Dall'Olmo, W. Moses, D.C. Rundquist, T. Barrow, T.R. Fisher, D. Gurlin, and J. Holz. 2008. *A simple semi-analytical model for remote estimation of chlorophyll-a in turbid waters: Validation*. **Remote Sensing of Environment**, 112: 3582–3593, doi:10.1016/j.rse.2008.04.015

Gitelson, A.A., Wardlow, B. D., Keydan, G. P. and B. Leavitt. 2007. *An Evaluation of MODIS 250-m Data for Green LAI Estimation in Crops*, **Geophysical Research Letters**, 34, L20403, doi:10.1029/2007GL031620.

Gitelson, A.A., Schalles, J., Hladik, C.M. 2007. *Remote chlorophyll-a retrieval in turbid productive estuarine: Chesapeake Bay case study*. **Remote Sensing of Environment**, 109: 464–472.

Gitelson, A. A., G. P. Keydan, and M. N. Merzlyak. 2006. *Three-band model for noninvasive estimation of chlorophyll, carotenoids, and anthocyanin contents in higher plant leaves*, **Geophysical Research Letters**, 33, L11402, doi:10.1029/2006GL026457.

Gitelson, A. A., A. Viña, S. B. Verma, D. C. Rundquist, T. J. Arkebauer, G. Keydan, B. Leavitt, V. Ciganda, G. G. Burba, and A. E. Suyker. 2006. *Relationship between gross primary production and chlorophyll content in crops: Implications for the synoptic monitoring of vegetation productivity*, **Journal of Geophysical Research**, 111, D08S11, doi:10.1029/2005JD006017.

Gitelson, A.A., A. Viña, D.C. Rundquist, V. Ciganda, T.J. Arkebauer. 2005. *Remote Estimation of Canopy Chlorophyll Content in Crops*, **Geophysical Research Letters**, 32,L08403,doi:10.1029/2005GL022688.

Gitelson, A. A. *Wide Dynamic Range Vegetation Index for Remote Quantification of Crop Biophysical Characteristics*. **Journal of Plant Physiology**, Vol. 161, 165-173, 2004.

Gitelson, A. A., S. B. Verma, A. Vina, D. C. Rundquist, G. Keydan, B. Leavitt, T. J. Arkebauer, G. G. Burba, and A. E. Suyker, 2003. *Novel technique for remote estimation of CO₂ flux in maize*. **Geophysical Research Letters**, 30(9), 1486, doi:10.1029/2002GL016543.

Gitelson, A. A., A. Viña, T. J. Arkebauer, D. C. Rundquist, G. Keydan, and B. Leavitt. 2003. *Remote estimation of leaf area index and green leaf biomass in maize canopies*, **Geophysical Research Letters**, 30(5), 1248.

Gitelson, A.A., Gritz, U. and Merzlyak M.N. 2003. *Relationships between leaf chlorophyll content and spectral reflectance and algorithms for non-destructive chlorophyll assessment in higher plant leaves*, **Journal of Plant Physiology**, Vol. 160, No 3, 271-282.

OTHER PROFESSIONAL ACTIVITIES

Editor, Remote Sensing of Environment

Associate Editor, Agronomy Journal (2004-2008)

JAMES W. GOEKE, Professor, 5% Research, 72% Extension/Outreach, 20% Scholarly Service, 3% University Service

Areas of Interest: Groundwater geology, Sand Hills, Drinking water, Hydrogeology, Irrigation, Water development

Contact: jgoeke1@unl.edu, 308/696-6704

EDUCATION

B.S. 1966, University of Wisconsin, Madison - Geology

M.S. 1970, Colorado State University, Ft. Collins - Groundwater Geology

PROFESSIONAL EXPERIENCE

1996- Present Full Professor

1976-1995 Research Hydrogeologist, Associate Professor and Tenure 1981, UNL Conservation and Survey Division at the West Central Research and Extension Center, North Platte, NE

1970-1976 Research Hydrogeologist, Conservation and Survey Division, Lincoln, NE

1969 Geologic Field Consultant - Cobin-Monroe Mining Company, Fairbanks, Alaska (Summer)

1967-1968 Geologic Field Assistant and Graduate Teaching Assistant, Colorado State University, Ft. Collins, CO

SURVEY, EXTENSION AND OUTREACH

One of my long-term and major scholarly service efforts has been assisting the locally controlled natural resources districts (NRDs) in the west-central part of the state in devising and implementing groundwater management plans. Required by state law, these plans help them determine how they want to manage their groundwater reservoir. In particular, the Upper Republican NRD in far southwestern Nebraska has been challenged by declining water tables and water restrictions, including groundwater metering and a moratorium on well-drilling. Since the late 1970s, I've worked closely with this NRD to help them adjust to these stresses. I've also assisted the Middle Republican and the Twin Platte NRDs with their groundwater management concerns. Other scholarly service includes being a state Attorney General's expert witness for the Republican River basin in litigation with Kansas over allocations from that river. I am currently the state representative for the Ogallala Aquifer Institute of Garden City, Kansas, and the UNL liaison to the Nebraska Well Drillers Association, an organization that Conservation and Survey helped found. I work closely with the U.S. Geological Survey on the High Plains Regional Aquifer System Analysis (RASA) and the High Plains National Water Quality Assessment (NAWQA) programs. I also run an acid rain monitoring station as part of the National Atmospheric Deposition Program, and monitor dioxin in the atmosphere in conjunction with the U.S. Environmental Protection Agency. In outreach, I've been involved with Lincoln-based Groundwater Foundation's board and educational events and the High Plains Water Expo and the Water Riches field days, both sponsored by the Lincoln County Extension office. I also often give talks for schools or at community events regarding groundwater geology and Nebraska's groundwater resource.

RESEARCH

My main research interests have to do with the groundwater of central and southwestern Nebraska, groundwater management, particularly under conditions of scarcity, and the age of the Sand Hills. Some key research projects I've been involved with have to do with gathering data for modeling of the unconfined aquifers near the Platte River in the central Platte region and similar stream-aquifer studies in the Republican River valley.

HONORS AND AWARDS

North Platte Public Schools Bulldog Award (1988)

Enersen Friends of the Forest Award (\$1000) with Keith Blackledge (1989)

IANR Team Effort Excellence - Cropping Systems Team Member (1990)

IANR Excellence in Team Programming from UN Cooperative Extension for "Water Quality Team from North Central, NE" (1992)

Master Card's Master Planter Award for Nebraska (1993)

State Forester's Award (1995)

Nebraska Statewide Arboretum Tree Planters State Award (1995)

Maurice Kremer Groundwater Achievement Award (2001)

Trustee Nebraska Nature Conservancy (2001)

GRANTS AND CONTRACTS

- Aquifer Tests for Defining Aquifer Parameters in Support of Magnetic Resonance Soundings for Groundwater Model Development* (collaborator), Nebraska Environmental Trust, \$1,500 (5% of total award of \$30,000); January 2008-December 2011.
- Development of Hydrologic Framework for Selected Areas of the Upper Loup Basin* (collaborator with Steven Sibray), Nebraska Department of Natural Resources, \$720 (6% of total award of \$12,000); January 2008-December 2010.
- Elkhorn-Loup Model (ELM) Project*, (co-PI with Susan Lackey; faculty partners, non-IANR/CEHS), Lower Loup NRD, \$75,000; December 2007-December 2009.

PUBLICATIONS

- McLean, J.S., H.H. Chen, and J. Goeke. *Simulation of Ground-Water Movement in the High Plains Aquifer, Southern Sandhills Area, West Central Nebraska*, USGS Open File Report 94-XXX, 50 pp (in final review).
- Gosselin, D.C., V. Srihda, F.E. Harvey, and J.W. Goeke. 2006. **Hydrological effects and groundwater fluctuations in interdunal environments in the Nebraska Sand Hills, Great Plains Research**, 16, 17–28.
- Chen, X.H., J. Goeke, J.F. Ayers, and S. Summerside. 2003. *The Observation Well Network Design for Pumping Tests in Unconfined Aquifers*. **Journal of the American Water Resources Association**, 39, 17-32.
- Goeke, J.W. 1999-2001. *Test Hole Log Books* for Arthur, Keith, Lincoln, and McPherson Counties for Cooperative Hydrology Study (1999-2001).
- Chen, X.H., J. Goeke, and S. Summerside. 1999. *Hydraulic Properties and Uncertainty Analysis for an Unconfined Alluvial Aquifer*, **Ground Water**, 37(6), 845-854.
- Gosselin, D.C., S. Drda, F.E. Harvey, and J. Goeke. 1999. *Hydrologic Dynamics of Two Interdunal Valleys in the Central Sand Hills Nebraska*, **Ground Water**, 37, 924-933.
- Chen, X.H., J. Goeke, and S. Summerside. 1998. *Geology, Hydrogeology and Aquifer Hydraulic Properties from Five Test Sites in the Republican River Valley, Nebraska*, **Contract Report for Nebraska Department of Water Resources**.
- Gosselin, D., E. Harvey, S. Drda, and J. Goeke. 1996. *Comparison of the Hydrogeologic and Geochemical Dynamics of Two Interdunal Valleys, Central Sandhills, Nebraska*, GSA Abstract.
- Bentall, R. and J. Goeke. 1995. *Map Observation of Nebraska Drainage Systems*, GSA Abstract.
- Goeke, J.W. 1992. *Hydrogeology of Parts of the Twin Platte and Middle Republican Natural Resources Districts Southwestern Nebraska*, **Nebraska Water Survey Paper No. 70**, 89 p.
- Goeke, J.W. 1990. *Groundwater Management Strategies in the High Plains of the United States - A Nebraska Perspective, 1990*, 6 p. in *Proceedings of 1st USA-USSR Joint Conference of Environmental Hydrology and Hydrogeology*, Presented in Leningrad, USSR and Budapest, Hungary.

OTHER PROFESSIONAL ACTIVITIES

- Member*, Conservation and Survey Division Director Advisory Committee, 1998-2001
- Member*, WCREC Directors Advisory Committee, 1998-2001
- Member*, IANR Facilities Committee, 1998-2001
- Member*, UNL Speakers Bureau 1997-1998, 2006-2009
- Member*, Phi Kappa Phi and Sigma Xi
- Member*, North Platte Groundwater Guardian Team Facilitator
- Member*, North Platte LincUP, 1998-2001
- Member*, North Platte Civil Service Commission, 2003-2009

DAVID C. GOSSELIN, Professor and Director of Environmental Studies, 70% Teaching,
20% Program Administration, 8% Scholarly Service, 2% University Service

Areas of Interest: Earth Systems Education, Groundwater geochemistry

Contact: dgosselin2@unl.edu, 402/472-8919

EDUCATION

B.S. Geology, University of St. Thomas (1982)

Ph.D. Geology, South Dakota School of Mines and Technology (1987)

PROFESSIONAL EXPERIENCE

2008-Present Director, Environmental Studies, University of Nebraska-Lincoln
2003-Present Professor, School of Natural Resources, University of Nebraska-Lincoln
1993-Present Director, Nebraska Earth Systems Education Network, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln
2004-2007 Associate Director, School of Natural Resources, University of Nebraska-Lincoln
1995-2003 Associate Professor, School of Natural Resource Sciences and Conservation and Survey Division, University of Nebraska-Lincoln
1989-1995 Assistant Professor, Conservation and Survey Division, University of Nebraska-Lincoln
1988-1989 Postdoctoral Trainee, Analytical Chemistry Group; Battelle-Pacific Northwest Laboratory and Northwest College and University Association for Science, Richland, WA

HONORS AND AWARDS

Lifetime Achievement Award, Nebraska State Soccer Association (2007)

Volunteer of the Year, Youth Sports Branch, YMCA, Lincoln, NE (2005)

Catalyst Award, Nebraska Association of Teachers of Science (1999)

Institute of Agriculture and Natural Resources Team Award: Mid-Nebraska Water Quality Demonstration Project (1995)

Nominated for John C. Frye Award, Association of American State Geologists for best paper in environmental geology published by a state survey. Paper: Bazile Triangle Groundwater Quality Study (1991)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 108 Earth's Natural Resource Systems Laboratory (F04, F05, F07, F08)
NRES 809 Laboratory Earth: Earth and its Systems (Online)
NRES 814 Laboratory Earth: Earth's Natural Resources Systems (offered at a variety of times yet)
NRES 822 Laboratory Earth: Earth's Changing Systems (offered at a variety of times yet)
ENVR 289 Sophomore Orientation (F08, F09)
ENVR 489 Senior Seminar (S09)
ENVR 499a Senior Thesis (F08, S09)
ENVR 499b Senior Thesis (F08, S09, Su09)
UHON 385H Water, Society, and the Future (S07, S08, S09)

Masters and Doctoral Students Advised

Kevin McVey (Ph.D. Natural Resource Sciences, 2009) *Biogeochemical Behavior of dissolved arsenic and uranium concentrations in public water supply wells.*

RESEARCH

The common theme in all my work has been the application of geochemical principles to both basic and applied scientific problems. Examples of these activities include assessing the biogeochemical controls on the occurrence of arsenic and uranium in public water supplies; local and state-wide groundwater quality; the physical and chemical hydrogeology of groundwater resources; and the potential impact of climate and environmental change on lake and wetland environments.

SURVEY

I began my career at UNL doing survey work. I have worked with local and state agencies to help them understand their water resources. I have focused increasing K-12 educators understanding of Earth System Science. In 1999, I was honored by the Nebraska Association of Teachers of Science with their Catalyst Award in —“Appreciation for Dedication to Science Education” for my contributions to K-12 education through the many professional development activities that I have provided or organized as Director of the Nebraska Earth Science Education Network (NESEN) over the last fifteen years. Whether I am working with teachers or a local natural resource district, I make every effort to highlight the practical applications of scientific information to current environmental issues.

UNIVERSITY SERVICE

I serve on department, college and university committees when needed. These include work on writing, assessment, sustainability curriculum, and online education opportunities.

SELECTED GRANTS AND CONTRACTS

Masters Degree in Applied Science Education, D.C. Gosselin, (P.I.) co-P.I. R.J. Bonnstetter, and B. Strand, Toyota Foundation, \$540,335; 4 Years, Projected Start date: 7/1/07.

Earth Science Institute of Elementary Educators (ESIEE), D.C. Gosselin, (P.I.) co-P.I. R.J. Bonnstetter, and T.F. Slater, NASA, \$356,094; 3 years, Start date: 8/14/05 to present.

Summer Earth Systems Education Institute (SESEI): A Partnership between Educational Service Unit #3 and the University of Nebraska-Lincoln., D.C. Gosselin, (P.I.), R.J. Bonnstetter, and S. Person-Pandil, Nebraska Department of Education Math and Science Partnership; \$60,916; 2/6/04 – 9/25/05.

Sand Hills Biocomplexity: Integrating Biogeophysical Processes across Space and Time, D. Wedin, G. Henebry, and D. Loope (PIs); Gosselin - Senior Personnel; Responsibilities include Educational Outreach, National Science Foundation; \$1,800,000 (not included in total); 10/1/03 to 9/30/07.

Integration of Earth System Science Research and Education: Involving Teachers in Scientific Research and Scientists in Inquiry-Based Learning, D.C. Gosselin, (P.I.), co-PI, Ron Bonnstetter, UNL Teachers College, \$74,204; National Science Foundation, January 2000 to June 2002.

Creating Connections between Regional Climate Change Information and the Public: A Multifaceted Approach. D.C. Gosselin, (P.I.), co-PI, Steve Meyer, UNL School of Natural Resource Sciences, \$161,874; National Institute of Global and Environmental Change, July 1999 to June 2003.

SELECTED PUBLICATIONS

Gosselin, D.C., J. Thomas, A. Redmond, S. Yendra, R.J. Bonnstetter, and T.F. Slater. 2008. *Laboratory Earth: Connecting Elementary and Middle School Teachers to Online Earth Science Resources through NASA-Sponsored, On-line Graduate Courses*. **Journal of Geoscience Education**, in review.

Thomas, J., A. Redmond, D. Gosselin, R. Bonnstetter, S. Yendra, and C. Larson-Miller. 2009. *Teaching Earth Science Online: Modifying Assessments to Improve Teacher's Content Knowledge*. Association for Science Teacher Education Annual Meeting, Hartford, CT. (Refereed)

Bonnstetter R.J. and D.C. Gosselin. 2004. *Present Status on Earth Science Education in the USA*. Proceedings of the Joint Conference (SITH2003) of The 38th Conference of Société Internationale des Techniques Hydrothermales and The 56th Annual Meeting of the Balneological Society of Japan, August; Okayama, Japan.

Gosselin, D.C., R.H. Levy, and R.J. Bonnstetter. 2003. *Utilizing Earth science research to improve understanding between scientists and educators*. **Journal of Geoscience Education**, 51 (1), 114-120.

Stotler, R., F.E. Harvey, and D.C. Gosselin. (in review) *Chemical & Isotope Evidence for a Black Hills Origin for Ground Water in the Dakota Aquifer Beneath Northeastern Nebraska*, **Journal of Ground Water**.

Harvey, F.E., J.F. Ayers, and D.C. Gosselin. 2008. *Ground Water Dependence of Endangered Ecosystems An Example from Nebraska's Saline Wetlands*, **Journal of Ground Water**, 45 (6), 736-752.

Gosselin, D.C., V. Srihdar, F.E. Harvey, and J.W. Goeke. 2006. *Hydrological effects and groundwater fluctuations in interdunal environments in the Nebraska Sand Hills*, **Great Plains Research**, 16, 17–28.

OTHER PROFESSIONAL ACTIVITIES

Member of Executive Committee, Council of Environmental Deans and Directors, National Council for Science and the Environment.

QINGFENG “Gene” GUAN, Assistant Professor, 50% Teaching, 40% Research,
10% University Service

Areas of Interest: Geographic Information Science, GeoComputation, Geospatial Analysis and Modeling
Contact: qguan2@unl.edu, 402/472-4002

EDUCATION

B.S. Geography, East China Normal University, Shanghai, China (2000)
M.S. Geography, Chinese Academy of Sciences, Beijing, China (2003)
Ph.D. Geography, University of California - Santa Barbara, Santa Barbara, California, USA (2008)

PROFESSIONAL EXPERIENCE

2009-present Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
2008-2009 Postdoctoral Research Associate, United States Geological Survey
2003-2008 Ph.D Student, Teaching Associate, Teaching Assistant, Graduate Student Researcher, University of California – Santa Barbara

HONORS AND AWARDS

Resident Research Associateship, National Research Council (2008)
Dangermond Travel Scholarship, Department of Geography, University of California – Santa Barbara (2008)
Dangermond Travel Scholarship, Department of Geography, University of California – Santa Barbara (2006)
UCGIS Assembly Travel Support, University Consortium for Geographic Information Science (2004)

TEACHING

Courses Taught (Fall, Spring, Summer)

GEOG 176A Introduction to Geographic Information Systems (Su06)
GEOG 128 Analytical and Computer Cartography (S07)

RESEARCH

I am involved in high-performance Geospatial Computing: developing a general-purpose parallel raster-processing programming library (pRPL) and have developed a geographical Cellular Automata model, pSLEUTH, using pRPL; developed a parallel geostatistical areal interpolation system. Regarding Geospatial Analysis and Modeling: I have developed an Artificial-Neural-Network-based and constrained, Cellular Automata model for urban growth simulation.

SELECTED PUBLICATIONS

Guan, Q. and K. C. Clarke. Accepted. A General-purpose Parallel Raster Processing Programming Library Test Application Using a Geographic Cellular Automata Model. **International Journal of Geographical Information Science**.
Guan, Q. 2009. pRPL: an open-source general-purpose parallel Raster Processing programming Library. **SIGSPATIAL Special**, 1(1): 57-62
Adler, P. B., J. HilleRisLambers, P. C. Kyriakidis, Q. Guan, and J. M. Levine. 2006. Climate variability has a stabilizing effect on coexistence of prairie grasses. **Proceedings of the National Academy of Sciences**, 103(34): 12793-12798
Guan, Q., L. Wang and K. C. Clarke. 2005. An Artificial-Neural-Network-based, Constrained CA Model for Simulating Urban Growth. **Cartography and Geographic Information Science**, 32(4): 369-380

OTHER PROFESSIONAL ACTIVITIES

Chair, High-performance Computing Committee, Cyberinfrastructure Specialty Group, Association of American Geographers, 2009-present.
Member, Association of American Geographers, 2006-present.
Member, International Association of Chinese Professional in Geographic Information Systems, 2006-present
Member, Cartography and Geographic Information Society, 2005-present

PAUL R. HANSON, Assistant Professor, 30% Teaching, 40% Research, 28% Scholarly Service, 2% University Service

Areas of Interest: Geomorphology, Landscape Evolution, Soil Processes
Contact: phanson2@unl.edu, 402/472-7762

EDUCATION

B.A. Anthropology, University of Wisconsin-Milwaukee (1994)
M.S. Geosciences, University of Nebraska (2003)
Ph.D. Geosciences, University of Nebraska (2005)

PROFESSIONAL EXPERIENCE

2005-present Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln

HONORS AND AWARDS

Myerly-Martin Prize for Outstanding Graduate Student, Department of Geosciences, University of Nebraska (2005)

TEACHING

Courses Taught (Fall, Spring, Summer)

GEOG 155 Introduction to Physical Geography (S09)
NRES 492 Boundary Waters Field Trip (Su07, Su08)
NRES 891 Seminar in Natural Resources (F07)

Masters and Doctoral Students Advised

Aaron R. Young (M.S. Natural Resource Sciences, 2008) Alluvial and Eolian Depositional History of the Barrens Fan, Northern Wisconsin.

RESEARCH

My research is focused on better understanding the responses of geomorphic systems to climate change and human activity. Recently I've studied changes in rivers, dunes, and soil deposits in the past 10,000 years. Much of my work involves using Optically-Stimulated Luminescence (OSL) dating, a recently developed suite of dating techniques, to estimate the frequency at which these geomorphic systems were activated in the recent past.

SURVEY

My survey work is focused on producing surficial geologic maps for selected areas in Nebraska, and publishing reports and other data that address groundwater concerns in eastern Nebraska.

UNIVERSITY SERVICE

I serve on both the School of Natural Resource Safety and Facilities (2007-2009) and Research (2008-2010) Committees.

SELECTED GRANTS AND CONTRACTS

Collaborative Research: How Important is the Loess Mantle in Midwestern Soil Catena Evolution? (with J.A. Mason and P. Jacobs), National Science Foundation, UN-L share = \$27,219; August 2008-August 2010.

Geologic Mapping of the Duncan, Hallam, and Obert Quadrangles, Nebraska, (with R.M. Joeckel and M. Kuzila), United States Geological Survey, \$49,759; June 2008-June 2009.

Eastern Nebraska Water Resources Assessment (with S. Lackey, and R.M. Joeckel), Lower Platte North Natural Resources District, \$216,000; December 2006-December 2009.

Geologic Mapping of the Doniphan, Grand Island, Silver Creek SE, and Wynot Quadrangles, Nebraska (with R.M. Joeckel), United States Geological Survey, \$68,053; June 2007-June 2008.

Geologic Mapping of the Columbus, Columbus SW, Cortland, and Firth Quadrangles, Nebraska (with R.M. Joeckel, and J.B. Swinehart), United States Geological Survey, \$56,378; June 2006-June 2007.

SELECTED PUBLICATIONS

- Hanson, P.R., Joeckel, R.M., Young, A.R., Horn, J. 2009. *Late Holocene Dune Activity in the Eastern Platte River Valley, Nebraska*, **Geomorphology** 103, 555-561.
- Divine, D.P., Joeckel, R.M., Korus, J.T., Hanson, P.R., Olafsen Lackey, S. 2009. *Eastern Nebraska Water Resources Assessment (ENWRA): Introduction to a Hydrogeologic Study*, University of Nebraska-Lincoln, **Conservation and Survey Division Bulletin 1 (New Series)**, 32 p.
- Mason, J.A., Miao, X., Hanson, P.R., Johnson, W.C., Jacobs, P.M., Goble, R.J. 2008. *Loess record of the last Glacial-Interglacial transition on the northern and central Great Plains*, **Quaternary Science Reviews** 27, 1772-1783.
- Rawling, J.E., III, Hanson, P.R., Young, A.R., Attig, J.W. 2008. *Late Pleistocene dune construction in the Central Sand Plain of Wisconsin, USA*, **Geomorphology** 100, 494-505.
- Morgan, M.L., Matthews, V., Gutierrez, F., Thorson, J.P., Madole, R.F., Hanson, P.R., 2008. *From buttes to bowls: Repeated relief inversions in the landscape of the Colorado Piedmont*, (R.G. Raynolds, ed.), *Roaming the Rocky Mountains and Environs: Geological Field Trips: Geological Society of America Field Guide* 10, 203-216.
- Burkhart, P.A., Rawling, J.E. III, Livingston, J., Hanson, P.R., Mahan, S., Benton, R., Heffron, E., Jahn, M., Anderson, T., Page, B. 2008. *Late Pleistocene through Holocene Landscape Evolution of the White River Badlands, South Dakota*, (R.G. Raynolds, ed.), *Roaming the Rocky Mountains and Environs: Geological Field Trips: Geological Society of America Field Guide* 10, 235-248.
- Joeckel, R.M., Wally, K.D., Fischbein, S.A., Hanson, P.R., 2007. *Sulfate mineral paragenesis in Pennsylvanian rocks and occurrence of slavikite, Nebraska, USA*, **Great Plains Research** 17, 17-33.
- Miao, X., Mason, J.A., Swinehart, J.B., Loope, D.B., Hanson, P.R., Goble, R.J., Liu, X., 2007. *A 10,000-year record of dune activity, dust storms, and drought in the central Great Plains*, **Geology** 35, 119-122.
- Hanson, P.R., Mason, J.A. and Goble, R.J., 2006. *The formation of fluvial terraces along Wyoming's Laramie Range as a response to late Pleistocene flooding events*. **Geomorphology** 76, 12-25.
- Miao, X., Mason, J.A., Goble, R.J. and Hanson, P.R., 2005. *Loess-inferred dry climate and eolian activity in the early to mid-Holocene, central Great Plains, North America*. **The Holocene** 15, 339-346.

OTHER PROFESSIONAL ACTIVITIES

- Invited presentation*, Geological Society of America Annual Meeting, May, 2007.
- Invited presentation*, University of Iowa Department of Geoscience, Oct, 2006.
- Member*, Geological Society of America, 1998-present.

F. EDWIN HARVEY, Associate Director & Professor, 50% Administration, 25% Teaching,
13% Research, 7% Scholarly Service, 5% University Service

Areas of Interest: Groundwater, Water Chemistry, Isotope Hydrology, Groundwater Dependent Ecosystems
Contact: feharvey1@unl.edu, 402/472-0232 or 402/472 -8237

EDUCATION

B.S. Geology, Olivet Nazarene University (1986)
M.S. Hydrogeochemistry, Purdue University (1990)
Ph.D. Hydrogeology, University of Waterloo (Ontario, Canada) (1996)

PROFESSIONAL EXPERIENCE

2008-present Professor, School of Natural Resources, University of Nebraska-Lincoln
2007-present Associate Director, School of Natural Resources, University of Nebraska-Lincoln
2002-2008 Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
1997-2002 Assistant Professor, School of Natural Resource Sciences & Conservation and Survey Division,
University of Nebraska-Lincoln
1996-1997 Assistant Professor, Conservation and Survey Division, University of Nebraska-Lincoln

HONORS AND AWARDS

Distinguished Service Award, Geological Society of America-Hydrogeology Division (2008)
Fellow, Geological Society of America (2006)
Certificate of Recognition for Contributions to Students, UNL Teaching Council/Parents Association (2008)
Darrell W. Nelson Excellence in Graduate Student Advising Award Nominee, UNL (2006)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 281 Introduction to Water Sciences (F 08)
NRES 917 Environmental Isotope Hydrology (S 09, S 07, S 05)
NRES 105 Justin Morrill Scholars Seminar (F 08, F 07, F 06)
NRES 353/853 Hydrology (S 08, S 07, S 06)
NRES 898 Groundwater Contamination & Remediation (F 06)

Masters and Doctoral Students Advised (Last 5 Years)

Cheng Cheng (Ph.D. Natural Resource Sciences, expected 2011) Groundwater/surface water interaction.
Kevin McVey (Ph.D. Natural Resource Sciences, expected 2009) Arsenic and uranium in public drinking water.
Sarah Foster (M.S. Geology, expected 2010) Contamination of Rainwater Basin wetlands.
Richard Wilson (M.S. Natural Resource Sciences, expected 2005) Rainwater Basin recharge.
James Gilbert (M.S. Natural Resources, 2008) Mixing dynamics in saline wetlands of Little Salt Creek watershed.
Carrie Wiese (M.S. Natural Resources, 2008) Hydrogeochemistry of riparian and parafluvial wetlands.
Gordon Coke (M.S. Natural Resources, 2008) Groundwater dynamics within the saline wetland alluvium.
Wyatt Webster (M.S. Natural Resources, 2007) Water balance analysis for a Nebraska Sand Hills wetland
Erica Sorensen (M.S. Natural Resources, 2005) Saline wetlands of eastern Nebraska – Regional groundwater flow.
Kelli Warren (M.S. Natural Resources, 2005) Initial characterization of regional water table dynamics.
Tina Kurtz (M.S. Natural Resources, 2005) Non-thesis Option
Kathleen Eggemeyer (M.S. Natural Resources, 2005) Functional characteristics of Sandhills trees and grasses.

RESEARCH

To understand the role of groundwater in ecosystems and specifically Nebraska's saline wetland, rainwater basin wetland, and Sandhills fen wetland ecosystems.

EXTENSION/OUTREACH

Supply information to, and answer questions for, the public on Nebraska's groundwater resources and ground water quality.

SURVEY

Conducting chemical and isotope surveys Nebraska's precipitation, groundwater and surface water resources.

UNIVERSITY SERVICE

Member of NU Executive Graduate Committee, UNL Academic Planning Committee, IANR Liaison Committee, CASNR Administrative Intern, and was Director of the Justin Morrill Scholars Program and Learning Community.

SELECTED GRANTS AND CONTRACTS

Using Electrical Resistivity Imaging (ERI) to map saline water beneath eastern Nebraska saline wetlands, U.S. Fish and Wildlife Service, \$62,500; 2009-2010.

Investigation of the role of rainwater basin wetlands in contributing to the functions of groundwater quality improvement and wildlife habitat, including an analysis of the impact of sediment on these functions (with T. LaGrange, L. Smith & W. Wood), U.S. Environmental Protection Agency, \$226,936; 2007-2009.

Habitat conservation plan for the Salt Creek tiger beetle and the eastern saline wetlands of Nebraska (with M. Fritz, S. Spomer, and L. Higley), U.S. Fish and Wildlife Service, \$650,000; 2006-2009.

Investigation of the role of rainwater basin wetlands in contributing to the functions of groundwater recharge, water quality improvement, and wildlife habitat, including an assessment of the impact of sediment on these functions (with T. LaGrange, L. Smith, and W. Wood), U.S. Environmental Protection Agency, \$257,126; 2006- 2009.

Determining reproductive habitat parameters for the Salt Creek tiger beetle (with M. Fritz, S. Spomer, and L. Higley), U.S. Fish and Wildlife Service, \$71,343; 2006-2007.

Developing a water budget analysis for a Nebraska Sandhills wetland (with K. Hoagland), Nebraska Department of Roads; \$31,923; 2006-2007.

Assessing wetland health at Nebraska's National Guard bases (with S. Narumalani), Nebraska Military Department-Army National Guard, \$14,000; 2005- 2006.

SELECTED PUBLICATIONS

Stotler, R., Harvey, F.E., and D.C. Gosselin. *Chemical and Isotopic Evidence for a Black Hills Origin for Groundwater in the Dakota Aquifer of Northeastern Nebraska*, **Ground Water** (accepted).

Eggemeyer, K.D., T. Awada, F.E. Harvey, D.A. Wedin, X.H. Zhou, and C.W. Zanner. 2009. *Seasonal Changes in Depth of Water Uptake for Encroaching Trees *Juniperus virginiana* and *Pinus ponderosa* and Two Dominant *C₄* Grasses in a Semi-Arid Grassland*, **Tree Physiology**, 29, 157-169.

Harvey, F.E., J.F. Ayers, and D.C. Gosselin. 2007. *Ground Water Dependence of Endangered Ecosystems: Nebraska's Saline Wetlands*, **Ground Water**, 45(6), 736-752.

Annable, W.K., S.K. Frape, O. Shoukzar-Stash, T. Shanoff, R.J. Drimmie, and F.E. Harvey. 2007. *³⁷Cl, ¹⁵N, ¹³C, Isotopic Analysis of Common Agro-chemicals for Identifying Non-point Source Agricultural Contaminants*, **Applied Geochemistry**, 22 (7), 1530-1536.

Harvey, F.E., J.B. Swinehart, and T.M. Kurtz. 2007. *Ground Water Sustenance of Nebraska's Unique Sand Hills Peatland Fen Ecosystems*, **Ground Water**, 45(2), 218-234.

Gosselin, D.C., L.M. Klawer, R.M. Joeckel, F.E. Harvey, A.R. Reade, and K. McVey. 2006. *Arsenic in Groundwater and Rural Public Water Supplies in Nebraska, U.S.A.*, **Great Plains Research**, 16(2), 137-148.

Eggemeyer, K.D., T. Awada, D.A. Wedin, F.E. Harvey, and X. Zhou. 2006. *Ecophysiology of Two Native Invasive Woody Species and Two Dominant Warm-Season Grasses in the Semi-Arid Grasslands of the Nebraska Sandhills*, **International Journal of Plant Sciences**, 167(5), 991-999.

Gosselin, D.C., V. Sridhar, F.E. Harvey, and J.W. Goeke. 2006. *Hydrological Effects and Groundwater Fluctuations in Interdunal Environments in the Nebraska Sand Hills*, **Great Plains Research**, 16(1), 17-28.

Harvey, F.E. 2005. *Stable Hydrogen and Oxygen Isotope Composition of Precipitation in Northeastern Colorado*, **Journal of the American Water Resources Association**, 41(2), 447-459.

Szilagyi, J., F.E. Harvey, and J.F. Ayers. 2005. *Regional Estimation of Recharge to Ground Water Using Water Balance, Base Recharge and Recharge Potential Estimates*, **Ground Water**, 43(1), 63-69.

OTHER PROFESSIONAL ACTIVITIES

2nd Vice Chair, Geological Society of America Hydrogeology Division (2008-present)

Technical Program Chair, Geological Society of America Hydrogeology Division (2009)

Newsletter Editor & Webmaster, Geological Society of America Hydrogeology Division (2001-2008)

Associate Editor, Ground Water (2000-2008); Hydrogeology Journal (2002-2007)

MICHAEL J. HAYES, Associate Professor and NDMC Director, 10% Teaching, 23% Research, 35% Scholarly Service, 2% University Service, 30% Administration (NDMC Director)

Areas of Interest: Drought mitigation strategies, drought impacts, vulnerability assessments, precipitation indices, and remote sensing applications

Contact: mhayes2@unl.edu, 402/472-4271

EDUCATION

B.S. Meteorology, University of Wisconsin-Madison (1986)

M.S. Atmospheric Science, University of Missouri-Columbia (1989)

Ph.D. Atmospheric Science, University of Missouri-Columbia (1994)

PROFESSIONAL EXPERIENCE

2007-present Associate Professor/Director, School of Natural Resources/NDMC, University of Nebraska-Lincoln

2006-2007 Research Associate Professor/Associate Director, SNR/NDMC, University of Nebraska-Lincoln

2003-2006 Research Associate Professor/Climate Impacts Specialist, SNR/NDMC, UNL

1995-2003 Research Assistant Professor/Climate Impacts Specialist, SNR/NDMC, UNL

1987-1994 Graduate Research Assistant, Department of Atmospheric Science, University of Missouri-Columbia

HONORS AND AWARDS

Fellow, Center for Great Plains Studies (2005)

Board Member, Center for Great Plains Studies Board of Governors (2007-2010)

Reviewer, National Research Council Review Team for the Climate Change Science Program's Synthesis and Assessment Product 3.3: Weather and Climate Extremes in a Changing Climate (2007)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 452/852 Climate and Society (S08, S10)

Masters and Doctoral Students Advised

Sandra Jones (M.S. SNR, expected 2009)

Jane Okalebo (Ph.D. SNR, expected 2011)

Crystal Bergman (Ph.D. SNR, expected 2012)

RESEARCH

Research topics include investigating new drought monitoring and impact assessment technologies, including the social, environmental and economic impacts of drought. Research also includes the development of appropriate drought planning and mitigation strategies at the local, regional, tribal, state, and national levels.

OUTREACH

A major component of my outreach program involves providing drought planning guidance for states and Native American tribes, participating in at least 40 drought planning-related workshops around the world since 1996. I have also been invited to give approximately 70 presentations since 2004. I serve a prominent role on the Implementation Team for the National Integrated Drought Information System (NIDIS) and co-chair another Working Group for NIDIS involving drought planners around the country.

SELECTED GRANTS AND CONTRACTS

Low Flow Project in the Alabama, Coosa, and Tallapoosa (ACT) River Basins, and the Appalachian, Chattahoochee, and Flint (ACF) River Basins (with M. Svoboda, C. Knutson, D. Woudenberg, M. Widhalm), \$24,999; NWS Southern Region Headquarters, Sept. 2008-Sept. 2009.

Drought Mitigation, Nebraska (with M. Svoboda, C. Knutson, and B. Wardlow), \$347,246; USDA-CSREES, July 2008-July 2009.

Hawaii Drought Plan (with M. Svoboda, Y. Ding, K. Smith, S. Scott, and M. Widhalm), \$100,000; Commission on Water Resource Management, State of Hawaii, June 2008-June 2010.

- An Assessment of Decadal Drought Information Needs of Stakeholders and Policymakers in the Missouri River Basin for Decision Support* (with C. Knutson and 3 others), \$294,111; NOAA May 2008-April, 2010.
- Transitioning the Drought Impact Reporter into an Operational System* (with D. Wilhite, M. Svoboda, C. Knutson, and 2 others), \$453,523; NOAA TRACS Program, August 2007-July 2010.
- Estimating the Impacts of Complex Climatic Events: the Economic Costs of Drought in Colorado, Nebraska, and New Mexico* (with D. Wilhite and 3 others), NOAA SARP Program, \$328,971; August 2006-July 2009.
- Rangeland and Forage Geospatial Decision Support System for Drought Risk Management* (with D.A. Wilhite, K. Hubbard, M. Svoboda, T. Tadesse, C. Knutson, and 3 others), \$1,023,038; USDA/RMA, Oct. 2005-Sept. 2010.
- Drought Risk, Impact, and Mitigation Information System* (with D. Wilhite and 7 others), \$6,407,472; USDA/RMA, Oct. 2005-Sept. 2010.
- Developing a Drought Preparedness Framework for Tribal Governments: Moving From Crisis to Risk-Based Management* (with C. Knutson and M. Svoboda), \$160,000; United States Bureau of Indian Affairs, Oct. 2007-Oct. 2008.
- Climate and Soil Risk Information System* (with D. Wilhite and 3 others), \$1,212,055; USDA/RMA, June 2005-May 2008.
- Engaging Agricultural Communities in the Great Plains of the U.S. with the Application and Development of Climate Prediction and Information* (with S. Hu and 4 others), \$432,916; NOAA, May 2002-July 2006.
- Sustainable Adaptation to Drought and Climate Variability in Agricultural Production Systems Across Nebraska* (with C. Knutson and 4 others), \$107,909; NOAA, July 2004-June 2006.

SELECTED PUBLICATIONS

- Wardlow, B., M. Hayes, M. Svoboda, T. Tadesse, and K. Smith. 2009. *Sharpening the focus on drought: new monitoring and assessment tools at the National Drought Mitigation Center*. **Earthzine**, unpaginated, <http://www.earthzine.org/2009/03/30/sharpening-the-focus-on-drought-%e2%80%93-new-monitoring-and-assessment-tools-at-the-national-drought-mitigation-center/>.
- Brown, J. F., B. D. Wardlow, T. Tadesse, M. J. Hayes, and B. C. Reed. 2008. *The Vegetation Drought Response Index (VegDRI): A new integrated approach for monitoring drought stress in vegetation*. **GIScience and Remote Sensing**, 45(1), 16-46.
- Dubrovsky, M., M. D. Svoboda, M. Trnka, M. J. Hayes, D. A. Wilhite, Z. Zalud, and P. Hlavinka. 2008. *Application of relative drought indices in assessing climate change impacts on drought conditions in Czechia*. **Theoretical and Applied Climatology**, 96(1-2), 155-171.
- Trnka, M., M. Dubrovsky, M. D. Svoboda, D. Semerádova, M. J. Hayes, Z. Zalud, and D. A. Wilhite. 2008. *Developing a regional drought climatology for the Czech Republic*. **International Journal of Climatology**, DOI: 10.1002/joc.1745.
- Wilhelmi, O. V., M. J. Hayes, and D. S. K. Thomas. 2008. *Managing drought in mountain resort communities: Colorado's experiences*. **Disaster Prevention and Management**, 15(5), 672-680.
- Woudenberg, D. L., D. A. Wilhite, and M. J. Hayes. 2008. *Perception of drought hazard and its sociological impacts in South-Central Nebraska*. **Great Plains Research**, 18(1), 93-102.
- Knutson, C. L., M. J. Hayes, and M. D. Svoboda. 2007. *Case study of tribal drought planning: the Hualapai Tribe*. **Natural Hazards Review**, 8(4), 125-131.
- Wilhite, D., M. Svoboda, and M. Hayes. 2007. *Understanding the complex impacts of drought: a key to enhancing drought mitigation and preparedness*. **Journal of Water Resources Management**, 21, 763-774.
- Wu, H., M. D. Svoboda, M. J. Hayes, D. A. Wilhite, and F. Wen. 2007. *Appropriate application of the Standardized Precipitation Index in arid locations and dry seasons*. **International Journal of Climatology**, 27, 65-79.
- Hayes, M., O. Wilhelmi, and C. Knutson. 2004. *Reducing drought risk: bridging theory and practice*. **Natural Hazards Review**, 5(2), 106-113.

OTHER PROFESSIONAL ACTIVITIES

- Member*, Nebraska Climate Assessment and Response Committee (2007-present)
- Member*, National Integrated Drought Information System Implementation Team (NIDIS) (2006-present)
- Co-Chair*, Engaging the Preparedness Communities Working Group, NIDIS (2006-present)
- Co-Chair*, Stakeholder Processes and Needs Working Group, WGA/NOAA NIDIS (2003-2004)
- Member*, WGA/NOAA National Integrated Drought Information System Core Team (2003-2004)
- Member*, 2003-2004, WGA/NOAA National Integrated Drought Information System Interdisciplinary Team.
- Co-author*, 1999-2005, U.S. Drought Monitor; *Co-author*, 2002-2005, North American Drought Monitor.

TIM L. HILLER, Post-doctoral Research Associate, 100% Research

Areas of Interest: Wildlife-habitat relationships, population responses to landscape-level changes

Contact: thiller2@unl.edu, 402/472-8296

EDUCATION

B.S. Fisheries and Wildlife Biology, Iowa State University (1995)

M.S. Wildlife Ecology, Oklahoma State University (2004)

Ph.D. Wildlife Ecology, Michigan State University (2007)

PROFESSIONAL EXPERIENCE

2008-present Post-doctoral Research Associate, School of Natural Resources, University of Nebraska-Lincoln

2004-2007 Graduate Research Assistant, Dept. of Fisheries and Wildlife, Michigan State University

2001-2004 Graduate Research Assistant, Dept. of Forestry, Oklahoma State University

1999-2001 Conservation Aide, Story County Conservation Board, Ames, IA

HONORS AND AWARDS

Charles Dobbins Memorial Scholarship, Fur Takers of America (2007)

Academic Scholarship, Northern Great Lake Fur Harvesters, Incorporated) (2006)

J. G. Schotthoeffer Memorial Award, Safari Club International (2006)

Wildlife Publications Award–Outstanding Monograph, The Wildlife Society (2006)

G. R. Hartsough Endowed Scholarship in Fur Animal Studies, MSU Dept. of Animal Science (2006)

Travel Grant Award, MSU Graduate Student Organization) (2006)

Research Enhancement Award, MSU Graduate School (\$700) (2005)

Academic Scholarship, Northern Great Lake Fur Harvesters, Incorporated (2005)

J. G. Schotthoeffer Memorial Award, Safari Club International (2005)

Bill Burtness Fellowship, Rocky Mountain Goats Foundation (2005)

G. R. Hartsough Endowed Scholarship in Fur Animal Studies, MSU Dept. of Animal Science (2005)

J. G. Schotthoeffer Memorial Award, Safari Club International (2004)

Student Membership Award, Cooper Ornithological Society (2 yr) (2004)

TEACHING

Courses Taught (Fall, Spring, Summer)

FW410 Upland Ecosystem Management (S07)

RESEARCH

My research has involved primarily game species ecology and management, wildlife-habitat relationships, and population responses to landscape-scale changes, though I delve into other research topics, including wildlife harvest management and damage management. I often work closely with state and federal agencies to address various management issues, including management of high abundance species.

EXTENSION/OUTREACH

My outreach activities relate primarily to presentations (13) and popular articles (34) on conservation and management issues and topics to a diverse array of audiences.

SELECTED GRANTS AND CONTRACTS

Selectivity and correlates of capture for winter-trapped white-tailed deer (Hiller, T.L.), **Whitetails Unlimited**, \$800; 2008.

Advancing ecological knowledge: development of an information guide to the ecology and management of Michigan's natural resources (with Felix, A.B., H. Campa III, and T. L. Hiller), (50% of \$12,000); 2008, in progress.

Movements and space use of white-tailed deer in an agro-forest ecosystem (with Hiller, T.L. and H. Campa III), **Whitetails Unlimited**, \$1,000; 2006.

SELECTED PUBLICATIONS

- Hiller, T. L., A. B. Felix, and F. S. Guthery. 2009. *Association of northern bobwhites with surface water in the semi-arid Texas Panhandle*, **Wilson Journal of Ornithology**, 121, 135–140.
- Hiller, T.L., H. Campa III, and S.R. Winterstein. 2009. *Estimation and implications of space use for white-tailed deer management in southern Michigan*, **Journal of Wildlife Management**, 73, 201–209.
- Hiller, T. L., and H. Campa III. 2008. *Age-specific survival and space use of white-tailed deer in southern Michigan*, **Michigan Academician**, 38, 101–119.
- Hiller, T. L., H. Campa III, S. R. Winterstein, and B. A. Rudolph. 2008. *Survival and space use of fawn white-tailed deer in southern Michigan*, **American Midland Naturalist**, 159, 403–412.
- Hiller, T. L., F. S. Guthery, A. R. Rybak, S. D. Fuhlendorf, S. G. Smith, W. H. Puckett, Jr., and R. A. Baker. 2007. *Management implications of cover selection data: northern bobwhite example*, **Journal of Wildlife Management**, 71, 195–201.
- Guthery, F. S., A. R. Rybak, W. R. Walsh, S. D. Fuhlendorf, and T. L. Hiller. 2005. *Quantifying usable space for wildlife with use-availability data*, **Journal of Wildlife Management**, 69, 655–663.
- Guthery, F. S., A. R. Rybak, S. D. Fuhlendorf, T. L. Hiller, S. G. Smith, W. H. Puckett, Jr., and R. A. Baker. 2005. *Aspects of the thermal ecology of bobwhites in North Texas*, **Wildlife Monographs**, No. 159.
- Hiller, T. L., and F. S. Guthery. 2005. *Microclimate versus predation risk in roost and covert selection by bobwhites*, **Journal of Wildlife Management**, 69, 140–149.
- Hiller, T. L., and F. S. Guthery. 2004. *Correlates of fall–spring mass dynamics of bobwhites*, **Wilson Bulletin**, 116, 324–329.
- Guthery, F. S., T. L. Hiller, W. H. Puckett, Jr., R. A. Baker, and S. G. Smith. 2004. *Effects of feeders on dispersion and mortality of bobwhites*, **Wildlife Society Bulletin**, 32, 1248–1254.

OTHER PROFESSIONAL ACTIVITIES

- Poster judge* Midwest Ecology and Evolution Conference (UNL), field trip transportation, 2009.
- Book/Video Review Editor*, Fur Taker Magazine, Fur Takers of America (FTA), 2007–present.
- Peer Reviewer*, Journal of Wildlife Management (4), Wilson Journal of Ornithology (1), Ibis (1), 2005–present.
- Ad hoc Committee Member (FTA)*, AFWA Best Management Practices for Trapping, 2007–present.
- District 20 MUCC Representative*, National Trappers Association, 2007–2008.
- District Director* (districts 3 and 6), Michigan Trappers Association, 2006–2008.
- Landowner Assistance Program Liaison*, Michigan Trappers Association, 2006–2008.
- Lead Editor, Staff Writer*, MSU Dept. of Fisheries and Wildlife Spotlight magazine, 2006–2007.

KYLE D. HOAGLAND, Professor and UNL Water Center Director, 15% Teaching, 35% Research, 50% Administration (Director, UNL Water Center)

Areas of Interest: Limnology, Aquatic Ecology, Ecotoxicology, Lake Restoration, Periphyton Ecology

Contact: khoagland@unl.edu, 402/472-3305

EDUCATION

B.S. Zoology, Michigan State University (1973)

M.S. Aquatic Biology; Eastern Michigan University (1975)

Ph.D. Life Sciences (Phycology), University of Nebraska (1981)

PROFESSIONAL EXPERIENCE

2000-present Director, University of Nebraska Water Center (50% administration)

2003-present Leader, Water Resources Research Initiative, University of Nebraska

1990-present Professor, School of Natural Resource Sciences, University of Nebraska, Lincoln (75% research/25% teaching appointment; tenured beginning 7/94; Associate Professor 1990-95).

2001-2003 Interim Director, School of Natural Resource Sciences, University of Nebraska

1996-2007 ESCOP/ACOP Leadership Development Program participant

1985-1993 Limnology Instructor, Cedar Point Biological Station, University of Nebraska. Five-week field course, emphasizing field and laboratory techniques

1983-1990 Associate Professor of Biology (Assistant Professor until 1988, tenured and promoted), Department of Biology, Texas Christian University, Fort Worth, TX.

HONORS AND AWARDS

University-wide Student/Parent Advisor Award

TEACHING

Courses Taught

NRES 459/859 Limnology (with laboratory)

NRES 468/868 Wetlands (with lab; team taught)

NRES 898 Aquatic Botany (with lab; team taught)

NRES 866 Advanced Limnology (team taught)

NRES 404 Wildlife Seminar

Masters and Doctoral Students Advised:

M.S. 21 (completed); Ph.D. 5 (completed), 1 (pending); Postdocs 4 (completed).

RESEARCH

My laboratory has focused on the ecotoxicology of agrichemicals on algae in lakes and streams, with emphasis on the commonly used herbicides atrazine and alachlor, as well as algal toxins. This research has been conducted at the population and community levels, at both chronic and acute exposures. In addition, the lab is addressing aquatic ecology issues including lake restoration, lake classification, and water quality assessment. A total of 60 peer-reviewed publications have resulted from this research..

SELECTED GRANTS AND CONTRACTS

Resilience and Adaptive Management in Stressed Watersheds, NSF IGERT (Craig Allen, lead PI), \$3.2 M; 2009-2014.

Change in filter strip performance over time: an evaluation of runoff chemistry, USDA (with M. Dosskey and J. Brandle), \$78,000; 2003-2005.

Develop a research and technical needs catalog for national parks in the Great Plains, National Park Service (Great Plains CESU) (with C. Lockert and G. Willson), \$41,000; 2002-2004.

Macroinvertebrate community biomonitoring for Tallgrass Prairie National Preserve, National Park Service, \$16,700; 2002-2004.

Development and implementation of a comprehensive lake and reservoir strategy for Nebraska as a model for agriculturally dominated ecosystems, U.S. Environmental Protection Agency (J. Holz lead PI), \$1,224,706; 2000-2004.

Appendix V – Faculty CVs - 62

Oxygen budget for Lake Ogallala, Nebraska Game & Parks Commission (with J. Holz et al.), \$93,084; 2000-2002.
Development of a Dissolved Oxygen Circulation Model for Lake Ogallala, Nebraska Game & Parks Commission (J. Stansbury, Civil Engineering, lead PI), \$123,368; 2000-2002.
Evaluating the effects of pesticide mixtures to aquatic organisms, U.S. Geological Survey (with B. Siegfried), \$34,300; 1999-2001.
Nebraska lake classification and assessment program, Nebraska Department of Environmental Quality (with J. Holz), \$370,000; Nebraska Game & Parks Commission, \$45,000; 1998-2001.
Branched Oak Reservoir evaluation, Nebraska Game & Parks Commission (with E. Peters), \$272,735; 1999-2001.
Changes in primary productivity in Pawnee Reservoir as a result of reservoir aging, U.S. Army Corps of Engineers, \$49,772; 1997-1999.
Herbicide effects on water quality in the Great Plains: mechanisms of selective toxicity in freshwater algae, U.S. Geological Survey (with B. Siegfried), \$50,006; 1997-1999.
Diatom attachment at aquatic interfaces: molecular interactions, mechanisms and physiology of adhesion, Office of Naval Research (with M. Gretz), \$565,541 (incl. \$67,905 of ASSERT fellowship funding); 1993-1996.
Biochemistry of the fouling marine diatom adhesives and the effects of substrate preconditioning on adhesion, Office of Naval Research (with M. Gretz), \$328,661; 1990-1993.
Impacts of global climate change on phytoplankton productivity in lakes along a thermal gradient, Department of Energy, NIGEC (Great Plains Regional Center) (with S. Ernst), \$123,070; 1994-1996.

SELECTED PUBLICATIONS

Bartelt-Hunt, S. L., D.D. Snow, T. Damon, J. Shockley, and K. Hoagland. 2009. *The occurrence of illicit and therapeutic pharmaceuticals in wastewater effluent and surface waters in Nebraska*. **Environmental Pollution** 157, 786-791.

Dosskey, M.G., K.D. Hoagland, and J.R. Brandle. 2007. *Change in filter strip performance over ten years*. **Journal of Soil and Water Conservation** 62, 21-32.

Lockert, C.K., K.D. Hoagland and B.D. Siegfried. 2006. *Comparative sensitivity of freshwater algae to atrazine*. **Bulletin of Environmental Contamination and Toxicology** 76, 73-79.

Hoagland, K.D., S. A. Matteen, J.-X. Tang and B.D. Siegfried. 2002. *Pesticide effects on diatom communities: differential toxicity of atrazine metabolites*. **15th International Diatom Symposium** pp. 135-141.

Holz, J.C. and K.D. Hoagland. 1999. *Effects of phosphorus reduction on water quality: comparison of alum-treated and untreated portions of a hypereutrophic lake*. **Journal of Lake and Reservoir Management** 15, 70-82.

Schmitt, T., M.G. Dosskey and K.D. Hoagland. 1999. *Filter strip performance and processes for different vegetation, widths, and contaminants*. **Journal of Environmental Quality** 28, 1479-1489.

Nelson, K.J., K.D. Hoagland and B.D. Siegfried. 1999. *Chronic effects of atrazine on tolerance of a benthic diatom*. **Environmental Toxicology and Chemistry** 18, 1038-1045.

Tang, J.-X., K.D. Hoagland and B.D. Siegfried. 1998. *Glutathione-S-transferase and in vitro metabolism of atrazine in freshwater algae*. **Pesticide Biochemistry and Physiology** 5, 155-161.

Lewis, R.J., S.I. Jensen, D.M. DeNicola, V.I. Miller, K.D. Hoagland and S.G. Ernst. 1997. *Genetic variation in the diatom *Fragilaria capucina* along a latitudinal gradient across North America*. **Plant Systematics and Evolution** 204, 99-108.

Johnson, L.M., K.D. Hoagland and M.R. Gretz. 1995. *Effects of bromide and iodide on stalk secretion in the biofouling diatom *Achnanthes longipes* (Bacillariophyceae)*. **Journal of Phycology** 31, 401-412.

OTHER PROFESSIONAL ACTIVITIES

President, National Institutes for Water Resources (2007-2008)
Treasurer, Phycological Society of America (1998-2000)
Editorial Boards, Biofouling (1987-93), Journal of Phycology (1988-90, *editorial board member*; 1990-1994, *Associate Editor*)

ARIS A. HOLZ, Research Assistant Professor, 25% Teaching, 73% Research, 2% University Service

Areas of Interest: Aquatic Ecology, Saline Lakes, Phytoplankton, Algal Toxins, Lake and Stream Nutrient Criteria
Contact: aholz2@unl.edu, 402-472-8182

EDUCATION

B.S. Biology, University of Nebraska-Lincoln (1992)
M.S. Parasitology, University of Nebraska-Lincoln (1994)
Ph.D. Natural Resources, University of Nebraska-Lincoln (2005)

PROFESSIONAL EXPERIENCE

2005-present Research Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
2007-present Coordinator, Water Science Major, School of Natural Resources, University of Nebraska-Lincoln
2007 Member, US EPA Technical Advisory Committee on Nebraska Lakes
2006-2007 Advisor, US EPA Survey of the Nations Lakes
2005-2006 Advisor, US EPA Region VII Streams Technical Assistance Group
2001-2004 Advisor, US EPA Region VII Lakes Regional Technical Assistance Group
2001-2005 Research Assistant, University of Nebraska-Lincoln, SNR
1999-2000 Research Technologist, University of Nebraska-Lincoln, SNR, Limnology
1997-1999 Laboratory Coordinator/Instructor, Dept. of Biology, Creighton University

HONORS AND AWARDS

Best Student Poster Presentation, 21st International Symposium of the North American Lake Management Society (2001)

A.C. Cuckler Award for outstanding parasitology graduate student (1994)

TEACHING

Courses Taught (Fall, Spring, Summer)

WATS 498a Senior Thesis in Water Science, 1st semester (F08, S09)
WATS 498b Senior Thesis in Water Science, 2nd semester (F08, S09)
NRES 465 Limnology Lab (S01)
BIOS 385 Parasitology Lab (S94)
BIOS 112 Zoology Lab (F91, S92, S93, F94)
BIOS 101 Introductory Biology Lab (F92, S93)

Masters and Doctoral Student Committee Member

Amy Zoller (M.S. Geography 2009)
Kimberly Laing (M.S. Natural Resources 2008)

RESEARCH

My research involves developing statistical methodologies for lake and stream classification using landscape based regions (hydrocoregions) as a means of quickly and cost effectively predicting water quality for rivers, streams and reservoirs. I am also involved in developing predictive models for freshwater cyanobacterial and toxic cyanobacterial blooms by integrating in-lake water quality, geographical, and weather parameters. I have been determining the frequency of algal blooms and toxic algal blooms pre and post European settlement in freshwater lakes using paleolimnological techniques and identifying the unique nutrient stoichiometry that limits phytoplankton growth over a range of freshwater and alkaline lakes in the Nebraska Sandhills.

UNIVERSITY SERVICE

I have served as chair of the School of Natural Resources Sustainability Committee (2008-present), co-chair of the Five Year Review Water Group (2008-present). I have participated in Student Retention and Recruitment bi-monthly activities (2007-present). I was a participant, Water Student Recruiting Website development (2008-present) and a member, School of Natural Resources Undergraduate Curriculum Committee (2007-present).

SELECTED GRANTS

- Fremont Alum Treatment Project*, Nebraska Department of Environmental Quality, \$201,700; 2007-2009.
- Classification of Nebraska's rivers and streams*, Nebraska Department of Environmental Quality, \$150,000; 2006-2007.
- Determination of appropriate water quality expectations in agriculturally dominated ecosystems*, University of Nebraska, Institute of Agriculture and Natural Resources, \$39,856; 2006-2009.
- Determining toxic algal bloom frequency in Nebraska lakes*, University of Nebraska, Office of Research (Layman Award), \$9,982; 2006-2007.
- Determination of appropriate lake water quality expectations in agriculturally dominated ecosystems. Phase I: Determining Nebraska's hydroecoregions*, United States Geological Survey/UNL Water Center, \$20,600; 2006 to 2007.
- Classification of Nebraska's streams and water quality outreach*, Nebraska Department of Environmental Quality, \$152,588; 2005 to 2006.
- Developing procedures for predicting toxic blue-green algae blooms using remote sensing capabilities*, Nebraska Department of Environmental Quality, \$105,263; 2004 to 2006.

SELECTED PUBLICATIONS

- Holz, A.A., J.C. Holz, A.M. Parkhurst, and K.D. Hoagland. *A novel ecological continuum approach for classification of aquatic resources using reservoirs as a model system*, **Environmental Management**, accepted.
- Bulley, H., D. Marx, J. Merchant, J. Holz, and A. Holz. 2008. *A Comparison of Nebraska Reservoir Classes Estimated from Watershed-Based Classification Models and Ecoregions*, **Journal of Environmental Informatics**, 11(2), 90-102.
- Bennett, D.M., S.C. Fritz, J.C. Holz, A.A. Holz, and V.A. Zlotnik. 2007. *Evaluating climatic and non-climatic influences on ion chemistry in natural and man-made lakes of Nebraska, USA*, **Hydrobiologia**, 591, 103-115.
- Bulley, H.N.N., J.M. Merchant, D.B. Marx, J.C. Holz, and A.A. Holz. 2007. *A GIS-based approach to watershed classification for Nebraska reservoirs*, **Journal of American Water Resources Association**, 43(3), 605-621.
- Janovy, J.J.Jr., R.E. Clopton, D.A. Clopton, S.D. Snyder, A. Efting (Holz), and L. Krebs. 1995. *Species density distributions as null models for ecologically significant interactions of parasite species in an assemblage*, **Ecological Modelling**, 77, 189-196.
- Rosowski, J.M. and A.A. Efting (Holz). 1992. *Growth of the brine shrimp *Artemia franciscana* Kellogg (Anostracoda) in the materials dispersion apparatus as a sealed microcosm*, **Transactions of the Nebraska Academy of Sciences**, 19, 7-19.

OTHER PROFESSIONAL ACTIVITIES

- Invited keynote speaker*, Great Plains Limnology Conference Annual Meeting, Lawrence, KS, 2005.
- Member*, American Society for Limnology and Oceanography, 2002-present.
- Member*, International Society for Salt Lake Research, 2007-present.
- Member*, North American Lake Management Society, 2001-present.

JOHN C. HOLZ, Research Assistant Professor, 15% Teaching, 70% Research,
13% Extension/Outreach, 2% University Service (Resigned)

Areas of Interest: Lake Water Quality, Lake/Reservoir Restoration, Aquatic Ecology

Contact: jholz1@unl.edu, 402/472-6648

EDUCATION

B.S. Natural Resources; University of Nebraska, Lincoln, NE (1991)

M.S. Forestry, Fisheries and Wildlife; University of Nebraska, Lincoln, NE (1994)

Ph.D. Biological Sciences (Aquatic Ecology); University of Nebraska, Lincoln, NE (1998)

PROFESSIONAL EXPERIENCE

2002-present Member, US EPA Region VII Streams Regional Technical Assistance Group

1999-2004 Member, US EPA Region VII Lakes Regional Technical Assistance Group

1999-2002 Board of Directors, North American Lake Management Society

1998-present Research Assistant Professor, School of Natural Resources, University of Nebraska, Lincoln, NE
(50% Research/35% Extension/15% Teaching)

1994-98 Research Project Manager, School of Natural Resource Sciences, University of Nebraska,
Lincoln, NE

HONORS AND AWARDS

Environmental Council of the States Program Innovation Award in recognition of the accomplishments of the
Community Lake Enhancement and Restoration (CLEAR) Program (2001)

North American Lake Management Society Technical Excellence Award for 1999 in recognition for Outstanding
Research in Lake Restoration, Protection, and Management (1999)

Selected as a *Participant in the Dissertations Initiative for the Advancement of Limnology and Oceanography
Symposium* at the Bermuda Biological Station for Research (1999)

Outstanding Water Resources Dissertation in the Field of Water Quality, Honorable Mention, The Universities
Council on Water Resources (1999)

Best Student Presentation, 17th International Symposium of the North American Lake Management Society (1997)

TEACHING (last five years)

Courses Taught (Fall, Spring, Summer)

NRES 459/859 Limnology (Su 04, S 05, Su 06, S 07, Su 08, S 09)

NRES 464/864 Lake and Reservoir Restoration (S 04, S 06, S 08)

RESEARCH (last five years)

Understand causes of poor lake and stream water quality; research, develop and assess water quality management tools (e.g., alum aeration, dredging, watershed practices); nutrient impacts on water quality; land-use impacts on water quality; determination of realistic surface water expectations (TMDLs, nutrient criteria); toxic algae ecology and remediation.

EXTENSION (last five years)

Supervision of UNL's Lake Water Quality Extension Program and UNL's Toxic Algae Outreach and Extension Program; Assist water resource managers, owners, regulators and users with water quality issues; Produce written and web-based material on water quality problems and solutions; Adult and youth water quality education.

SELECTED GRANTS AND CONTRACTS (last five years)

Heartland Integrated Water Coordination Initiative, USDA CSREES 406, \$561,603; 2008-2012

Stream Data Assessment, Nebraska Department of Environmental Quality, \$149,888; 2008-2009

Water Quality Extension and Outreach, Nebraska Department of Environmental Quality, \$54,560; 2008-2009

Statewide Algae Monitoring and Assessment, Nebraska Department of Environmental Quality, \$29,744; 2008-2009

Classification of Nebraska's Streams, Nebraska Department of Environmental Quality, \$150,000; 2007-2008

Water Quality Extension and Outreach, Nebraska Department of Environmental Quality, \$54,343; 2007-2008

Toxic Algae and Extension, Nebraska Department of Environmental Quality, \$29,744; 2007-2008

Fremont Alum Treatment Project, Nebraska Department of Environmental Quality, \$201,700; 2007-2009

- Determination of Appropriate Lake Water Quality Expectations in Agriculturally Dominated Ecosystems*, USGS/UNL Water Center, \$39,928; 2006-2007
- Determination of Appropriate Lake Water Quality Expectations in Agriculturally Dominated Ecosystems: Phase II*, IANR-ARD, \$20,600; 2006-2008
- Classification of Nebraska's Rivers and Streams*, Nebraska Department of Environmental Quality, \$152,588; 2006-7
- Water Quality Extension and Outreach*, Nebraska Department of Environmental Quality, \$44,494; 2006-2007
- Toxic Algae Outreach*, Nebraska Department of Environmental Quality, \$26,088; 2006-2007
- Toxic Algae Extension and Outreach*, Nebraska Department of Environmental Quality, \$26,853; 2005-2006
- Water Quality Extension and Outreach*, Nebraska Department of Environmental Quality, \$47,045; 2005-2006
- Stream Data Assessment (Classification of Nebraska's Rivers and Streams)*, Nebraska Department of Environmental Quality, \$150,000; 2005-2006
- Developing Procedures for Predicting Toxic Blue-Green Algae Blooms Using Remote Sensing Capabilities*, Nebraska Department of Environmental Quality, \$105,263; 2005-2006
- Reservoirs Biological Study: 2005*, Nebraska Department of Environmental Quality, \$45,000; 2005-2006
- Reservoirs Biological Study: 2004*, Nebraska Department of Environmental Quality, \$45,000; 2004-2005
- Classification of Nebraska Streams and Rivers: Phase I Data Assessment, Collection, and Analysis*, Nebraska Department of Environmental Quality, \$111,000; 2004-2005
- Salt Valley Reservoirs Biological Study*, Nebraska Department of Environmental Quality, \$45,000; 2002-2004
- States Lakes Classification 2002-03*, Nebraska Department of Environmental Quality, \$350,000; 2003-2004

SELECTED PUBLICATIONS (list up to 10, emphasize last five years)

- Gitelson, A.A., G. Dall'Olmo, W. Moses, D.C. Rundquist, T. Barrow, T.R. Fisher, D. Gurlin, and J.C. Holz. 2008. *A Simple Semi-Analytical Model for Remote Estimation of Chlorophyll-A in Turbid Waters: Validation. Remote Sensing of Environment*, 112, 3582-3593.
- Bulley, H., D. Marx, J. Merchant, J. Holz, and A. Holz. 2008. *A Comparison of Nebraska Reservoir Classes Estimated from Watershed-Based Classification Models and Ecoregions*, **Journal of Environmental Informatics**, 11, 90-102.
- Eades, R., L. Richters, T. Barrow, J. Holz, P. Brakhage, and E. Traylor. 2008. *Improving Nebraska lakes via the Community Lakes Enhancement and Restoration (CLEAR) program* (R. Eades, J. Neal, T. Lang, K. Hunt, and P. Pajak, editors), **Proceedings of the 2007 Urban Fishing Symposium**, Bethesda, MD: American Fisheries Society Special Publication.
- Walker, S.R., J.C. Lund, D.G. Schumacher, P.A. Brakhage, B.C. McManus, J.D. Miller, M.M. Augustine, J.J. Carney, R.S. Holland, K.D. Hoagland, J.C. Holz, T.M. Barrow, D.C. Rundquist, and A.A. Gitelson. 2007. *Nebraska Experience* (H. Kenneth Hudnell, ed.), *Proceedings of the Interagency, International Symposium on Cyanobacterial Harmful Algal Blooms*, **Advances in Experimental Medicine and Biology**, 619, 135-148.
- Bennett, D.M., S.C. Fritz, J.C. Holz, A.A. Holz, and V.A. Zlotnik. 2007. *Evaluating Climatic and Non-climatic Influences on Ion Chemistry in Natural and Man-Made Lakes of Nebraska, USA*, **Hydrobiologia**, 591, 103-115.
- Bulley, H.N.N., J.M. Merchant, D.B. Marx, J.C. Holz, and A.A. Holz. 2007. *A GIS-based Approach to Watershed Classification for Nebraska Reservoirs*, **Journal of American Water Resources Association**, 43, 605-621.
- Wortmann, C.S., M. Al-Kaisi, J. Sawyer, M. Helmers, D. Devlin, C. Barden, P. Scharf, R. Ferguson, C.A. Shapiro, R. Spalding, D. Tarkalson, W. Kranz, J. Holz, D. Francis, and J. Schepers. 2007. *Agricultural Nitrogen Management for Water Quality Protection in the Midwest*, **University of Nebraska** RP 189.
- Wortman, C.S., M. Helmers, A. Mallarino, C. Barden, D. Devlin, G. Pierzynski, J. Lory, R. Massey, J. Holz, C. Shariro, and J. Kovar. 2006. *Agricultural Phosphorus Management and Water Quality Protection in the Midwest*, **University of Nebraska**.
- Dall'Olmo, G., A.A. Gitelson, D.C. Rundquist, B. Leavitt, T.M. Barrow, and J.C. Holz. 2005. *Assessing the Potential of SeaWiFS and MODIS for Estimating Chlorophyll Concentration in Turbid Productive Waters Using Red and Near-infrared Bands*, **Remote Sensing of Environment**, 96, 176-187.

Memberships in Professional Societies:

- Member*, American Society for Limnology and Oceanography
- Member*, Ecological Society of America
- Member*, North American Lake Management Society

QI STEVEN HU, Associate Professor, 53% Research, 15% Extension/Outreach, 2% University Service, 30% Department of Geosciences (Teaching)

Areas of Interest: Climate variability of regional and global scales, Hydrological responses to climate forcing, Intra-seasonal oscillations in the tropical atmosphere, Numerical modeling, Human dimensions in climate change

Contact: E-mail: qhu2@unl.edu, Telephone: 402/472-6642

EDUCATION

B.S. Meteorology, Lanzhou University, Lanzhou, China (1982)

M.S. Atmospheric Sciences, Colorado State University, Fort Collins, CO (1986)

Ph.D. Atmospheric Sciences, Colorado State University, Fort Collins, CO (1992)

PROFESSIONAL EXPERIENCE

2003-present Associate Professor, School of Natural Resources, and Department of Geosciences, University of Nebraska-Lincoln, Lincoln, NE

1999-2003 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE

1995-1999 Research Assistant Professor, Department of Soil and Atmospheric Sciences, University of Missouri-Columbia, Columbia, MO

1995-1999 Director, Missouri Climate Center, University of Missouri-Columbia, Columbia, MO

1994-1995 Research Scientist, Pacific Northwest National Laboratory, Richland, WA

1992-1994 Research Associate, State University of New York-Albany, Albany, NY

HONORS AND AWARDS

Junior Faculty for Excellence in Research, Agricultural Research Division, Institute of Agriculture and Natural Resources, University of Nebraska (2002)

Oversea Science Advisor of the Chinese Academy of Science, elected award (2005-present)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 208 Applied Climate Science (F04, F05, F06)

NRES 467/867 Global Climate Change (F04, S06, S08)

NRES 907 Agricultural Meteorology (S03, S05)

METR 453/853 Physical Climatology (F05, F07)

METR 498/898 Special Topics (General Circulation of the Atmosphere, now METR415/815) (F06, F08)

Masters and Doctoral Students Advised

Chad M. Kauffman (Ph.D. Geosciences/Meteorology 2001) –*Evaluation of the ASOS Impact on Climatic Normals and Assessment of Variable-Length Time periods in Calculation of Normals.*

Kaikai Lu (MS School of Natural Resources 2002-03) (transferred to another program)

Lawren N. Graf (MS School of Natural Resources 2005) –*Using the Theory of Planned Behavior to Determine Factors Affecting Agricultural Use of Climate Forecasts across Three Counties in Nebraska.*

Melissa Melvin (MS School of Natural Resources 2004-05) (transferred to another program)

Yacoubou Tawaye (Ph.D. School of Natural Resources 2007) –*Variations of Energetics of Cyclones in the Mid-latitude North America, 1948-2000*

James McComik (MS Geosciences/Meteorology 2006-07) (dismissed because of health problems)

Bo Liu (Ph.D. Hydrology, Chinese Academy of Sciences, 2009) –*Water Cycle in the Upper Yangtze River Basin*

RESEARCH

I have investigated variations in the summer precipitation in the central U.S. from interannual to multidecadal timescales and identified major sources affecting the variations. I have examined the decision-making processes of farmers and proposed pathways to improve farmer effective use of climate predictions in farming decision-making.

EXTENSION/OUTREACH

I am involved in improved understanding of the farmer decision-making and developed a prototype model (<http://driftwood.unl.edu/farmsmart>) to train farmers for their construction of personal knowledge of weather and climate predictions and their use in making farming decisions.

UNIVERSITY SERVICE

I have served as a member on numerous search committees for faculty positions in SNR and Geosciences Department. I also have served as a member of the Research Committee of SNR.

SELECTED GRANTS AND CONTRACTS

Transition of weather and climate forecasts into effective decision-making tools (with 4 collaborators), NOAA, \$293,001; 2005-2008.

Predicting wheat curl mite movement and wheat streak mosaic virus spread (with Gary Hein and three collaborators), USDA CSREES, \$89,662; 2006-2009.

NC-94 (NC-1018) Regional Climate Research (with K. Hubbard), USDA, \$50,000; 2003-2008.

Evaluation of ecosystem models for beef cattle production (with T. Mader and one collaborator), DOE NIGEC, \$324,513; 2004-2007.

Sand Hills Biocomplexity (with D. Wedin and 8 collaborators), NSF, \$1.8M; 2003-2007.

Engaging agricultural communities in the Great Plains of the United States with the applications & developments of climate predictions & information (with 5 collaborators), NOAA, \$432,916; 2002-2005.

Soil Enthalpy effects on land memory in the western United States, NOAA, \$40,000; 2003-2004.

SELECTED PUBLICATIONS

Hu, Q., Z.N. Liang, and M.W. Hoffman. 2009. *Detecting source regions of wave activities in the tropical atmosphere by applying beamforming to interpolated data grids*, **Journal of Atmospheric Oceanic Technology**, 26, 270-280.

Guo, H., Q. Hu, and T. Jiang. 2008. *Annual and seasonal streamflow responses to climate and land-cover changes in Poyang Lake Basin, China*, **Journal of Hydrology**, 355, 106-122.

Aebly, F.A., Q. Hu, and S.C. Fritz. 2008. *Alternative indices for summer season NAO and precipitation variability in West Greenland*, **Journal of Climate**, 21, 532-541.

Hu, Q. and S. Feng. 2008. *Variation of the North American summer monsoon regimes and the Atlantic Multidecadal Oscillation*, **Journal of Climate**, 21, 2371-2383.

Hu, Q., S. Feng, H. Guo, and T. Jiang. 2007. *Interactions of the Yangtze River flow and the hydrologic processes of the Poyang Lake, China*, **Journal of Hydrology**, 347, 90-100.

Hu, Q. and S. Feng. 2007. *Decadal variation of the southwest U.S. summer monsoon circulation and rainfall in a regional mode*, **Journal of Climate**, 20, 4702-4716.

Hu, Q., A. Weiss, S. Feng, and P.S. Baenziger. 2006. *Earlier winter wheat heading dates and warmer spring in the Great Plains of the United States*, **Agricultural and Forest Meteorology**, 135, 284-290.

Hu, Q., L.M. PytlíkZillig, G.D. Lynne, K.G. Hubbard, W.J. Waltman, M.J. Hayes, A.J. Tomkins, and D.A. Wilhite. 2006. *Improving farmers' forecast use from understanding their beliefs, social norms, and perceived obstacles*, **Journal of Applied Meteorology and Climatology**, 45, 1190-1201.

OTHER PROFESSIONAL ACTIVITIES

Reviewer of proposals for NSF Climate Dynamics, Dynamics of Natural and Human Systems Program, and Science and Technology Center Program.

Reviewer of proposals for U.S. NOAA Office of Global Program.

Reviewer of proposals for U.S. Department of Energy NIGEC Program.

Reviewer of book proposals for **Cambridge University Press**.

Member of Editorial Board of **Journal of Advanced Meteorology** (<http://www.hindawi.com/journals/amet/>), 2008-present.

Reviewer of manuscripts submitted to **Proceedings of National Academy of Sciences of USA**, **Journal of the Atmospheric Sciences**, **Journal of Climate**, **Tellus-A**, **Journal of Applied Meteorology**, **Journal of Hydrometeorology**, **Journal of Geophysical Research**, **Geophysical Research Letters**, **International Journal of Climatology**, **Journal of Hydrology**, **Hydrological Processes**, **Climatic Change**, **Quaternary International**, **Advances in Atmospheric Sciences**, **Great Plains Research**, **Journal of Arid Environment**, **Applied Engineering in Agriculture**, **China Science Bulletin**, **Bulletin of Glaciology Research**, **Global and Planetary Change**, **Agronomy Journal**, **Weather and Forecasting**, **Meteorology and Atmospheric Physics**, **Agricultural and Forest Meteorology**, **Journal of Theoretical and Applied Climatology**.

KENNETH G. HUBBARD, Professor and Director HPRCC, 10% Teaching, 48% Research, 20% Extension Outreach, 20% Scholarly Service, 2% University Service

Areas of Interest: Network topics on spatial resolution, sensor performance, micro-climate of shields, quality assurance, analysis techniques; Micro-climate topics on energy/water budgets and evapotranspiration

Contact: khubbard1@unl.edu, 402/472-8294

EDUCATION

B.S. Math and Physics, Chadron State College (1971)

M.S. Meteorology, S. Dakota School of Mines and Technology (1973)

Ph.D. Soil Science and Biometeorology, Utah State University (1982)

PROFESSIONAL EXPERIENCE

1987-present Director, High Plains Climate Center, University of Nebraska-Lincoln

1994-present Professor, School of Natural Resources, University of Nebraska-Lincoln

1986-1993 Associate Professor, University of Nebraska-Lincoln

1981-1990 State Climatologist, University of Nebraska-Lincoln

1981-1986 Assistant Professor, University of Nebraska-Lincoln

HONORS AND AWARDS

Who's Who in Technology Today (1990)

Who's Who in Science and Engineering (1994-1995)

TEACHING

Course Taught (Fall)

NRES 208 Introduction to Bio-Atmospheric Resources (F05, F06, F07)

NRES 469/869 Bio-Atmospheric Instrumentation (F05, F07)

Masters and Doctoral Students Advised

Eric D. Hunt (M.S. Natural Resource Sciences 2007) The development and evaluation of a soil moisture index (SMI) using automated weather data network (AWDN) soil moisture data in Nebraska for the 1999-2006 growing seasons.

Hector Flores (PhD Agricultural Meteorology 2007) Penman-Monteith formulation for direct estimation of maize evapotranspiration in well watered conditions with full canopy.

Nathan C Healey (M.S. Natural Resource Sciences 2008) A spatial analysis of anthropogenically derived and naturally occurring environmental controls on corn-based ethanol production in Nebraska.

RESEARCH

My research has focused on two main areas. The first major topic is climate data fidelity and the second is the surface energy and water budget for various microclimates. This includes study of how longwave forcing impacts the partitioning of energy in various ecosystems both natural and managed.

EXTENSION/OUTREACH

I am involved in the management of the Nebraska Automated Weather Data Network and the provision of leadership of the High Plains Regional Climate Center to accomplish collection, quality control and dissemination of data from federal and state networks in order to improve various updates and summaries made available to the public. A new Advanced Climate Information System has been developed to provide historical and near-real time data, networked and synchronous links between centers, and produces 1000's of updated maps per day as well as special summaries through standard user interfaces < <http://www.rcc-acis.org/about.php>>.

UNIVERSITY SERVICE

I was a member of the SNR Director's Faculty Advisory Council in 2007-2008 and a member of the Survey Committee from 2006-2008.

SELECTED GRANTS AND CONTRACTS

High Plains Climate Center Budget. National Oceanic & Atmospheric Administration (NOAA), \$383,000; May 2005-April 2006.

High Plains Climate Center Budget. NOAA, \$460,000; May 2006-April 2007.

High Plains Climate Center Budget. NOAA, \$325,000; May 2007-April 2008.

High Plains Climate Center Budget. NOAA, \$525,000; May 2008-April 2009.

Improvement of instrumentation record, NOAA Climate Program Office, \$169,000; July 2006-June 2009.

Estimating Solar Radiation and Dew point at COOP location, NOAA Climate Program Office, \$67,000; June 2008-May 2010.

SELECTED PUBLICATIONS

Kunkel, K.E., M. Palecki, L. Ensor, K.G. Hubbard, D. Robinson, K. Redmond, and D. Easterling. 2008. *Trends in 20th Century snowfall using a quality-controlled data set*, **Journal of Atmospheric and Oceanic Technology**, DOI: 10.1175/2008JTECHA1138.

Sridhar, V., K.G. Hubbard, J. You, and E. Hunt. 2008. *Development of a soil moisture index to quantify agricultural drought and its „user friendliness“ in severity-area-duration assessment*, **Journal of Hydrometeorology**, 9(4):660-676.

Mahmood, R., K.G. Hubbard, R. Leeper, and S.A. Foster. 2008. *Increase in near surface atmospheric moisture content due to land use changes: Evidence from the observed dew point temperature data*, **Monthly Weather Review**, 136(4):1554-1561.

Hunt, E.D., K.G. Hubbard, D.A. Wilhite, T.J. Arkebauer, and A.L. Dutcher. 2008. *The development and evaluation of a soil moisture index*, **International Journal of Climatology**, Wiley InterScience, DOI: 10.1002/joc.1749.

Hubbard, K.G. 2008. *Agricultural Climatology*, **Journal of Service Climatology**, American Association of State Climatologists, 1(2):1-9. www.journalofserviceclimatology.org/articles/2007/2.0-Hubbard.pdf.

Pielke, R. A. Sr., C. Davey, D. Niyogi, K. G. Hubbard, X. Lin, M. Cai, H. Li, J. Neilsen-Gammon, K. P. Gallo, R. Hale, and J. Angel. 2007. *Unresolved issues with the assessment of multidecadal global surface temperature trends*, **Journal of Geophysical Research**, 112, D24S08, doi: 10.1029/2006JD08229.

Mahmood, R., R. Pielke, Sr. and K.G. Hubbard. 2007. *Effect of human activities on the atmosphere*. **Transactions - American Geophysical Union**. 88(52), DOI:10.1029/2007EO520007.

Grant, R.F., T.J. Arkebauer, A. Dobermann, K.G. Hubbard, T.T. Schimelfenig, A.E. Suyker, S.B. Verma, and D.T. Walters. 2007. *Net biome productivity of irrigated and rainfed maize-soybean rotations: Modeling vs. measurements*, **Agronomy Journal**, 99(6):1404-1423.

Lin, X., R.A. Pielke, Sr., K.G. Hubbard, K.C. Crawford, M.A. Shafer, and T. Matsui. 2007. *An examination of 1997-2007 surface layer temperature trends at two heights in Oklahoma*, **Geophysical Research Letters**, 34(24):L24705. doi:10.1029/2007GL031652.

Lin, X. and K.G. Hubbard. 2007. *What are maximum and minimum temperature in climatology?*, **Journal of Applied Climatology**, DOI:10.1002/joc.1536.

OTHER PROFESSIONAL ACTIVITIES

President, American Association of State Climatologists, 1985-86.

Member, Committee on Applied Climate Service, American Meteorological Society, 2008-current.

Co-Editor, Journal of Service Climatology, American Association of State Climatologists, 2008-2009.

Member, Standing Committee on Surface Mesonets, American Association of State Climatologists, 2007-2009.

JULIE A. HUDDLE, Research Assistant Professor, 5% Teaching, 50% Research,
45% University Service

Areas of Interest: Plant Ecophysiology, Forestry, Water Resources, Fire Ecology, Prairie Ecology
Contact: jhuddle2@unl.edu, 402/472-8556

EDUCATION

B.A. Biology, Grinnell College (1989)

Ph.D. Forestry, University of Missouri-Columbia (1995)

PROFESSIONAL EXPERIENCE

2008-present	Assistant Research Professor, School of Natural Resources, University of Nebraska-Lincoln
2006-2007	Biology Teacher, Henry-Senachwine High School, C.U.S.D. 5
2005-2006	Science Teacher, Barry Community Unit School District 1
2002-2004	Peace Corps Volunteer Forestry Instructor, Tribhuvan University, Institute of Forestry, Nepal
2000-2001	Biology Instructor, Northwest Missouri State University, Biology Department
1998-2000	Postdoctorate Population Ecologist, University of Nebraska, Department of Agronomy and Horticulture
1997-1998	Postdoctorate Research Associate, Texas A&M University, Rangeland Ecology and Management
1995-1997	Research Associate, Texas A&M University, Rangeland Ecology and Management

HONORS AND AWARDS

Superior Graduate Achievement Award, University of Missouri, Forestry Department (1991-1992)

Grinnell Trustee Scholarship (1985-1988)

TEACHING

Courses Assisted (Fall, Spring, Summer, Winter)

NRES 310 Forest Management (F08)

Guest Lecturing (Fall, Spring, Summer, Winter)

NRES 406/806 Plant Ecophysiology (F08, 2 lectures, 1 lab)

Courses Taught (Fall, Spring, Summer, Winter)

Biology I grades 9 & 10, Henry-Senachwine High School, C.U.S.D. 5, Henry, IL (F06, F07)

Biology II grades 11 & 12, Henry-Senachwine High School, C.U.S.D. 5, Henry, IL (F06, F07)

Life Science grades 10 & 11, Henry-Senachwine High School, C.U.S.D. 5, Henry, IL (F06, F07)

General Biology grades 9 & 10, Barry Community Unit School District 1, Barry, IL (F05, F06)

Biology grades 9 & 10, Barry Community Unit School District 1, Barry, IL (F05, F06)

Env. Science grades 9 & 10, Barry Community Unit School District 1, Barry, IL (F05, F06)

Silviculture 406 Tribhuvan University, Institute of Forestry (W02, W03)

Silviculture 451 Tribhuvan University, Institute of Forestry (S03)

Silviculture 556 Tribhuvan University, Institute of Forestry (S04)

BIO491 Senior Seminar, Northwest Missouri State University, Biology Department (F00, S01)

BIO575 Methods of Plant Ecology, Northwest Missouri State University, Biology Department (F00)

BIO113 Botany Lab, Northwest Missouri State University, Biology Department (S01)

RESEARCH

I am working to advance scientific understanding of the ecophysiology and population dynamics of plants and ecosystems and use this understanding to improve vegetation management. Last year I continued ongoing experiments at Nebraska Forest in Halsey, NE by operating, maintaining, and improving sap flux equipment to monitor evapotranspiration and climate and by measuring the size, and growth and sapwood length of trees. I have conducted surveys to document how vegetation in cottonwood riparian forests changes when invasive tree species are removed. As a Peace Corps Volunteer in Nepal, I designed and implemented a survey of non-timber forest products by the Lhosepakha Raniban Community Forest Users Group to improve their management plans.

UNIVERSITY SERVICE

Much of my University Service involves setting up sap flux experimental stations that will run for three years. This has involved designing data logging systems, solar power systems, monitoring wells, and access tubes. To

accomplish these tasks, I have become a Licensed Water Well Monitoring Technician and have passed training to obtain the University of Nebraska's Radiation Safety Certificate. Last spring I served as an Environmentor with a Lincoln High School sophomore who was interested in the effects of household pollutants on plants. I attended the First Annual SNR Fall Workshop August 22 where an overview of the process was described, and I participated in listening and planning sessions of the Ecological Challenges and Water Resources and Water Quality. I served as a class sponsor both years that I taught high school.

SELECTED GRANTS AND CONTRACTS

Effects of Eastern Redcedar on the Hydrology of Cottonwood Stands in the Republican River Basin, Burlington Northern Endowment, \$10,000; June, 2008–May, 2009.

Workshops and Survey of Non-Timber Forest Products in Lhosepakha Raniban Community Forest, Small Project Assistance Program, Peace Corps/Nepal, \$1,146.66; June–December, 2003.

SELECTED PUBLICATIONS

Huddle, J.A., T. Awada, S.E. Pegg, D. Martin, X.H. Xhou, and S. Josiah. (in progress). *Water and invasive woody species in semi-arid riparian zones*. **Great Plains Research**.

Huddle, J.A., T. Awada, and D. Wedin. (in progress). *What traits make some tree species invasive? A comparison of above- and below-ground traits in 16 woody species*.

Huddle, J.A., T. Awada, D.L. Martin, and X.H. Zhou. (accepted poster abstract). *Understory response following the removal of invasive woody species from a cottonwood riparian forest depends on overstory type*. In: **The 94th Ecological Society of America Annual Meeting, August 2009, Albuquerque, NM**.

Galen, C., J. Huddle, and E. Liscum. 2004. *An experimental test of the adaptive evolution of phototropins: blue light photoreceptors controlling phototropism in Arabidopsis thaliana*. **Evolution**, 58, 515-523.

Tunnell, S.J., J. Stubbendieck, J. Huddle, and J. Brollier. 2004. *Seed dynamics of eastern redcedar in the mixed-grass prairie*. **Great Plains Research**, 14, 129-142.

Huddle, J.A. (editor). 2003. *Proceedings of the December 2003 Nepal Natural Resource Volunteers' Workshop (VolCon). Learning from Past Experiences and from Forest User Groups*, Hetauda, Dec. 5-6, 2002, Pokhara, Nepal, **Natural Resource Management Sector Assistant Programme**, 70 p.

Huddle, J.A., R. J. Ansley, and S. R. Archer. 2002. *Fire Temperatures and Scorch Height: an Example from Prescribed Burning Mesquite in Texas*, **The Prabhat**, Year 9, Publication 8, Volume 1:13-19.

Huddle, J.A., G. Tichota, and J. Stubbendieck. 2001. *Evaluation of Grassland Restoration at Scotts Bluff National Monument*, **Proceedings of the 17th North American Prairie Conference**, 17, 125-135.

Huddle, J.A. and S.G. Pallardy. 1999. *Effects of controlled burning on survival and growth of seedlings of Acer and Quercus*, **Forest Ecology and Management**, 118, 49-56.

Huddle, J.A. and S.G. Pallardy. 1996. *Effects of soil and stem base heating on survival, sprouting and gas exchange of seedlings of Acer and Quercus*, **Tree Physiology**, 16, 583-589.

Huddle, J.A. and S.G. Pallardy 1996. *Effects of long-term annual and periodic burning on tree survival and growth in a Missouri Ozark oak-hickory forest*, **Forest Ecology and Management**, 82, 1-9.

OTHER PROFESSIONAL ACTIVITIES

President, Wachiska Audubon Society (2009)

Recording Secretary, Wachiska Audubon Society (2008)

Member, Ecological Society of America (1995 – present)

Member, Natural Areas Association (2000 – present)

Graduate Student Representative, Missouri University Environmental Affairs Council (1991–1993)

Forestry Representative, Graduate Professional Council (1991–1992)

Member, University of Missouri Earth Week Steering Committee (Spring 1992 and 1993)

SCOTT E. HYGSTROM, Professor, 25% Teaching, 25% Research, 50% Extension

Area of Interest: Wildlife Ecology, Wildlife Damage Management, Wildlife Diseases

Contact: shygstrome1@unl.edu, 402/472-6822

EDUCATION

B.S. Biology-Conservation, University of Wisconsin-River Falls (1980)

M.S. Natural Resources-Wildlife, University of Wisconsin-Stevens Point (1983)

Ph.D. Wildlife Ecology, University of Wisconsin-Madison (1988)

PROFESSIONAL EXPERIENCE

2000-present Professor, School of Natural Resources, University of Nebraska-Lincoln
1994-2000 Associate Professor, School of Natural Resource Sciences, University of Nebraska-Lincoln
1999 Visiting Scientist, National Wildlife Research Center, USDA-APHIS-Wildlife Services
1988-1994 Assistant Professor, Department of Forestry, Fisheries and Wildlife,
University of Nebraska-Lincoln
1987 Staff Lecturer, Department of Biology, University of Wisconsin-River Falls
1983-1986 Wildlife Damage Program Coordinator, University of Wisconsin-Extension

HONORS AND AWARDS

Twenty-year Service Award, University of Nebraska, 2008

Award of Excellence, Northeast Extension Directors Association, 2007

Excellence in Team Programming Award, UNL-Extension, 2005, 1996(2), 1994, 1991

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 348 Wildlife Damage Management (S04, S05, S06, S07, S09)

NRES 496/896 Wildlife Diseases (S05, S07)

NRES 315 Wilderness Study Tours (Su05, Su06, Su07, Su08)

Masters and Doctoral Students Advised

Dave Baasch (Ph.D. Natural Resource Sciences, 2008) Resource Selection in Cervids

Greg Clements (M.S. Natural Resource Sciences, 2008) Movements and Home Range of Male White-tailed Deer

Charles Frost (Ph.D. Natural Resource Sciences, expected 2009) Epidemiology of Chronic Wasting Disease

Travis Kinsell (M.S. Natural Resource Sciences, expected 2009) Scraping Behavior of White-tailed Deer

Justin Boner (M.S. Natural Resource Sciences, expected 2009) Prevalence of Chronic Wasting Disease

Jason Gilsdorf (M.S. Natural Resource Sciences, 2004) Frightening Devices for White-tailed Deer

SELECTED GRANTS AND CONTRACTS

Nebraska Master Naturalist Program, Nebraska Environmental Trust and Nebraska Game and Parks Commission, \$168,000; 2009-2011.

UNL Integrated Pest Management Program-Vertebrates, USDA-CSREES, \$76,756; 2007-08.

Revision of the book "Prevention and Control of Wildlife Damage," USDA-APHIS-Wildlife Services, \$92,000; 2001-08.

Wildlife damage management on the web: protecting health and resources by providing research-based information through eXtension, USDA-CSREES-extension, \$127,700; 2005-07.

Revision, expansion, and maintenance of the Internet Center for Wildlife Damage Management, USDA-CSREES-IPM-North Central and Eastern Regions, \$60,000; 2004-06.

IPM in Nebraska schools, Nebraska Department of Agriculture and UNL-Extension, \$89,490; 2002-05.

Development of spatially-explicit models of wildlife disease, USDA-APHIS-WIS-National Wildlife Research Center, \$726,084; 2004-09.

Mechanisms that influence the distribution of deer in the Missouri River Valley-a landscape perspective, USDA-APHIS-WIS-National Wildlife Research Center, US Fish and Wildlife Service, Cabella's Inc., Nebraska Bowhunters Association, \$128,500; 2002-09.

Individual-based models to predict the spread of chronic wasting disease in Nebraska, USGS-Biological Resources Division and Nebraska Game and Parks Commission, \$352,105; 2004-08.

- Evaluation of cross-unders to facilitate movements of white-tailed deer across Interstate Highway 80 and reduce deer-vehicle collisions*, Nebraska Department of Roads, \$94,265; 2008-2010.
- Evaluation of novel fences for containing or excluding feral hogs*, USDA-APHIS-WS-National Wildlife Research Center, \$50,000; 2008-09.
- Efficacy and secondary hazards of chlorophacinone for managing black-tailed prairie dogs*, LiphaTech, Inc., \$25,000; 2006-08.
- Wallows as vectors of chronic wasting disease in elk*, IANR Equipment Grant, \$18,300; 2005-06.
- Surveillance of wildlife diseases in Nebraska*, USDA-APHIS-Wildlife Services, \$155,000; 2003-06.
- Distance delivery of wildlife damage management training materials for pest management professionals*, USDA-CSREES-IPM-NC Region, \$10,000; 2007-08.
- Development of a course in wildlife damage management to reach distance learners*, UNL Extended Education and Outreach, \$10,000; 2006-07.

SELECTED PUBLICATIONS

- Hygnstrom, S.E., P.D. Skelton, S.J. Josiah, J.M. Gilsdorf, D.R. Virchow, J.A. Brandle, A.K. Jayaprakash, K.M. Eskridge, and K.C. VerCauteren. *White-tailed deer browsing and rubbing preferences for trees and shrubs that produce non-timber forest products*, **HortTechnology** (in press).
- Walter, W.D., K.C. VerCauteren, J.M. Gilsdorf, and S.E. Hygnstrom. *Crop, native vegetation, and biofuels: long-term response of white-tailed deer to changing habitat management priorities*, **Journal of Wildlife Management** (in press).
- Frickey, K.A., M.A. Cover, S.E. Hygnstrom, S.R. Groepper, H.H. Genoways, K.M. Hams, and K.C. VerCauteren. 2008. *Historic and recent distributions of elk in Nebraska*, **Great Plains Research**, 18, 189-204.
- Gilsdorf, J.M., K.C. VerCauteren, S.E. Hygnstrom, W.D. Walter, J.R. Boner, and G.M. Clements. 2008. *An integrated vehicle-mounted system for VHF telemetry applications*, **Journal of Wildlife Management**, 72, 1241-1246.
- Groepper, S.R., P.J. Gabig, M.P. Vrtiska, J.M. Gilsdorf, S.E. Hygnstrom, and L.A. Powell. 2008. *Population and spatial dynamics of resident Canada geese in southeastern Nebraska*, **Human-wildlife Conflicts**, 2, 271-278.
- Gubanyi, J.A., J.A. Savidge, S.E. Hygnstrom, K.C. Vercauteren, G.W. Garabrandt, and S.P. Korte. 2008. *Deer impact on vegetation in natural areas in southeastern Nebraska*, **Natural Areas Journal**, 28, 121-129.
- Hygnstrom, S.E., S.R. Groepper, K.C. VerCauteren, C.J. Frost, J.R. Boner, T.C. Kinsell, and G.M. Clements. 2008. *Literature review of mule deer and white-tailed deer movements in western and midwestern landscapes*, **Great Plains Research**, 18, 219-231.
- VerCauteren, K.C., J.M. Gilsdorf, S.E. Hygnstrom, P.B. Fioranelli, J.A. Wilson, and S. Barras. 2006. *Green and blue lasers are ineffective for dispersing deer at night*, **Wildlife Society Bulletin**, 34, 371-374.
- VerCauteren, K.C., M.J. Lavelle, and S.E. Hygnstrom. 2006. *A simulation model for determining cost-effectiveness of fences for reducing deer damage*, **Wildlife Society Bulletin**, 34, 16-22.
- VerCauteren, K.C., M.J. Lavelle, and S.E. Hygnstrom. 2006. *Fences and deer damage management: a review of design and efficacy*, **Wildlife Society Bulletin**, 34, 191-200.

OTHER PROFESSIONAL ACTIVITIES

- Lead editor, Prevention and Control of Wildlife Damage Management*. I was the lead editor for the 863-page book (1994) that is the leading resource in the field. We conservatively estimate that it saves \$210 million per year in personal property and resources and \$220 million per year in time and labor. The book is available on-line (<http://icwdm.org/handbook/index.asp>) and is currently being revised. The new edition will include 80 chapters and contributions from over 100 authors.
- Developer (2006) and Coordinator, Internet Center for Wildlife Damage*, (<http://icwdm.org>), which is the leading website in the field. The site currently receives about 15 million pagehits per year from over 1 million visitors in 140 countries. We were one of eight Pioneer Communities of Practice for eXtension and were the third CoPi to launch a website (2008) at (http://www.extension.org/pages/Wildlife_Damage_Management_Community_Page). Our website receives over 400,000 page hits per year, which is second only to Consumer Horticulture in the eXtension system.

AYSE IRMAK, Assistant Professor, 15% Teaching, 43% Research, 2% University Service,
40% Department of Civil Engineering (13% Teaching, 27% Research)

Area of interest: Water Resources, Remote Sensing-based Estimation of Land Surface Evapotranspiration
Contact: airmak2@unl.edu, 402/ 472-8024

EDUCATION

B.E. Agricultural Structures and Irrigation Engineering, Cukurova University, Adana, Turkey (1993)

M.E. Agricultural and Biological Engineering, University of Florida, Gainesville, Florida (1998)

Ph.D. Agricultural and Biological Engineering, University of Florida, Gainesville, Florida (May 2002)

PROFESSIONAL EXPERIENCE

2007-present Assistant Professor, School of Natural Resources and Civil Engineering, University of Nebraska-Lincoln

2004-2007 Research Assistant Professor, Biological Systems Engineering, University of Nebraska-Lincoln

2002-2003 Postdoc, Agricultural and Biological Eng. Dept., University of Florida, Gainesville, FL

1998-2002 GRA, Agricultural and Biological Eng. Dept., University of Florida, Gainesville, FL

HONORS AND AWARDS

Most popular paper award, ASCE/EWRI (2008)

Honorable Mention Paper Award, ASABE (2006)

Best practical paper award, ASCE/EWRI National Society Award (2005)

Young Researcher Award, presented by the Florida Section of the American Society of Agricultural Engineers, ASAE (2003)

Outstanding 2001 ASAE annual meeting paper award (IET section), Sacramento, California (2001)

University of Florida Presidential Recognition Award, for academic achievement and contributions to the University of Florida (2000)

Third Prize Winner, Poster Presentation in Agricultural & Environmental Sciences. The 2000 Graduate Student Forum of the University of Florida (2000)

Nominee for the 1999 Master's Thesis Award of the Conference of Southern Graduate Schools, University of Florida (1999)

Third Prize Winner for a Poster Presentation in Engineering and Math, the 1999 Graduate Student Forum of the University of Florida (1999)

TEACHING

Courses Taught (Fall, Spring, Summer

CIVE 898 GIS in Water Resources (F08, F06)

NRES 312 Introduction to Geospatial Information Science (S08, F08)

BSEN 130 Technical Drawing (S04)

Masters and Doctoral Students Advised

Nathan Healey (M.S. SNR 2008) Thesis title: A spatial analysis of anthropogenically derived and naturally occurring environmental controls on corn-based ethanol production in Nebraska.

Parikshit Ranade (M.E. Biological Systems Engineering 2009) Thesis title: Understanding the implications of spatial climate variability in the context of water resources and hydrologic modeling.

Ramesh Singh (Ph.D. Biological Systems Engineering 2009) Dissertation title: Geospatial Approach for estimating land surface evapotranspiration.

RESEARCH

My research team has been studying SEBAL/METRIC land surface energy balance models to map evapotranspiration (ET) using aerial and satellite remote sensing data. The Natural Resources Districts in Nebraska are implementing our project findings into their Integrated Management Plans that was mandated by LB962 to establish long-term supply-demand ratio for several watersheds. Our growers and state agencies such as Nebraska Department of Natural Resources and Natural Resources Districts are benefiting from the project results by implementing large-scale ET estimations to their long-term planning process. We also developed a distributed GIS-based soil water balance model to understand the processes controlling water use at the watershed scale. The model

simulates spatial distribution of each water balance component at a **daily time step**. This model is going to be merged with SEBAL/METRIC models to develop a better simulation of hydrologic processes for a given hydrologic domain. Our research efforts have resulted in submission of several peer-reviewed journal articles.

SELECTED GRANTS AND CONTRACTS

Remote sensing-based energy balance for mapping riparian water use technology, Anna Elliot funding, \$60,000; June 01, 2009-May 31, 2011. My Role: PI, Percentage of Award: 100%.

Estimating riparian water use: an application of remote sensing technology. Layman Foundation, \$10,000; June 01, 2008-May 31, 2009. My Role: PI.

Quantification of Crop Evapotranspiration, Evaporation and Water Balance of Tilled and Untilled Fields, Nebraska Environmental Trust, \$679,106; April 4, 2008-March 30, 2011. My Role: Co-PI.

Satellite-based Energy Balance to Assess Riparian Water Use, USGS, 104B, \$20,000; March 1, 2008- Feb. 28, 2009. My Role: PI.

Measurement of growing season actual crop evapotranspiration and crop coefficients, and dormant season evaporative losses for key vegetation surfaces in the Central Platte Natural Resources District, Central Platte Natural Resources District, \$492,564; July 1/2007-Dec. 31, 2010. My Role: Co-PI.

Estimation of Evapotranspiration from Riparian and Invasive Species Using Remote Sensing and In Situ Measurements in the Republican River Basin, Nebraska Department of Natural Resources, \$946,549; March 1, 2007-March 1, 2011.

Demonstrate and Adapt Remote Sensing Technology to Produce and Utilize Consumptive Water Use Maps for the Nebraska Panhandle, NRCS & North Platte and South Platte Natural Resources Districts, \$479,000; Oct. 1, 2006-Sept. 30, 2009. My Role: Co-PI.

Developing Irrigation Management Decisions Using a Functional Crop Growth Model. UNL-ARD, \$30,000; Dec. 1, 2005-Dec. 31, 2007. My Role: PI.

SELECTED PUBLICATIONS

Sing, R. and A. Irmak. 2009. *Estimation of Crop Coefficients Using Satellite Remote Sensing*, **Journal of Irrigation and Drainage Engineering, ASCE**. (accepted).

Irmak A. 2009. *Landsat-based Estimation of Land Surface Energy Fluxes with METRICtm: Comparison with Bowen Ratio Measurements*. **Agricultural Forest Meteorology** (accepted).

Kamble, B. and A. Irmak. 2009. *Evapotranspiration data assimilation with genetic algorithms and swap model for on-demand irrigation*, **Irrigation Science** (in-print).

Sing, R., A. Irmak, S. Irmak, and D.L. Martin. 2008. *Application of SEBAL for mapping evapotranspiration and estimating surface energy fluxes in south central Nebraska*, **Journal of Irrigation and Drainage Engineering, ASCE**, 134, 273.

Irmak, A. and P. Ranade. 2009. *Prediction of gridded reference evapotranspiration: Evaluation of interpolation methods*, **Irrigation Science** (accepted).

Irmak, A and S. Irmak. 2008. *Reference and crop evapotranspiration in south central Nebraska: II. Measurement and estimation of actual evapotranspiration*, **Journal of Irrigation and Drainage Engineering, ASCE**, 134(6), 700-715.

Irmak, A., S. Irmak, and D.L. Martin. 2008. *Reference and crop evapotranspiration in south central Nebraska: I. Comparison and analysis of grass and alfalfa-reference evapotranspiration*, **Journal of Irrigation and Drainage Engineering, ASCE**, 134(6), 690-699.

OTHER PROFESSIONAL ACTIVITIES

Member, American Society of Civil Engineers, Task Committees on Standardization of Reference Evapotranspiration and Crop Coefficient Calculations.

Review Panelist, USDA-NRI, 2007.

Journal Reviews, Agricultural Forest Meteorology, Transcript of ASAE, Journal of Irrigation and Drainage Engineering, ASCE; Irrigation Science, Agronomy Journal.

Participation in the development and testing of the following softwares (1996-present): POTYLDR, CROPGRO-Soybean; CERES-Maize; DSSAT-Century.

Professional membership, American Geophysical Union (AGU), American Society of Civil Engineers, American Society of Agricultural Engineers, American Society of Agronomy.

ERKAN ISTANBULLUOGLU, Assistant Professor, 67% Research, 3% University Service,
30% Department of Biological Systems Engineering (30% Teaching)

Areas of Interest: Hydrology, ecohydrology, geomorphology, modeling

Contact: eistanbulluoglu2@unl.edu, 402/472-3500

Education

B.S. Agricultural Engineering, Uludag University (1996)

M.S. Agricultural Engineering, Uludag University (1998)

Ph.D. Civil and Environmental Engineering, Utah State University (2003)

PROFESSIONAL EXPERIENCE

2005-present Assistant Professor, School of Natural Resources

2005-present Assistant Professor, Biological Systems Engineering, University of Nebraska-Lincoln,

2005-2008 Assistant Professor, Geosciences, University of Nebraska-Lincoln,

2002-2005 Postdoctoral Associate, MIT, Civil and Environmental Engineering

TEACHING

Courses Taught (Fall, Spring)

GEOL/498, GEOS/898 Land and Water Dynamics

GEOL/450, GEOL/850 Landscape Evolution

GEOS 898/NRES 896 Statistical Methods in Hydrological Sciences

CIVE 353, NRES 853 Hydrology

Masters and Doctoral Students Advised

Omer Yetemen (Ph.D. candidate), University of Nebraska-Lincoln (current).

Evren Soylu (Ph.D. candidate), University of Nebraska-Lincoln (current).

Steven Walters (M.S. candidate), University of Nebraska-Lincoln (current).

RESEARCH

My research involves studying the water balance of the rivers in the Nebraska Sand Hills through streamflow and climate data analysis and modeling, vegetation-landscape interactions, and the geomorphic evolution of central New Mexico and modeling grassland dynamics in the Nebraska Sand Hills.

SELECTED GRANTS AND CONTRACTS

Quantifying uncertainty in Missouri River Adaptive Management processes, USGS, USACE, \$247,000, Co-PI, with Andrew Tyre and Craig Allen (2009-2010).

Geomorphology & Landuse Dynamics/Ecosystem Studies, Collaborative Research: On Topographic Imprint of Hillslope Aspect: Deciphering Aspect Controls on Vegetation and Landforms in Central New Mexico, PI (UNL share) NSF, \$117,599, (September 1, 2008–August 31, 2010).

Riparian Vegetation Removal Impacts on Water Quantity, \$433,960, Nebraska Department of Natural Resources, Quality and Stream Ecology, Co-PI, with D.T. Scott, and J.D. Lenters (March 1, 2008-June 30, 2010).

Analysis of Hydrological Data of the Niobrara River Basin, \$39,746, Nebraska Game and Parks Commission, PI (June 1, 2007-March 31, 2008).

Integrating meteorology data in hydrology research and education and expanding the University of Nebraska's IDD capabilities and Great Plains, \$20,000, University Corporation for Atmospheric Research (UCAR), PI (June 21, 2006 - June 21, 2007).

Regional Water Balance and Climate: Managing water resources under uncertainty in Nebraska, \$11,038, USGS-PI (March 1, 2006-February 28, 2007).

SELECTED PUBLICATIONS

Istanbulluoglu E. (2009a). *Modeling Catchment Evolution: From Decoding Geomorphic Processes Signatures Toward Predicting Impacts of Climate Change*. **Geography Compass**, Hydrology and Water Resources, DOI: 10.1111/j.1749-8198.2009.00228.x, April. (per invitation)

Istanbulluoglu E. (2009b). *An Eco-hydro-geomorphic Perspective to Modeling the Role of Climate in Catchment Evolution*. **Geography Compass**, Hydrology and Water Resources section DOI: 10.1111/j.1749-8198.2009.00229.x, April. (per invitation).

- Istanbulluoglu E., O. Yetemen, E.R. Vivoni, H.A. Gutierrez-Jurado, and R.L. Bras. 2008.** *Eco-geomorphic implications of hillslope aspect: Inferences from analysis of landscape morphology in central New Mexico.* **Geophysical Research Letters**, 35, L14403, doi:10.1029/2008GL034477.
- Irmak S., E. Istambuluoğlu, and A. Irmak. 2008. *An evaluation of evapotranspiration model complexity against performance in comparison with Bowen Ratio Energy Balance latent heat measurements.* **Transactions of the American Society of Agricultural and Biological Engineers (ASABE)**, Vol. 51(4): 1295-1310.
- Gutiérrez-Jurado, H.A., Vivoni, E.R., Istambuluoğlu, E. and R.L. Bras. 2007. *Ecohydrological Response to a Geomorphically Significant Flood Event in a Semiarid Catchment with Contrasting Ecosystems.* **Geophysical Research Letters**, 34, L24S25, doi:10.1029/2007GL030994
- Istanbulluoglu E., and R. L. Bras. 2006.** *On the dynamics of soil moisture, vegetation and erosion: Implications of climate variability and change,* **Water Resources Research** v. 42, no. 6. W06418 10.1029/2005WR004113.
- Flores-Cervantes, J. H., E. Istambuluoğlu, and R.L. Bras. 2006.** *The Development of Gullies on the Landscape: A Model of Headcut Retreat Resulting From Plunge Pool Erosion,* **Journal of Geophysical Research**, Vol. 111, F01010.
- Istanbulluoglu E., and R. L. Bras. 2005. *Vegetation-modulated landscape evolution: Effects of vegetation on landscape processes, drainage density, and topography.* **Journal of Geophysical Research**, 110, F02012.
- Istanbulluoglu E., R. L. Bras, H. Flores, and G. E. Tucker. 2005. *Implications of Bank Failures and Fluvial Erosion for Gully Development: Field Observations and Modeling,* **Journal of Geophysical Research**, 110, F01014.
- Istanbulluoglu, E., D. G. Tarboton, R. T. Pack and C. H. Luce. 2004. *Modeling of the Interactions Between Forest Vegetation, Disturbances and Sediment Yields,* **Journal of Geophysical Research**, 109, F01009, doi:10.1029/2003JF000041.

OTHER PROFESSIONAL ACTIVITIES

International invited short courses and presentations

- Lecturer* for short courses for The Honors Center of Italian Universities: Summer school on landscape form and processes: Models and applications in watershed analysis, Viterbo, IT, 26 – 30 June, 2006. GIS Terrain Analysis for Hydrogeomorphic Applications, Polytech Institute of NYU, July, 2008.
- Presenter* at the University of Padova, Dept. of Land and Agroforest Environments, Padova Italy, July 2006
- Ataturk University, College of Agriculture, Erzurum, Turkey, May, 2006
- Department of Biological Sciences, University of Calgary, AB, CAN, April 2008
- European Surface Processes Group, Gewatt, Switzerland, May 2008

Journal and Proposal Reviews

- Water Resources Research, Journal of Geophysical Research, Geophysical Research Letters, Journal of Hydrology, Geomorphology, Earth Surface Processes and Landforms, Computers and Geosciences, Forest Ecology and Management, Irrigation Science, Water International
- NSF Hydrology, NSF Geomorphology and Land Use Dynamics, Netherlands Organization for Science Research, Nebraska Natural Resources Commission. *Participant* in Community Science Efforts: *Member* in Community Surface Dynamics Modeling Systems (CSDMS), CU, Boulder, CO.

J. MICHAEL JESS, Geoscientist; 20% Teaching, 15% Research, 65% Scholarly Service

Areas of interest: Water resources, law and policy; Hydrology of rivers and aquifer systems; Landslides and slope stability; property boundaries near meandering shorelines

Contact: mjess3@unl.edu; 402/472-7570

EDUCATION

B.S. Civil Engineering, University of Nebraska-Lincoln (1968)
M.S. Civil Engineering, University of Nebraska-Lincoln (1969)
Certificate Administrative Law Judge, National Judicial College (1986)

PROFESSIONAL EXPERIENCE

1999-present Senior Lecturer, School of Natural Resources, University of Nebraska-Lincoln
1981-1999 Director of Water Resources and Chairman, Nebraska Boundary Committee, State of Nebraska
1975-1981 Deputy Director of Water Resources, State of Nebraska
1972-1975 Associate Hydrologist, Illinois State Water Survey, IL
1970-1972 First Lieutenant, U.S. Army Corps of Engineers (active duty), Ft. Belvoir, VA
1969-1970 Assistant Hydrologist, Conservation & Survey Division, University of Nebraska-Lincoln

HONORS AND AWARDS

Ditchrider Award, Four States Irrigation Council (2000)
Pioneer Award, Nebraska Water Conference Council (1999)
Gladys Forsyth Award, Lincoln YWCA (1990)
Chi Epsilon, National Civil Engineering Honor Society (1989)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 916, CIVE 916, LAW 774 Water Law & Policy (F04, F05, F06, F07, F08)
NRES 423/823 Integrated Resources Management (S03, S04, S05)
AGRO 481/881, NRES 415/815, GWOG 481/881, GEOL 415/815 Water Resources Seminar Series

Undergraduate mentoring and advising

McNair Scholars Mentor – 07, 08, 09
UCARE Advisor – 09

RESEARCH

My interests lie in water law and policy, especially as it relates to transfer/marketing of water rights and to conjunctive use of surface and ground water. Research supported by grants and periodic contracts has led to discovery of several innovative proposals adopted by the Department of Natural Resources.

EXTENSION/OUTREACH

Efforts in outreach/extension emphasize water law/policy and resolution of disputes where meandering shorelines serve as property boundaries.

SURVEY

Survey Division test hole records and data are sources used in providing ground water exploration recommendations to commercial well drillers and property owners in southeast Nebraska. Other Survey records are used in landslide and slope stability analyses. Jointly with others, I have participated in preparation of annual hydrological summaries of ground water and surface water supplies. In collaboration with other Survey personnel, I will participate in updating the 1998 *Nebraska Groundwater Atlas* (to be re-constituted/re-titled *Nebraska Water Atlas*). To fill the unexpired term of a former member, I was first elected to the UNL Faculty Senate in 2008. I was re-elected to a full term in 2009. Additionally, I am a member of the Senate's Committee on Committees.

SELECTED GRANTS AND CONTRACTS

Water Rights Administration - - - Data and Assessment Support for Conjunctive Use Management (with J. David Aiken), Burlington Northern Endowment, \$28,000; Sept. 2007.
Survey of Procedures for Assessing Full and Over-appropriation of Water (w/J. David Aiken & Sandra Zellmer), Nebraska Department of Natural Resources, \$34,000; July 2006.

SELECTED PUBLICATIONS

Jess, J. Michael. 2008. *Historical Annual Stream-flow at Selected Locations*, **Conservation & Survey Division Map Series**, UNL, September 2008.
Burbach, Mark and J. Michael Jess. 2008. *Hydrological Conditions in Nebraska – Spring 2008*, **Conservation & Survey Division**, UNL, September 2008.
Megdal, Sharon B., Richard Hamann, Thomas Harter, James W. Jawitz and J. Michael Jess. 2008. *Water, People, and the Future: Supply and Demand*, **The Council for Agriculture Science and Technology (CAST)**, Ames, IA.
Jess, J. Michael and J. David Aiken. *Water Rights Administration - - - Data and Assessment Support for Conjunctive Use Management*, **Burlington Northern Report (UNF Fund No. 2844)**, Lincoln, NE.
Jess, J. Michael. 2005. *Over-Appropriated Water - - - Saying „No“ to Additional Exploitation Survey of States from the Great Plains to the Pacific*, **CLE International**, Denver, CO.
Jess, J. Michael. 2003. *Water Transfers and Marketing in Nebraska*, **Earth Science Notes, Number 5**, Conservation and Survey Division, UNL.
Jess, J. Michael. 2000. *Satisfying Contemporary Water Needs – Reflections on Market Driven Water Rights Exchanges*, **Nebraska Tax Research Institute, Incorporated**, Lincoln.

OTHER PROFESSIONAL ACTIVITIES

Board Member, Nebraska State Irrigation Association, 1999-present.
Chairman of Resolutions & Legislative Committee, Nebraska State Irrigation Association, 2008-present.
Registered Professional Engineer, Nebraska & Illinois (inactive).

ROBERT MATTHEW (—MTT”) JOECKEL, Associate Professor, 30% Research,
13% Scholarly Service, 27% University Service, 30% Department of Geosciences (30% Teaching)

Areas of Interest: Stratigraphy, Pedology, Quaternary and Environmental Geology, Geomorphology, Paleontology
Contact: rjoeckel3@unl.edu, 402/472-7520

EDUCATION

B.S. Geology, University of Nebraska-Lincoln (1985)
M.S. Geology, University of Nebraska-Lincoln (1988)
Ph.D. Geology, University of Iowa (1993)
Also: graduate work at University of Kansas, University of Florida, and Iowa State University

PROFESSIONAL EXPERIENCE

2006-present Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
2000-2006 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
1996-2006 Assistant Professor, Department of Environmental Sciences, Bellevue University
1994-1996 Postdoctoral Research Fellow, University of Tennessee-Knoxville
1993-1994 Research Associate and Instructor, Department of Geosciences, University of Nebraska-Lincoln

TEACHING

Courses Taught (Fall, Spring, Summer)

GEOL 450/850 Surficial Processes (S09)
GEOL 110 Geological Natural Hazards (F08)
GEOL 100 Introduction to Geology (F07, S08, S09)
NRES 477/877 Great Plains Field Pedology (S05, S07, S08)

Masters and Doctoral Students Advised

Jalot Al-Absy (M.S. Geosciences expected 2010) Thesis title: Subsurface Pennsylvanian Stratigraphy of the Omaha, Nebraska Area.
John Horn (P.h.D. Geosciences expected 2010—co-advisor) Thesis title: Quaternary Stratigraphy and Evolution of Platte River at Grand Island, Nebraska.
Will F. Myers* (M.S. Natural Resource Sciences 2005) Water Well Annular Seal Conditions and Stratigraphic Characteristics of the Unsaturated Zone : Case Studies from Nebraska.
Jeffrey A. Hellerich* (M.S. Natural Resource Sciences, 2006) Influence of Afforestation and Hillslope Position on Soil Carbon Dynamics in the Nebraska Sand Hills.

Also: service on multiple M.S. and Ph.D. committees in Department of Geosciences, UN-L

*Assumed advising of these students after advisor William C. Zanner departed UN-L.

RESEARCH

I am involved in research in Cretaceous and Pennsylvanian stratigraphy and interpretation of depositional environments, sea-level change, and paleoclimates; (e.g., Early Cretaceous —Greenhouse World”), Quaternary, Cretaceous, and Pennsylvanian soil/paleosol/weathering profile morphology, development, and interpretation, acid rock drainage and mineral paragenesis; geomicrobiology and mineralogy of saline-alkaline wetlands and burrowing behavior of ancient rodents in Late Miocene.

EXTENSION/OUTREACH

I am involved in consultative service to individuals, municipalities, NRDs, and other entities regarding groundwater occurrence and supply in Nebraska. I work with city of Omaha and contract engineering offices to establish geologic framework for major public works project. I, also, do consultative services for oil and gas, limestone, cement, sand and gravel, and industrial clay producers.

SURVEY

I have produced 14 7.5-minute quadrangle geologic maps for U.S. Geological STATEMAP geologic mapping program (ongoing) and done a compilation of information about carbonatite resources (sources of rare-earth elements). I have sent a submission of yearly reports on Nebraska’s mineral industry to U.S. Geological Survey for

Minerals Yearbook (published online) and had integral involvement in Eastern Nebraska Water Resources Assessment (ENWRA) program (ongoing).

UNIVERSITY SERVICE

I have served as an Outreach Coordinator in SNR; also as member of Faculty Advisory, Survey and Natural Resources Undergraduate curriculum committees; member of Graduate Committee, Department of Geosciences; and served on committees in Center for Great Plains Studies.

SELECTED GRANTS AND CONTRACTS)

- Urban and Rural Geologic Mapping in Nebraska, United States Geological Survey STATEMAP Geologic Mapping Program*, 2008 (co-investigator). Pending.
- U.S. Geological Survey Assessment of geologic data in Geological Survey Holdings*, \$5,000; 2007.
- Eastern Nebraska Water Resources Assessment* (co-investigator), \$216,000; 2007.
- Urban and Rural Geologic Mapping in Nebraska, United States Geological Survey STATEMAP Geologic Mapping Program* (co-investigator), \$83,828; 2007.
- Urban and Rural Geologic Mapping in Nebraska, United States Geological Survey STATEMAP Geologic Mapping Program* (co-investigator), \$56,395; 2006.
- Urban and Rural Geologic Mapping in Nebraska, United States Geological Survey STATEMAP Geologic Mapping Program* (co-investigator), \$94,881; 2005.
- Urban and Rural Geologic Mapping in Nebraska, United States Geological Survey STATEMAP Geologic Mapping Program* (co-investigator), \$140,375; 2004.

SELECTED PUBLICATIONS

- Joeckel, R.M. and G.M. Henebry. 2008. *Channel and island change in the lower Platte River, Eastern Nebraska, USA: 1855-2005*, **Geomorphology**, 102, 407-418.
- Joeckel, R.M., H.M. Loope, K.D. Wally, and J.E. Hellerich. 2007. *Late Cenozoic geomorphology of a bedrock-dominated landscape adjacent to the Laurentide glacial limit, Southeastern Nebraska, USA*, **Zeitschrift für Geomorphologie**, 51, 469-486.
- Joeckel, R.M., K.D. Wally, S.A. Fischbein, and P.R. Hanson. 2007. *Sulfate mineral paragenesis in Pennsylvanian rocks and the occurrence of slavikite in Nebraska*, **Great Plains Research**, 17, 17-34.
- Joeckel, R.M., B.L. Nicklen, and M.P. Carlson. 2007. *Low-accommodation, eustasy-dominated, coarse-clastic sediment apron alongside a basement uplift, Pennsylvanian of Midcontinent North America*, **Sedimentary Geology**, 197, 165-187.
- Mason, J.A., R.M. Joeckel, and E.A. Bettis. 2007. *Middle to Late Pleistocene loess record in eastern Nebraska, USA, and implications for the unique record of Oxygen Isotope Stage 2*, **Quaternary Science Reviews**, 26, 773-792.
- Gröcke, D.R., G.A. Ludvigson, B.L. Witzke, S.A. Robinson, R.M. Joeckel, D.F. Ufnar, and R.L. Ravn. 2006. *Recognizing the Albian-Cenomanian (OAE1d) sequence boundary using plant carbon isotopes: Dakota Formation, Western Interior Basin, USA*, **Geology**, 34, 193-196.
- Fang, J., O. Chan, R.M. Joeckel, Y. Huang, Y. Wang, D.A. Bazylnski, T.B. Moorman, and B.J. Ang Clement. 2006. *Biomarker analysis of microbial diversity in sediments of a saline groundwater seep in Nebraska*, **Organic Geochemistry**, 37, 912-931.
- Joeckel, R.M., B. Ang Clement, and L.R. Van Fleet. 2005. *Sulfate mineral crusts, pyrite weathering, and acid rock drainage in the Dakota Formation and Graneros Shale (Cretaceous), Jefferson County, Nebraska*, **Chemical Geology**, 215, 433-452.
- Joeckel, R.M. and B.J. Ang Clement. 2005. *Soils, Surficial Geology, and Geomicrobiology of Saline-Sodic Wetlands, North Platte River Valley, Nebraska, USA*, **Catena** 61, 63-101.

OTHER PROFESSIONAL ACTIVITIES

Member, Geological Society of America

Member, Nebraska Geological Society

JOHANNES M. H. KNOPS, Associate Professor, 10% Teaching, 10% Research (SNR); 80%
School of Biological Sciences

Areas of Interest: ecosystem ecology, community ecology, plant ecology, biological invasions and biodiversity
Contact: jknops2@unl.edu, 402/310-3904

EDUCATION

Ing. Horticulture, Higher Agricultural College (1982)
Drs. Plant Ecology, University of Utrecht (1989)
Ph.D. Botany, Arizona State University (1994)

PROFESSIONAL EXPERIENCE

2005-present Director, Cedar Point Biological Station
2004-present Associate Professor, University of Nebraska, School of Biological Sciences, & School of Natural Resources
1999-2004 Assistant Professor, University of Nebraska, School of Biological Sciences & School of Natural Resources
1995-1999 Research Director, Long-Term Ecological Research program at the Cedar Creek Natural History Area, and adjunct assistant professor, Department of Ecology, Evolution and Behavior, University of Minnesota
1994-1995 Postdoctoral Research Fellow, Museum of Vertebrate Zoology, University of California, Berkeley (Sponsor: Dr. Walter D. Koenig)

HONORS AND AWARDS

Outstanding young scientist, Sigma Xi (2005)

TEACHING

Courses Taught (Fall, Spring, Summer)

Bios 457/857 Ecosystem Ecology (S05, S 09)
BIOS 207 Ecology and Evolution (F05, S07, S 08, S09)
RUTE Mathematics – Biology Undergraduate research experience (S08)
BIOS 901 Ecological Principles (S06, S05)

Masters and Doctoral Students Advised

Amy Kochsiek (Ph.D.) Litter decomposition in corn-soybean agroecosystems (2002–ongoing).
Ramesh Longani (Ph. D.) Plant influence on gross nitrogen mineralization (2003–ongoing).
Erin Miles (Masters) Plant community assembly in prairies (2005–2008)
Kate Bradley (Ph D.) Feedbacks on nitrogen cycling caused by nitrogen fertilization induced changes in microbial populations (2000–2005)
Heidi Hillhouse (Masters) Litter decomposition dynamics (2001–2004)

UNIVERSITY SERVICE

I have served on the following Departmental Committees: Executive committee (2004-2006, 2007, 2007-2009), Cedar Point Associate Director Search (2008, chair), Microbial Biology Search (2006-2007), Community Ecology Search Committee Search (2005, Chair), Community Ecology Search Committee Search (2004, Chair), Natural Resources committee (1999–ongoing), EEB seminar organizer (2003-2005), School of Natural Resources Ecosystem Ecologist Search Committee (2001), Initiative for Ecology and Evolutionary Analysis (IEEA) Steering committee (2004 - 2006) and Greenhouse Committee (2001-2006). I , also, served on the College Faculty Instructional Development Committee from 2007 to 2010.

SELECTED GRANTS AND CONTRACTS

FSML, Facilities improvement at Cedar Point, Chancellor's Office, UNL, DBI NSF, \$172,500 plus \$90,000 SVCAA and \$143,820; 2008-2010.

- Carbon sequestration in dryland and irrigated agroecosystems: Quantification at different scales for improved prediction*, Renewal. S.B. Verma, K.G. Cassman, T.J. Arkebauer, A. Dobermann, J.W. Doran, K.G. Hubbard, J.M.H. Knops, D.L. Martin and D.T. Walters. U.S. Department of Energy. \$900,000; 2006-2009.
- The role of microbes in prairie plant species interactions*, J. Knops and R. Laungani. Center for Invasive Plant Management, (\$?); 2006.
- Biodiversity, Environmental Change and Ecosystem Functioning at the Prairie-Forest Border*, D. Tilman, S. Hobbie, P. Reich, J. Knops. National Science Foundation, \$4,800,000; 2006-2012.
- Factors affecting valley and blue oak regeneration in Upper Carmel Valley, California*, W.D. Koenig, M.V. Ashley, E.T. Borer, J.M.H. Knops, E.W. Seabloom and M. Stromberg. Integrated Hardwood Range Management Program, \$122,023; 2005-2010.
- Initiative for Ecological and Evolutionary Analysis (IEEA): Enhancement of Population Biology at UNL*, Bachman, J. Knops, G. Orti and D. Pilson. Program of Excellence Funding, UNL. \$890,000; 2005-2009.
- Carbon sequestration in dryland and irrigated agroecosystems; Quantification at different scales for improved prediction*, S.B. Verma, K.G. Cassman, T.J. Arkebauer, A. Dobermann, J.W. Doran, K.G. Hubbard, J.M.H. Knops, D.L. Martin and D.T. Walters. U.S. Department of Energy, \$900,000; 2003-2006.
- Research implementation program: Renewal application. Carbon sequestration and global climate change*, S.B. Verma, K.G. Cassman, T.J. Arkebauer, A. Dobermann, J.W. Doran, K.G. Hubbard, J.M.H. Knops, D.L. Martin, and D.T. Walters. Nebraska EPSCOR-DOE, U.S. Department of Energy, \$1,992,066; 2003-2006.
- Interacting Responses of C and N Cycles to Altered Biodiversity, Elevated CO₂, and N Enrichment*, Reich et al. Biocomplexity. National Science Foundation, \$1,800,000; 2003-2006.

SELECTED PUBLICATIONS

- Bakker, E.S., J.M.H. Knops, D.G. Milchunas, M.E. Ritchie and H. Olff. 2009. *Cross-site comparison of herbivore impact on nitrogen availability in grasslands: the role of plant nitrogen concentration*, **Oikos**, in press.
- Koenig, W.D., J.M.H. Knops, W. Carmen, and D. Sage. 2009. *No trade-off between seed size and number in the valley oak *Quercus lobata**, **American Naturalist**, in press.
- Knops, J.M.H., W.D. Koenig, and W. Carmen. 2007. *A negative correlation between growth and reproduction does not imply a tradeoff between growth and reproduction in California oaks*, **Proceedings of the National Academy of Sciences**, 104, 16982-16985.
- Knops, J.M.H., S. Naeem, and P. Reich. 2007. *The impact of elevated CO₂, increased nitrogen availability and biodiversity on plant tissue quality and decomposition*, **Global Change Biology**, 13, 1960-1973.
- Grace, J.B., T.M. Anderson, M.D. Smith, E. Seabloom, S.J. Andelman, G. Meche, E. Weiher, L.K. Allain, H. Jutila, M. Sankaran, J. Knops, M. Ritchie, and M.R. Willig. 2007. *Does species diversity limit productivity in natural grassland communities?*, **Ecology Letters**, 10, 680-689.
- Fargione, J., D. Tilman, R. Dybzinski, J. Hille Ris Lambers, C. Clark, W.S. Harpole, J.M.H. Knops, P.B. Reich, and M. Loreau. 2007. *From selection to complementarity: shifts in the causes of biodiversity-productivity relationships in a long-term biodiversity experiment*, **Proceedings of the Royal Society B**, 274, 871-876.
- Knops, J.M.H. 2006. *Fire does not alter vegetation in infertile prairie*. **Oecologia**, 150, 477-483.
- Bakker, E.S., M.E. Ritchie, H. Olff D.G. Milchunas, and J.M.H. Knops. 2006. *Herbivore impact on grassland plant diversity depends on habitat productivity and herbivore size*, **Ecology Letters**, 9, 780-788.
- Tilman, D. P. Reich, and J. Knops. 2006. *Biodiversity and ecosystem stability in a decade-long grassland experiment*, **Nature**, 441, 629-633.
- Reich, P.B., S.E. Hobbie, T. Lee, D.S. Ellsworth, J.B. West, D. Tilman, J.M.H. Knops, S. Naeem, and J. Trost. 2006. *Nitrogen limitation constrains sustainability of ecosystem response to CO₂*, **Nature**, 440, 922-925.

OTHER PROFESSIONAL ACTIVITIES

- Editorial board*, Plant Biology (2003–2008)
- Ecology Letters* (2002–ongoing)

CODY L. KNUTSON, Research Assistant Professor, 50% Research, 48% Scholarly service, 2% University Service

Areas of Interest: drought planning, environmental geography, water and natural resources policy, rural water development, indigenous peoples, environmental perceptions, public participation, collaborative planning, capacity building, environmental justice, and international development

Contact: cknutson1@unl.edu, 402/472-6718

EDUCATION

B.S. Geological Engineering, South Dakota School of Mines and Technology (1993)

M.S. Geological Engineering, South Dakota School of Mines and Technology (1996)

M.A. Anthropology, University of Nebraska-Lincoln (1997)

Ph.D. Geography, University of Nebraska-Lincoln (2004)

PREVIOUS EXPERIENCE AND TRAINING

2006-present Research Assistant Professor, School of Natural Resources/NDMC, UNL
2004-2006 Assistant Geoscientist, School of Natural Resources/NDMC, UNL
2002-2004 Water Resources Specialist, School of Natural Resources/NDMC, UNL
2001-2003 Lecturer and Teaching Assistant, Anthropology and Geography Department, UNL
2001-2002 Applied Anthropologist, Development Systems/Applications Int., Lincoln, NE
1997-2000 Water Resources Specialist, National Drought Mitigation Center, UNL
1996-1997 Technical Assistant, United States Geological Survey,
1994-1996 Hydrologic Technician, USDA Black Hills National Forest
1994-1994 Research/Teaching Assistant, SD School of Mines & Technology
1993-1994 Project Manager, American Technical Services
1991-1992 Geologist (Summers), Independence Mining Company

HONORS AND AWARDS

Editors Choice for Best Article – Honorable Mention, Journal of Soil and Water Conservation (2009)

Research Fellowship, Human Rights/Human Diversity Initiative, UNL (2001)

Doctoral Research Fellowship, Endowed Fellowship, UNL (2000)

TEACHING

Courses Taught (Fall)

NRES 898 Human Dimensions of Natural Resources Management (F07)

GEOG 898 Nature and Society: A Geographic Perspective (F09)

Masters Students Advised

Ryan Bjerke (M.S. SNR, expected 2009)

Melissa Mosier (M.S. SNR, expected 2011)

RESEARCH

Research includes investigating how individuals and groups perceive and manage water scarcity and drought, as well as the development of tools, strategies, and guides to help better prepare for and respond to drought at the local, regional, tribal, state, and national levels. International planning guides have been developed in collaboration with the United Nations International Strategy for Disaster Reduction and the Food and Agriculture Organization of the United Nations Near East Regional Office. Domestically, drought planning guides are being developed to assist livestock producers, communities, and tribes.

SCHOLARLY SERVICE

Oversee outreach activities at the National Drought Mitigation Center (NDMC) and participate in many drought planning education and training activities across the U.S. and abroad. Since 2005, have made 63 presentations in Canada, China, India, Spain, Saudi Arabia, Switzerland, and 15 in the U.S. Also oversee the organization and facilitation of NDMC workshops across the U.S., as well as serve on several committees, such as the National Integrated Drought Information System Education and Outreach Working Group, the United Nations International Strategy for Disaster Reduction Drought Advisory Group, and the UNCCD Working Group III.

SELECTED GRANTS AND CONTRACTS

- Surveying Potential Low-Flow Impacts for the NWS Advanced Hydrologic Prediction Service in the Upper Colorado River Basin* (with M. Hayes, M. Svoboda, and D. Woudenberg), NWS Central Region Headquarters, \$87,000; October 2008–September 2003.
- Drought Mitigation – Nebraska Project* (with M. Hayes, M. Svoboda, and B. Wardlow), USDA-CSREES, \$347,246; July 2008–June 2009.
- An Assessment of Decadal Drought Information Needs of Stakeholders and Policymakers in the Missouri River Basin for Decision Support* (with M. Hayes and two collaborators), NOAA, \$294,111; May 2008–April 2010.
- Development of a Drought Ready Communities Program* (with M. Svoboda, M. Sittler, K. Smith, D. Woudenberg, and three collaborators), NOAA, \$288,670; May 2008–April 2010.
- Developing a Predictive Capability Decision Support System for Drought Mitigation* (with J. Ryu, M. Svoboda, D. Wilhite, and 6 collaborators), NASA, \$959,788; May 2008–April 2010.
- Development of a Drought Decision Support Portal for the Republican River Basin of Nebraska, Colorado, and Kansas* (with M. Svoboda and J. Ryu), NOAA, \$223,525; August 2007–July 2009.
- Transitioning the Drought Impact Reporter into an Operational System* (with M. Hayes, D. Wilhite, and M. Svoboda), NOAA, \$453,523; August 2007–July 2010.
- Drought Risk, Impact, and Mitigation Information System* (with D. Wilhite, M. Hayes, M. Svoboda, T. Tadesse, K. Hubbard, and two others) USDA-RMA, \$6,407,472; October 2005–September 2010.
- Integrated Real-Time Ground Water-Level Monitoring Network to Support Drought Impact Assessment and Mitigation Programs* (with M. Burbach and one other), USDA-RMA, \$403,293; October 2005–September 2009.
- Rangeland and Forage Geospatial Decision Support System for Drought Risk Management* (with D. Wilhite, M. Hayes, T. Tadesse, M. Svoboda, and two others), USDA-RMA, \$1,023,038; October 2005–September 2010.

SELECTED PUBLICATIONS

- Knutson, C.L. 2008. *Adaptation to Water Stress in the Great Plains*, **Water Resources IMPACT**, 10(4), 18-21.
- Knutson, C.L. 2008. *The role of water conservation in drought planning*, **Journal of Soil and Water Conservation**, 63(5).
- T. Tadesse, M. Haile, G. Senay, B. D. Wardlow, and C. L. Knutson . 2008. *The need for integration of drought monitoring tools for proactive food security management in sub-Saharan Africa*, **Natural Resources Forum**, 32 (4), 303-316.
- Knutson, C.L., S. Jones, M.E. Sittler, M. Higgins, M.D. Svoboda, D.R. Kluck, and D.A. Wilhite. 2008. *Development of a Low Flow Early Warning System for the NOAA National Weather Service, USA*, **Stream Ecology and Low Flows**, Special Issue of the **International Journal of Ecological Economics and Statistics**, 12(F08), 44-57.
- FOA/NDMC. 2008. **The Near East Drought Planning Manual: Guidelines for Drought Mitigation and Preparedness Planning**, C. L. Knutson (Lead Author), Food and Agriculture Organization of the United Nations Near East Regional Office and the National Drought Mitigation Center, USA. FAO: Rome, Italy, 52+iv pp.
- Knutson, C.L., M.J. Hayes, and M.D. Svoboda. 2007. *Case Study of Tribal Drought Planning: The Hualapai Tribe*. **Natural Hazards Review**, 8(4), 125-131.
- Wilhite, D.A., M.J. Hayes, and C.L. Knutson. 2005. *Drought Preparedness Planning: Building Institutional Capacity*, Chapter 5 in **Drought and Water Crises: Science, Technology, and Management Issues** (D.A. Wilhite, ed.), CRC Press: Boca Raton, FL.
- Hayes, M.J., O. Wilhelmi, and C.L. Knutson. 2004. *Reducing Drought Risk: Bridging Theory and Practice*. **Natural Hazards Review**, 5(2), 106-113.

OTHER PROFESSIONAL ACTIVITIES

- Member*, UNCCD Socio-Economic and Knowledge Assessment Working Group III, 2009 - present
- Member*, Climate Change Initiative Advisory Panel, University of Nebraska-Lincoln, 2008-present
- Member*, Education/Outreach Committee, NOAA National Integrated Drought Information System, 2008-present
- Member*, Scientific Advisory Committee, Indian Centre for Climate and Societal Impacts Research, 2007-present
- Member*, Drought Advisory Group, UN International Strategy for Disaster Reduction, 2006-present
- Member*, Municipal Water Supply, Health, and Energy Subcommittee; Nebraska CARC, 1998-present

MARK S. KUZILA, Professor, 15% Teaching, 30% Research, 20% Scholarly Service,
35% University Service

Areas of Interest: Soil Survey, Soil Genesis and Morphology, Surficial Geology

Contact: mkuzila@unl.edu, 402/472-7537

EDUCATION

B.S. Agronomy, Kansas State University (1973)

M.S. Agronomy, Kansas State University (1976)

Ph.D. Agronomy, University of Nebraska (1988)

PROFESSIONAL EXPERIENCE

9/2007-Present Professor, Director, Conservation and Survey Division, School of Natural Resources

2003-8/2007 Director, School of Natural Resources, University of Nebraska-Lincoln

1998-2003 Director, Conservation and Survey Division, School of Natural Resources, UNL

1983-1998 Principle Soil Scientist, Conservation and Survey Division, University of Nebraska-Lincoln

1977-1983 Assistant Principle Soil Scientist, Conservation and Survey Division, University of Nebraska-Lincoln

1975-1977 Soil Scientist, Conservation and Survey Division, University of Nebraska-Lincoln

TEACHING

Courses Taught

NRES 108 Earths Natural Resources Systems

NRES 279 Soil Evaluation

NRES 477/877 Great Plains Field Pedology

RESEARCH

My research program was re-established in 2008. Projects include; Surficial Geology in Lancaster County, Nebraska, Soil Characteristics of Tern and Plover Nesting Sites, Physical and Chemical Properties of Loess Soils under Forest and Grassland ecosystems, and the Effect of Loess and Glacial Till Soils on Viticulture in Southeast Nebraska.

EXTENSION/OUTREACH

I am involved in interpretation of soil survey data for land use management.

SURVEY

I am the Nebraska State Geologist with responsibilities include addressing the mission of the Conservation and Survey Division in research, scholarly service, education and publication and the facilitation of projects and activities pertaining to geology, soils, water, and remote sensing.

OTHER PROFESSIONAL ACTIVITIES

Member, Association of American State Geologists

Member, Geological Society of America

Member, Nebraska Society of Professional Soil Scientists

Member, Registered Professional Geologist

Member, Soil Science Society of America

Member, Soil and Water Conservation Society

**SUSAN OLAFSEN LACKEY, Geoscientist, 25% Research, 70% Scholarly Service,
5% University Service**

Areas of Interest: Hydrogeology, Geology, Groundwater – Surface Water Interaction
Contact: slackey1@unl.edu, 402/370-4007

EDUCATION

B.S. Geological Engineering, South Dakota School of Mines and Technology (1982)
9 graduate credit hours Hydrogeology, Oklahoma State University (1990)

PROFESSIONAL EXPERIENCE

1991 - Present	Hydrogeologist, Conservation and Survey Division, University of Nebraska, Norfolk, Nebraska
1987 - 1991	Project Manager/Scientist, BCI Geonetics, Inc., Laconia, New Hampshire
1984 - 1987	Construction Engineer, Department of Transportation, Custer, South Dakota
1982 - 1983	Radiation Tester, Batelle Northwest Laboratory, Edgemont, South Dakota
Summer 1982	Teaching Assistant; Black Hills Field Station, Rapid City, South Dakota

RESEARCH

I am involved in a coalition of six Natural Resources Districts (NRDs) initiated the Eastern Nebraska Water Resources Assessment (ENWRA) project after discussing groundwater-surface water relationships in eastern Nebraska. I am, also, involved in the Nebraska Water Science Center, a part of the U.S. Geological Survey and the Conservation and Survey Division (CSD) of the School of Natural Resources at the University of Nebraska. The staff from the Nebraska Department of Natural Resources (NDNR) also joined the project as technical advisors. During these discussions, it became clear that the careful management of all aquifers even those not directly connected to surface water are also important because the localized and hydrogeologically-complex nature of many aquifers in eastern Nebraska makes them susceptible to overdevelopment. The ultimate goal of ENWRA is to develop a three-dimensional geologic framework and water budget for all of eastern Nebraska. Pilot studies were designed to investigate these complex systems on a limited scale and determine the technology needed to map aquifers in areas impacted by glaciation. Standard techniques were applied including test hole drilling, monitoring well installation, water level and chemistry monitoring, and aquifer testing. The results of these techniques will be used to assess new technology that can be more economically applied to larger areas. New techniques applied at the pilot sites included Helicopter Electromagnetic (HEM), Time Domain Electromagnetic (TDEM), Passive seismic, and gravity surveys. This effort has produced an educational bulletin published in 2009. Technical Bulletins and/or Water Supply Papers will be published for each of the pilot study sites over the next two years.

SURVEY/SCHOLARLY SERVICE

The Nebraska Grout Task Force (NGTF) was formed in 2001 to consider further investigation of anomalies detected in bentonite slurry grout by a down-hole camera survey that was performed on the first clear-cased well 16 months after installation. This project was originally developed to study in-situ bentonite grouts over a two-year period to assess state regulations related to minimum percent solids requirements and observe the nature of grout material under varying geologic and hydrologic conditions. These clear-cased wells were constructed with bentonite slurry grouts containing less than 20, equal to 20, and greater than 20 percent solids. In 2003, after a portion of the site monitoring was performed, it became evident that the bentonite slurry grouts did not perform as expected in the unsaturated zone. Therefore, the NGTF decided to expand the project. First, the Task Force decided to test all grouts, including chip bentonite, geothermal, and cement-based grouts, approved by the State of Nebraska. Second, it was decided to support a study to provide detailed analyses of the physical and chemical nature of the unsaturated zone and compare these results to the nature of the grout observed in the 90-day down-hole camera surveys. The results of this study were published in August 2005 as a University of Nebraska master's thesis entitled "Water Well Annular Seal Conditions and Stratigraphic Characteristics of the Unsaturated Zone: Case Studies from Nebraska". In 2006, preliminary assessment of this field-based research indicated most grouts were not performing as expected in the unsaturated zone. In the fall of 2005 the Nebraska Well Drillers Association (NWDA) licensing board voted to expand the project to include testing of new annular seal materials above the water table. The objective of the unsaturated zone study was to identify materials that divert water away from the borehole in the unsaturated zone. These materials were also to be economical as well as relatively easily placed. Preliminary results of this study have

been presented at a number of national, regional, and state conferences and workshops. Project reports are presently being written for the original and the unsaturated zone studies. The project reports will be summarized into a formal educational publication that will be available this fall at the Nebraska Grout and Unsaturated Zone Study Conference.

UNIVERSITY SERVICE

I serve, as a governor appointee, on the Nebraska Board of Geologists, 2004-2009. I also serve on the Nebraska Grout Task Force, 2001-2009, the Nebraska Well Drillers Association, Chapter 12 Examination Subcommittee, appointee 2001-2009, and the Nebraska Well Drillers Association, Chapter 12 Technical Subcommittee, appointee 1998-2009. I am a member of the National Groundwater Association, 1988-2008. I hold a Nebraska Drilling/Pump Installation Contractors License, 1997-2008, #39390 and am a Nebraska Licensed Professional Geologist, #0176, 1999-2008.

SELECTED GRANTS AND CONTRACTS

Elkhorn-Loup Model(ELM) (with J. Goeke), Lower Loup NRD via Integrated Management Funds, \$100,000; 2008-2010.

Eastern Nebraska Water Resources Assessment (ENWRA) (with P. Hanson and R. Joeckle), Lower Platte North NRD via Integrated Management Funds, \$476,000; 2006-2010.

Streambed Tests in the Elkhorn River Basin, Nebraska (with X. Chen), Lower Elkhorn NRD via interlocal agreement with Upper Elkhorn NRD and Nebraska Department of Natural Resources, \$85,000; 2007-2009.

Lower Elkhorn Hydrogeologic Studies, Lower Elkhorn NRD, \$460,000; 1999-2010.

Upper Elkhorn Hydrogeologic Studies, Upper Elkhorn NRD, \$230,000; 1999-2010.

SELECTED PUBLICATIONS

Divine, D.P., R. Joeckel, J. Korus, P. Hanson, S. Olafsen-Lackey. 2009. *Eastern Nebraska Water Resources Assessment (ENWRA) Introduction to a Hydrogeological Study*, **Conservation and Survey Division, School of Natural Resources Bulletin 1.**

Chen, X.H., J. Song, C. Cheng, D. Wang, and S. Lackey. 2008. *A New Method for Mapping Variability in Vertical Seepage Flux in Streambeds*, **Hydrogeology Journal**, (10.1007/s10040-008-0384-0).

Summerside, S., S.Olafsen-Lackey, J. Goeke, and W. Myers. 2005. *Mapping of Aquifer Properties – Transmissivity and Specific Yield - for Selected River Basins in Central and Eastern Nebraska*, **Open-File Report #71.**

Olafsen-Lackey, S. 2005. *Transmissivity of the Principal Aquifer, Sioux City Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-65.10.**

Olafsen-Lackey, S., 2005. *Specific Yield of the Principal Aquifer, Sioux City Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-66.10.**

Olafsen-Lackey, S. and L. Cast. 2005. *Transmissivity of the Principal Aquifer, O'Neill Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-65.8.**

Olafsen-Lackey, S. and L. Cast. 2005. *Specific Yield of the Principal Aquifer, O'Neill Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-66.8.**

Cast, L., J. Cannia, and S. Olafsen-Lackey. 2005. *Transmissivity of the Principal Aquifer, Broken Bow Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-65.2.**

Cast, L., J. Cannia, and S. Olafsen-Lackey. 2005. *Specific Yield of the Principal Aquifer, Broken Bow Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-66.2.**

Olafsen-Lackey, S. and S. Summerside. 2005. *Transmissivity of the Principal Aquifer, Fremont Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-65.3.**

Olafsen-Lackey, S. and S. Summerside. 2005. *Specific Yield of the Principal Aquifer, Fremont Quadrangle, Nebraska*, **Nebraska Water Survey Map GM-66.3.**

CINDY S. LARSON-MILLER, Program Specialist, 20% Teaching,
10% Recruitment/Outreach, 10% Academic Advising, 60% Coordinate Toyota USA
Foundation Grant

Areas of Interest: Science Education, Earth Systems, Integrated Science, Application, and Inquiry

Contact: clarsonmiller2@unl.edu, 402/730-9691

EDUCATION

B.S. Biological Sciences, University of Nebraska-Lincoln (1993)

M.S. Curriculum and Instruction, Secondary Science, University of Nebraska-Lincoln (2000)

Ph.D. Candidate, Teaching, Learning, and Teacher Education, University of Nebraska-Lincoln (2010)

CERTIFICATION

Educational Administration K-12, University of Nebraska, Lincoln, Nebraska, (2010)

Nebraska Teaching Certificate Natural Sciences (7-12), August 2001

Nebraska Initial Teaching Certificate Natural Sciences (7-12), August 1996

Project Wild Certificate August 1995

PROFESSIONAL EXPERIENCE

2007-present Program Specialist, School of Natural Resources, University of Nebraska-Lincoln

2006-2007 Project Manager – Inspiring Inquiry, College of Education and Human Sciences, University of Nebraska-Lincoln

2005-2007 Elementary Science Methods Instructor, College of Education and Human Sciences, University of Nebraska-Lincoln

2002-2006 Secondary Science Methods Instructor, College of Education and Human Sciences, University of Nebraska-Lincoln

HONORS AND AWARDS

Paul & Edith Babson Fellowship, University of Nebraska, Lincoln, Nebraska (August 2002-May 2005)

TEACHING

Courses Taught (Fall, Spring, Summer)

FDST 801 Teaching Applications of Food Science, co-taught with Dr. John Rupnow (F07, S08, Su 08, F09, S09, Su10)

AGRO 896 Teaching Biotechnology, co-taught with Dr. Don Lee (Su08)

NRES 809 Laboratory Earth: Earth and Its Systems, co-taught with Dr. Dave Gosselin (F08)

NRES 814 Laboratory Earth: Earth's Natural Resource Systems, co-taught with Dr. Dave Gosselin (S09, Su 10)

NRES 822 Laboratory Earth: Earth's Changing Systems, co-taught with Dr. Dave Gosselin (F08, Su10)

Masters Students Advised

Joel Fritz (M.A.S. Science for Educators) Non-thesis option.

COORDINATION TOYOTA USA FOUNDATION GRANT

The focus of this grant is to develop content-driven, standards-based, inquiry-based, integrated, and application-minded courses designed for K-12 science educators. We now have a set of 24 hours of online courses that meet our template of inquiry, integration, and application set forth in our plan for an online masters degree program. In addition, we have recently secured the name change of the Master of Agriculture to the Master of Applied Science. We believe this change will be a much more marketable program for our audience.

RECRUITMENT/OUTREACH

I work towards recruiting graduate students from around the country. To date, we have taught our Science in Action courses to over 150 students from across the United States. Our goal is to recruit 20 new students into our program per semester.

ACADEMIC ADVISING

Once we have students in the courses, I work with them to address their needs, concerns, and future plans in order to move them towards degree completion.

SELECTED GRANTS AND CONTRACTS

Masters Degree in Applied Science Education, Toyota USA Foundation (Faculty Partners -Non-IANR/CEHS: Billie Strand, Extended Education and Outreach; IANR/CEHS Associated Faculty: David Gosselin and Ronald Bonnstetter, Co-Principal Investigators), \$540,335; July 2007–June 2011.

NASA Earth System Science Class Involvement, Teacher Training Mini-grants, NASA Space Grant, \$7,500; August 2009–May 2010.

OTHER PROFESSIONAL ACTIVITIES

Member, National Science Teachers Association (1994–present)

Presenter, Nebraska Association of Teachers of Science (2000-2004)

Coach, judge, and event coordinator, Science Olympiad (1995-2006)

STEPHEN J. LAVIN, Professor, 60% Teaching, 30% Research, 10% Service

Areas of Interest: Cartography, Map and Atlas Design, Scientific Visualization, Map Animation, GIS

Contact: slavin1@unl.edu, 402/472-3580

EDUCATION

B.S. Geography/Geology, State University of New York at Buffalo (1969)

M.S. Earth Sciences, Montana State University (1971)

Ph.D. Geography, University of Kansas (1979)

PROFESSIONAL EXPERIENCE

2008-present Professor, Geography, School of Natural Resources, University of Nebraska-Lincoln

2005-2008 Professor, Department of Anthropology and Geography, University of Nebraska-Lincoln

1989-2004 Associate Professor, Department of Geography, University of Nebraska-Lincoln

1981-1988 Assistant Professor, Department of Geography, University of Nebraska-Lincoln

1977-1981 Instructor/Assistant Professor, Department of Geography, Dartmouth College

HONORS AND AWARDS

Top award winner, **Historical Atlas of U.S. Presidential Elections 1788-2004**, Single Volume Reference/Humanities and Social Sciences Category, Conferred by the Professional and Scholarly Publishing Division (PSP) of the Association of American Publishers (2007)

Best Reference book of 2006, **Historical Atlas of U.S. Presidential Elections 1788 -2004**, Conferred by the **Library Journal** (2007)

Choice Award for Outstanding Academic Title, For **Atlas of American Politics: 1960-2000**. J. Clark Archer, Stephen Lavin, Kenneth Martis and Fred Shelley. Conferred by the American Library Association, January (2003)

British Cartographic Society Award, Best Article, **The Cartographic Journal**, with Randall Cervený. For **Unit-Vector Density Mapping** (1988)

Andrew McNally award for Finest Article In Cartography in 1984, Rand-McNally Corporation and American Congress on Surveying and Mapping, Washington, D.C. For **Computer-Produced Unclassed Bivariate Choropleth Maps**, with J. Clark Archer, (1985)

TEACHING

Courses Taught (Fall, Spring)

GEOG 317 Cartography I - Introduction to Cartography (F04, F05, F06, F07, F08)

GEOG 417/817 Cartography II – Electronic Atlas Design and Construction (S04, S05, S06, S08)

GEOG 425/825 Scientific Visualization in Cartography (S05, S06 S07)

GEOG 915 Seminar in Cartography (S04, S07, S08)

Masters and Doctoral Students Advised

Natalia Lys, (M.A. Geography 2009), Analysis of Thematic Maps in Newspapers: Quality, Quantity and Variety

David Weekley (M.A. Geography 2009), Non-thesis option

Sarah Kohtz (M.A. Geography, 2008), Non-thesis option

Patrick Guiberson, (Ph.D. Geography, 2007), A Cartographic Analysis of Visual Transparency on Maps

Joan Lubischer (Ph.D. Geography 2006), Metropolitan Areas as Unique Economic Regions

Matthew Dooley, (Ph.D. Geography 2006), Multi-Temporal Land-Use Patterning in the Western Papagueria: A Geoarchaeological Analysis of Pre-Columbian Cultural Landscapes

Michael Shambaugh-Miller, (Ph.D. Geography 2004), Rural Health Delivery Systems: A GIS Analysis

RESEARCH

My research has been devoted to various aspects of cartographic visualization including design of alternate computer map symbolizations and the design, uses and evaluation of map animation. Most recently, I have been involved in a number of atlas projects for publication, including **Atlas of American Politics: 1960-2000** and the nearly completed **Atlas of the Great Plains**, scheduled for publication in 2010. My newest project, tentatively titled —**An Atlas of the Watershed Election of 2008**” is in its beginning stages and involves collaboration with political geographers and political scientists from across the country. It will be completed in the summer of 2010.

UNIVERSITY SERVICE

I have served as the Chair for the Program and Planning Committee and the Center for Great Plains Studies (2005-2006). I have been a member of the Curriculum Committee, Arts and Sciences (2005-present), Program and Planning Committee, Center for Great Plains Studies (2004-2005) and Board of Governors, Center for Great Plains Studies (2003-2006). I was the Chair for the Scholarship Committee, Center for Great Plains Studies (2003-2005), Fellow for the Center for Great Plains Studies (2002 to present). I also served as Director, UNL GIS Certificate Program (2002-2009) and the Chair for the Geography Graduate Committee, University of Nebraska (1992 to Present).

SELECTED GRANTS

Atlas of the Great Plains, Omaha World Herald, with J. Clark Archer. \$35,000. 2006

Atlas of the Great Plains. University of Nebraska Foundation, University of Nebraska Research Council, University of Nebraska Center for Great Plains Studies, with J. Clark Archer, \$34,000; 2002-2004

SELECTED PUBLICATIONS

Dooley, M., and Lavin S. 2007. *Visualizing Method-Produced Uncertainty in Isoline Mapping*, **Cartographic Perspectives**, March issue, pp. 16-35.

Archer, J. C., Lavin, S.J., Martis, K.C. and Shelley, F.M. 2006. **Historical Atlas of Presidential Elections: 1789 to 2004**, (Congressional Quarterly Press; Washington, D.C.; 2006), 286 pages, (Hardcover ISBN 1-56802-665-X).

Archer, J. C., Lavin, S.J., Martis, K.C. and Shelley, F.M. 2002. **Atlas of American Politics, 1960-2000**, (Congressional Quarterly Press; Washington, D.C.; 2002), 242 pages, (Hardcover ISBN 1-56802-665-X).

John L. Moore, Jon P. Preimesberger, and David R. Tarr, editors, 57 maps by J. Clark Archer and Stephen Lavin. **Congressional Quarterly's Guide to U.S. Elections**, 4th ed., 2 vols., (Congressional Quarterly Press; Washington, D.C.), 1700 pages, (Hardcover ISBN 1-56802-603-X).

Rossum, S. and Lavin, S.J. 2000. *Where are the Great Plains?: A Cartographic Analysis*, **The Professional Geographer**, August, 2000, pp. 543-552.

JOHN D. LENTERS, Associate Professor, 15% Teaching, 50% Research, 5% University Service, 30% Department of Geosciences (8% Teaching, 17% Research, 5% Service)

Areas of interest: Lake energy and water balances, climate variability and change, physical limnology, hydrology
Contact: jlenters2@unl.edu, 402-472-9044

EDUCATION

B.S. Physics and Mathematics, Hope College (1991)
M.S. Atmospheric Science, Cornell University (1995)
Ph.D. Atmospheric Science, Cornell University (1997)

PROFESSIONAL EXPERIENCE

2006-present Associate Professor, School of Natural Resources and Department of Geosciences, University of Nebraska-Lincoln (UNL)
2001-2006 Assistant Professor, Department of Geology and Physics, Lake Superior State University (LSSU)
2002 Visiting Assistant Professor, Center for Sustainability and the Global Environment (SAGE), University of Wisconsin-Madison
1996-2001 Postdoctoral Research Associate, Center for Limnology and Center for Climatic Research, University of Wisconsin-Madison

HONORS AND AWARDS

Postdoctoral research award, National Research Council (1997)
Global change symposium scholarship, American Meteorological Society (1994)
Graduate fellowship honorable mention, National Science Foundation (1991)
Magna cum laude graduate, Hope College (1991)

TEACHING

Courses Taught (Fall, Spring)

NRES 478/878 Regional Climatology (S07, S09)
NRES 496/896 Hydroclimatology (F08)
GEOS 898 Physical Limnology (S08)
METR 898 Graduate Research Forum (F07)
GG108 Physical Geography: Meteorology and Climatology (S04, S06) – taught at LSSU
PH231 Applied Physics for Engineers and Scientists I (F05) – taught at LSSU
PH232 Applied Physics for Engineers and Scientists II (S05, S06) – taught at LSSU
GE411 Hydrologic Systems: Surface and Groundwater (S05) – taught at LSSU
PH221 Elements of Physics I (F04) – taught at LSSU
PH222 Elements of Physics II (S04) – taught at LSSU

Masters and Doctoral Students Advised

Sandra L. Jones (M.S., Natural Resource Sciences, expected 2009)
Gregory J. Cutrell (M.S., Natural Resource Sciences, expected 2010)
Nathan C. Healey (Ph.D., Natural Resource Sciences, expected 2011)

RESEARCH

I initiated a collaborative study (with the University of Wisconsin-Madison) to study the impacts of changes in climate and land use on water resources and crop yields in the central U.S. (2008–present). I began a collaborative project (with UCLA and the University of Cincinnati) to study the effects of climate on the dynamics of thaw lakes in the Arctic coastal plain of Alaska (2007–present). I initiated a study of the impacts of riparian vegetation on water quantity, quality, and ecology (2007–present). I am involved in an ongoing study of the impacts of climate on lake evaporation and hydrology (1996–present). I initiated a study of the impacts of riparian vegetation on water quantity, quality, and ecology (2007–present). I am involved in an ongoing study of the impacts of climate on lake evaporation and hydrology (1996–present).

UNIVERSITY SERVICE

I am a member of Graduate Committee, School of Natural Resources, UNL (2007–present), Water Science Undergraduate Curriculum Committee, UNL (2007–present) and was a member of the General Education committee (LSSU, 2005–2006). I was the Director of University Honors Program (LSSU, 2004–2006).

SELECTED GRANTS AND CONTRACTS

- Collaborative research: Evolution of dissolved organic nitrogen (DON) from the headwaters to the catchment outlet: Sources, variation with scale, and differences with DOC* (with five collaborators), National Science Foundation, \$540,634; October 2008–September 2011.
- Impacts of historical and future changes in climate and atmospheric CO₂ on terrestrial ecosystem structure and functioning in the Midwestern U.S.* (with one collaborator), U.S. Department of Energy, \$362,176; July 2008–June 2011.
- Riparian vegetation impacts on water quantity, quality, and stream ecology* (with E. Istanbuluoglu and one collaborator), Nebraska Environmental Trust, \$433,960; April 2008–June 2010.
- Collaborative research: Changes in lake dynamics on the Arctic Coastal Plain of North America over the past half century* (with seven collaborators), National Science Foundation, \$735,387; September 2007–August 2010.

SELECTED PUBLICATIONS

- Lenters, J.D. 2008. *Low lake levels in northern Wisconsin: Precipitation or evaporation-driven?*, **LakeLine**, 28, 17–19.
- Magnuson, J.J., B.J. Benson, J.D. Lenters, and D.M. Robertson. 2006. *Climate-driven variability and change*, chapter in **Long-Term Dynamics of Lakes in the Landscape: Long-Term Ecological Research on North Temperate Lakes** (J. Magnuson, T. Kratz, and B. Benson, eds.), Oxford University Press.
- Webster, K.E., M.P. Anderson, C.J. Bowser, and J.D. Lenters. 2006. *Understanding the lake-groundwater system: Just follow the water*, in **Long-Term Dynamics of Lakes in the Landscape: Long-Term Ecological Research on North Temperate Lakes** (J. Magnuson, T. Kratz, and B. Benson, eds.), Oxford University Press.
- Lenters, J.D., T.K. Kratz, and C.J. Bowser. 2005. *Effects of climate variability on lake evaporation: Results from a long-term energy budget study of Sparkling Lake, northern Wisconsin (USA)*, **Journal of Hydrology**, 308, 168–195.
- Lenters, J.D. 2004. *Trends in the Lake Superior water budget since 1948: A weakening seasonal cycle*, **Journal of Great Lakes Research**, 30 (Supplement 1), 20–40.
- Donner, S.D., M.T. Coe, J.D. Lenters, T.E. Twine, and J.A. Foley. 2002. *Modeling the impact of hydrological changes on nitrate transport in the Mississippi River Basin from 1955 to 1994*, **Global Biogeochemical Cycles**, 16, doi:10.1029/2001GB001396.
- Lenters, J.D. 2001. *Long-term trends in the seasonal cycle of Great Lakes water levels*, **Journal of Great Lakes Research**, 27, 342–353.
- Lenters, J.D., M.T. Coe, and J.A. Foley. 2000. *Surface water balance of the continental United States, 1963–1995: Regional evaluation of a terrestrial biosphere model and the NCEP/NCAR reanalysis*, **Journal of Geophysical Research-Atmospheres**, 105, 22,393–22,425.
- Kucharik, C.J., J.A. Foley, C. Delire, V.A. Fisher, M.T. Coe, J.D. Lenters, C. Young-Molling, N. Ramankutty, J.M. Norman, and S.T. Gower. 2000. *Testing the performance of a dynamic global ecosystem model: Water balance, carbon balance, and vegetation structure*, **Global Biogeochemical Cycles**, 14, 795–825.
- Benson, B.J., J.D. Lenters, J.J. Magnuson, M. Stubbs, T.K. Kratz, P.J. Dillon, R.E. Hecky, and R.C. Lathrop. 2000. *Regional coherence of climatic and lake thermal variables of four lake districts in the Upper Great Lakes Region of North America*, **Freshwater Biology**, 43, 517–527.

OTHER PROFESSIONAL ACTIVITIES

- Journal reviewer*, Water Resources Research, Geophysical Research Letters, Earth Interactions, Journal of Climate, Ecosystems, Journal of Hydrology, Journal of Hydrometeorology, Journal of Geophysical Research Atmospheres, Journal of Great Lakes Research, Ecological Modeling, Monthly Weather Review, Quarterly Journal of the Royal Meteorological Society.
- Proposal reviewer*, NSF Division of Ocean Sciences, NOAA Climate and Global Change Program, NSF Division of Earth Sciences, NOAA Pan American Climate Studies (PACS).
- Session co-chair*, “Regional lake-atmosphere interactions: Past, present, and future,” 50th Annual Conference, International Association for Great Lakes Research (IAGLR); and —“Climate effects on lake hydrology and thermal structure,” 47th Annual Conference (IAGLR).

JAMES W. MERCHANT, Professor, 40% Teaching, 33% Research, 27% University Service

Areas of Interest: Remote Sensing, Geographic Information Systems, Landscape Ecology

Contact: jmerchant1@unl.edu, 402/472-7531

EDUCATION

B.S. Geography, Towson State University (1969)

M.A. Geography, University of Kansas (1973)

Ph.D. Geography, University of Kansas (1984)

PROFESSIONAL EXPERIENCE

2008-present Professor and Director, Center for Advanced Land Management Information Technologies, and Five-year Review Coordinator, School of Natural Resources

1998-2008 Professor and Associate Director, Center for Advanced Land Management Information Technologies, School of Natural Resources

1989-1998 Associate Professor and Associate Director, Center for Advanced Land Management Information Technologies, Conservation & Survey Division, University of Nebraska-Lincoln

1986-1989 Assistant Professor, Department of Geography, University of Kansas

1979-1986 Remote Sensing Specialist, Kansas Applied Remote Sensing Program, University of Kansas

HONORS AND AWARDS

Outstanding Service Award, American Society for Photogrammetry and Remote Sensing (2008)

Editor-in-Chief of the journal **Photogrammetric Engineering & Remote Sensing**, American Society for Photogrammetry and Remote Sensing (2002-2008; Associate Editor 2001-2002 and 1987-1998)

Certificate of Appreciation, U.S. Geological Survey (2005)

Career Achievements Award, MidAmerica GIS Consortium (2004)

Outstanding Contributions Award, Nebraska GIS/LIS Association (1999)

Outstanding Contributions Award, Association of American Geographers Remote Sensing Specialty Group (1998)

John Wesley Powell Award, U.S. Geological Survey (1997)

TEACHING

Courses Taught (Fall, Spring, Summer)

GEOG 217 Map and Air Photo Interpretation (F07)

GEOG/NRES 412/812 Geographic Information Systems (F04, S06, F06, S07, S08, S09)

GEOG/NRES 418/818 Introduction to Remote Sensing (F04)

GEOG 902 Geography General Seminar (S09)

Masters and Doctoral Students Advised

Ruopu Li (Ph.D. Natural Resources, expected 2010) Groundwater Pollution Risk Assessment under Scenarios of Climate and Land Use Change in the Northern Great Plains

Roberto Bonifaz (Ph.D. Geography, expected 2010) Estimating Biophysical Parameters of Tropical Forests from AVHRR Data

Henry Bulley (Ph.D. Geography, 2004) A Watershed-Based Classification System for Lakes in Agriculturally Dominated Ecosystems: A Case Study of Nebraska Reservoirs

Nathan Freitas (MA Geography, expected 2010) Non-thesis option

Andrew Kessler (MS Natural Resources, expected 2009) Decision Support Tools for Mitigating the Impacts of Invasive Vegetation on Sandhill Crane (*Grus Canadensis*) Habitat

Amy Zoller (MS Natural Resources, 2008; co-advisor with J. Holz) A GIS Approach to Modeling Soil erosion and Sediment Transport in a Small Agricultural Watershed

Thad Miller (MS Natural Resources, expected 2009; co-advisor with C. Allen) Risk Assessment: An Approach to Prioritizing the Control of Invasive Plant Species and the Conservation of Rare Species and Plant Communities

Ronald Bahl (MA Geography, 2005) Non-thesis option.

Travis Talbitzer (MA Geography, 2005) Non-thesis option.

RESEARCH

My research focuses on land cover characterization using digital multispectral satellite data, spatial and contextual analysis of digital images and application of geospatial information technologies in modeling.

UNIVERSITY SERVICE

I served as SNR Research Coordinator (2002-2005) and Coordinator for the SNR Five-Year Review in 2003 and 2008-2009. In addition, I have served on many other SNR committees including as Chair of the Faculty Advisory Committee (2006-present).

SELECTED GRANTS AND CONTRACTS

Initial Design and Implementation of the Nebraska Geospatial Data Sharing and Web Services Network, Nebraska Office of the Chief Information Officer, \$290,870; August 6, 2008-February 5, 2011.

Leadership to Design and Implement the Nebraska Geospatial Data Sharing and Web Services Network, Nebraska Office of the Chief Information Officer, \$5482; October 18, 2007-January 17, 2008.

Determination of Appropriate Lake Water Quality Expectations in Agriculturally Dominated Ecosystems (with J. Holz, A. Holz, E. **Istanbulluoglu**), UNL IANR/ARD, \$39,964; July 1, 2006-June 30, 2008.

Monitoring, Mapping, Risk and Management of Invasive Species in Nebraska (collaborator with C. Allen), Nebraska Environmental Trust, \$325,081; May 2006-April 2009.

Implementation of the AmericaView Program in Nebraska, U.S. Geological Survey, \$572,808; September 1, 2002-September 29, 2009.

Geospatial Data Analysis Support for the Nebraska Emergency Management Agency, Nebraska Emergency Management Agency, \$263,886; January 2006-August 31, 2009.

GIS Support for the Nebraska Health and Human Services System, Nebraska Health and Human Services System, \$839,619; April 20, 2003-August 31, 2008.

Land Use and Land Cover Mapping of Nebraska (with P. Dappen), Nebraska Department of Natural Resources, \$477,802; August 2005-June 2007.

Generation of Improved Land-surface Data and an Assessment of its Impact on Mesoscale Predictions, National Science Foundation, \$149,224; May 2003-April 2006.

SELECTED PUBLICATIONS

Merchant, J. W. and S. Narumalani. 2009. *Integration of Remote Sensing and GIS*, Chapter 17 in **Handbook of Remote Sensing** (T. Warner, D. Nellis and G. Foody, eds.). Sage Publications.

Bulley, H., D. Marx, J. Merchant, J. Holz, and A. Holz. 2008. *A Comparison of Nebraska Reservoir Classes Estimated from Watershed-Based Classification Models and Ecoregions*, **Journal of Environmental Informatics**, 11(2), 90-102.

Dappen, P.R., I. Ratcliffe, C. Robbins, and J.W. Merchant. 2008. *Mapping Agricultural Land Cover for Hydrologic Modeling in the Platte River Watershed of Nebraska*. **Great Plains Research**, 18(1), 39-52.

Bulley, H., J. Merchant, D. Marx, J. Holz, and A. Holz. 2007. *A GIS-based Approach to Watershed Classification for Nebraska Reservoirs*, **Journal of the American Water Resources Association**, 43, 605-621.

Henebry, G.M. and J.W. Merchant. 2006. *Land Cover Map of Nebraska*, 1:800,000. University of Nebraska-Lincoln, School of Natural Resources.

Merchant, J.W. 2005. *Remote Sensing and the Organization*, Chapter 13 in **Remote Sensing for GIS Managers** (S. Aronoff, editor). Redlands, CA: ESRI Press, 415-419.

Loveland, T.R. and J. W. Merchant. 2004. *Ecoregions and Ecoregionalization: Geographical and Ecological Perspectives*, **Environmental Management**, 34, S1-S13.

OTHER PROFESSIONAL ACTIVITIES

Guest Editor, Journal of Geography, special issue on *Using Geospatial Data in Geographic Education* (November/December 2007)

Guest Editor, Great Plains Research, selected papers from the Association of American Geographers 2006 joint meeting of the Great Plains-Rocky Mountain & West Lakes Divisions (Fall 2007)

Chair, Association of American Geographers, joint annual meeting of the Great Plains-Rocky Mountain and West Lakes Divisions, October 5-7, 2006, Lincoln, NE. <http://www.calmit.unl.edu/aag/>

Technical Program Chair, Pecora 16 Symposium, October 21-27, 2005, Sioux Falls, SD.

Served on planning committee for Natural Areas Association annual conference, Lincoln, NE, September 2005.

SUNIL NARUMALANI, Professor, 40% Teaching, 50% Research, 10% University Service
(40% SNR; 60% CAS)

Areas of Interest: Geography, GISciences, Ecological Applications, Water Resources

Contact: snarumalanil@unl.edu, 402/472-9842

EDUCATION

M.A. Geography, University of Georgia (1989)

Ph.D. Geography, University of South Carolina (1993)

PROFESSIONAL EXPERIENCE

2008-present Geography Program Coordinator, School of Natural Resources, University of Nebraska-Lincoln

2008-present Associate Director, CALMIT, School of Natural Resources, University of Nebraska-Lincoln

2007-present Professor, School of Natural Resources, University of Nebraska-Lincoln

2005-present Research Coordinator, School of Natural Resources, University of Nebraska-Lincoln

1998-2007 Associate Professor, School of Natural Resources, University of Nebraska-Lincoln

1993-1998 Assistant Professor, Department of Geography, University of Nebraska-Lincoln

HONORS AND AWARDS

3436th Military Intelligence Detachment for geospatial assistance in Operations in Iraq & Afghanistan (2004)

Autometric Award for Outstanding Paper on Photographic or Imagery Interpretation American Society for
Photogrammetry & Remote Sensing (1996)

Certificate of Recognition for Contributions to Students University of Nebraska (1995)

TEACHING (last five years)

Courses Taught (Fall, Spring, Summer)

GEOG/NRES 412/812 Introduction to Geographic Information Systems (S06, F07, F08)

GEOG 420/820 Digital Image Analysis (S04, S05, S07, S08)

GEOG 422/822 Advanced Geographic Information System (S04, S05)

Masters and Doctoral Students Advised

Chad Smith (M.A. Geography 2006) A GIS for Applications in Viticulture

Deepak Mishra (Ph.D. Natural Resource Sciences 2006) Multi- and Hyperspectral Remote Sensing of Tropical
Marine Benthic Habitats

Thomas Jeffrey (Ph.D. Geography 2006) An Analysis of Potential Soil Productivity and Land Use on the Standing
Rock Reservation

Paul Merani (M.A. Geography expected 2007) Salt Marsh Species Discrimination and Mapping in the Chesapeake
Bay Using Hyperspectral Remote Sensing

Jeffrey Rhodes (M.A. Geography 2007) A GIS Analysis of Social Vulnerability in the New Orleans Area

RESEARCH

My research has focused on the application of geographic information systems (GIS) and remote sensing toward various physical processes, landscape ecology, environmental and natural resources management issues. Some projects include mapping the distribution of vegetation invasive species, military and homeland security applications of remote sensing and GIS, developing integrated natural resources management plans, as well as GIS databases for the Army National Guard, and using GIS for national park condition assessments.

UNIVERSITY SERVICE

University service has focused on my administrative roles as Research Coordinator for the SNR, Geography Program Coordinator, Associate Director of CALMIT, and service on several SNR and UNL committees including the SNR's Graduate and Faculty Advisory Committees, the UNL Research Council, IANR Vice Chancellor's Liaison Committee.

SELECTED GRANTS AND CONTRACTS

Purple Loosestrife (Lythrum salicaria) Mapping and Biocontrol Along the Niobrara Scenic River, USDA-APHIS, \$39,000; March 2008-Dec. 2008.

- Assessment of Natural Resources for the Niobrara National Scenic River and Mount Rushmore National Monument* (with G. Willson); \$125,341, Aug. 2007–Jan. 2009.
- Geographic Information System Support for the Nebraska Army National Guard*, Nebraska Military Department, \$63,260; Oct. 2007–Sept. 2008.
- Geographic Information System Support for the Nebraska Army National Guard*, Nebraska Military Department, \$61,754; Oct. 2006–Sept. 2007.
- Mapping, quantifying, and predicting current and future invasive plant species spread in the North Platte corridor from east of Lake McConaughy to North Platte* (with D. Mishra), USDA-APHIS, \$25,000; Sept. 2006–Aug. 2007.
- Natural Resources Mapping of Camp Ashland Training Site, Using High Density LIDAR*, Nebraska Military Department, \$70,000; Jan. 2006–Nov. 2006.
- Geographic Information System Support for the Nebraska Army National Guard*, Nebraska Military Department, \$60,632; Oct. 2005–Sept. 2006.
- Wetlands Planning Level Surveys for Camp Ashland, Mead, and Greenlief*, Nebraska Military Department, \$112,563; June 2005–May 2006.
- Geographic Information System Support for the Nebraska Army National Guard*, Nebraska Military Department, \$59,038; Oct. 2004–Sept. 2005.
- Integrated Natural Resources Management Plan – 5th Year Revision – for Camp Ashland and Mead*, Nebraska Military Department, \$75,000; Aug. 2004–July 2005.

SELECTED PUBLICATIONS

- Narumalani, S., D.R. Mishra, R. Wilson, P. Reece, and A. Kohler, 2008. *Detecting and Mapping Four Invasive Species along the Floodplain of North Platte River, Nebraska*, **Weed Technology**. In Press.
- Willson, G.D., J. Subbendieck, S.J. Tunnell, and S. Narumalani. 2008. *Ranking and Mapping Exotic Plants at Capulin Volcano and Fort Union National Monuments*, **Park Science**, 25(1), 81-86.
- Hoffman, J., S. Narumalani, D. Mishra, P. Merani, and R. Wilson. 2008. *Predicting Potential Occurrence and Spread of Invasive Plant Species along the North Platte River, Nebraska*, **Invasive Plant Science and Management**, 1, 359-367.
- Mishra, D.R., S. Narumalani, D. Rundquist, and M.P. Lawson. 2007. *Enhancing the Detection and Classification of Coral Reef and Associated Benthic Habitats: A Hyperspectral Remote Sensing Approach*, **Journal of Geophysical Research**, 112, C08014, doi:10.1029/2006JC003892.
- Narumalani, S., D. Mishra, J. Burkholder, P. Merani, and G. Willson. 2006. *Remote Sensing of Invasive Species Using Airborne Hyperspectral Data*, **GeoCarto International: A Multidisciplinary Journal of Remote Sensing**, 21(2), 59-66.
- Mishra D., S. Narumalani, D. Rundquist, and M. Lawson. 2006. *Benthic Habitat Mapping in Tropical Marine Environments Using QuickBird Multispectral Data*, **Photogrammetric Engineering and Remote Sensing**, 72(9), 1037-1048.
- Mishra, D., S. Narumalani, R. Bahl, D. Rundquist, and M. Lawson. 2006. *Predicting the Percent Cover of Corals: An in-situ Remote Sensing Approach*, **Geophysical Research Letters**, 33, L06603, doi:10.1029/2005GL025056.
- Mishra D., S. Narumalani, D. Rundquist, and M. Lawson. 2005. *Characterizing the vertical diffuse attenuation coefficient for downwelling irradiance in coastal water of Roatan Island, Honduras*, **ISPRS, International Journal of Photogrammetry and Remote Sensing**, 60(1), 48-64.
- Mishra, D., S. Narumalani, D. Rundquist, and M. Lawson, 2005. *High Resolution Ocean Color Remote Sensing of Benthic Habitats: A Case Study at Roatan Island, Honduras*, **IEEE Transactions in Geosciences and Remote Sensing**, 43(7), 1592-1604.

OTHER PROFESSIONAL ACTIVITIES

- Chair: Remote Sensing Specialty Group*, Association of American Geographers (March 2008–present)
- Member, Geography Undergraduate Curriculum Committee*, University of Nebraska (September 2008–present)
- Member, Environmental Studies Advisory Council*, University of Nebraska (September 2008 – present)
- Member, Editorial Board*, GIScience and Remote Sensing (2003–present)
- Member, Organizing Committee*, Map Asia 2003 Conference in Kuala Lumpur, Malaysia (2002–2003)
- Member, Editorial Board*, International Journal of Geoinformatics (2002 – present)
- Book Review Editor*, Photogrammetric Engineering & Remote Sensing (2002–December 2005)

ROBERT J. OGLESBY, Professor, 28% Research, 2% University Service (SNR);
30% Teaching, 35% Research, 5% Service (Geosciences)

Areas of Interest: Global and regional climate modeling, past and future climate change, land-surface atmosphere interactions

Contact: roglesby2@unl.edu, 402/472-1507

EDUCATION

B.S. Physical Geography University of California, Davis (1985)

Ph.D. Geophysical Fluid Dynamics Yale University (1990)

PROFESSIONAL EXPERIENCE

2006-present Professor, Dept. of Geosciences and School of Natural Resources, University of Nebraska-Lincoln

2001-2005 Senior Scientist, Marshall Space Flight Center, NASA

2001-2005 Adjunct Associate Professor, Department of Atmospheric Sciences, University of Alabama in Huntsville

1997-2000 Associate Professor, Department of Earth and Atmospheric Sciences, Purdue University

1995-1999 Adjunct Fellow, Centre for Resource and Environmental Studies, Australian National University

1992-1997 Assistant Professor, Department of Earth and Atmospheric Sciences, Purdue University

1990-1991 Postdoctoral Research Associate, Department of Geological Sciences, Brown University

RESEARCH

My major research emphases are on climate change, past and future; climate predictability on seasonal and longer time scales; land surface-atmospheric interactions, and controls on drought. In the last five years, I have published over 20 papers in major journals, including 2 in **Science**, and have successfully completed three major funded projects.

UNIVERSITY SERVICE

My major university service emphasizes two areas: bringing the east campus and city campus atmospheric and climate science groups together on matters of research and curriculum and helping to develop the UNL climate change initiative. I have also served on the usual assortment of university and department committees.

SELECTED GRANTS AND CONTRACTS

Understanding and predicting tropical and North Atlantic SST forcing on variations in warm season precipitation over North America, NOAA, Lead PI Hu, co-PI Oglesby, \$300,000; July 2009-June 2011

Evaluating the role of global snow cover on seasonal to interannual predictability of precipitation National Aeronautics and Space Administration (NASA), lead PI – Oglesby, Co-PI's David Erickson, Oak Ridge National Laboratory; John Roads University of California, San Diego, \$598,215; March 2006-February 2010

Climatic Aspects of Initiation of the Laurentide Ice Sheet, National Science Foundation (subaward from Ohio State University), Lead PI – David Bromwich, Ohio State University; UNL co-PI Oglesby, \$100,678 (UNL subaward); January 2006 – September 2008

Investigation into the Ecological and Climatic Effects of Past and Present Human Activity in the Central American Region, National Aeronautics and Space Administration (NASA), lead PI Tom Sever, NASA/MSFC; co-PI Oglesby, \$1,122,000 (Funds at MSFC/NASA); January 2003–December 2007

SELECTED PUBLICATIONS

Oglesby, R.J., T.L. Sever, W. Saturno, D.J. Erickson, and J. Srikishen. 2009. *The Collapse of the Maya: Could deforestation have contributed?*, **Journal of Geophysical Research**, in press.

Feng, S., R.J. Oglesby, C.M. Rowe, D.B. Loope, and Q. Hu. 2008. *Pacific and Atlantic SST influences on Medieval Drought in North America Simulated by Community Atmospheric Model*, **Journal of Geophysical Research**, 113, D11101, doi:10.1029/2007JD009347.

Staiger, J., J. Gosse, R. Toracinta, R. Oglesby, J. Fastook, and J.V. Johnson. 2007. *Atmospheric scaling of cosmogenic nuclide production: the climate effect*, **Journal of Geophysical Research**, 112, B02205, doi:10.1029/2005JB003811

- Pittman, J.V., E.M. Weinstock, R.J. Oglesby, D.S. Sayres, J.B. Smith, J.G. Anderson, O.R. Cooper, S.C. Wofsy, I. Xueref, C. Gerbig, B.C. Daube, E.C. Richard, B.A. Ridley, A.J. Weinheimer, M. Lowenstein, H-J. Jost, J.P. Lopez, M.J. Mahoney, T.L. Thompson, W.W. Hargrove, and F.R. Hoffman. 2007. *Transport in the subtropical lowermost stratosphere during the Cirrus Regional Study of Tropical Anvils and Cirrus Layers–Florida Area Cirrus Experiment*, **Journal of Geophysical Research**, 112, D08304, doi:10.1029/2006JD007851.
- Michaels, A., K.R. Laird, S.E. Wilson, D. Thomson, P.R. Leavitt, R.J. Oglesby, and B.F. Cummings. 2007. *Multi-decadal to millennial-scale shifts in drought conditions on the Canadian prairies over the past six millenia: Implications for future drought assessment*, **Global Change Biology**, 13, 1295-1307
- Rowe, C.M., D.B. Loope, R.J. Oglesby, R. Van der Voo, and C.E. Broadwater. 2007. *Inconsistencies between Pangean reconstructions and basic climate controls*, **Science**, 318, 1284-1286, DOI: 10.1126/science.1146639
- Hernandez, J.L., J. Srikishen, D.J. Erickson III, R.J. Oglesby, and D. Irwin. 2006. A regional climate study of Central America using the MM5 modeling system: Results and comparison to observations, **International Journal of Climate**, 26 (15), 2161-2179
- Sridhar, V., D.B. Loope, J.B. Swinehart, J.A. Mason, R.J. Oglesby, and C.M. Rowe. 2006. *Large wind shift on the Great Plains during the Medieval Warm Period*, **Science**, 313, 345-347.
- Shin, S., P.D. Sardeshmukh, R.S. Webb, R.J. Oglesby, and J.J. Barsugli. 2006. *Understanding the mid-Holocene Climate*, **Journal of Climate**, 19, 2801-2817.
- Oglesby, R.J., M.Y. Stephens, and B. Saltzman. 2005. *The Influence of Ocean Thermocline Temperatures on the Earth's Surface Climate*, **Journal of Climate**, 18, 2222-2246.

OTHER PROFESSIONAL ACTIVITIES

Associate Editor, Environmental Modelling and Software 1995-present
Board Member, International Environmental Modeling and Software Society 2000- present
Associate Editor, Journal of Geophysical Research 1998-2002
Proposal Review Panel, NASA, 2007
Journal Referee, Science, Nature, Journal of Geophysical Research, Journal of Climate (and 10 others)
Chair of Graduate Admissions, Geosciences, UNL 2007-present

MARK A. PEGG, Associate Professor, 48% Teaching, 48% Research, 4% University Service

Areas of Interest: Fish Ecology and Management; River Ecology, Restoration Ecology, Invasive Species

Contact: mpegg2@unl.edu, 402/472-6824

EDUCATION

B.S. Fisheries and Wildlife Biology, Iowa State University (1992)

M.S. Biology, Tennessee Technological University (1994)

Ph.D. Fisheries Biology, Iowa State University (2000)

PROFESSIONAL EXPERIENCE

2008-present Associate Professor, School of Natural Resources, University of Nebraska-Lincoln

2005-2008 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln

2000-2005 Assistant Professional Scientist, Illinois Natural History Survey

1995-2000 Graduate Research Assistant, Iowa State University

1994-1995 Senior Fishery Biologist, Kentucky Department of Fish and Wildlife

1994 Research Associate, Tennessee Technological University

HONORS AND AWARDS

Junior Faculty Excellence in Research Award, UNL Agriculture Research Division (2007)

Outstanding New Employee, Illinois Natural History Survey (2004)

Outstanding Achievement Award, Illinois Natural History Survey (2003)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 315 Tropical Ecology – Study Abroad (S08)

NRES 463/863 Fisheries Science (F06, F07, F08)

NRES 489/889 Ichthyology (S06, S08)

NRES 492 Southern African Ecology – Study Abroad (Su07, Su09)

NRES 896/8 Managed Aquatic Systems (S07, S09)

Masters and Doctoral Students Advised

Jeremy Hammen (Ph.D. Applied Ecology, expected 2013) Population dynamics of shovelnose sturgeon.

Cameron Goble (M.S. Aquatic Ecology, expected 2011) Catfish population dynamics.

Tara Anderson (M.S. Aquatic Ecology, expected 2010) Benthic fish community composition and structure.

Brenda Pracheil (Ph.D. Applied Ecology, expected 2010) Paddlefish population dynamics.

Mike Archer (M.S. Aquatic Ecology expected 2009) Status of large woody debris in the Missouri River.

Tony Barada (M.S. Aquatic Ecology 2009) Catfish population dynamics in the Platte River, Nebraska.

Jennifer Hogue (M.S. Natural Resources 2008) Respiration rates of two invasive carp species.

Ben Neely (M.S. Aquatic Ecology 2008) Movements and habitat use of blue suckers in the Missouri River.

Mike McClelland (M.S. Biology, Western Illinois University 2005) Illinois River fish communities.

Schuyler Sampson (M.S., Resource Mgt., University of Illinois 2005) Diet overlap of fishes in Illinois.

Lindsay Peters (Anderson) (M.S., Biology, E. Michigan 2005) Movements of Asian carp.

RESEARCH

My research has largely focused on fish related issues in rivers. Specifically, this research has focused on fish ecology and management, restoration ecology of large river systems, as well as ecology and control of invasive species. I have sought funding that fits collaboratively with ongoing research projects in my lab in an attempt to build a nexus of data on river fish ecology to answer problems outside the scope of any one project. To this end, my students and I are fitting fish community data for the Missouri River and its tributaries to develop large-scale river paradigms on the contribution of tributaries to modified river systems.

UNIVERSITY SERVICE

My service oriented activities have largely centered on graduate and undergraduate interests. Undergraduate activities include serving as a peer-reviewer for the University's Program of Excellence through Assessment, Research, and Learning (PEARL) program, serving on the CASNR International Studies Task Force, and as acting

co-coordinator of the Fisheries and Wildlife major while the coordinator is on sabbatical. I have served the past three years as a member (co-Chair for the past two years) of the SNR Graduate Committee where we have attempted to standardize entrance requirements and student quality across the diverse disciplines represented within SNR. I also serve on the SNR Faculty Advisory Committee outside of student-related service activities.

SELECTED GRANTS AND CONTRACTS

- Missouri River Sportfish Ecology and Management*, Nebraska Game and Parks Commission, \$401,210; March 2009–February 2014.
- Sturgeon Management in the Platte River, Nebraska: Implications to a Declining Sportfish Population*, Nebraska Game and Parks Commission, \$801,000; August 2008–July 2013.
- AISR: Ecosystem-Scale Evaluations of the Effectiveness of Sound-Bubble Barriers to Prevent Spread of Bighead and Silver Carp* (with INHS faculty), National Sea Grant College Program, \$200,000; January 2008–December 2009.
- Habitat Usage of Missouri River Paddlefish in Nebraska*, Nebraska Environmental Trust, \$55,050; June 2007–May 2010.
- Assessment of Catfish Populations in the Platte River*, Nebraska Game and Parks Commission, \$140,554; January 2007–December 2009.
- Recruitment, Movement and Influence of Large Woody Material on Aquatic Biota in the Missouri River: A Modified Large River System*, Nebraska Game and Parks Commission, \$133,000; October 2006– September 2009.
- Aquatic Invasive Species Research - Evaluating Asian carp colonization potential and impact in the Great Lakes*, National Sea Grant, \$443,000; July 2006–June 2008.

SELECTED PUBLICATIONS

- Sampson, S., J.H. Chick, and M.A. Pegg. 2009. *Dietary overlap of bighead and silver carp with three native filter feeding fishes*, **Biological Invasions**, 11, 483-496.
- Peters, L., U. Reinhardt, and M.A. Pegg. 2008. *Factors influencing radio wave transmission and reception: applications for radio telemetry by boat in large river systems*, **North American Journal of Fisheries Management**, 28, 301-307.
- Noble, R.L., D.J. Austen, and M.A. Pegg. 2007. *Fishery Management Study Design Considerations*, Pages 31-49 in C.G. Guy and M.L. Brown (editors), **Analysis and Interpretation of Freshwater Fishery Data**, American Fisheries Society, Bethesda, Maryland.
- Pegg, M.A., and R.M. Taylor. 2007. *Diversity partitioning of fish communities along the Illinois and Missouri rivers*, **Journal of Biogeography**, 34, 549-558.
- Pegg, M.A., K.S. Irons, and T.M. O'Hara. 2006. *Response of floodplain fish communities to habitat restoration*, **Ecology of Freshwater Fishes**, 15, 40-47.
- Peters, L., M.A. Pegg, and U. Reinhardt. 2006. *Dispersal rates of adult bighead carp in the Illinois River*, **Transactions of the American Fisheries Society**, 135, 1205-1212.
- Lovell, J., J.R. Nedwell, and M.A. Pegg. 2006. *The hearing abilities of the bighead carp and silver carp*, **Comparative Biochemistry and Physiology, Part A**, 143, 286-291.
- Chick, J.H., M.A. Pegg, and T.M. Koel. 2006. *Spatial Patterns of Fish Communities in the Upper Mississippi River System: Implications for Long Term Monitoring*. **River Research and Applications**, 22, 413-427.

OTHER PROFESSIONAL ACTIVITIES

- Member* (Governor appointed), Nebraska Aquaculture Board (2005–present)
- North Central Representative*, Education Section, American Fisheries Society (2006–present)
- President*, Nebraska Chapter American Fisheries Society (2007-2008)
- Chair*, Scholarship Committee, Nebraska Chapter American Fisheries Society (2006–present)
- Member*, Conservation Leaders for Tomorrow (2007–present)

RICHARD L. PERK, Assistant Geoscientist, 100% Research

Areas of Interest: Hyperspectral Remote Sensing & Thermography as applied to precision agriculture, water quality and invasive species

Contact: rperk1@unl.edu, 420/472-0310

EDUCATION

BSE (Biology/Math)	University of South Dakota-Springfield (1971)
Additional Post-Graduate Course work	University of South Dakota, United States Naval Academy, California Institute of Technology, and the University of Nebraska -Lincoln.
Currently finishing MS in Geography	University of Nebraska-Lincoln
Level I Certified Thermographer	Flir Infrared Training Center, Boston, MA (2007)
Level II Certified Thermographer Flir	Infrared Training Center, Boston, MA (2009)
Assistant Geoscientist	School of Natural Resource Sciences, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln
Nebraska Aerial Remote Sensing Project Coordinator	School of Natural Resource Sciences, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln

PROFESSIONAL EXPERIENCE

1996-Present	Assistant Geoscientist (Airborne Remote Sensing Project Coordinator) -CALMIT
1989-1996	Earth Science Educator/Head Football Coach, Waverly High School, Waverly NE
1984-1989	Director of Manufacturing and Installation, SEMTECH, Salt Lake City, Utah
1975-1984	Science Educator, Head Coach, Athletic Director Hartington Cedar Catholic High School, Hartington, NE
1971-1975	Math/Science Educator, Coach, Chester-Hubbell High School

RESEARCH

I have been involved in management and development of airborne research strategies associated with numerous water quality, viticulture, precision agriculture, and invasive species research projects. I have also been involved in the identification and integration of new instrumentation for the Nebraska Aerial Remote Sensing Program and the development of state-of -the-art field research vehicles for precision agriculture. I am currently working on hyperspectral image applications for aquatic and terrestrial environments, remote sensing and GIS as applied to precision agriculture and educational outreach programs promoting remote sensing and GIS.

SELECTED PUBLICATIONS

- Adamchuk, V., R. Perk, and J. Schepers. *Applications of Remote Sensing in Site-Specific Management*, University of Nebraska Extension Circular, EC 03-702.
- Perk R.L., D.C. Rundquist, and A.A. Gitelson. 2008. *Airborne Hyperspectral Remote Sensing: The CALMIT System*, in **REMOTE SENSING METHODS FOR LAKE MANAGEMENT: A Guide for Resource Managers and Decision Makers**, North American Lake Society.
- Mishra, D., S. Narumanlani, D. Rundquist, M. Lawson, and R. Perk. 2007. *Enhancing the detection and classification of coral reef and associated benthic habitats: A hyperspectral remote sensing approach. **Journal of Geophysics Research**, 1112, C08014.*
- Rundquist, D., R. Perk, B. Leavitt, G. Keydan, and A. Gitelson. 2004. *Collecting spectral data over cropland vegetation using machine-positioning versus hand-positioning of the sensor*, [Computers and Electronics in Agriculture, Vol. 43, Issue 2](#), May 2004, 173-178.
- Maeder, J., S. Narumalani, D. Rundquist, R. Perk, J. Schalles, K. Hutchins, and J. Keck. 2002. *Classifying and Mapping Coral-Reef Structure Using IKONOS Data*, **Photogrammetric Engineering and Remote Sensing**, 68(12), 1297-1305.
- D. Rundquist, R. Perk, B. Leavitt, G. Keydan, and D. Smith. 2002. *An All-terrain data-collection platform and associated processing algorithm for monitoring cropland vegetation*, Proceedings, Third International Conference on Geospatial Information in Agriculture and Forestry, Denver, CO, November, 2002.
- D. Rundquist, R. Perk, B. Leavitt, G. Keydan, and D. Smith. 2002. *The Goliath Data Collection and Data Processing System for Monitoring and Analysis of Cropland Vegetation*, Proceedings, Third European Conference on Precision Agriculture, Montpellier, France, April, 2002. Vol. 1:301-306.

- Gitelson, A., D. Rundquist, G. Dall'Olmo, and R. Perk. 2002. *Algorithms for remote estimation of phytoplankton pigment concentration and composition in productive waters*, Seventh International Conference on Remote Sensing for Marine and Coastal Environments, Miami, FL, April, 2002.
- Gitelson, A., D. Rundquist, D. Derry, J. Ramirez, G. Keydan, R. Stark, and R. Perk. 2001. *Using remote sensing to quantify vegetation fraction in corn canopies*, Proceedings, Third International Conference on Geospatial Information in Agriculture and Forestry, Denver, CO, 5-7 November, 2001. Vol. 3:1-8.

OTHER PROFESSIONAL ACTIVITIES

Member, University Consortium for Geographic Information Science (UCGIS)

Member, Photogramatic Engineering & Remote Sensing

Member, Nebraska GIS/LIS Association

KEVIN L. POPE, Adjunct Associate Professor, 0% Teaching, 0% Research, 0%
Extension/Outreach, 0% University Service

Area of Interest: Fishery Ecology

Contact: kpope2@unl.edu, 402/472-7028

EDUCATION

B.S. Wildlife and Fisheries Sciences, Texas A&M University (1991)

M.S. Fisheries and Allied Aquacultures, Auburn University (1993)

Ph.D. Biological Sciences, South Dakota State University (1996)

PROFESSIONAL EXPERIENCE

2005-present Assistant Unit Leader, USGS—Nebraska Cooperative Fish and Wildlife Research Unit
and Adjunct Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
2004-2005 Associate Professor, Dept. of Range, Wildlife, and Fisheries Management, Texas Tech University
1998-2004 Assistant Professor, Dept. of Range, Wildlife, and Fisheries Management, Texas Tech University
1997 Assistant Professor, Dept. of Wildlife and Fisheries Sciences, South Dakota State University

HONORS AND AWARDS

Outstanding Fishery Worker of the Year for Education, Texas Chapter of the American Fisheries Society (2006)

Faculty of the Semester Award, Texas Tech Range, Wildlife, and Fisheries Club (Fall 2004)

New Faculty Award, Texas Tech Alumni Association (2002)

Outstanding Fishery Worker of the Year for Education, Texas Chapter of the American Fisheries Society (2001)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 896 Managed Aquatic Systems (S07, S09; team-taught with M. A. Pegg)
NRES 896 Quantitative Fishery Assessment (S08)
RWFM 2305 Freshwater Ecology and Fisheries (S04, F04, S05)
RWFM 4335 Fisheries Science (S04)
HONS 3302 Honors Seminar in Science – The Good, the Bad and the Ugly of Fishing (F04)
RWFM 5100 Seminar (F04)
RWFM 5335 Advanced Fisheries Science (S04)

Masters and Doctoral Students Advised

Jason DeBoer (Ph.D. Natural Resource Sciences, expected 2013). Recruitment of walleye and white bass in
Midwestern irrigation reservoirs.
Dustin R. Martin (Ph.D. Natural Resource Sciences, expected 2013). Spatiotemporal patterns of angler
participation.
Ryan Lueckenhoff (M.S. Natural Resource Sciences, expected 2010). Morphological characteristics that distinguish
juvenile white bass and hybrid striped bass.
Lindsey Richters (M.S. Natural Resource Sciences, expected 2010). Influence of water-body type and stocking
history on population structure of channel catfish.
Carla Knight (M.S. Natural Resource Sciences, expected 2010). Anglers' abilities to identify fishes.
Alexie Maple (M.S. Natural Resource Sciences, expected 2009). Temporal pattern in size structure of fish captured
by recreational anglers.
Dustin R. Martin (M.S. Natural Resource Sciences, 2008). Relative importance of spawning habitats for walleye
and white bass in irrigation reservoirs.
Nathan J. C. Gosch (M.S. Natural Resource Sciences, 2008) Predation as a mechanism for control of white perch:
an investigation of food habits in two Nebraska reservoirs.
Christopher J. Chizinski (Ph.D. Fishery Science, 2007) Variation in life-history traits and morphology of stunted and
non-stunted fish. (co-advised with G. R. Wilde)
Caleb G. Huber (M.S. Fishery Science, 2007) Habitat use by juvenile common snook in the lower Rio Grande. (co-
advised with R. Patiño)
Christopher J. Chizinski (M.S. Fishery Science, 2002) Evaluation of water-quality characteristics on water-based
recreation at Lake Kemp, Texas.

Calub E. Shavlik (M.S. Fishery Science, 2000) An assessment of largemouth bass and panfish population dynamics in west Texas ponds.

RESEARCH

My research is in applied fishery ecology on lakes and reservoirs and is focused on understanding mechanisms that alter population dynamics (recruitment, growth, mortality) of fishes, especially for purposes of predicting changes in fish populations cause by anthropogenic disturbances. My studies are initiated in response to the needs of Cooperators and are designed to provide information useful in directly improving management of aquatic resources.

UNIVERSITY SERVICE

I am currently serving as an elected member of the Research Committee for the School of Natural Resources.

SELECTED GRANTS AND CONTRACTS [since 2004 (>\$3.9 million)]

- Angler behavior in response to management actions on Nebraska reservoirs*, Nebraska Game and Parks Commission, \$3,147,776; Jan. 2009 – Dec. 2013.
- Geographic trends in contamination of Nebraska's surface waters as indexed by sex steroids of common carp* (with A.S. Kolok and D.D. Snow), U.S. Geological Survey 104B funds administered by University of Nebraska—Lincoln Water Center, \$14,400; Mar. 2008 – Feb. 2009.
- Population assessment of channel catfish in Nebraska*, Nebraska Game and Parks Commission, \$139,845; Jan. 2008- Dec. 2010.
- Recruitment of walleye and white bass in irrigation reservoirs*, Nebraska Game and Parks Commission, \$475,176; Jan. 2009 – Dec. 2013.

SELECTED PUBLICATIONS (N = 45; h-index of ISI publications = 10)

- Pope, K.L., R.M. Neumann, and S.D. Bryan. 2009. *Warmwater fish in small standing waters*, Chapter 2 in **Standard Methods for Sampling North American Freshwater Fishes** (S.A. Bonar, D.W. Willis, and W.A. Hubert, eds.), Bethesda, MD: American Fisheries Society, 000-000.
- Chizinski, C.J., B. Sharma, K.L. Pope, and R. Patiño. 2008. *A bioenergetic model for zebrafish Danio rerio (Hamilton)*, **Journal of Fish Biology**, 7, 35-43.
- Wilde, G.R., and K.L. Pope. 2008. *A simple model for predicting survival of angler-caught and released largemouth bass*, **Transactions of the American Fisheries Society**, 13, 834-840.
- Pope, K.L., and C.G. Kruse. 2007. *Condition*, Chapter 10 in **Analysis and Interpretation of Freshwater Fisheries Data** (C.S. Guy and M.L. Brown, eds.), Bethesda, MD: American Fisheries Society, 423-471.
- Chizinski, C.J., C.L. Higgins, C.E. Shavlik, and K.L. Pope. 2006. *Multiple hypotheses testing of fish incidence patterns in an urbanized ecosystem*, **Aquatic Ecology**, 40, 97-109.
- Pope, K.L., and G.R. Wilde. 2004. *Effect of catch-and-release angling on growth of largemouth bass, Micropterus salmoides*, **Fisheries Management and Ecology**, 11, 39-44.
- Pope, K.L., M.L. Brown, W.G. Duffy, and P.H. Michaletz. 2001. *A caloric-based evaluation of diet indices for largemouth bass*, **Environmental Biology of Fishes**, 61, 329-339.
- Unkenholz, E.G., M.L. Brown, and K.L. Pope. 1997. *Oxytetracycline marking efficacy for yellow perch fingerlings and temporal assays of tissue residues*, **The Progressive Fish-Culturist**, 59, 280-284.
- Pope, K.L., and D.W. Willis. 1996. *Seasonal influences on freshwater fisheries sampling data*, **Reviews in Fisheries Science**, 4, 57-73.
- Pope, K.L., and D.R. DeVries. 1994. *Interactions between larval white crappie and gizzard shad: quantifying mechanisms in small ponds*, **Transactions of the American Fisheries Society**, 123, 975-987.

OTHER PROFESSIONAL ACTIVITIES

- Associate Editor*, Transactions of the American Fisheries Society, American Fisheries Society (2005-present)
- Invited keynote speaker*, Annual Meeting of the Nebraska Chapter of the American Fisheries Society, Gretna, NE, February 12-13, 2008
- President-Elect*, Nebraska Chapter of the American Fisheries Society, 2008-2009.

LARKIN A. POWELL, Associate Professor, 60% Teaching, 38% Research, 2% University Service

Areas of Interest: Wildlife Ecology, Conservation Biology, Avian Ecology
Contact: lpowell3@unl.edu, 402/472-6825

EDUCATION

B.S. Biology, Graceland University (1990)
M.S. Ecology and Evolutionary Biology, Iowa State University (1992)
Ph.D. Ecology, University of Georgia (1998)

PROFESSIONAL EXPERIENCE

2005-present Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
2001-2005 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
1998-2001 Assistant Professor, Department of Biology, University of Dubuque
1998 Postdoctoral Associate, School of Forest Resources, University of Georgia

HONORS AND AWARDS

Fulbright Scholar: Namibia Lecture/Research Award, Council for International Exchanges of Scholars (2008)
Teaching Award of Merit, National Association of College Teachers of Agriculture (2008)
Superior Academic Advising Award, College of Agricultural Sciences and Natural Resources (2007)
Holling Family Junior Faculty Award for Teaching Excellence, College of Agricultural Sciences and Natural Resources, University of Nebraska (2004)
Faculty of the Year, University of Dubuque (2000)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 311 Wildlife Ecology and Management (S04, S05, S06, S07, S08)
NRES 312 Introduction to Geospatial Information Sciences (S04, S05, S06)
NRES 350 Wildlife Management Techniques (F04, Sum05, F06, Sum07, F08)
NRES 492/892 Study Tours: BWCA Wilderness Ecology (Sum05, Sum07)
NRES 492 Study Tours: Puerto Rico Tropical Ecology (S06, S08)
NRES 896 Parameter Estimation (S06, S08)
NRES 896 Avian Ecology Seminar (S08)

Masters and Doctoral Students Advised

Christina Kocer (M.S. Natural Resource Sciences 2004). Mesopredator movement, abundance, and habitat selection in the Rainwater Basins of Nebraska.
Max Post van der Burg (M.S. Natural Resource Sciences 2005). Factors affecting songbird nest survival and brood parasitism in the Rainwater Basin region of Nebraska.
Silka L. F. Kempema (M.S. Natural Resource Sciences 2007). The influence of grazing systems on grassland bird density, productivity, and species richness on private rangeland in the Nebraska Sandhills.
January S. Frost (M.S. Natural Resource Sciences 2007). Small mammal and bird community composition in response to forest habitat structure and composition in the Niobrara River Valley, Nebraska.
Karen Leavelle (M.S. Natural Resource Sciences 2008). Occupancy and associated habitat characteristics, fruit preferences, and nesting behaviors of the Blue-headed Quail-dove (*Starnoenas cyanocephala*) of Cuba.
Ty W. Matthews (Ph.D. Natural Resources Sciences, expected 2009).
Zach Cunningham (M.S. Natural Resources Sciences, expected 2009).
Matt Giovanni (Ph.D. Agronomy, expected 2009).
Ingrid Barcelo (Ph.D. Natural Resources Sciences, expected 2010).
Sarah Rehme (M.S. Natural Resources Sciences, expected 2010).
Lars Anderson (M.S. Agronomy, expected 2012).

RESEARCH

My research emphasis revolves around reproduction, survival, and movement of wildlife species with regard to management and conservation questions.

SELECTED GRANTS AND CONTRACTS

- Using high-resolution, hyperspectral images to characterize vegetation cover on Sandhills prairie* (co-PI with W. Schacht and D. Rundquist), Sampson Range and Pasture Management Endowment, \$20,000; 2007.
- Assessing local and regional variability in productivity and fidelity of grassland birds on NPS units in the Great Plains* (co-PI with C. Allen and K. Hobson), NPS/USGS, \$212,121; 2007.
- Use of state wildlife surveys to assess benefits of Farm Bill Program* (co-PI with R. Tyre), USDA-NRCS, \$70,935; 2007.
- Greater prairie-chicken habitat selection* (co-PI with R. Tyre), Nebraska Game and Parks Commission, \$68,084; 2007.
- Productivity and biology of ducks nesting in the Sandhills of Nebraska*, Nebraska Game and Parks Commission, \$71,420; 2007.
- Conservation status of the blue-headed quail-dove in Cuba* (transfer of funds to UNL from F. Chavez-Rameriz), Platte River Whooping Crane Maintenance Trust, \$50,000; 2005.
- Effects of grassland management on ring-necked pheasant habitat selection and productivity*, Nebraska Game and Parks Commission, \$53,250; 2004.
- Duck recruitment in the Nebraska Sandhills* (Written with S. Stephens, M. Vrtiska, R. Heiniger, Co-PI's), Sandhills Task Force, \$20,000; 2004.
- Effects of red cedar removal on bird and small mammal populations in upland habitats of the Niobrara Valley*, Great Plains CESU (NPS), \$77,110; 2004.
- Monitoring small mammal and songbird communities in the Niobrara Valley*, Nebraska Game and Parks Commission, \$24,053; 2004.

SELECTED PUBLICATIONS

- Powell, L.A. *In press. Using reflection documents to assess student learning*, **Journal of Natural Resources and Life Science Education**. *In press*.
- Post van der Burg, M., L.A. Powell, and A.J. Tyre. *In press. Modeling parasitism rate and parasitism risk: an illustration using a colonially nesting songbird*, **Journal of Avian Biology**, *In press*.
- Kocer, C.J., and L.A. Powell. *In press. A field system for isoflurane anesthesia of multiple species of mesopredators*, **American Midland Naturalist**. *In press*.
- Powell, L.A. 2008. *An ecologist struggles with the problem of evil: why Aldo Leopold and baby meadowlarks argue against an all-powerful God*, **Theology**, 16: 96-108.
- Plummer, M.V., D.G. Krentz, L.A. Powell, and N.E. Mills. 2008. *Effects of habitat disturbance on survival rates of softshell turtles (Apalone spinifer) in an urban stream*, **Journal of Herpetology**, 42, 555-563.
- Powell, L.A. 2007. *Approximating variance of demographic parameters using the delta method: a reference for avian biologists*, **Condor**, 109, 950-955.
- Fritz, S., D. Husmann, D. Reese, R. Stowell, and L. Powell. 2007. *High school students' perceptions of a College of Agricultural Sciences and Natural Resources*, **NACTA Journal**, 51, 44-49.
- Powell, L.A., and K.A. Hobson. 2006. *Enriched feather hydrogen isotope values for Wood Thrushes sampled in Georgia, USA, during the breeding season: implications for quantifying dispersal*, **Canadian Journal of Zoology**, 84, 1331-1338.
- Powell, L.A., and M.L. Knutson. 2006. *A productivity model for parasitized, multi-brooded songbirds*, **Condor**, 108, 292-300.
- Powell, L.A., J.D. Lang, D.G. Krentz, and M.J. Conroy. 2005. *Use of radio-telemetry to reduce bias in nest searching*, **Journal of Field Ornithology**, 76, 274-278.
- Powell, L.A. 2004. *A multi-state capture-recapture model using stable isotope data to enhance estimation of movement rates*, **Condor**, 106, 761-767.

OTHER PROFESSIONAL ACTIVITIES

- Instructor*, Conservation Leaders for Tomorrow (2008-present)
- Coordinator*, Fisheries and Wildlife major (2004-2008)
- Associate Editor*, **Journal of Forest Science**, Society of American Foresters (2004-2007)

KARL J. REINHARD, Professor, 5% Teaching, 45% Research, 48% Outreach, 2% University Service

Areas of Interest: Environmental Archaeology, Forensic Science
Contact: kreinhard1@mac.com, 402/472-6858

EDUCATION

B.S. Anthropology, University of Arizona (1977)
M.S. Ecology and Evolution, Northern Arizona University (1985)
Ph.D. Anthropology, Environmental Archaeology, Texas A&M University (1989)

PROFESSIONAL EXPERIENCE

2005-present Professor, School of Natural Resources, University of Nebraska-Lincoln
2000-2004 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
1995-1999 Associate Professor, Department of Anthropology, University of Nebraska-Lincoln
1989-1994 Assistant Professor, Department of Anthropology, University of Nebraska-Lincoln
1988-1989 Instructor, Department of Anthropology, Texas A&M University
1985-1988 Teaching Assistant, Department of Biosciences, Texas A&M University
1982-1984 Teaching Assistant, Department of Biosciences, Northern Arizona University
1977-1979 Instructor, Arizona State Museum, University of Arizona

HONORS AND AWARDS

Fulbright Senior Specialist, 2004-2009

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 896 SNR Seminar (F05, F05, F06, F08)
NRES 445/845 Human Remains in Forensic Science (S09)
NRES 446/846 Palynology (F08)

Masters and Doctoral Students Advised

Christian Eloski (Ph.D. Natural Resource Sciences, expected 2011) Forensic Botanical Approaches to Plant Remains at Crime Scenes
Nicole Wall (Ph.D. Natural Resource Sciences, expected 2011) Statistical Theory in Forensic Palynology

RESEARCH

I mapped the distribution of various parasite species through time and space for the Americas and defined the effects of empire expansion on parasitic disease. I aided the establishment of laboratories in Peru, Chile, Brazil and Argentina. I have collected dietary data from Southwestern USA and northern Mexico sites that reveal 10,000 years of dietary development. My data provide an excellent explanation of how diabetes evolved in western tribes I am reconstructing the diet of the earliest Chinchorro culture to the latest Inka cultures in the Atacama Desert. I am integrating palynology and forensic botany in crime scene investigation.

EXTENSION/OUTREACH

I am an associate editor for the Journal of Parasitology and review articles for parasitology and archaeology journals. I have consulted with Nebraska law enforcement personnel on several homicides and have taught workshops for regional law enforcement agencies.

UNIVERSITY SERVICE

I helped develop the new Forensic Science Degree Program and designed two courses.

SELECTED GRANTS AND CONTRACTS

Professor Visitante, Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz, ENSP/FIOCRUZ 2006 (Visiting researcher, National School of Public Health, Oswaldo Cruz Foundation, Rio de Janeiro), Brazilian CAPES Agency, \$24,000; August 2007– January 2008
Fulbright Senior Specialist, Chico Norte Project, Universidad Peruana de Cayetano Heredia, Lima, Peru.

U.S. State Department, \$10,000; March. 2007–April 2003
Fulbright Senior Specialist, Archaeobotany and Forensic Botany Universidade de São Paulo, São Paulo, Brazil,
 U.S. State Department, \$10,000; March. 2007–April 2003, \$15,000; February 2005-March 2005.
Fulbright Scholar, ENSP/FIOCRUZ Brazil, U.S. State Department, \$30,000; February 2001-September 2001.

SELECTED PUBLICATIONS * indicate Reinhard was corresponding author

- Araújo, A., K.J. Reinhard, L.F. Ferreira, and S.L. Gardner. 2008. *Parasites: probes for evidence of prehistoric human migrations*. **Trends in Parasitology**, 24, 112-115.
- Fugassa, M., N. Sardella, V. Taglioretti, K. Reinhard, and A. Araújo. 2008. *Eimeriid Oocysts From Archaeological Samples in Patagonia, Argentina*. **Journal of Parasitology**, 94, 1418-1420.
- *Johnson, K.L., K.J. Reinhard, L. Sianto, A. Araújo, S.L. Gardner, and J. Janovy, Jr. 2008. *A tick from a prehistoric Arizona coprolite*. **Journal of Parasitology**, 94, 296-298.
- *Reinhard, K.J., A. Araújo, L. Sianto, J.G. Costello, and K. Swope. 2008. *Chinese liver flukes in latrine sediments from Wong Nim's property, San Bernardino, California: Archaeoparasitology of the Caltrans District Headquarters*. **Journal of Parasitology**, 94, 300-303.
- *Reinhard, K.J., S.A.M. Chaves, and A.M. Iñiguez. 2008. *Chloroplast aDNA in Prehistoric Texas Coprolites: Evidence of Contamination, Medicine, and Diet*. **Journal of Archaeological Science**, 35, 1748-1755.
- Eggers, S., C.C. Petronilho, K. Brandt, C. Jerico-Daminello, J. Filippini, and K.J. Reinhard. 2008. How does a riverine setting affect the lifestyle of shellmound builders in Brazil? **HOMO—Journal of Comparative Human Biology**, 59, 405-427.
- Fisher, C.L., K.J. Reinhard, M. Kirk, and J. DiVirgilio. 2007. *Privies and Parasites: The Archaeology of Health Conditions in Albany, New York*. **Historical Archaeology**, 41, 172-197.
- *Reinhard, K.J., C. Szuter, and J.R. Ambler. 2007. *Hunter-gatherer Use of Small Animal Food Resources*. **International Journal of Osteoarchaeology**, 17, 416-428.
- *Reinhard, K.J., V.M. Byrant, Jr., and S.D. Vinton. 2007. *Reinterpreting the Pollen Data From Dos Cabezas*. **International Journal of Osteoarchaeology**, 17: 531 - 541.
- Boyadjian, C.H.C., S. Eggers, and K. Reinhard. 2007. *Dental wash: a problematic method for extracting microfossils from teeth*. **Journal of Archaeological Science**, 34, 1622-1628.

OTHER PROFESSIONAL ACTIVITIES

Vice President, Paleopathology Association, 2005-2007.
Member of the Board of Directors of the Fulbright Academy of Science and Technology, 2003-2008.
Invited keynote speaker, 2007 XV Meeting of the Society for Human Ecology, Rio de Janeiro, September 3-5, 2007
Invited colloquium, 2007, Obesidade e Diabetes em uma População Indígena. Fundação Oswaldo Cruz, Manaus, (presented at the Oswaldo Cruz Foundation Research Extension Office in Manaus, Brazil), September 23, 2007.
Invited colloquia, 2007, Antropología Forense y Determinación de Depravación and Botánico Forense for the Programa en Antropología Forense y Bioarqueología, Pontificia Universidad Católica del Perú (PUCP). March 13 and 21, 2007.
Invited colloquium, 2007, O gene econômico, paleonutrição e as bases evolutivas do diabetes em Índios americanos. Programação do Centro de Estudos do Departamento de Endemias Samuel Pessoa (DENSP/ENSP/FIOCRUZ). Rio de Janeiro April 14, 2006.
Invited workshop, 2007, Paleonutrition, Universidad de Tarapacá, Arica, Chile, November 6-12, 2007.

DONALD C. RUNDQUIST, Professor, 35% Teaching, 63% Research, 2% University Service

Areas of Interest: Remote sensing of surface waters and agricultural vegetation, field methods

Contact: drundquist1@unl.edu, 402/472-7536

EDUCATION

B.S. Geography, University of Wisconsin-Whitewater (1967)

M.A. Geography, University of Nebraska-Omaha (1971)

Ph.D. Geography, University of Nebraska-Lincoln (1977)

PROFESSIONAL EXPERIENCE

1989-present Professor, Conservation & Survey Division and School of Natural Resources, UNL

1986-2008 Director, Center for Advanced Land Management Information Technologies

1983-1988 Associate Professor, Conservation & Survey Division, UNL

1982 Assistant Professor, Conservation & Survey Division, UNL

1974-1981 Assistant Professor, Department of Geography, University of Nebraska-Omaha

HONORS AND AWARDS

Outstanding Contributions, Remote Sensing Specialty Group, Association of American Geographers (2007)

John I. Davidson American Society for Photogrammetry and Remote Sensing Award for Practical Papers (1990-1989)

University of Nebraska Board of Regents Commendation (1979)

Charles A. Lindbergh Award/Grant in Aerospace and Aeronautics (1978), presented by Astronaut Neil Armstrong.

TEACHING

Courses Taught (Fall, Spring)

GEOG/NRES 418/818 Introduction to Remote Sensing (F06, F07, F08)

GEOG/AGRON 419/819 Practical Applications of Remote Sensing (F04, F05, S08, S09)

NRES 420/820 Practical Applications of Remote Sensing (F04, F05, S08, S09)

NRES/GEOG 421/821 Field Techniques in Remote Sensing (S04, S05, S06, S07)

Masters and Doctoral Students Advised

Ting Chen (current M.A. student in Geography)

Art Zygielbaum (current Ph.D student in Geography; co-chair with Anatoly Gitelson)

Andy Boateng (current Ph.D student in Natural Resources)

Paul Merani (current Ph.D student in Geography)

Dan Becker (M.A., Geography, 2008) Modeling the effect of urbanization on surface runoff within the Apalachicola-Chattahoochee-Flint watershed

Mark R. Steele (M.A., Geography, 2007) Non-destructive estimation of leaf pigments and monitoring phenology of grapevines

Joel A. Connot (M.A., Geography, 2005) Using close-range spectroscopy to quantify corn leaf defoliation caused by simulated hail damage

RESEARCH

I am involved in on-going programs related to hyperspectral remote sensing of inland water quality, marine benthic features, coastal estuaries, and agricultural crops. I led development of world-class field spectroscopic data-collection capability. I led, with Rick Perk from the CALMIT program, of airborne hyperspectral remote sensing. I, also, facilitated acquisition of thermal scanner for CALMIT aircraft.

UNIVERSITY SERVICE

I served as Chairman of SNR Promotion and Tenure Committee 2005 through 2008. I was a member of the Vice Chancellor for Research Advisory Committee, 2004. I served on various other committees.

SELECTED GRANTS AND CONTRACTS

Rundquist, D. (PI), *GIS Development*, Nebraska Department of Agriculture, \$90,000; Jul. 2005–Jun 2009.

Rundquist, D. (PI), *Pesticide Sensitive Crop Locater*, Nebraska Department of Agriculture, \$28,523; 2007, for one year.

- Rundquist, D. (PI), *Environmental Cooperative Science Center*, National Oceanic and Atmospheric Administration and Florida A&M University, \$320,000; October 2005–September 2009.
- Fisher, T. (PI), G. Williams, A. Gitelson, and D. Rundquist, *Responses of Coastal Waters to Terrestrial Inputs of Elemental CNP in Urbanizing Coastal Regions*, National Aeronautics and Space Administration, \$630,000; 2005.
- Rundquist, D. and A. Gitelson (PI's), 2005. *Remote sensing of blue-green algae*. Nebraska Department of Environmental Quality, \$100,000; July 2006–June 2008.

SELECTED PUBLICATIONS

- Rundquist, D., A. Gitelson, M. Lawson, M. Keydan, G., Leavitt, B., Perk, R., J. Keck, D. Mishra, and S. Narumalani. 2008. *Proximal sensing of coral features: spectral characterization of *Sidastrea siderea**. **GIScience and Remote Sensing**. In Press
- Steele, M., A. Gitelson, and D. Rundquist. 2008. *Non-destructive estimation of leaf chlorophyll content in grapes*. **American Journal of Enology and Viticulture**, 59:3, 299-305.
- Mishra, D., S. Narumalani, D. Rundquist, M. Lawson, and R. Perk. 2007. *Enhancing the detection and classification of coral reef and associated benthic habitats: A hyperspectral remote sensing approach*, **Journal of Geophysical Research**, 112, C08014, doi:10.1029/2006JC003892.
- Gitelson, A., A. Viña, S. B. Verma, D. C. Rundquist, T. J. Arkebauer, G. Keydan, B. Leavitt, V. Ciganda, G. G. Burba, and A. E. Suyker. 2006. *Relationship between gross primary production and chlorophyll content in crops: Implications for the synoptic monitoring of vegetation productivity*, **Journal of Geophysical Research**, 111, D08S11, doi:10.1029/2005JD006017.
- Mishra, D., S. Narumalani, D. Rundquist, and M. Lawson. 2006. *Benthic habitat mapping in tropical marine environments using Quickbird imagery*. **Photogrammetric Engineering and Remote Sensing**, 72:9, 1037-1048.
- Gitelson, A., A. Vina, D.C. Rundquist, V. Ciganda, T.J. Arkebauer. 2005. *Remote estimation of canopy chlorophyll content in crops*. **Geophysical Research Letters**, 32,L08403,doi:10.1029/2005GL022688
- Dall'Olmo, G., A. Gitelson, D. Rundquist, B. Leavitt, T. Barrow, and J. Holz. 2005. *Estimation of chlorophyll concentration in case-2 productive waters using existing ocean color sensors: calibration, validation, and radiometric considerations*. **Remote Sensing of Environment**, 96:176-187
- Mishra, D., S. Narumalani, D. Rundquist, and M. Lawson. 2005. *High resolution ocean color remote sensing of benthic habitats: a case study at Roatan Island, Honduras*. **IEEE Transactions in Geoscience and Remote Sensing**, 43(7):1592-1604.
- Vina, A., A. Gitelson, D. Rundquist, G. Keydan, B. Leavitt, and J. Schepers, 2004. *Monitoring maize (*Zea mays* L.) phenology with remote sensing*. **Agronomy Journal**, 96: 1139-1147.
- Rundquist, D., R. Perk, B. Leavitt, G. Keydan, and A. Gitelson. 2004. *Collecting spectral data over cropland vegetation using machine positioning versus hand-held positioning of the sensor*. **Computers and Electronics in Agriculture**, 43, 173-178.

OTHER PROFESSIONAL ACTIVITIES

- Associate Editor, **GIScience and Remote Sensing**
- Advisory Committee, **NASA Space Grant and EPSCoR**, 2000-2008.

JAE H. RYU, Hydrologist, 70% Research, 30% Scholarly Service

Areas of Interest: Drought, Water Management, Hydrologic Modeling and Forecasting, Geographic Information Systems

Contact: jryu2@unl.edu, 402/472-1483

EDUCATION

B.S. Agricultural Engineering, Konkuk University, Seoul, Korea (1996)

M.S. Agricultural Engineering, Konkuk University, Seoul, Korea (1998)

M.S. Civil and Environmental Engineering, University of Washington (2001)

Ph. D. Civil and Environmental Engineering, University of Washington (2006)

PROFESSIONAL LICENSES

2006-present Postdoctoral Research Associate (Hydrologist), School of Natural Resources, University of Nebraska-Lincoln

2009-present Professional Engineer, The State of Nebraska since 2009

2004-present Professional Engineer, The State of Washington since 2004

RESEARCH

As a hydrologist with the National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln I am involved in developing seasonal predictive capability for drought mitigation. This is a state-of-the-art forecast tool in the Decision Support System (DOSS) and is utilized to improve seasonal drought predictive capability using Earth Science Models, such as GAME, CUFS, CAM, Cerf and NAR. The research will provide real-time decision support information regarding "what to do now" and "when to wait and see". I, also, am involved with Basin Scale Water and Drought Portal. This portal will be a clearinghouse for water-related data in the Republican River Basin, Colorado, Nebraska, and Kansas. Available information in this portal include past, current, and potential water and drought conditions, as well as drought mitigation actions that can be taken to foster effective water and drought management. I am involved in the US Hydro Drought Atlas. The US Drought Atlas has been initiated by the Institute for Water Resources (EWER/USAGE). We extended the scope of the previous Atlas project and enhanced system visualization to help stakeholders make short-term decisions and; long-term strategies' for water resources planning and management. I am involved in the Drought Information System for National Drought Disaster Reduction. Drought continues to result in significant economic, social, and environmental impacts, not only in developing countries, but also in developed countries, such as United States and Korea. This research will promote drought knowledge networks and collaboration to share data, information, technologies, tools and good practices on drought disaster reduction, mitigation and preparedness. Working with international collaborators in Korea, NMS support to building the initial nation-wide drought monitoring system and share sound technologies and tolls learned from precious successful practices worldwide. As a Ph.D. candidate (Graduate Research Assistant) I worked with Professor Richard N. Palmer, Department of Civil and Environmental Engineering, University of Washington, Seattle, from August, 2004, to May 2, 2006. I worked on the Streamflow Forecast using a GCM. These streamflow forecasts are critical for water management. The forecast system attempts to anticipate the onset of wet/dry spells by using regional climate and watershed information to identify conditions that suggest the potential for extreme hydrologic events. A mid-range climate forecast model, streamflow forecast system (up to 3 months lead-time) was used to inform decision makers, resource managers and stakeholders and to ensure that decisions are based upon scientific facts and forecasts, rather than past operations or ad-hoc management.

SELECTED GRANTS AND CONTRACTS

Development of a Drought Decision Support Portal for the Republican River Basin of Nebraska, Colorado, and Kansas, National Oceanic and Atmospheric Administration, \$223,525; May 2007 –April 2009.

Developing a Predictive Capability Decision Support System for Drought Mitigation, National Aeronautics and Space Administration, \$332,000; October 2007–September 2010.

Development of a Pilot Drought Information System for National Drought Disaster Reduction, The Korea National Emergency Reduction, \$70,000; August 2008–May 2011.

SELECTED PUBLICATIONS

Jae H. Ryu, Richard N. Palmer, Sangman Jeong, Jooheon Lee, and Young-Oh Kim. 2009. *Sustainable Water Resources Management in the Conflict Resolution Framework*, **Journal of the American Water Resources Association**, 45(2), 485-499.

Jae H. Ryu, Richard N. Palmer, Matthew W. Wiley, and Sangman Jeong. 2009. *Mid-Range Streamflow Forecasts Based on Climate Modeling-Statistical Correction and Evaluation*, **Journal of the American Water Resources Association**, 45(2), 355-368.

OTHER PROFESSIONAL ACTIVITIES

Committee, American Society of Civil Engineers, World Environmental & Water Resources Congress (2002-present)

Member, American Water Resources Association (2002-Present)

Member, American Geophysics Union (2002-Present)

KARINA SCHOENGOLD, Assistant Professor, 25% Teaching, 5% Research, 75%
Department of Agricultural Economics (75% Research)

Areas of Interest: Environmental and natural resource economics, water resource economics, water pricing,
technology choice, agricultural economics

Contact: kschoengold2@unl.edu, 402/472-2304

EDUCATION

B.S. Economics and Mathematics, University of Wisconsin-Madison (1998)

M.S. Agricultural and Resource Economics, University of California-Berkeley (2001)

Ph.D. Agricultural and Resource Economics, University of California-Berkeley (2005)

PROFESSIONAL EXPERIENCE

2005-present Assistant Professor, Department of Agricultural Economics and School of Natural Resources,
University of Nebraska-Lincoln

TEACHING (last five years)

Courses Taught (Fall, Spring, Summer)

NRES 323 Natural Resource Policy (S06, F07, S07, F08 – 2 sections, F09 – 2 sections)

AECN 901J Environmental and Resource Economics (F08)

AECN 902J Environmental and Resource Economics (S08)

Masters and Doctoral Students Advised

Prabhakar Shrestha (M.S. Agricultural Economics, expected 2009) The Economic Impacts of Drought on the
Whitewater Rafting Industry in Colorado

Zhenyu Zhang (Ph.D. Agricultural Economics, expected 2009) Economic Growth and Carbon Emission Control

Gibson Nene (Ph.D. Agricultural Economics, expected 2009) Three Essays on Industrial Organization and
Economic Growth

RESEARCH

My overall research agenda is focused on improving water management and allocation between different uses and different users. Some of my recent research projects have looked at the impact of drought on the adoption of conservation tillage, the effect of increased electricity prices on groundwater irrigation use, and the impact of a change in water prices on the irrigation technology and crop choice.

UNIVERSITY SERVICE

Since starting my current position at the University of Nebraska in 2005, I have been an active member of various departmental and university-level groups, providing service to the university at various levels. I have been a contributing member of two graduate committees (School of Natural Resources and Department of Agricultural Economics), chair of the seminar committee for the Department of Agricultural Economics, and an active participant in various Water Resource Research Initiative conferences, workshops, and programs.

SELECTED GRANTS AND CONTRACTS

Pollution and economic decision support tool for impaired watershed management plans in eastern Nebraska (with Daniel Ginting, Martha Mamo, and Charles Wortmann), CSREES, \$335,000; September 2003– September 2008.

The Impact of Weather Extremes on Agricultural Production Methods: Does Drought Increase the Adoption of Conservation Tillage Practices? (with Ya Ding and Tsegaye Tadesse), University of Nebraska-Agricultural Research Division, \$39,876; July 2007–June 2009.

Estimating the Impacts of Complex Climatic Events: the Economic Costs of Drought in Colorado, Nebraska, and New Mexico (with Michael Hayes, Don Wilhite, Ray Supalla, and Ya Ding), National Oceanic Atmospheric Administration (NOAA), \$300,000; July 2006–June 2009.

Drought Risk, Impact, and Mitigation Information System (with Michael Hayes and six additional collaborators), United States Department of Agriculture – Risk Management Agency, \$6,407,472; October 2005– September 2010.

SELECTED PUBLICATIONS

- Hellegars, P., K. Schoengold, and D. Zilberman. 2008. *Water Resource Management and the Poor* in **Economics of Poverty, Environment and Natural-Resource Use** (R.B. Dellink and A. Ruijs, eds.), Springer Publishing.
- Schoengold, K. and D. Zilberman. 2008. *Creating Incentives for Sustainable Water Use*, in **Mountains: Sources of Water, Sources of Knowledge**, (E. Wiegandt, ed.) Kluwer Academic Press.
- Schoengold, K. and D. Zilberman. 2007. *The Economics of Water, Irrigation, and Development* in **Handbook of Agricultural Economics: Volume 3**, (R. Evenson and P. Pingali, eds.), Elsevier Science Publishers.
- Schoengold, K., D.L. Sunding, and G. Moreno. 2006. *Price elasticity reconsidered: Panel estimation of an agricultural water demand function*, **Water Resources Research**, 42, W09411, doi:10.1029/2005WR004096.
- Schoengold, K., and D. Zilberman. 2005. *The Use of Pricing and Markets for Water Allocation*, **Canadian Water Resources Journal** 30(1): 47-54.

OTHER PROFESSIONAL ACTIVITIES

- Referee*, Agricultural Economics, American Journal of Agricultural Economics, Canadian Journal of Agricultural Economics, Journal of Agricultural and Food Industrial Organization, Journal of the American Water Resources Association, Journal of Environmental Management, Journal of Water Resources Planning and Management, Middle East Development Journal, Southern Economic Journal, Water Resources Research.
- Member*, Agricultural and Applied Economics Association, Association of Environmental and Resource Economists, Western Agricultural Economics Association.
- Departmental Representative*, Western Agricultural Economics Association.

PATRICK J. SHEA, Professor, 10% Teaching, 30% Research; 10% Extension, 25% University Service, 25% UNMC College of Public Health

Areas of Interest: Environmental Chemistry and Toxicology, Xenobiotics in Soil-Water-Biotic Systems, Remediation and Detoxification

Contact: psheal1@unl.edu, 402/472-1533

EDUCATION

B.S. Biology (Pre-Medical focus), Fordham University (1975)

M.S. Plant Science (Agronomy-Weed Science focus), University of Connecticut (1979)

Ph.D. Crop Science (Soil Science minor, Xenobiotic Chemistry focus), North Carolina State University (1981)

PROFESSIONAL EXPERIENCE

2007-present Professor and Vice-Chair, Department of Environmental, Agricultural and Occupational Health, University of Nebraska Medical Center, Omaha

1997-present Professor, School of Natural Resources, University of Nebraska-Lincoln

2000-2001 Associate Director and Research Coordinator, SNRS, University of Nebraska-Lincoln

1993-1997 Professor, Department of Agronomy, University of Nebraska-Lincoln

1986-1993 Associate Professor, Department of Agronomy, University of Nebraska-Lincoln

1981-1986 Assistant Professor, Department of Agronomy, University of Nebraska-Lincoln

HONORS AND AWARDS

Excellence in Review Award, Environmental Science and Technology (2007)

Editor's Citation for Excellence in Manuscript Review, Journal of Environmental Quality (2006)

Certificate of Merit for Extension Publications, American Society of Agronomy (2006)

Distinguished Achievement Award for Research, North Central Weed Science Society (1991)

Team Effort Award, IANR, University of Nebraska-Lincoln (1991)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 891 Graduate Seminar Natural Resources (co-instructor S05, S06, S07; primary S08, S09)

TOXI 950 (UNMC) (team-taught S05)

ENV 892 (UNMC) (guest lecturer and UNL exam proctor F07, F08)

Masters and Doctoral Students Advised

Jeong Park (Ph.D. Natural Resource Sciences 2004) Remediating Munitions-Contaminated Soil and Water with Zerovalent Iron and Surfactants.

Robin Culp (M.S. Toxicology 2004) Using a Bioluminescence Assay to Assess the Toxicity of Munitions-Contaminated Water During Remediation with Reducing and Oxidizing Agents.

Hardiljeet K. Boparai (Ph.D. Natural Resource Sciences 2006) Evaluating In Situ Redox Manipulation for Remediating Pesticide-and Explosive-Contaminated Groundwater.

Sathaporn Onanong (Ph.D. Natural Resource Sciences 2006) Using Gas-Phase and Quantum Molecular Descriptors to Predict Dehalogenation Rates of Chlorinated Alkanes by Zerovalent Iron.

Bernard J. Kronschnabel (M.S. Natural Resource Sciences 2007) Graphite and Carbide Catalysts for Contaminant Remediation.

Jong S. Kim (M.S. Natural Resource Sciences 2007) Formation of Nitrosamines from Reaction of Pharmaceuticals with Nitrite and Chloramine.

RESEARCH

I developed process-based index models to assess landscape vulnerability to pesticide contamination of ground and surface waters; demonstrated nitrosamine formation from secondary amine pesticides and pharmaceuticals in the presence of nitrate and during disinfection of water; used dithionite to remediate herbicide and explosives-contaminated aquifer sediment and characterized surface chemistry; demonstrated graphite and carbide remediation catalysts; and used gas-phase molecular descriptors to predict chloroalkane dechlorination rates by zerovalent iron.

EXTENSION

Guide for Weed Management in Nebraska Environmental Considerations When Applying Herbicides, Bernards, M.

- et al. (P.J. Shea). 2004, 2005, 2006, 2007, 2008, 2009. University of Nebraska-Lincoln.
- Pesticide Management Water Quality Protection in the Midwest*, „*Pesticide Behavior and Movement in a Landscape*“
Devlin, D. et al. (P.J. Shea). 2008. Heartland Regional Water Coordination Initiative, Kansas State
University, Manhattan, KS.
- Targeting of Watershed Management Practices for Water Quality Protection*. Wortmann, C.S. et al. (P.J. Shea).
2008. Heartland Regional Water Coordination Initiative, University of Nebraska-Lincoln.

UNIVERSITY SERVICE

I have served as Secretary to the Faculty Senate, 2004-2006; Executive Committee, 2003-2006; and Senator, 2002-present. I have also been a member of the Chancellor's Committee on Wellness, 2007-present; Academic Rights and Responsibilities Committee, 2006-present; co-Chair 2008-2009, and the Special Committee on Academic Titles, 2005-2006.

SELECTED GRANTS AND CONTRACTS

- Targeting Watershed Vulnerability and Behaviors Leading to Adoption of Conservation Management Practices*
(lead PI with co-PI M. Burbach, M. Milner, A. Martin, G. Lynne and KS, IA and MO collaborators),
USDA-CSREES National Integrated Water Quality Program, \$570,000; September 2006–September 2009.
- Managing Soil and Water Contamination Using Novel Predictive and Remediation Technologies* (lead PI
with co-PIs S. Comfort, P. Burrow, T. Zhang), EPA/EPSCoR, \$410,000; August 2002-August 2005.
- Building Surface Analysis into a New University Infrastructure in Environmental Science* (lead PI with co-PIs M.
Langell, P. Burrow, S. Comfort, T. Zhang), Nebraska Research Initiative, \$390,000; July 2002-June 2005.
- Evaluating the Physical and Biological Availability of Pesticides and Pharmaceuticals in Agricultural Contexts*,
USDA Multi-State Program (W-1082; Nebraska PI), \$57,000; September 2006–September 2010.
- Impacts of Emerging Contaminants on Natural and Societal Environments* (lead PI with co-PIs T. Zhang, J.
Stansbury, Y. Xia), Water Resources Research Initiative, \$20,000; January 2007– June 2008.
- Formation of Nitrosamine and Hydrazine Derivatives of Pesticides and Pharmaceuticals during Disinfection of
Drinking Water and Wastewater*, USGS 104b, \$19,210; March 2007–February 2008.

SELECTED PUBLICATIONS

- Kolok, A.S., C.L. Beseler, X-H. Chen, and P.J. Shea. 2009. *The Watershed as a Conceptual Framework for the
Study of Environmental and Human Health*, **Environmental Health Insights**, 3, 1-10.
- Boparai, H.K., P.J. Shea, S.D. Comfort, and T.A. Machacek. 2008. *Sequencing Zerovalent Iron Treatment with
Carbon Amendments to Remediate Agrichemical-Contaminated Soil*, **Water, Air and Soil Pollution**, 193,
189-196.
- Onanong, S., S.D. Comfort, P.D. Burrow, and P.J. Shea. 2007. *Using Gas-Phase Molecular Descriptors to Predict
Dechlorination Rates of Chloroalkanes by Zerovalent Iron*, **Environmental Science and Technology**, 41,
1200-1205.
- Kim, J.S., P.J. Shea, J.E. Yang, and J-E. Kim. 2007. *Halide Salts Accelerate Degradation of High Explosives by
Zerovalent Iron*, **Environmental Pollution**, 147, 634-641.
- Kim, J., M. Cho, J. Yoon, P.J. Shea, and B-T. Oh. 2007. *Surficial Disinfection of Escherichia coli Contaminated
Playground Soil by UV Irradiation*, **Environmental and Geochemical Health**, 12, 64-71.
- Vasilyeva, G.K., E.R. Strijakova, and P.J. Shea. 2006. *Use of Activated Carbon for Soil Bioremediation*, Pages 309-
322 in **Soil and Water Pollution Monitoring: Protection and Remediation** (I. Twardowska, H.E. Allen,
M.M. Haggblom and S. Stefaniak, eds.), **NATO Science Series IV-Earth and Environmental Sciences**,
Vol. 69, Springer Netherlands, Dordrecht.
- Onanong, S., P.D. Burrow, S.D. Comfort, and P.J. Shea. 2006. *Electron Capture Detector Response and
Dissociative Electron Attachment Cross Sections in Chloroalkanes and Chloroalkenes*, **Journal of
Physical Chemistry A**, 110, 4363-4368.
- Boparai, H.K., P.J. Shea, S.D. Comfort, and D.D. Snow. 2006. *Dechlorinating Chloroacetanilide Herbicides by
Dithionite-Treated Aquifer Sediment and Surface Soil*, **Environmental Science and Technology**, 40,
3043-3049.
- Tyess, D.L., P.J. Shea, and A.M. Parkhurst. 2006. *Mineralization Potential of Atrazine and Degradation
Intermediates from Clustered Characteristics in Inoculated Soils*, **Journal of Soil Sediment
Contamination**, 15, 87-102.
- Shea, P.J., T.A. Machacek, and S.D. Comfort. 2004. *Accelerated Remediation of Pesticide-Contaminated Soil with
Zerovalent Iron*, **Environmental Pollution**, 132, 183-188.

MARTHA D. SHULSKI, Assistant Professor and Director HPRCC, 20% Teaching, 33% Research, 30% Extension/Outreach, 15% High Plains Regional Climate Center Director, 2% University Service

Areas of Interest: Climate Variability and Change, Applied Climatology

Contact: mshulski2@unl.edu, 402/472-6709

EDUCATION

B.S. Meteorology, North Carolina State University (1996)

M.S. Agricultural Meteorology, University of Nebraska Lincoln (1998)

Ph.D. Soil Science/Climatology, University of Minnesota (2002)

PROFESSIONAL EXPERIENCE

2009-present Assistant Professor and Director, School of Natural Resources and High Plains Regional Climate Center, University of Nebraska Lincoln

2007-2009 Adjunct Professor, Geography, University of Alaska Fairbanks

2002-2009 Research Professional, Geophysical Institute, University of Alaska Fairbanks

1999-2002 Graduate Research Assistant, Department of Soil, Water, and Climate, University of Minnesota

1999 Research Technician, High Plains Regional Climate Center, University of Nebraska Lincoln

1997-1998 Graduate Research Assistant, Climate and Bio-Atmospheric Sciences Group, University of Nebraska Lincoln

HONORS AND AWARDS

University of Alaska Fairbanks Travel Award for participation in the International Conference on Arctic Research Planning (2005)

Research Partnership Award for University of Minnesota Center for Transportation Studies living snow fence design and website implementation interdisciplinary project (2003)

TEACHING

Courses Taught (Fall, Spring, Summer)

GEOG 412 Geography of Climate and Environmental Change (S08, S09)

GEOG 401 Weather and Climate (F07)

Masters and Doctoral Students Advised

Peter Bieniek (M.S. Atmospheric Science, 2007) Climate and Predictability of Alaskan Wildfires

RESEARCH

The major area of research is on the topic of climate change and variability and serving as lead author on a book: *The Climate of Alaska*. Multidisciplinary research efforts resulting in publication include: impacts of extreme weather events and climate change on native ecosystems, extended duration extreme weather events (diagnostics and predictability), and human dimensions of climate change and variability.

EXTENSION/OUTREACH

Primary extension activities involve the development of climate summaries and climate monitoring products and information disseminated to stakeholder groups (media, private industry, educators, general public), climate service activities (providing climate data and information to users), developing and giving lectures and talks on weather and climate, serving as a science fair judge, and giving guidance on lesson planning for local educational outreach office.

UNIVERSITY SERVICE

Major university service activities include serving on committees, participating in undergraduate recruitment activities, and academic club service projects.

SELECTED GRANTS AND CONTRACTS

Beaufort and Chukchi Sea Mesoscale Meteorology Model Study (with 6 collaborators), Minerals Management Service, U.S. Department of the Interior, \$1,400,000; January, 2009–December, 2011.

- Beaufort Sea Mesoscale Meteorology Model Study* (with 5 collaborators), Minerals Management Service, U.S. Department of the Interior, \$340,000; September, 2006–August, 2008.
- Quality Assurance of Weather Data and the Probability of Favorable Weather for Prescribed Fire in Alaska* (with 2 collaborators), Joint Fire Sciences Program, U.S. Forest Service, \$75,000; August, 2005–July, 2007.
- Climate change in the Koyukuk and Yukon Flats Regions of Alaska* (with 2 collaborators), Alaska Fish and Wildlife Service and University of Alaska Fairbanks, \$5,000; January-August, 2006.
- Climate of the Coastal Zone of the Alaskan North Slope*, British Petroleum Corporation, \$10,000; January–March, 2005.

SELECTED PUBLICATIONS

- Shulski, M. and H. M. Mogil. 2009. *Alaska's weather and climate*, **Weatherwise**, January/February, 2009.
- Shulski, M. and G. Wendler. 2007. **The Climate of Alaska**, Fairbanks, AK: University of Alaska Press, 216 pp.
- Klein, D. and M. Shulski. 2007. *Lichen recovery following heavy grazing by reindeer delayed by climate warming*, **Ambio**, 38, 11-16.
- Damoah R., N. Spichtinger, R. Servranckx, M. Fromm, E. Eloranta, I. Razenkov, P. James, M. Shulski, C. Forster, and A. Stohl. 2006. *Transport modeling of a pyro-convection event in Alaska*. **Atmospheric Chemistry and Physics**, 6:173-185.
- Wendler G., M.D. Shulski, and B. Hartmann. 2005. *Potential climatic effects of cirrus contrails for the subarctic setting of Fairbanks, Alaska*, **Theoretical and Applied Climatology**, 81:149-159.
- Wendler G., B. Hartmann, C. Wyatt, M.D. Shulski, and H. Stone. 2005. *Midsummer energy balance for the ice covered southern seas*, **Boundary Layer Meteorology**, 117:131-148.
- Fan X., J.-F. Chou, B.-R. Guo, and M.D. Shulski. 2004. *A coupled simple climate model and its global analysis*, **Theoretical and Applied Climatology**, 79:31-43.
- Shulski M.D. and M.W. Seeley. 2004. *Application of snowfall and wind statistics to snow transport modeling for snowdrift control in Minnesota*, **Journal of Applied Meteorology**, 43:1711-1721.
- Shulski M.D., E.A. Walter-Shea, K.G. Hubbard, G.Y. Yuen, and G. Horst. 2004. *Penetration of photosynthetically active and ultraviolet radiation into alfalfa and tall fescue canopies*, **Journal of Agronomy**, 96:1562-1571.
- Yuen G.Y., C.C. Jochum, L.J. Giesler, M.D. Shulski, E.A. Walter-Shea, and K.G. Hubbard. 2002. *UV-B bidosimetry in turfgrass canopies*, **Crop Science**, 42:859-868.

OTHER PROFESSIONAL ACTIVITIES

- Reviewer, Danish Journal of Geography* (2008)
- Co-Chair, Atmospheric Circulation, Dynamics, and Chemistry session at Global Change Connection to the Arctic Conference (GCCA-6)* – Tokyo, Japan, December 12-13, 2005
- Invited keynote speaker, Alaska Weather Symposium*, University of Alaska, Fairbanks, AK, March 10-12, 2009
- Invited speaker, First International Symposium on Arctic Research (ISAR-1)*, Tokyo, Japan, November 4-6, 2008
- Invited speaker, Wildlife Response to Environmental Arctic Change (WildREACH)*, Fairbanks, AK, November 17-18, 2008
- Invited speaker, 2nd Annual Alaska Book Festival*, Fairbanks, AK, June 11-13, 2008
- Climate Services Partnership Program participant*, NOAA Climate Services Division, Washington, DC, November 1-14, 2004
- Member, American Association of State Climatologists* (2002-present)

STEVEN S. SIBRAY, Geoscientist, 25% Research, 74% Scholarly Service, 1% University Service

Areas of Interest: Geochemistry of ground water, ground water and surface water interaction, groundwater management and geologic framework of Nebraska Panhandle aquifers, exploration for uranium roll front deposits, and economic geology

Contact: ssibray1@unl.edu, 308/632-1382

EDUCATION

B.S. (with honors) Geology, University of California at Davis (1972)

M.S. Geology, University of New Mexico (1977)

PROFESSIONAL EXPERIENCE

2004 - present Geoscientist, School of Natural Resources, UNL, Scottsbluff, NE
1995 - 2004 Associate Geoscientist, Conservation and Survey Division, UNL Scottsbluff, NE
1989 - 1995 Assistant Research Hydrogeologist, C.S.D., UNL, Scottsbluff, NE
1987 - 1989 Senior Reservoir Technology Geologist, Exxon, Midland, Texas
1985 - 1987 Senior Petroleum Geologist, Exxon, Midland, Texas
1981 - 1985 Petroleum Geologist, Exxon, Oklahoma, City, Oklahoma
1976 - 1981 Uranium Exploration Geologist, Pathfinder Mines, Albuquerque, New Mexico

RESEARCH

I am involved in emphasis on groundwater resources of the Nebraska Panhandle. Accomplishments include mapping of a significant paleochannel aquifer in the Brule Formation near Sidney, Nebraska. Some of my other accomplishments include evaluating the interconnection of groundwater and surface water in Lodgepole Creek and Pumpkin Creek watersheds. The geology of the economically significant uranium resources was also reinterpreted.

EXTENSION/OUTREACH

I am involved in an emphasis on educating the public on the importance of water conservation. Accomplishments include establishing groundwater management plans with local government agencies.

SCHOLARLY SERVICE

I am involved with an emphasis on delineating the geologic framework of the aquifers of the Nebraska Panhandle. Accomplishments include drilling and logging hundreds of test holes, compiling test hole logbooks, and installation of groundwater monitoring wells. Hundreds of ranchers and farmers were given assistance during the prolonged drought of 2000-2009.

UNIVERSITY SERVICE

I am a member of PREC arboretum committee. Accomplishments include emphasizing xeriscaping for water conservation.

SELECTED GRANTS AND CONTRACTS

Heliborne Electromagnetic Surveys within the North Platte River and Lodgepole Creek Valleys, Western Nebraska (Collaborator), Nebraska Environmental Trust Fund, \$443,850; 2008.

Characterization of Near-Surface Lithologies under Selected Irrigation Canals within the North Platte Valley, Western Nebraska, using Geophysical Methods (Co-Investigator), Nebraska Department of Natural Resources, \$1,192,896; 2006.

Evaluation of Public Water Supply Wells Having High Arsenic and/or Uranium, NHHSS Grant, \$31,500; 2005.

SELECTED PUBLICATIONS

Sibray, Steven S. 2009. *Uranium Exploration Targets in the Overlooked and Under-explored Nebraska Panhandle*, **Global Uranium Symposium 2009**.

Sibray, S. and M.P. Carlson. 2009. *Hydrostratigraphic Controls on Uranium Mineralization - Example the Nebraska Panhandle*, AAPG Annual Meeting 2009, Alternative and Renewable Energy section.

Steele, G.V., S.S. Sibray, and K.A. Quandt. 2007. *Evaluation of the Source Water near Sidney, western Nebraska, 2004-2005*, **USGS Scientific Investigations Report**, 5086, 54p.

- Steele, G., K. Quandt, and S. Sibray. 2006. *Evaluation of Source Water near Sidney, Western Nebraska*, **Midwest Ground Water Conference**, Lincoln Nebraska.
- Steele, G.V., J.C. Cannia, S.S. Sibray, and V.L. McGuire. 2005. *Age of ground water and sources of nitrogen in the surficial aquifers in Pumpkin Creek Valley, Western, Nebraska, 2000*, **USGS Scientific Investigations Report**, 5157, 68p.
- Evaluation of Public Water Supply Wells Having High Arsenic and/or Uranium: A Collaborative Project Between HHHSS and UNL* - September, 2005; Contract Report.
- Steele, G., J. Cannia, and S. Sibray. 2002. *Ground-water quality and age in Pumpkin Creek Valley, western Nebraska [abs.]*, **Geological Society of America** Abstracts with Programs, 34 (6), 97.
- Harvey, F. and S. Sibray. 2001. *Delineating Ground Water Recharge from Leaking Irrigation Canals Using Water Chemistry and Isotopes*, **Ground Water**, 39 (3), 408-421.
- Gosselin, D.C., P.E. Nabelek, Z.E. Peterman, and S. Sibray. 1997. *Oxygen, Hydrogen and Strontium Isotopes in Saline Alkaline Lakes from Western Nebraska, U.S.A.*, **Journal of Paleolimnology**, 17, 51-65.
- Sibray, S. and F. Harvey. 1997. *Determining Recharge Sources and the Impact of Unlined Irrigation Canals in Western Nebraska, Using Stable Isotope and Major Ion Chemistry and Tritium and Carbon 14 Dating [abs.]*, **Geological Society of America** Abstracts with Programs v. 29, No. 6.
- Verstraeten, I.M., S.S. Sibray, J.C. Cannia, and D.Q. Tanner. 1995. *Reconnaissance of Ground Water Quality in the North Platte Natural Resources District, Western Nebraska, June-July 1991*, **U.S.G.S. Water-Resources Investigations Report**, 94-4057, 114 pages.
- Gosselin, D.C., S. Sibray, and J.F. Ayers. 1994. *Geochemistry of K-Rich Alkaline Lakes, Western Sandhills, Nebraska, U.S.A.*, **Geochimica Cosmochimica Acta**, 58, 1403-1418.

OTHER PROFESSIONAL ACTIVITIES

Member, National Groundwater Association

Member, American Association of Petroleum Geologists

Registered Professional Geologist, Wyoming #626

Certified Petroleum Geologist (American Association of Petroleum Geologists) #4565

RAMESH K. SINGH, Postdoctoral Research Associate, 100% Research

Areas of Interest: Water Management, Irrigation Engineering, Remote Sensing and Geographic Information Systems

Contact: rsingh2@unl.edu, 402/472-3497

EDUCATION

B.S. Agricultural Engineering, Rajendra Agricultural University (1992)

M.S. Agricultural Engineering, Indian Institute of Technology Kharagpur (1994)

Ph.D. Agricultural and Biological Systems Engineering, University of Nebraska-Lincoln (2009)

PROFESSIONAL EXPERIENCE

2009-present Postdoctoral Research Associate, School of Natural Resources, University of Nebraska-Lincoln

2005-2009 Graduate Research Assistant, Biological Systems Engineering, University of Nebraska-Lincoln

1999-2005 Scientist, Indian Institute of Remote Sensing, Dehradun

1998-1999 Scientist, Nagarjuna Agricultural Research and Development Institute, Hyderabad

1995-1998 R & D Engineer, Jain Irrigation Systems Ltd., Jalgaon

HONORS AND AWARDS

Outstanding Graduate Student Research Poster Award (2009)

Widaman Distinguished Graduate Student Award (2008)

Finalist for the International Graduate Student of the Year Award (2008)

Water Resources Research Initiative Fellowship (2007)

Milton E. Mohr Fellowship (2007)

Frank and Marie Wheeler Fellowship (2007)

National R & D award for Technology Absorption from Government of India for Jain Irrigation Systems Ltd. (1997)

Government of India Fellowship for Academic Excellence (1993-94)

Gold Medal for the 1st class rank in Bachelor degree (1992)

Merit Scholarship for outstanding performance in academics (1988-92)

TEACHING (last five years)

Masters and Doctoral Students Advised

Sonika Sharma (M.S. Remote Sensing 2005) Geospatial approach for estimation of actual evapotranspiration in Chambal Command Area.

M. S. Senthilkumar (M.S. Remote Sensing 2004) Land use dynamics of Harike Wetlands, Punjab.

RESEARCH (emphasize last five years)

My current research focuses on using visible and thermal remote sensing data for water management. I have been working on geospatial approach for estimating land surface evapotranspiration using satellite remote sensing data for my Ph.D. dissertation. For this, I have used energy balance models namely SEBAL and METRIC. The models algorithms have been modified for localized application. The modification resulted in improved estimation of evapotranspiration. I have also developed a modeling approach for estimating soil heat flux under different cropping systems and irrigation practices. In addition, I have also developed reflectance based crop coefficient for major crops using spectral data. While working at Indian Institute of Remote Sensing, I have carried out research on watershed management, soil erosion, water quality, and irrigation management.

SELECTED GRANTS AND CONTRACTS (emphasize last five years)

Remote Sensing of Evapotranspiration, Drought, and Ecosystem Production in the United States Using Integrated Thermal and Reflected Wavelengths, U.S. Geological Survey, \$307,340; Oct. 2009 – Sept. 2011.

SELECTED PUBLICATIONS (list up to 10, emphasize last five years)

Singh, R. K., A. Irmak, E. Walter-Shea, S. Verma, and A. E. Suyker. 2008. *Comparison and analysis of empirical equations for soil heat flux for different cropping systems and irrigation methods*. **Transactions of the ASABE** (accepted).

Singh, R. K., and A. Irmak. 2008. *Estimation of crop coefficients using satellite remote sensing*. **ASCE Journal of Irrigation and Drainage Engineering** (in print).

- Singh, R. K., A. Irmak, S. Irmak, and D. Martin. 2008. *Application of SEBAL model for mapping evapotranspiration and estimating surface energy fluxes in South-Central Nebraska*. **ASCE Journal of Irrigation and Drainage Engineering**, 134(3), 273-285.
- Bhatt, C. M., P. K. Sharma, R. K. Singh, V. K. Verma, and P. K. Litoria. 2006. *Mapping and monitoring of waterlogged areas in parts of Muktsar Block (Punjab) using remote sensing and GIS approach*. **Indian Journal of Ecology**, 33, 35-39.
- Singh, R. K., C. M. Bhatt, and V. H. Prasad. 2004. *Remote sensing and GIS approach for assessment of the water balance of a watershed*. **Hydrological Sciences Journal**, 49(1), 131-141.
- Singh, R. K., C. M. Bhatt, and V. H. Prasad. 2003. *Morphological study of a watershed using remote sensing and GIS techniques*. **Hydrology Journal**, 26(1-2), 55-66.
- Bandara, I. B. J., R. P. De Silva, and R. K. Singh. 2003. *Remote sensing and GIS based methodology for curve number estimation in rainfall – runoff modeling*. **Tropical Agricultural Research**, 15, 307-315.
- Nainwal, D. C., P. K. Deshpande, and R. K. Singh. 2003. *GIS based geomorphometric analysis of Malin Watershed, Uttarakhand, India*. **Quarterly Journal of GARC**, 11(1), 9-17.
- Singh, R. K., S. P. Aggarwal, T. Ulanbek, and V. H. Prasad. 2002. *Prioritization of Bata River Basin using remote sensing and GIS techniques*. **Indian J. of Soil Conservation**, 30(3), 200-205.
- Singh, R. K., K. N. Tiwari, and J. J. Kulkarni. 1997. *Performance evaluation of micro irrigation emitters*. **Journal of The Institution of Engineers (India)**, 77, 47-54.

OTHER PROFESSIONAL ACTIVITIES

Science Judge, Nebraska Science Bowl, 2009

Department representative for UNL Graduate Student Association, 2006-2008

Judge, Nebraska Junior Academy of Sciences Southeast Regional Science Fair, 2008

Parent representative of school for Lincoln Action Program policy committee, 2007-2008

Joint Secretary, Indian Society of Remote Sensing, Dehradun Chapter, 2004-2005

Member, Editorial board of **CONTACT**, an in-house publication of Indian Institute of Remote Sensing, 2003-2005

JOSEPH SKOPP, Associate Professor, 50% Teaching, 50% Research

Areas of Interest: Soil Physics, Contaminant Transport

Contact: jskopp1@unl.edu, 402/472-6304

EDUCATION

B.S. Chemistry, University of California, Davis (1971)

M.S. Soil Physics, University of Arizona (1975)

Ph.D. Soil Physics, University of Wisconsin (1980) (Minor Math)

PROFESSIONAL EXPERIENCE

1986-present Associate Professor, University of Nebraska-Lincoln

1980-1986 Assistant Professor, University of Nebraska-Lincoln

1976-1980 Research Assistant, University of Wisconsin

1973-1975 Research Assistant, University of Arizona

1972 Chemist, California Institute of Technology

Courtesy Appointment Department of Biological Systems Engineering

TEACHING

Courses Taught (Fall, Spring, Summer)

NRESAGRI 103 Recitation (F, S)

NRES 281 Introduction to Water Science (F, S)

NRES 461/861 Soil Physics (F)

SOIL 101 Soil and Society (F taught once)

RESEARCH

The primary focus of my research is on transport of chemicals in soil and water. This includes quantitative descriptions of soil and transport. Applications include crop nutrient uptake and remediation of contaminated soils or aquifers. The recent focus has been on *a priori* methods of predicting hydrodynamic dispersion.

UNIVERSITY SERVICE

I am a past member of the Water Science Advisory Committee and past chair of the College and School Curriculum Committee. I have, also, been a past member of the University of Nebraska Academic Senate Committee for Computational Services and Facilities, past member of the University of Nebraska Radiation Safety Committee and past chair of the Instructional Improvement Committee of the College of Agricultural Sciences and Natural Resources.

SELECTED GRANTS AND CONTRACTS

Bank Removal Efficacy for Removal of Cryptosporidium Oocysts within the Lincoln, NE City Well Fields. Lincoln Water System Principal Investigator (\$?)

Carbon Dioxide Exchange and Energy Balance in a Grassland Ecosystem, NSF, Co-principal Investigator. (\$?)

Identification of Optimum Soil Physical Properties for Crop Production. BARD, Principal Investigator. (\$?)

An Economic and Resource Analysis of Deep Tillage to Reduce Soil Compaction for Soybean Production, Soybean Board, Co-principal Investigator. (\$?)

Evaluation of the Thermal Conductivity of the Soil Parent Materials, Omaha Public Power District, Consultant (\$?)

A fiberoptic probe to simultaneously determine soil water content and soil temperature, Small Business Innovation Research (USDA), Consultant (\$?)

Evaluating Teaching, Teaching Council, University of Nebraska, Principal Investigator (\$?)

SELECTED PUBLICATIONS

Skopp, J. In Press. *Derivation of the Freundlich Adsorption Isotherm from Kinetics*, **Journal of Chemical Education**.

Troyer, W. and J. Skopp. 2003. *Rapid Water Flow Instrumentation*, **Journal of Soil Science Society of America**, 67:107-111.

- Aslan, M., J. Skopp, and W. Powers. 1998. *Characterization of the time dependence of sieving*, **Soil Science**, 163, 472-481.
- Widmer, S.K., R.F. Spalding, and J. Skopp. 1995. *Nonlinear regression of breakthrough curves to obtain retardation factors in a natural gradient field study*, **Journal Of Environmental Quality**, 24, 439-444.
- Davidoff, B., W.W. Wilhelm, and J. Skopp. 1992. *Evaluation of NTRM as a tool to determine sensitivity of winter wheat to soil physical environment*, **Agronomy Journal**, 84, 516-523.
- Powers, W.L. J.U. Baer, and J. Skopp. 1992. *Alternative soil water release parameters for distinguishing tillage effects*, **Journal of Soil Science of America**, 56, 873-878.
- Skopp, J. and W. Gardner. 1992. *Miscible Displacement: An interacting Pore Region Model*, **Journal of Soil Science of America** 56, 1680-1686.
- Grahammer, K., M.D. Jawson, and J. Skopp. 1991. *A comparison of daytime and nighttime soil respiration from grassland*, **Soil Biology and Biochemistry**, Vol. 23, No. 1, pp. 77-81.
- Remund, C.P., D.D. Schulte, and J. Skopp. 1991. *Predicted effects of moisture addition on horizontal loop performance*, **Transactions of the American Society of Agricultural Engineers**, Vol. 34, No. 5.
- Kargbo, D., J. Skopp, and D. Knudsen. 1991. *Phosphate and potassium movement and uptake as influenced by transpiration level and frequency of soil watering*, **Agronomy Journal**, 83, 1023-1028.
- Skopp, J., M.D. Jawson, and J.W. Doran. 1990. *Steady-state aerobic microbial activity as a function of soil water content*, **Soil Science Society of America**, 54, 1619-1625.
- Skopp, J. 1985 *Microscopic description of oxygen uptake and transport in soils*, **Soil Science Society of America**, 49, 1327-1331.

DANIEL D. SNOW, Research Associate Professor, 5% Teaching, 50% Research, 45% Service
Areas of Interest: Environmental Analytical Chemistry, Emerging Contaminants, Isotope Analysis, Bioremediation
Contact: dsnow1@unl.edu, 402/472-7539

EDUCATION

B.S. Geology, Missouri State University (1982)
M.S. Geochemistry, Louisiana State University (1988)
Ph.D. Geochemistry, University of Nebraska-Lincoln (1996).

PROFESSIONAL EXPERIENCE

2007-present Laboratory Director/Research Associate Professor, School of Natural Resources/Water Center
2003-2007 Laboratory Director/Research Assistant Professor, School of Natural Resources/Water Center
1998-2003 Chemist/Research Assistant Professor, Water Sciences Laboratory, University of Nebraska
1990-1998 Laboratory Manager, Water, Center/Water Sciences Laboratory, University of Nebraska

HONORS AND AWARDS

Certificate of Merit, National Meeting Presentation, American Chemical Society (2002)
Graduate Faculty Member, Institute of Agriculture and Natural Resources (IANR) (2000)
IANR Team Effort Award, MSEA Water Quality Project (1997)

TEACHING

Guest Lecturer – UNMC ENV 892 Public Health Environment and Society
GEOL 442/842, GEOL 816, NRES 851, NRES 481/881, NRES 419/819, SOIL 361, UNO/UNK/UNMC
Department Seminars.
NDEQ Groundwater Monitoring for Livestock Producers

Graduate Students

Teyona Damon (M.S. Natural Resources expected 2009)
Gyanendra Prasai (M.S. Engineering 2008)

RESEARCH

I developed and published analytical methods for determination of steroids, cyanotoxins, explosives, antibiotics, pesticides, and stable isotopes using state-of-the-art extraction and instrumental technologies. These methods have been applied to field research studies to investigate the fate and transport of specific synthetic organics in the environment.

SERVICE

I served as manager for the UNL Water Sciences Laboratory for over 15 years, providing technical support and supervising all analyses conducted at the facility. I developed and implemented extensive quality assurance program, conducted tours of the facility, and answered a wide variety of water quality questions from the public and educators. I served as water faculty program leader and Safety Committee Chair in School of Natural Resources, and IANR Nominating Committee member and chair.

SELECTED GRANTS AND CONTRACTS

Chemical Fingerprinting of Contaminant Sources Using Passive Samplers (with S. Bartelt-Hunt), Nebraska Department of Environmental Quality, \$72,073; August 2008-July 2010.
Fate of Micro-contaminants in Streams Augmented by Wastewater Treatment Plant Effluent (with S. Bartelt-Hunt), USGS 104b Program, \$15,300; March 2008-February 2009.
Evaluation of Lewis and Clark Lake Sediments: Mercury and Selenium Sequestration, Release, and Potential Influence on Ancient Fishes (with M. Pegg), \$10,000; UNL Grant in Aid.
Geographic Trends in Contamination of Nebraska's Surface Waters as Indicated by Sex Steroids of Common Carp (with K. Pope and A. Kolok), USGS 104b program, \$14,440; March 2008-February 2009.
Analysis and calibration of passive samplers for steroids and pesticides, US Fish and Wildlife Service, \$31,410; August 2007-September 2012.

- Effects of Handling/Management Strategies on Fate and Transport of Hormones in Cattle Manures in the Feedlot and the Field* (Lead PI with S. Bartelt-Hunt, T. Zhang, D. Shelton, C. Shapiro, T. Mader, W. Kranz, and D. Shelton), US Environmental Protection Agency STAR Program, \$699,607; July 2007–June 2010.
- Detection of Episodic Low-level Concentrations of Emerging Contaminants in Drinking Water* (with B. Dvorak), USGS 104b program, \$20,000; January 2007-May 2008.
- Monitoring Nebraska Lakes for Neurotoxins*, Nebraska Department of Environmental Quality, \$60,000; November 2006 -December 2009.
- Contaminants from wastewater treatment plants: Occurrence and potential effects to local fish populations* (with A. Kolok), Nebraska Department of Environmental Quality, \$40,000; August 2006–December 2007.
- Groundwater monitoring at selected livestock waste control facilities: Antibiotics and Hormones* (with S. Bartelt-Hunt), Nebraska Department of Environmental Quality, \$15,000; August 2006–December 2007.
- Environmental Stewardship of Cattle Waste* (with G. Erickson and A. Kolok), UNL Ag Research Division Interdisciplinary Research, \$40,000; July 2006– June 2008.
- Androgenic Growth Promoters in Nebraska Rivers: Detection and Toxicity* (with A. Kolok), USGS 104b FY2005 Grant Program, \$10,000; and NE Game and Parks Commission, \$10,000; March 2005-February 2006.
- Emerging Contaminants in Agricultural Watersheds* (with D. Hage and M. Morley), Strategic Research Cluster Grant, UNL Office of Sponsored Programs, \$50,000; July 2004-June 2005.

SELECTED PUBLICATIONS

- Bartelt-Hunt, S.L., D.D. Snow, T. Damon, J. Shockley, and K. Hoagland. 2009. *The occurrence of illicit and therapeutic pharmaceuticals in wastewater effluent and surface waters in Nebraska*, **Environmental Pollution**, 157, 786-791.
- Snow, D.D. S.L. Bartelt-Hunt, S.E. Saunders, S.L. Devivo, and D.A. Cassada. 2008. *Detection, Occurrence and Fate of Emerging Contaminants in Agricultural Environments*, **Water Environment Research**, (80)10, 868-897.
- Kolok, A.S., D.D. Snow, S. Kohno, M.K. Sellin, and L.J. Guillette. 2007. *Occurrence and biological effect of exogenous steroids in the Elkhorn River, Nebraska, USA*, **Science of the Total Environment**, 388(1-3), 104-115.
- Batt, A.L., D.D. Snow, and D.S. Aga. 2006. *Occurrence of sulfonamide antimicrobials in private water wells in Washington County, Idaho USA*, **Chemosphere**, 64, 1963-1971.
- Bopari, H.K., P.J. Shea, S.D. Comfort, and D.D. Snow. 2006. *Dechlorinating chloroacetanilide herbicides by dithionite-treated aquifer sediment and surface soil*, **Environmental Science and Technology**, 40, 3043-3049.
- Aga D.S., O. Connor, S. Ensley, J.O. Payero, D. Snow, and D. Tarkalson. 2005. *Determination of the persistence of tetracycline antibiotics and their degradates in manure-amended soil using enzyme-linked immunosorbent assay and liquid chromatography-mass spectrometry*, **Journal of Agricultural and Food Chemistry**, 53:18, 7165 -7171.
- Adam, M.L., S.D. Comfort, M.C. Morley, and D.D. Snow. 2004. *Remediating RDX-Contaminated Ground Water with Permanganate: Laboratory Investigations for the Pantex Perched Aquifer*, **Journal of Environmental Quality**, 33:6, 2165-2170.
- Sra, A.K., Y. Hu, G.E. Martin, D.D. Snow, M.W. Ribbe, and A. Kohen. 2004. *Competitive ¹⁵N Kinetic Isotope Effects of Nitrogenase-Catalyzed Dinitrogen Reduction*, **Journal of American Chemical Society**, 126, 12768-12769.

OTHER PROFESSIONAL ACTIVITIES

- Member*, Water Environment Federation Literature Review Committee.
- Reviewer*, Analytical Chemistry, Talanta, Environmental Science and Technology, Journal of Chromatography A.
- Member*, Journal of Environmental Monitoring, Journal of Environmental Quality.
- Member*, American Chemical Society, American Geophysical Union, Association of Ground Water Scientists and Engineers, Society of Environmental Toxicologists and Chemists.
- Certification and Training*, Hazardous Waste Site Worker Protection and Supervisor's Training, Supervisor's Training, UNL Environmental Health and Safety Authorized Radioactive Materials User, UNL Radiation Safety Office - 40 hours, Supervisor's Training, UNL Human Resources Department.

MARY EXNER SPALDING, Professor, 58% Scholarly Service, 2% University Service,
40% Research

Areas of Interest: Groundwater Quality: Agrichemical Contamination, Effects of Mitigation Practices
Contact: mspalding1@unl.edu, 402/472-7547

EDUCATION

B.S. Chemistry, Chestnut Hill College (1970)
M.S. Oceanography, Texas A&M University (1972)

PROFESSIONAL EXPERIENCE

1997 to present	Professor & Research Chemist, School of Natural Resources, University of Nebraska-Lincoln
1994 - 1997	Professor & Research Chemist, Conservation & Survey Div., University of Nebraska-Lincoln
1983 - 1994	Associate Professor & Research Chemist, Conservation & Survey Div., U. of Nebraska-Lincoln
1976 - 1983	Assistant Professor & Research Chemist, Conservation & Survey Div., U. of Nebraska-Lincoln
1974 - 1976	Chemist, Conservation & Survey Division, University of Nebraska-Lincoln
1973 - 1974	Research Associate, Dept. of Environmental Chemistry & Engineering, Texas A&M University
1973	Chemist, Ichthyological Associates, Drumore, PA

HONORS AND AWARDS

Outstanding Contributions to groundwater research in Nebraska, Lower Platte South Natural Resources District (1992)

Special Merit Award, Nebraska Groundwater Foundation (1991)

Meritorious Service to Conservation Award, Central Platte Natural Resources District (1977)

RESEARCH

I am interpreting nineteen years of soil, nutrient and water data to determine the impact of management practices on groundwater nitrate concentrations in a 227-square mile regulated management area. Our findings, to date, show that the rate of decrease is small but significant. However, 30-40% of the decrease is attributable to increased removal of N in grain as a result of increased yields. The fate and transport of gasoline-denatured ethanol has been under investigation at three derailment sites for three years. There appears to be minimal immediate threat to groundwater when releases of ethanol at concentrations greater than 50% are above the water table. High concentrations of hydrogen and methane, however, accumulate in the unsaturated zone for years after a spill.

SURVEY

Since 1996 the focus of my survey activities has been coordination of the building and maintenance of the “Quality-Assessed Agrichemical Contaminant Database for Nebraska Groundwater” and assessment of the quality of the data entered into the database. The comprehensive database contains more than 81,000 nitrate and 288,000 pesticide analyses for more than 21,000 wells sampled since 1974. This is a secondary use of data collected by university researchers and federal, state and local agencies for other purposes. The unique aspect of the clearinghouse is that the quality of submitted data is reviewed with respect to accepted sampling, preservation and analytical protocols and field and laboratory quality assurance practices and each analytical result assigned a quality ranking. Nebraska is the only state to maintain a publicly accessible groundwater quality database.

SELECTED GRANTS AND CONTRACTS

Ground water data management through the statewide clearinghouse-2009, Nebraska Department of Environmental Quality, \$62,176; October 2008–September 2010.

Effectiveness of irrigated crop management practices in reducing groundwater nitrate concentrations, USDA-CREES Conservation Effects Assessment Program, \$450,000; September 2007–August 2009.

Effectiveness of irrigated crop management practices in reducing groundwater nitrate concentrations, USDA-CREES Conservation Effects Assessment Program, \$180,768; September 2006–August 2007.

Phase II: Impact of a 30,000 gallon ethanol release on the Equus Beds aquifer beneath South Hutchinson, KS, Nebraska Ethanol Board, \$76,122; 2006-2009.

Ground water data management through the statewide clearinghouse, Nebraska Department of Environmental Quality, \$229,000; October 2000–September 2008.

Preliminary assessment: Impact of a 30,000 gallon ethanol release on the Equus Beds aquifer beneath South Hutchinson, KS, Nebraska Ethanol Board, \$20,000; 2005-2006.

Half-life determinations of trichloroethylene intermediates during intrinsic remediation, National Water Research Institute, \$78,500; 1996-1998.

Sprinkler irrigation as a remedial technique for VOC-contaminated ground water, Cooperative States Research Service, \$147,250; September 1993–August 1996.

SELECTED PUBLICATIONS

Mariappan, S., M.E. Exner, G.E. Martin, and R.F. Spalding. 2009. *Variability of anaerobic animal waste lagoon delta ¹⁵N source signatures*, **Environmental Forensics**, 10(1), 18-25.

Exner, M.E., R.F. Spalding, and D.M. Harrell. 2005. *Development of a Quality-Assessed Agrichemical Database for Monitoring Anthropogenic Impacts on Ground-Water Quality*, **Environmental Monitoring and Assessment**, 107, 249-257.

Spalding, R.F., D.G. Watts, D.D. Snow, D.A. Cassada, M.E. Exner, and J.S. Schepers. 2003. *Herbicide loading to shallow ground water beneath Nebraska's Management Systems Evaluation Area*, **Journal of Environmental Quality**, 32, 84-91.

Spalding, R.F., M.E. Exner, D.D. Snow, D.A. Cassada, M.E. Burbach, and S.J. Monson. 2003. *Herbicide in ground water beneath Nebraska's Management Systems Evaluation Area*, **Journal of Environmental Quality**, 32, 92-99.

Exner, M.E., D. Harrell, P.L. Larsen, C. Romary, and R.F. Spalding. 2002. *A quality-assessed database for pesticides in ground water*, In **Proceedings of the 2nd European Conference on Pesticides and Related Organic Micropollutants in the Environment** (T.A. Albanis, ed.), Corfu, Greece: University of Ioannina, 87-92.

Spalding, R.F., D.D. Snow, and M.E. Exner. 2002. *Acetamides and their transformation products in ground water beneath Nebraska's Management Systems Evaluation Area*, In **Proceedings of the 2nd European Conference on Pesticides and Related Organic Micropollutants in the Environment** (T.A. Albanis, ed.), Corfu, Greece: University of Ioannina, 125-128.

Spalding, R.F., Z.K. U, S.W. Hyun, G.E. Martin, M.E. Burbach, S.I.I. Yang, M. Kim, M.E. Exner, and S.J. Song. 2001. *Source identification of nitrate on Cheju Island, South Korea*, **Nutrient Cycling in Agroecosystems**, 61(3), 237-246.

Spalding, R.F., D.G. Watts, J.S. Schepers, M.E. Burbach, M.E. Exner, R.J. Poreda, and G.E. Martin. 2001. *Controlling nitrate leaching in irrigated agriculture*, **Journal of Environmental Quality**, 30(4), 1184-1194.

Spalding, R.F., M.E. Exner, D.D. Snow, and M.E. Stange. 1999. *The Hastings, Nebraska ground water contamination Superfund site: a case study in logic and illogic*, **Technology**, 6, 141-149.

Zlotnik, V.A., M.E. Burbach, M.E. Exner, and R.F. Spalding. 1995. *Well sampling for agrichemicals in high capacity systems*, **Journal of Soil and Water Conservation**, 50, 95-101.

ANDREW E. SUYKER, Research Assistant Professor, 60% Research, 40% Scholarly Service

Areas of interest: Carbon dioxide, methane, and water vapor exchange in natural and managed ecosystems, carbon sequestration, water use efficiency, eddy covariance instrumentation

Contact: asuyker@unl.edu, 402/472-2168

EDUCATION

B.S. Meteorology, University of Alberta, Edmonton, Alberta, Canada (1988)

M.S. Agricultural Meteorology (Micrometeorology), University of Nebraska (1992)

Ph.D. Agricultural Meteorology (Micrometeorology), University of Nebraska (2000)

PROFESSIONAL EXPERIENCE

2004-present Research Asst. Prof., School of Natural Resources, University of Nebraska-Lincoln

2001-2004 Post Doc. Research. Assoc., School of Natural Resources, University of Nebraska-Lincoln

1996-2001 Research Tech., School of Natural Resources Sciences, University of Nebraska-Lincoln

1989-1996 Graduate Research Asst., Dept. of Agricultural Meteorology, University of Nebraska-Lincoln

HONORS AND AWARDS

Widaman Distinguished Graduate Student (1991)

Sue Wilson Fellowship (1993)

RESEARCH

My research emphasis has been quantifying the exchange of carbon dioxide, methane, and energy in natural and agricultural ecosystems and understanding ecophysiological processes that control this exchange. I have conducted studies in grasslands in Kansas and Oklahoma, wetlands in Minnesota and Saskatchewan (Canada), and agro-ecosystems in Nebraska and Oklahoma. In the wetland research, in addition to quantifying CO₂ exchange, I have also quantified methane emissions and linked these fluxes to environmental controls. The most recent project involves using efficient agricultural management (i.e., no-till, scheduled irrigation) to determine if maize or maize/soybean crops are able to sequester a significant amount of carbon from the atmosphere. As part of my Masters research, I developed and tested a method to measure turbulent CO₂ fluxes using a closed-path infrared gas analyzer, which previously had never been applied using the eddy correlation technique. This new technique published in *Boundary Layer Meteorology* (1993), is now used in several long-term CO₂ exchange measurements around the world.

SCHOLARLY SERVICE

The focus of my scholarly service is as follows: a) conduct regional/national intercomparisons of tower flux and key micrometeorological sensors, b) continue to collaborate with other scientific groups to measure high resolution CO₂ concentrations needed for inversion modeling of the regional CO₂ carbon budget, c) provide data to other scientists and graduate students at UNL as well as national and international researchers, and d) provide data to the national archive of Ameriflux (network of carbon flux stations in North America).

SELECTED GRANTS AND CONTRACTS

A Satellite-Based Quantification of Carbon Exchange of the Dominant Ecosystems (Maize-Soybean) in the NACP Mid-Continent Intensive (MCI) Region (with A. Gitelson and S.B. Verma), National Aeronautics and Space Administration, \$599,483; 04/10/2008 - 03/31/2011.

Carbon sequestration in dryland and irrigated ecosystems: Quantification at different scales for improved prediction (with S.B. Verma and K. Classman), U.S. Department of Energy, Office of Biol. and Environ. Research, \$1,050,000; September 15, 2006-September, 14, 2009.

SELECTED PUBLICATIONS

Suyker, A.E. and S.B. Verma. 2009. *Evapotranspiration of irrigated and rainfed maize-soybean cropping systems*, **Agricultural Forest Meteorology**, 149, 443-452.

Suyker, A.E. and S.B. Verma. 2008. *Interannual water vapor and energy exchange in an irrigated maize-based agroecosystem*, **Agricultural Forest Meteorology**, 148, 417-427.

Gitelson, A.A., A. Vina, J.G. Masek, S.B. Verma, and A.E. Suyker. 2008. *Synoptic monitoring of gross primary productivity of maize using Landsat data*, **IEEE Geoscience Remote Sensing Letter**, 5(2):133-137.

- Xiao, J., Q. Zhuang, D.D. Baldocchi, B.E. Law, A.D. Richardson, J. Chen, R. Oren, G. Starr, A. Noormets, S. Ma, S.B. Verma, S. Wharton, S.C. Wofsy, P.V. Bolstad, S.P. Burns, D.R. Cook, P.S. Curtis, B.G. Drake, M. Falk, M.L. Fischer, D.R. Foster, L. Gu, J.L. Hadley, D.Y. Hollinger, G.G. Katul, M. Litvak, T.A. Martin, R. Matamala, S. McNulty, T.P. Meyers, R.K. Monson, J.W. Munger, W.C. Oechel, K.T. Paw U, H.P. Schmid, R.L. Scott, G. Sun, A.E. Suyker, and M.S. Torn. 2008. *Estimation of net ecosystem carbon exchange for the conterminous United States by combining MODIS and AmeriFlux data*, **Agricultural Forest Meteorology**, 148, 1827-1847.
- Grant, RAFT, T.J. Arkebauer, A. Dobermann, K.G. Hubbard, T.T. Schimelfenig, A.E. Suyker, S.B. Verma, and D.T. Walters. 2007. *Net biome productivity of irrigated and rainfed maize-soybean rotations: modeling vs. measurements*, **Agronomy Journal**, 99:1404-1423.
- Gitelson, A.A., A. Vina, S.B. Verma, D.C. Rundquist, T.J. Arkebauer, G. Keydan, B. Leavitt, V. Ciganda, G.G. Burba, and A.E. Suyker. 2006. *Relationship between gross primary production and chlorophyll content in crops: implications for the synoptic monitoring of vegetation productivity*, **Journal of Geophysical Research Atmosphere**, 111: D08S11, doi:10.1029/2005JD006017.
- Suyker, A.E., S.B. Verma, G.G. Burba, and T.J. Arkebauer. 2005. *Gross primary production and ecosystem respiration of irrigated maize and irrigated soybean during a growing season*, **Agricultural Forest Meteorology** 131, 180-190.
- Verma, S.B., A. Dbarman, K.G. Classman, D.T. Walters, JAM Knops, T.J. Arkebauer, A.E. Suyker, G.G. Burba, B. Amos, H. Yan, D. Ginting, K.G. Hubbard, A.A. Gitelson, and E.A. Walter-Shea. 2005. *Annual carbon dioxide exchange in irrigated and rainfed maize-based agroecosystems*, **Agricultural Forest Meteorology**, 131, 77-96.
- Gitelson, A.A., A. Viña, S.B. Verma, D.C. Rundquist, T.J. Arkebauer, G. Keydan, B. Leavitt, V. Ciganda, G.G. Burba, and A.E. Suyker. 2004. *Remote estimation of net ecosystem CO₂ exchange in crops: principles, technique, calibration and validation*, 2nd International Workshop on Remote Sensing of Vegetation Fluorescence, November 17-19, 2004, Montreal, Canada. CD-Rom, ESA WPP-242.
- Suyker, A.E., S.B. Verma, G.G. Burba, T.J. Arkebauer, D.T. Walters, and K.G. Hubbard. 2004. *Growing season carbon dioxide exchange in irrigated and rainfed maize*, **Agricultural Forest Meteorology**, 124(1-2), 1-13.

OTHER PROFESSIONAL ACTIVITIES

Peer Review, manuscripts submitted to Global Change Biology; Agricultural and Forest Meteorology; JGR–Atmospheres, JGR-Biogeosciences
Member, American Meteorological Society – February 2005
Member, American Geophysical Union – May 2004

MARK D. SVOBODA, Associate Geoscientist, 75% Scholarly Service, 25% Research

Areas of Interest: drought monitoring and early warning systems, planning and preparedness, indices and impacts; soil moisture and its role in drought monitoring; water issues; and GIS and remote sensing applications

Contact: msvoboda2@unl.edu, 402/472-8238

EDUCATION

B. S. Geography, University of Nebraska-Lincoln (1989)

M. A. Geography, University of Nebraska-Lincoln (1992)

PROFESSIONAL EXPERIENCE

2006-present Associate Geoscientist/Climatologist, National Drought Mitigation Center (NDMC)/UNL/SNR

2004-2006 Assistant Geoscientist/Climatologist, NDMC/UNL/SNR

1995-2003 Water Resources Specialist/Climatologist, NDMC/UNL/SNR

1993-1995 Geographic Information Specialist, USDA-Soil Conservation Service, Lincoln, NE

HONORS AND AWARDS

Reviewer, Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (two chapters)

Technical Coordinator (delegated), 2005, U.S.-China Bilateral Drought Workshop, Beijing, China

RESEARCH

The research topics I cover include looking at drought indicators, historical and return frequency of droughts, indices and monitoring (early warning) systems and decision support tools. I am also studying climate change and its potential role on drought and impacts on society and the natural environment. Other research has focused on developing new tools utilizing GIS and remote sensing to better monitor drought and vegetation conditions.

OUTREACH/SCHOLARLY SERVICE

I have organized, participated, or been invited to present at over 40 workshops in the U.S. and around the world over the past 5 years. I have also given approximately 140 invited presentations nationally and internationally over the past five years as well. I sit on the National Integrated Drought Information System (NIDIS) Implementation Team and co-chair the NIDIS Drought Portal development at drought.gov. My job also requires a constant interface with local, regional and national media in all mediums, and I have conducted well over 500 interviews during the past five years alone. I am, also, a member of Nebraska Water Availability and Outlook Committee (WAOC) since 1995. I provide annual state drought assessments and briefings to the Nebraska Governor's Climate Assessment and Response Committee. I helped design and develop the U.S. Drought Monitor (<http://drought.unl.edu/dm>) and have served as one of the principal authors of the weekly product since its inception in 1999, which is produced through the joint efforts of the USDA, NOAA's Climate Prediction Center and National Climatic Data Center, and the NDMC (<http://drought.unl.edu>). Also, serve as one of the primary authors for the monthly North American Drought Monitor involving scientists in Canada, Mexico and the United States. This year we reached our 500 map milestone, and this map is featured regularly on CNN, the Weather Channel, national news networks, and all major newspapers and internet media outlets.

GRANTS AND CONTRACTS

Development of a "Drought Ready Communities" Program (with M. Sittler, K. Smith, M. Shafer, M. Palecki, C. Knutson, D. Arndt, D. Woudenberg, and J. Angel), NOAA's Sectoral Applications Research Program (SARP), NOAA, \$288,670; June, 2008-June, 2010.

Integrating Enhanced GRACE Water Storage Data into the U.S. and North American Drought Monitors (with Rodell, M., J. Lawrimore, J.S. Famiglietti, R. Heim, R. Reichle, B. Wardlow, B. Zaitchik, and A. Pinheiro), NASA's Decision Support through Earth Science Research Results. NASA, \$597,000; August, 2008-August, 2010.

Drought Mitigation, Nebraska (with M. Hayes, C. Knutson, and B. Wardlow), USDA-CSREES, \$347,246; July, 2008-July, 2009.

Hawaii Drought Plan (with M. Hayes, Y. Ding, K. Smith, S. Scott, and M. Widhalm), Commission on Water Resource Management, State of Hawaii, \$100,000; June, 2008-June, 2010.

Enhancement of the U.S. Drought Monitor by Integrating Earth Science Data (with S.V. Nghiem, G.R. Brakenridge, R. Dole, D. LeComte, E.G. Njoku, J. Verdin, D.A. Wilhite, B. Wardlow, and T. Tadesse), NASA, 119,000; September, 2007-September, 2010.

- Drought Risk, Impact, and Mitigation Information System* (with S. Goddard and D. Wilhite, M. Hayes, T. Tadesse, C. Knutson, K. Schoengold, and K. Hubbard), USDA/RMA, \$6,407,472; October, 2005- October, 2010.
- Transitioning the Drought Impact Reporter into an Operational System* (with M. Hayes, D. Wilhite, G. Garfin, C. Knutson, D. Wood, and M. Higgins), NOAA Office of Global Programs, \$453,523; March, 2007 to March, 2010.
- Rangeland and Forage Geospatial Decision Support System for Drought Risk Management* (with D.A. Wilhite, K. Hubbard, T. Tadesse, J. Brown, M. Hayes, C. Knutson, J. Volesky, and M. Tooze), USDA/RMA, \$1,023,038; October, 2005 to October, 2008.
- Development of a Drought Decision Support Portal for the Republican River Basin of Nebraska, Colorado, and Kansas* (with C. Knutson and J. Ryu, NOAA, \$223,525; August, 2007-August, 2009.
- Developing a Drought Preparedness Framework for Tribal Governments: Moving From Crisis to Risk-Based Management* (with M. Hayes and C. Knutson), United States Bureau of Indian Affairs, \$160,000; October, 2007-October, 2008.

SELECTED PUBLICATIONS

- Wardlow, B., M. Hayes, M. Svoboda, T. Tadesse, and K. Smith. 2009. *Sharpening the focus on drought: new monitoring and assessment tools at the National Drought Mitigation Center*, **Earthzine**, unpaginated, <http://www.earthzine.org/2009/03/30/sharpening-the-focus-on-drought-%e2%80%93-new-monitoring-and-assessment-tools-at-the-national-drought-mitigation-center/>.
- Trnka, M., M. Dubrovsky, M. Svoboda, D. Semerádova, M. Hayes, Z. Zalud, and D. Wilhite. 2008. *Developing a Regional Drought Climatology for the Czech Republic for 1961-2000*, **International Journal of Climatology**, DOI: 10.1002/joc.1745.
- Dubrovsky, M., M. Svoboda, M. Hayes, D. Wilhite, Z. Zalud, and P. Hlavinka. 2008. *The Application of Relative Drought Indices in Assessing Climate Change Impacts on Drought Conditions in Czechia*, **Theoretical and Applied Climatology**, 96(1-2), 155-171.
- Wu, H., M.D. Svoboda, M.J. Hayes, D.A. Wilhite, and F. Wen. 2007. *Appropriate Application of the Standardized Precipitation Index in Arid Locations and Dry Seasons*, **International Journal of Climatology**, 27, 65-79.
- Knutson, C., M. Hayes, and M. Svoboda. 2007. *Case Study of Tribal Drought Planning: The Hualapai Tribe*, **Natural Hazards Review**, 8(4), 125-131.
- Wu, H., M.J. Hayes, D.A. Wilhite, and M.D. Svoboda. 2005. *The effect of Data Length on the Standardized Precipitation Index Calculation*, **International Journal of Climatology**, 25:4, 505-520.
- Hayes, M., M. Svoboda, D. LeComte, K. Redmond, and P. Pasteris. 2005. *Drought Monitoring: New Tools for the 21st Century*, In: **Drought and Water Crises: Science, Technology, and Management Issues**, D. Wilhite, ed., Oxford University Press/CRC Press, pp. 53-69.
- Svoboda, M., D. LeComte, M. Hayes, R. Heim, K. Gleason, J. Angel, B. Rippey, R. Tinker, M. Palecki, D. Stooksbury, D. Miskus, and S. Stephens. 2002. *The Drought Monitor*, **Bulletin of the American Meteorological Society**, 83(8):1181-1190.

OTHER PROFESSIONAL ACTIVITIES

- Member*, American Meteorological Society; American Association of State Climatologists; National Hydrologic Warning Council 2006-present, NOAA-National Integrated Drought Information System (NIDIS) Implementation Team
- Co-Chair*, 2001-2005, Monitoring and Prediction Task Group, Interim National Drought Council
- Co-Chair*, 1999-2000, Monitoring and Prediction Working Group, National Drought Policy Commission
- Co-author*, 1999-present, U.S. Drought Monitor (<http://drought.unl.edu/dm>)
- Co-author*, 2002-present, North American Drought Monitor
- Invited delegate*, 2008, Canberra, Australia, representing U.S. delegation in a bilateral drought workshop between Australia and the United States hosted by the Australian Bureau of Rural Sciences
- Invited Expert Evaluator and Rapporteur*, 2007, European Commission in Brussels for research proposal reviews
- Invited roundtable expert and plenary speaker*, 2006, Mediterranean: Water and Drought Forum, in Zaragoza, Spain sponsored by the Spanish Ministry of Environment
- Consultant*, 2007, USAID/Chemonics on assessing the status of the Moroccan Drought Observatory in Rabat

JAMES B. SWINEHART, Professor, 6% Teaching, 69% Research, 23% Scholarly Service,
2% University Service

Areas of Interest: Great Plains Cenozoic Stratigraphy and Sedimentology, Eolian Sedimentation and Paleoclimates
Contact: jswinehart1@unl.edu, 402/472-7529

EDUCATION

B.A. Geology, University of California-Riverside (1965)
Geology, Pennsylvania State University (1965-1970)
M.S. Geology, University of Nebraska-Lincoln (1979)

PROFESSIONAL EXPERIENCE

1997- present Professor, School of Natural Resources, Conservation and Survey Division, University of Nebraska-Lincoln
1986-1997 Associate Professor, Conservation and Survey Division, University of Nebraska-Lincoln
1979-1986 Assistant Professor/Research Geologist, Conservation and Survey Division, University of Nebraska-Lincoln-L
1970-1979 Research Geologist, Conservation and Survey Division, University of Nebraska-Lincoln

HONORS AND AWARDS

Charles E. Bessey Award for best paper (with co-author David Loope) in natural sciences, **Great Plains Research** (2000)

Charles E. Bessey Award for best paper (with co-author Barbara Nicholson) in natural sciences, **Great Plains Research** (2005)

TEACHING Courses Taught (Fall, Spring)

Geol 106 Environmental Geology, 3 cr (S 02, S 04)
Geol 869 Regional Field Geology, 1 cr (one of two instructors) (F 02, F03, F04, F05, F06)

Masters Students Advised

Claire C. Larson (M.S. Geology 2002)
Kimberly Roberts (M.S. Geology 2004)

RESEARCH AND SURVEY

I have established basic and applied programs focusing on the stratigraphy, sedimentology, and sedimentary petrology of the Cenozoic strata of Nebraska and their relationship to similar strata in adjacent states. I have made investigations of the surface and subsurface to gain an understanding of alluvial, eolian and lacustrine depositional systems in the evolution of Great Plains landscapes. This information, in the form of over 65 geologic maps, test hole reports, and open file publications is an important data set for the evaluation of Nebraska's geologic natural resources, including its groundwater. Collaborative research on the Nebraska Sand Hills has demonstrated this region has experienced several significant mega-droughts during the last 20,000 years.

SELECTED GRANTS AND CONTRACTS

Collaborative Research: Mechanisms Producing Variation in Lake Salinity in Dune Environments: Nebraska Sand Hills, National Science Foundation; Vitaly Zlotnik is the PI, I am a CO-PI along with and Sheri Fritz, \$219,958; September 06-August 09.

Rural and Urban Geologic Mapping of NE: Detailed Surficial and Geological Stack Mapping in Urbanizing Reaches of the Platte River Valley: The Columbus and Columbus SW 7.5 Minute Quadrangles, U.S. Geological Survey, I was Co-PI with Paul Hanson and Matt Joeckel, \$46,431; May 06-April 07

Dunefield Records of Late Quaternary Climactic Change, Northern China., National Science Foundation, I am Co-PI on this grant along with Dr. Ron Goble of UNL Geosciences, \$87,581; June 05- May 09.

Sand Hills Biocomplexity: Integrating Biogeophysical Processes Across Space and Time, National Science Foundation, I was one of 15 project team scientists from across UNL on this four-year grant, David Wedin was the Project Coordinator, \$1,794,236; Sept 03- Aug 07.

Rural and Urban Geologic Mapping of NE- Subprojects 2 and #3, Mapping and Digitizing in the Alliance Quadrangle, with H. LaGarry, U.S. Geological Survey, \$87,485; May 05-April 06.

Hydrogeological controls on salinity patterns in the Sand Hill lakes, NE, the PI was Vitaly Zlotnik and I was one of three Co-PI's, U.S. Geological Survey, \$19,975; May 04-August 05.

Collaborative Research: Resolving the Enigma of Late Quaternary Loess on the Great Plains, National Science Foundation, with Co-PI's, Ron Goble and Dave Loope. \$114,022; March 03-April 06.

Rural and Urban Geologic Mapping of NE- Subprojects 2 and #3, Mapping and Digitizing in the Alliance and Crawford Quadrangle, U.S. Geological Survey, with H. LaGarry \$113,383, May 04-April 05.

Rural and Urban Geologic Mapping of NE- Subprojects 1 and #3, Mapping and Digitizing in the Alliance and Crawford Quadrangle, with H. LaGarry, U.S. Geological Survey, \$115,313, May 03-April 04.

Rural and Urban Geologic Mapping of NE- Subprojects 3 and #4, Mapping and Digitizing in the Alliance and Crawford Quadrangle, with H. LaGarry, U.S. Geological Survey, \$124,980, May 02-April 03.

REFEREED PUBLICATIONS

Mason, J., Swinehart, J., Hyhuan, L., and Miao, X. *Limited change in dune mobility in response to a large decrease in wind power in semi-arid northern China since the 1970s*. **Geomorphology**, in press.

Fielding, C.R., LaGarry, H. E., LaGarry, L. A., Bailey, B. E., and Swinehart, J. B. 2007. *Sedimentology of the Whiteclay Gravel Beds (Ogallala Group) in northwestern Nebraska, USA: Structurally controlled drainage promoted by Early Miocene uplift of the Balch Hills Dome*, **Sedimentary Geology** 200, 58-71.

Miao, X., Mason, J.A., Swinehart, J.B., Loope, D.B., Hanson, P.R., Goble, R.J., and Liu, X. 2007. *A 10,000-year record of dune activity, dust storms, and drought in the central Great Plains*, **Geology**

Harvey, F.E., J.B. Swinehart and T.M. Kurtz. 2007, *Ground Water Sustenance of Unique Ecosystems: Nebraska's Sand Hills Peatland Fens*, **Ground Water**

Sridhar, V., D.B. Loope, J.B. Swinehart, J.A. Mason, R.J. Oglesby, and C.M. Rowe. 2006. *Large wind shift on the Great Plains during the Medieval Warm Period*, **Science**, 313, 345-347.

Nicholson, B.J. and Swinehart, J.B. 2005. *Evidence of Holocene climate change in a Nebraska Sandhills wetland*. **Great Plains Research**, v. 15, pp. 45-67.

Lu, H., X. Miao, Y. Zhou, J. Mason, J. Swinehart, J. Zhang, L. Zhou, and S. Yi. 2005. *Late Quaternary aeolian activity in the Mu Us and Otindag dune fields (north China) and lagged response to isolation forcing*, **American Geophysical Union**, v 32, p. 716-720.

Goble, R.J., Mason, J.A., Loope, D.B., and Swinehart, J. B. 2004. *Optical and radiocarbon ages of stacked paleosols and dune sands in the Nebraska Sand Hills, USA*, **Quaternary Science Reviews**, 23, 1173-1182.

Mason, J., J. Swinehart., R. Goble, and D. Loope. 2004. *Late Holocene Dune Activity linked to Hydrologic Drought, Nebraska Sand Hills, USA*. **The Holocene**. 14, 209-217.

OTHER PROFESSIONAL ACTIVITIES

Faculty Development Leave, learning optically stimulated luminescence dating techniques, July-Dec, 2002

Invited Keynote Speaker, 2002, 2004, 2005, 2006, and 2008 *Sand Hills Discovery Experience*, Ainsworth, NE

Field Trip Co-Chair, 7th *International Conference on Fluvial Sedimentology* Lincoln, NE (2001)

Technical Session Co Chair (T98) Evolution of the Great Plains Landscape at the 2004 Geological Society of America Annual Meeting in Denver, CO.

Treasurer, Nebraska Geological Society, (2001-2007)

Chair, Yatkola-Edwards Grants Committee, Nebraska Geological Society; (1979-present)

Registered Professional Geologist, State of Nebraska, (1999-present)

JOZSEF SZILAGYI, Associate Professor, 100% Research (.33 FTE appointment)

Areas of Interest: Hydrologic Science, Applied Climate Science, Ecology

Contact: jszilagyil@unl.edu, 472-9667

EDUCATION

M.S. Meteorology with an emphasis in Hydrology, Eotvos Lorand University, Budapest, Hungary (1989).

M.S. Hydrology, University of New Hampshire (1994)

Ph.D. Hydrologic Sciences, University of California, Davis (1997)

PROFESSIONAL EXPERIENCE

2004-present Associate Professor, School of Natural Resources, University of Nebraska-Lincoln
2003-2004 Visiting Scientist, Hungarian Hydrological Forecasting Service
2000-2001 Visiting Scientist, Water Resources Research Group of the Hungarian Academy of Sciences
1997-2004 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
1994-1997 Postgraduate Researcher, University of California-Davis, Hydrologic Sciences
1992-1994 Research Assistant, Institute for the Study of Earth, Oceans and Space, Complex Systems Research Center, University of New Hampshire
1989-1992 Junior Research Associate, Hungarian Hydrological Forecasting Service

HONORS AND AWARDS

Doctor of Science Degree, Hungarian Academy of Sciences (2005)

Janos Bolyai Research Fellowship, Hungarian Academy of Sciences (2001)

University of California Tuition Fellowship (1995, 1996)

The Alfred Hille Prize, Hungarian Meteorological Society (1989)

RESEARCH

My research involves watershed hydrology; application of GIS to watershed/regional scale problems in hydrology; nonlinear models in surface water-soil moisture-groundwater interactions; coupling of remotely sensed data with GIS in catchment/ aquifer parameterization; regional evapotranspiration mapping; linear models of hydrology; hydrological forecasting.

SELECTED GRANTS AND CONTRACTS

Estimation of long-term evaporation rates from large lakes of Hungary under climate change scenarios and their comparison with historical estimates, as part of the European Union's –Climate Change and Variability: Impact on Central and Eastern Europe (CLAVIER) project, \$80,000; 2006-2010.

A new technique for mapping recharge fluxes to groundwater at a regional scale, National Science Foundation, \$15,120; 2003.

Equipment grant for modeling subsurface unsaturated/saturated zone interactions, University of Nebraska Water Center, \$11,320; 2002.

Mapping groundwater recharge in Nebraska, Research Council of the University of Nebraska, \$3,000, 2002.

Modeling capture zones in wellhead protection areas, Nebraska Department of Environmental Quality, \$25,241; 1999-2000.

SELECTED PUBLICATIONS

Szilagyil, J., Hobbins, M., and J. Jozsa. 2009. *A modified Advection-Aridity model of evapotranspiration*, **Journal of Hydrologic Engineering**, 14(6), 1-6.

Szilagyil J. and J. Jozsa. 2009. *Estimating spatially distributed monthly evapotranspiration rates by linear transformations of MODIS daytime land surface temperature data*, **Hydrology and Earth System Science, Discussion**, 6, 1433-1462.

Szilagyil, J. and J. Jozsa. 2009. *An evaporation estimation method based on the 2-D turbulent heat and vapor transport equations*, **Journal of Geophysical Research-Atmospheres**, 114, D06101.

Szilagyil, J. and J. Jozsa. 2008. *New findings about the Complementary Relationship-based evaporation estimation methods*, **Journal of Hydrology**, 354, 171-186.

- Szilagyi, J., Pinter, N. and R. Venczel. 2008, *Application of a routing model for detecting channel flow changes with minimal data*, **Journal of Hydrologic Engineering**, 13(6), 521-526.
- Szilagyi, J., Gribovszki, Z., Kalicz, P. and M. Kucsara. 2008. *On diurnal riparian zone groundwater-level and streamflow fluctuations*, **Journal of Hydrology**, 349(1-2), 1-5.
- Gribovszki, Z., Kalicz, P., Szilagyi, J. and M. Kucsara. 2008. *Riparian zone evapotranspiration from diurnal groundwater-level fluctuations*, **Journal of Hydrology**, 349(1-2), 6-17.
- Szilagyi, J. 2007. *Analysis of the nonlinearity in the runoff response to precipitation through numerical modeling*, **Journal of Hydrology**, 337, 391-401.
- Szilagyi, J., Gribovszki, Z. and P. Kalicz. 2007. *Estimation of catchment-scale evapotranspiration from baseflow recession data: Numerical model and practical application results*, **Journal of Hydrology**, 336, 206-217.
- Szilagyi, J. 2007. *On the inherent asymmetric nature of the complementary relationship of evaporation*, **Geophysical Research Letters**, 34, L02405.

OTHER PROFESSIONAL ACTIVITIES

- Associate Editor* of Water Resources Research (2008-present)
- Associate Editor* of the Journal of Hydrology (2005-2007)
- Member*, American Geophysical Union (1997-present)
- Member*, European Geophysical Union (2003-present)
- Member*, Hydrological Society of Hungary (1991-present)
- Member*, Public Body of the Hungarian Academy of Sciences (2004-present)

TSEGAYE TADASSE, Research Assistant Professor, 50% Research, 48% Scholarly Service,
2% University Service

Areas of Interest: Drought Monitoring, Remote sensing, Data mining, Climate change & variability
Contact: ttadesse2@unl.edu, 402/472-3383

EDUCATION

B.S. Physics, Addis Ababa University, Ethiopia (1982)
M.S. Space Studies, International Space University, Strasbourg, France (1998)
Ph.D. Agro-meteorology, University of Nebraska-Lincoln (2002)

PROFESSIONAL EXPERIENCE

2008-present Research Assistant Professor, School National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln
2005-2008 Assistant Geoscientist, National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln
2002-2005 Research Associate, National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln
1998-2002 Graduate Research Assistant, Department of Agronomy & Horticulture, University of Nebraska-Lincoln
1984-1997 Meteorologist & Team Leader, National Meteorological Services, Ethiopia
1982-1984 Instructor, Ethiopian Air Force Academy

HONORS AND AWARDS

Marquis Who's Who in America 2006 for achievements that influence the people today (2006)
Madison Who's Who for outstanding work for professionals & executives (2005)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 299 Climate in Crisis (as a guest lecturer)
NRES 452/852 Climate society (as guest lecturer)
NRES 103 Introduction to Agriculture & Natural Resources Systems (as guest lecturer)

Masters and Doctoral Students Committees

Eric D. Hunt (Ph.D. Natural Resources Sciences, expected 2011) Course work in progress.

RESEARCH

I am involved in drought monitoring research focused on the development of new drought monitoring tools integrating climate, satellite, oceanic observations with biophysical parameters such as land use/land cover in assessing and predicting large-area vegetation stress by using data mining techniques. As a result, we have developed operational monitoring tools such as the Vegetation Response Drought Index (VegDRI), as well as predictive tools such as the Vegetation Outlook (VegOut). Research is undergoing to model & evaluate the prediction tool (i.e., VegOut) to be operational in the near future. Additional research is underway that includes investigation of the use of thermal data and microwave sensors for estimating evapotranspiration and soil moisture to monitor drought in collaboration with scientists who are working at USGS Earth Resources Observation & Science (EROS) and NASA Jet Propulsion Laboratory (JPL).

EXTENSION/OUTREACH

I presented climate and remote sensing-based drought monitoring research and applications at several national and international professional meetings and workshops. I conducted numerous workshops nationally to introduce agricultural producers and other decision makers to new drought monitoring tools being developed at the NDMC and educate them on the use of information from these tools for specific applications.

UNIVERSITY SERVICE

I served as a member on the Chancellor's commission on the status of people of color from April 2008 to present. I serve on the School of natural resources Research Committee since 2006. I serve on the graduate committee as a

member for one Ph.D. student. I, also, served on the search committees in hiring different faculty and staff members within the School of Natural Resources including for the position of the Director of High Plains Regional Climate Center.

SELECTED GRANTS AND CONTRACTS

The Impact of Weather Extremes on Agricultural Production Methods: Dose Drought Increase the Adoption of Conservation Tillage Practices? (with Ya Ding and Karina Schoengold), UNL Agricultural Research Division, \$39,876; July 2007 to June 2009.

Incorporating Remote Sensing Information into the US Drought Monitor (with M. Svoboda, D.A. Wilhite and B. Wardlow), NASA, \$152,608; October 2007 to October 2010.

Rangeland and Forage Geospatial Decision Support System for Drought Risk Management (with D.A. Wilhite and other four investigators), U.S. Department of Agriculture Risk Management Agency (RMA), \$1,023,038; October 2005 to September 2010.

Drought Risk, Impact, and Mitigation Information System (with S. Goddard, D.A. Wilhite, and other collaborators), U.S. Department of Agriculture Risk Management Agency (RMA), \$6,407,472; October 2005 to September 2010.

SELECTED PUBLICATIONS

Tadesse, T., M. Haile, G. Senay, C. Knutson, and B.D. Wardlow, 2008. *Building integrated drought monitoring and food security systems in sub-Saharan Africa*. **Natural Resources Forum**, 32(4):245-279.

Brown, J.F., B.D. Wardlow, T. Tadesse, M.J. Hayes, and B.C. Reed, 2008. *The vegetation drought response index (VegDRI): a new integrated approach for monitoring drought stress in vegetation*. **GIScience and Remote Sensing**, 45(1):16-46.

Tadesse, T., B. Wardlow, and M. Hayes, 2008. *The application of data mining for drought monitoring and prediction*. **Data Mining Applications for Empowering Knowledge Societies**, Idea Group Publishers, New York, NY, pp. 280-291. (Peer-reviewed book chapters).

Tadesse, T., D.A. Wilhite, M.J. Hayes, J.F. Brown, and C.L. Knutson, 2006. *Modern drought monitoring tool for decision support system*. In: Ari-Veikko Anttiroiko and Matti Malkia (Eds.), **Encyclopedia of Digital Government**, Volume 3, 1212–1218. (Peer-reviewed book chapters).

Tadesse, T., J.F. Brown, and M.J. Hayes. 2005. *A new approach for predicting drought-related vegetation stress: Integrating satellite, climate, and biophysical data over the U.S. central plains*. **ISPRS Journal of Photogrammetry and Remote Sensing**, 59(4):244-253.

Tadesse, T., D.A. Wilhite, M.J. Hayes, S.K. Harms, and S. Goddard. 2005. *Discovering associations between climatic and oceanic parameters to monitor drought in Nebraska using data-mining techniques*. **Journal of Climate**, 18(10):1541-1550.

Tadesse, T., D.A. Wilhite, S.K. Harms, M.J. Hayes, and S. Goddard. 2004. *Drought Monitoring Using Data Mining Techniques: A Case Study for Nebraska, U.S.A.* **Natural Hazards** 33(1):137-159.

OTHER PROFESSIONAL ACTIVITIES

Representative and coordinator of North America, Ethiopian Meteorological Society (2008-present)

Member, International Editorial Advisory Board (EAB) of the *Advances in Knowledge Communities & Social Networks* (AKCSN) Book Series (2006-present)

Member, American Meteorological society (2002-present)

Member, National Geographic Society (2002-present)

STEVEN A THOMAS, Assistant Professor, 20% Teaching, 78% Research, 2% University Service

Areas of Interest: Stream ecology, biogeochemistry, ecosystem ecology
Contact: sthomas5@unl.edu, 402/472-4030

EDUCATION

B.S. Botany, University of New Hampshire (1987)
M.S. Zoology, University of Wyoming (1991)
Ph.D. Aquatic Ecology, Idaho State University (2000)

PROFESSIONAL EXPERIENCE

2006-present Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
2005-2006 Postdoctoral Fellow, Ecology and Evolutionary Biology, Cornell University
2003-2004 Senior Hydrologist, Eco-metrics, Inc.,
2000-2002 Postdoctoral Fellow, Department of Biological Sciences, Virginia Tech

TEACHING

Courses Taught (Fall, Spring, Summer)
NRES 496/896 Advanced Stream and River Ecology (F07, F08)
NRES 896 Graduate Seminar: Ecological Readings (F08)

Masters and Doctoral Students Advised

Christopher Pracheil (M.S. Aquatic Ecology 2009) Ecological affects of bank stabilization in the Cedar River, NE.
Sharon Cooperstein (M.S. Aquatic Ecology 2009) The influence of nutrients and invertebrate grazing on epilithon stoichiometry.
Thomas Heatherly (PhD. Applied Ecology 2012) Stoichiometric constraints on secondary production in tropical streams.
Tyler Kohler (M.S. Aquatic Ecology 2010) The influence of season and relative nutrient availability on periphyton in tropical streams.
David C. Owens M.S. Aquatic Ecology 2010) The influence of canopy cover and precipitation on terrestrial invertebrate subsidies to stream ecosystems.

RESEARCH

My research focuses on the functional attributes of aquatic ecosystems, the influence of community composition on these processes, and how ecosystem and evolutionary processes interact. Much of my research focuses on the transport dynamics of various ecological entities (e.g. fine organic particles, nitrogen, and phosphorus) and the potential for transport to longitudinally link ecosystems. More recently, my research has expanded to consider community and evolutionary topics and to understand the functional consequences of management activities (e.g. stream bank restoration). Although my research has focused on streams, I seek an understanding of these principles as generic processes active in all aquatic ecosystems.

UNIVERSITY SERVICE

Member of the CASNR international studies Task Forces overseeing international study programs for CASNR undergraduates

SELECTED GRANTS AND CONTRACTS

The ecological consequences of nutrient loading to stream ecosystems, Nebraska Department of Environmental Quality (pending), \$252,230.
Collaborative Research: Nutrient Processing and Retention in Streams - A Stioichiometric Approach to Coupled N and P Cycling, NSF-Ecosystems DEB- 0715117, \$51,345.
From genes to ecosystems: How do ecological and evolutionary processes interact in nature?, NSF-FIBR award number 0623632, Thomas subcontract \$307,000, total funds \$5,000,002; 2006-2011.
Ecological responses to stream bank stabilization in the Cedar River, Nebraska Department of Environmental Quality, \$153,000; 2006-2009.

Coupling consumer-resource interactions and nutrient spiraling in a stream network, NSF-Ecosystems 0543363, Thomas subcontract, \$119,000, total \$625,000; 2006-2009.

The Fate of Nitrate Entering a Coupled Terrestrial- Aquatic Ecosystem in the Upper Susquehanna Basin: a Pilot Tracer Experiment, Agricultural Ecology Program of Cornell University, \$60,000; 2005-2008.

Stream-Riparian Corridors - Disturbance, Linkages, and Resistance, NSF-Ecosystems, \$98,000; 2004-2005.

Geomorphic, Hydrologic, and Microbiological Networks in Integrated Terrestrial/Aquatic Biological Systems, NSFFIBR Incubation Grant, \$50,000; 2004-2005.

Nutrient and pesticide flux within a floodplain aquifer, USEPA through the Confederated Tribes of the Umatilla Indian Reservation, \$50,000.

SELECTED PUBLICATIONS

- Goodale, C, S.A. Thomas, G. Fredricksen, E.M. Elliot, M. Flinn, and T.J. Butler. 2008. *Unusual seasonal patterns and inferred processes of nitrogen retention in forested headwater catchments of the Upper Susquehanna basin*. **Biogeochemistry**, 93:197-218.
- McIntyre, P.S. Alexander S. Flecker, Michael J. Vanni, James M. Hood, and S.A. Thomas. 2008. *Fish distributions and nutrient cycling hotspots in a Neotropical stream*. **Ecology**, 89:2335-2346.
- Valett, H.M., S.A. Thomas, P.J. Mulholland, J.R. Webster, C.N. Dahm, C.S. Fellows, C.L. Crenshaw, and C.G. Peterson. 2008. *Endogenous and exogenous control of ecosystem function: N cycling in a headwater stream*. **Ecology**, 12:3515-3527.
- Arrigoni, A., G.C. Poole, L.A.K. Mertes, S.J. O'Daniel, W.K. Woessner, and S.A. Thomas. 2008. *Buffering, lagging, or cooling? Disentangling mechanisms of hypothetic influence on stream channel temperature*. **Water Resources Research**, Vol. 44, W09418, doi:10.1029/2007WR006480.
- Jones, K.L., G.C. Poole, W.W. Woessner, M.V. Vitale, B.R. Boer, S.J. O'Daniel, S.A. Thomas, and B.A. Geffen. 2008. *Geomorphology, hydrology, and aquatic vegetation drive seasonal hyporheic flow patterns across a gravel-dominated floodplain*. **Hydrological Processes**, DOI: 10.1002/hyp.6554.
- Brookshire, E.N.J., H.M. Valett, S.A. Thomas, and J.R. Webster. 2007. *Atmospheric N deposition - increases organic N loss from temperate forests*. **Ecosystems**, 2: 252-262.
- Fellows, C.S., H.M. Valett, C.N. Dahm, P.J. Mulholland, and S.A. Thomas. 2006. *Coupling nutrient uptake and energy flow in headwater streams*. **Ecosystems**, 9: 788-804.
- Mulholland, P.J., S.A. Thomas, H.M. Valett, J.R. Webster, and J. Beaulieu. 2006. *Effects of light on NO₃- uptake in small forested stream: diurnal and day to day variations*. **Journal of the North American Benthological Society**, 25(3):583-595.
- Thomas S.A., T.V. Royer, E.B. Snyder, and J.C. Davis. 2005. *Organic carbon spiraling in the Snake River, Idaho, USA*. **Aquatic Sciences**, 67:424-433.
- Brookshire, J.D., H.M. Valett, S.A. Thomas, and J.R. Webster. 2005. *Cycling of dissolved organic nitrogen in a forested headwater stream*. **Ecology**, 86:2487-2496.
- Cross, W.F., J.P. Benstead, P.C. Frost, and S.A. Thomas. 2005. *Applying principles of ecological stoichiometry to freshwater benthic ecology: recent progress and future potential*. **Freshwater Biology**, 50:1985-1912.
- Johnson, A.N., B.R. Boer, W.W. Woessner, J.A. Stanford, G.C. Poole, S.A. Thomas, and S.J. O'Daniel. 2005. *Evaluation of an inexpensive small-diameter temperature logger for documenting ground water-river interactions*. **Ground Water Monitoring and Remediation**, 25(4):68-74.
- Newbold, J.D., S.A. Thomas, G.W. Minshall, C.E. Cushing, and T. Georgian. 2005. *Deposition, benthic residence, and resuspension of fine organic particles in a mountain stream*. **Limnology and Oceanography**, 50:1571-1580.

OTHER PROFESSIONAL ACTIVITIES

Panel Member, National Science Foundation DEB-Ecosystems, Fall 2007 and Fall 2009

ANDREW J. TYRE, Assistant Professor, 40% Teaching, 58% Research, 2% University Service
Areas of Interest: Population Ecology, Adaptive Management, Statistical Ecology
Contact: antyre2@unl.edu, 402/472-4054

EDUCATION

B.S. (Honours) Zoology, University of Alberta (1991)
M.S. Behavioral Ecology, Simon Fraser University (1994)
Ph.D. Agriculture and Natural Resources, University of Adelaide (1999)

PROFESSIONAL EXPERIENCE

2003-present Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln
2002 - 2003 Research Scientist, CSIRO Marine Research, Cleveland, Queensland, Australia
1999 - 2001 Postdoctoral Fellow with Prof. Hugh Possingham, University of Queensland

HONORS AND AWARDS

IANR Junior Faculty Award for Research Excellence (2006)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 450/850 Biology of Wildlife Populations (S04, S05, S06, S07, S08, S09)
NRES 101 Orientation to Natural Resources (F04, F05, F06, F07, F08)
NRES 404 Senior Seminar (F04, F05, F08)
NRES 896 Ecological Statistics (F04, F05, F06, F07, F08)

Masters and Doctoral Students Advised

Brenda Woodward (M.S. Natural Resources, 2008) Testing the Textural Discontinuity Hypothesis and Indices of Biological Integrity using Missouri River Fish Communities
Max Post van der Burg (Ph.D. Natural Resource Sciences, 2008) Pseudorandom walks in ecological analysis: capturing uncertainty for better estimation and decision making

RESEARCH

My main area of interest revolves around helping people to make good wildlife management decisions, especially when very little is known about the wildlife population. We often know particularly little about threatened and endangered species, and we must make many decisions about such species. I like to try and frame these problems to identify “robust” decisions that ensure good outcomes even when we use inaccurate information. Right now, I’m working on using very simple, “prototype” models of habitat and population dynamics to guide decisions about habitat management for Interior Least Terns, Piping Plovers, and other threatened and endangered species. I build these models together with small groups of managers and stakeholders to directly incorporate their objectives into the modeling process. By involving the decision makers in the process of predicting the consequences of their decisions, they accept the recommendations emerging from the decision support process much more readily.

SELECTED GRANTS AND CONTRACTS

IGERT: Resilience in stressed watersheds, NSF, \$2,966,035; 2010-2015.

Quantifying uncertainty in Missouri River Adaptive Management processes, USACE, \$254098; April, 2009–December, 2010.

Contract Technical Support for Adaptive Management of Habitat Restoration Projects on the Missouri River, USACE, \$42,000; September, 2008-April 2009.

An adaptive management approach for selecting habitat improvement targets in the shortgrass prairie ecosystem, Nebraska Game and Parks Commission, \$62,747.97; 2006.

Western Nebraska grassland bird conservation: closing the adaptive loop with population monitoring and implementation of field clearing, State Wildlife Grants, Nebraska Game and Parks Commission, \$129,990; 2006-2008.

UBM: Research for Undergraduates in Theoretical Ecology (RUTE), Primary Investigators: Glenn W. Ledder, Bo Deng, Irakli Loladze, Robert M. Gibson, Svata M. Louda; Senior Scientists: Brigitte Tenhumberg, D. Logan, D. Pilson, Jean Knopf, Andrew J. Tyre. NSF, \$905000; 2005-2009.

SELECTED PUBLICATIONS

- Post van der Burg, M., Larkin, A. Powell, and Andrew J. Tyre. In press. *Modeling parasitism rate and parasitism risk: an illustration using a colonially nesting songbird*, **Journal of Avian Biology**.
- Justin D. Hoffman, Naikoa Aguilar-Amuchastegui, and Andrew J. Tyre. In press. *Use of simulated data from a process-based habitat model to evaluate methods for predicting species occurrence*, **Ecography**.
- Brigitte Tenhumberg, Andrew J. Tyre, and Richard Rebarber. In press. *Model complexity affects predicted transient population dynamics following a dispersal event: A case study with *Acyrtosiphon pisum**, **Ecology**.
- Don Wardwell, Craig R. Allen, Garry D. Peterson, and Andrew J. Tyre. 2008. *A test of the cross-scale resilience model: functional richness in Mediterranean-climate ecosystems*, **Ecological Complexity**, 5(2), 165-182.
- Joan Lubben, Brigitte Tenhumberg, Andrew J. Tyre, and Richard Rebarber. 2008. *Management Recommendations Based on Matrix Projection Models: The Importance of Considering Biological Limits*, **Biological Conservation**, 141, 517-523.
- Aly Deines, Ellen Peterson, Derek Boeckner, James Boyle, Amy Keighley, Joy Kogut, Joan Lubben, Richard Rebarber, Richard Ryan, Brigitte Tenhumberg, Stuart Townley, and Andrew J. Tyre. 2007. *Robust population management under uncertainty for structured population models*, **Ecological Applications**, 17(8), 2175-2138.
- Andrew J. Tyre, Gregory D. Kerr, Brigitte Tenhumberg, and C. Michael Bull. 2007. *Identifying mechanistic models of spatial behavior using pattern-based modeling: an example from lizard home ranges*, **Ecological Modeling**, 208, 307-316.
- Andrew J. Tyre, Brigitte Tenhumberg, and C. Michael Bull. 2006. *Identifying landscape pattern from individual scale processes*, **Ecological Modeling**, 199, 442-450.
- Tom E.X. Miller, Andrew J. Tyre, and Svata M. Louda. 2006. *Plant reproductive allocation predicts herbivore dynamics across spatial and temporal scales*, **The American Naturalist**, 168, 608-616.
- Jonathan Rhodes, Andrew J. Tyre, Niclas Jonzen, Clive McAlpine, and Hugh Possingham. 2006. *Optimising presence/absence surveys for detecting population trends*, **Journal of Wildlife Management**, 70(1), 8-18.

OTHER PROFESSIONAL ACTIVITIES

Member of Science Team, Nebraska's Natural Legacy Project, developing a comprehensive, science based conservation plan for Nebraska wildlife.

Participant in USGS/USFWS Adaptive Management Workshop; invited Adaptive Management Coach for National Conservation Training Center course on Structured Decision Making; Have run 3 workshops on Adaptive Management for large rivers in the last year for USACE/USFWS and Headwaters Corporation. Co-instructor for pilot Adaptive Management Short Course, UNL July 2008.

Writing a science blog on Adaptive management: aminpractice.blogspot.com

SHASHI B. VERMA, Professor, 15% Teaching, 83% Research, 2% University Service

Areas of Interest: Carbon Sequestration, Evapotranspiration, Micrometeorology

Contact: sverma1@unl.edu, 402/472-6702

EDUCATION

B.S. Ranchi University, Ranchi, India (1965)

M.S. University of Colorado, Boulder, Colorado (1967)

Ph.D. Colorado State University, Fort Collins, Colorado (1971)

PROFESSIONAL EXPERIENCE

2002-Present *Charles Bessey Professor of Natural Resource Sciences*, School of Natural Resources, University of Nebraska-Lincoln

1997-Present *Director*, Great Plains Regional Center for Global Environmental Change

1984-Present *Professor*, School of Natural Resources (formerly, School of Natural Resource Sciences, Department of Agricultural Meteorology, Center for Agricultural Meteorology and Climatology), University of Nebraska-Lincoln

HONORS AND AWARDS

Distinguished Professor, University of Nebraska, Lincoln, NE (2002-present)

University of Nebraska Institute of Agriculture and Natural Resources 2004 Team Award for the Carbon Sequestration Program (2004)

Fellow, American Society of Agronomy (2004)

The Award for Outstanding Achievement in Biometeorology, American Meteorological Society (2006)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 208 Introduction to Bio-Atmospheric Resources (F05, F06)

NRES 408-808 Microclimate: The Biological Environment (F04, F05, F07)

NRES 954 Turbulent Transfer in the Atmospheric Surface Layer (S04, S07)

Masters and Doctoral Students Advised

M.S.: T. Brakke (1977), D. Baldocchi (1979), J. Kim (1986), R. Clement (1988), A. Suyker (1992), G. Burba (1996)

Ph.D.: R. Motha (1978), D. Baldocchi (1982), D. Anderson (1983), J. DaCosta (1983), D. Nielsen (1983), P. Azevedo (1984), E. Graser (1985), J. Kim (1990), R. Garcia (1991), N. Shurpali (1995), P. Mielnick (1996), A. Suyker (2000), G. Burba (2005)

RESEARCH

I lead an interdisciplinary research program (2000-present) on carbon and water exchanges involving ten faculty members from five departments at the University of Nebraska-Lincoln (School of Natural Resources, School of Biological Sciences, Departments of Agronomy and Horticulture, Biological Systems Engineering, and Biochemistry). The research effort has quantified carbon sequestration and evapotranspiration in dryland and irrigated agroecosystems and has helped improve understanding of relevant biophysical controlling factors. Collaborating with scientists in North America and Europe to help synthesize results on CO₂ and energy fluxes from a variety of ecosystems (e.g., agricultural crops, grasslands, forests). These studies, using data from national and international carbon flux networks (AmeriFlux, CarboEurope, Fluxnet), have allowed development of relevant comparative information on processes controlling carbon, water and energy exchanges of terrestrial vegetation.

UNIVERSITY SERVICE

I am a member of the Integration Advisory Team, School of Natural Resources (2007-present), the Agronomy and Horticulture Farm Ad Hoc Committee (2008), the School of Natural Resources Research Committee (2002-present), the University of Nebraska Agricultural Research and Development Center Advisory Committee (1984-present), a Steering Committee member for the Energy Sciences Minor Steering Committee (2007-present) and member of the School of Natural Resources Promotion and Tenure Committee (2007-present). I am the Leader of the SNR Applied Climate Sciences Faculty (2009-2010).

SELECTED GRANTS AND CONTRACTS

U.S. Department of Agriculture, CSREES-CASMGS, \$1,139,462; 2002-06.
 U.S. Department of Energy: EPSCoR, \$1,025,066; 2003-06.
 U.S. Department of Energy: Office of Biol. and Environ. Research, \$900,000; 2003-06.
 U.S. Department of Energy: Office of Biol. and Environ. Research, \$1,050,000; 2006-09.
 National Aeronautics and Space Administration, \$599,485; 2008-11.

SELECTED PUBLICATIONS

Suyker, A.E. and S.B. Verma. 2009. *Evapotranspiration of irrigated and rain fed maize-soybean cropping systems*, **Agriculture and Forest Meteorology**, 149, 443-452.
 Suyker, A.E. and S.B. Verma. 2008. *Interannual water vapor and energy exchange in an irrigated maize-based agroecosystem*, **Agriculture and Forest Meteorology**, 148, 417-427.
 Verma, S.B., A. Dobermann, K.G. Cassman, D.T. Walters, J.M. Knops, T.J. Arkebauer, A.E. Suyker, G.G. Burba, B. Amos, H. Yang, D. Ginting, K.G. Hubbard, A.A. Gitelson, and E.A. Walter-Shea. 2005. *Annual carbon dioxide exchange in irrigated and rain fed maize-based agroecosystems*, **Agricultural and Forest Meteorology**, 131, 77-96.
 Suyker, A.E., S.B. Verma, G.G. Burba, and T.J. Arkebauer. 2005. *Gross primary production and ecosystem respiration of irrigated maize and irrigated soybean during a growing season*, **Agricultural and Forest Meteorology**, 131, 180-190.
 Suyker, A.E., S.B. Verma, and G.G. Burba. 2003. *Interannual variability in net CO₂ exchange of a native tallgrass prairie*, **Global Change Biology**, 9, 1-11.
 Suyker, A.E. and S.B. Verma. 2001. *Year-round observations of the net ecosystem exchange of carbon dioxide in a native tallgrass prairie*, **Global Change Biology**, 7, 279-289.
 Verma, S.B., J. Kim, R.J. Clement, N.J. Shurpali, and D.P. Billesbach. 1995. *Trace gas and energy fluxes: micrometeorological perspectives*, pp. 361-376, In: R. Lal, J. Kimble, E. Levine and B.A. Stewart (eds.), **Soils and Global Change**, Lewis Publishers, Chelsea, MI.
 Verma, S.B., P.J. Sellers, C.L. Walthall, F.G. Hall, J. Kim, and S.J. Goetz. 1993. *Photosynthesis and stomatal conductance related to reflectance on the canopy scale*, **Remote Sensing of Environment**, 44, 103-116.
 Verma, S.B., F. Ullman, D. Billesbach, R. Clement, and J. Kim. 1992. *Eddy correlation measurements of methane flux in a northern peatland ecosystem*, **Bound-Layer Meteorology**, 58, 289-304.
 Verma, S.B., J. Kim, and R.J. Clement. 1992. *Momentum, water vapor and carbon dioxide exchange at a centrally located prairie site FIFE*, **Journal of Geophysical Research**, 97, 18,629-18,640.

OTHER PROFESSIONAL ACTIVITIES

Board of Editors, Agricultural and Forest Meteorology (1994-present)
Nebraska Representative on the Executive Committee, Consortium for Agric. Soils Mitigation of Greenhouse Gases (2002-present)
Member, Steering Committee, AmeriFlux: US National Flux Network (1996-present)
Nebraska Representative, National Atmospheric Deposition Program (1978-present)
Member, Task Force of the NACP (North American Carbon Program) Mid-Continental Intensive Field Campaign (2000-present)
Member, State of Nebraska Carbon Sequestration Advisory Committee (2000-present)

ELIZABETH A. WALTER-SHEA, Professor, 35% Teaching, 40% Research, 25% University
Service as Teaching Coordinator

Areas of Interest: Environmental Biophysics, Remote Sensing
Contact: ewalter-shea1@unl.edu, 402/472-1553

EDUCATION

B.S. Geography, University of Central Arkansas (1978)
M.S. Geography, Texas A&M University (1981)
Ph.D. Agronomy (Agricultural Meteorology emphasis), University of Nebraska (1987)

PROFESSIONAL EXPERIENCE

2003-present Professor, School of Natural Resources, University of Nebraska - Lincoln
1997- 2003 Associate Professor, School of Natural Resources, University of Nebraska - Lincoln
1995-1997 Associate Professor, Department of Agricultural Meteorology, University of Nebraska - Lincoln
1989-1995 Assistant Professor, Department of Agricultural Meteorology, University of Nebraska - Lincoln
1987-1989 Research Assistant Professor, Department of Agronomy, University of Nebraska - Lincoln

HONORS AND AWARDS

IANR Team Award, Carbon Sequestration (2004)
CASNRR Service Award, University of Nebraska-Lincoln (2006)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 208 Applied Climate Sciences (team taught) (S04, S09)
NRES 312 Introduction to Geospatial Information Sciences (S06, S08)
NRES 408/808 Microclimate: The Biological Environment (team-taught) (F04, F05, F06, F07, F08)
NRES 908 Solar Radiation Interactions at the Earth's Surface (S05, S07)
NRES 891 Seminar in Natural Resource Sciences (team-taught) (S05, S09)

Masters and Doctoral Students Advised

Kham Noam Nang (Ph.D. Natural Resource Sciences, withdrew 2007) Understanding the fraction of PAR utilized by vegetation and its relation to remotely-sensed data

RESEARCH

I am involved in remote sensing techniques applied to carbon flux from vegetative canopies; relation between PAR absorbed by photosynthetically active vegetation and vegetative canopy reflectance; effects of shortwave and longwave forcings on surface temperature and evapotranspiration from various surfaces; ultraviolet radiation interactions in vegetative canopies.

UNIVERSITY SERVICE

I am the SNRS Teaching Coordinator, August 2000-2004 and August 2007-present.

SELECTED GRANTS AND CONTRACTS

UV-B climatological network site at the University of Nebraska Agricultural Research and Development Center, (with K. Hubbard), UV-B Monitoring Program (USDA), Colorado State University, \$3,000 annually; 1996-ongoing.
Carbon Sequestration and Global Climate Change (with S. Verma and K. Cassman), Department of Energy – EPSCoR, \$941,161 (\$65,950 EWS) renewal; 2003-2007.

SELECTED PUBLICATIONS

Arkebauer, T.J., E.A. Walter-Shea, M.A. Mesarch, A.E. Suyker, and S.B. Verma. Submitted. *Scaling Up of CO₂ fluxes from Leaf to Canopy in Maize-based Agroecosystems*, Submitted to **Agricultural and Forest Meteorology**.

- Hanan, N.P., J.A. Berry, S.B. Verma, E.A. Walter-Shea, A.E. Suyker, G.G. Burba, and A.S. Denning. 2005. *Model analyses of biosphere-atmosphere exchanges of CO₂, water and energy from Great Plains tallgrass prairie and wheat sites*, **Agricultural and Forest Meteorology**, 131, 162-179.
- Verma, S.B., A. Dobermann, K.G. Cassman, D.T. Walters, J.M.H. Knops, T.J. Arkebauer, A.E. Suyker, G.G. Burba, B. Amos, H. Yang, D. Ginting, K.G. Hubbard, A.A. Gitelson, and E.A. Walter-Shea. 2005. *Annual carbon dioxide exchange in irrigated and rainfed maize-based agroecosystems*, **Agricultural and Forest Meteorology**, 131, 77-96.
- Shulski, M.D., E.A. Walter-Shea, K.G. Hubbard, G.Y. Yuen, and G.L. Horst. 2004. *Penetration of photosynthetically active and ultraviolet radiation into alfalfa and tall fescue canopies*, **Agronomy Journal**, 96, 1562-1571.

OTHER PROFESSIONAL ACTIVITIES

Occasional Reviewer for Agronomy Journal, Remote Sensing of Environment, Agricultural and Forest Meteorology, NASA Research Proposals, UNL Agricultural Research Division Research Projects

Graduate Faculty Fellow, University of Nebraska, 1993-present

Chair, Natural Resources Undergraduate Curriculum Committee, 2008-present

Member, CASNR Curriculum Committee, 2007 to present; Life Sciences Core Curriculum Sub-Committee

Ex-officio member, SNR Curriculum and Graduate Committees, 2007 to present

Co-chair, Natural Resource Sciences Graduate Specialization (Bio-Atmospheric Interactions), ongoing Member, CASNR Teaching and Learning Improvement Council, 2007-present

Member and Program Leader, Program Excellence through Assessment, Research and Learning (PEARL), 2005-present

Courtesy appointment, Agronomy and Horticulture

Search Committees, Mead Laboratory Manager, SNR undergraduate advisor, GIS positions

Member, professional societies: American Association for the Advancement of Science, American Society of Agronomy, American Society for Photogrammetry and Remote Sensing, Ecological Society of America, American Meteorological Society, Gamma Sigma Delta

TIEJUN WANG, Postdoctoral Research Associate, 100% Research

Areas of Interest: Catchment Hydrology, Groundwater Hydrology, and Ecohydrology

Contact: twang3@unl.edu, 402-472-6275

EDUCATION

B.S. Hydrogeology and Engineering Geology, minor in International Finance, Ocean University of China (2001)

M.S. Environmental Engineering, Ocean University of China (2004)

Ph.D. Geosciences with specialization in Hydrogeology, University of Nebraska-Lincoln (2008)

PROFESSIONAL EXPERIENCE

2008-present Post Doctoral Research Associate, University of Nebraska-Lincoln

RESEARCH

I have been working closely with my colleagues on issues, such as interactions between groundwater and surface water on catchment scales, groundwater recharge, soil physics, and land surface processes. We found that the Nebraska Sand Hills plays a very important role in controlling the regional water balance on both long-term mean annual and annual time scales.

SELECTED PUBLICATIONS

Zhao, P., M. Shao, and T.J. Wang. *Multifractal characterization of soil particle-size redistributions of alluvial soils*, Submitted to **Journal of Soils and Sediments**.

Zhao, P., M. Shao, and T.J. Wang. *Spatial distributions of surface-layer saturated hydraulic conductivity and controlling factors on dam farmlands*, Submitted to **Water Resources Management**.

Wang, T.J., E. Istanbuluoglu, J. Lenters, and D. Scott. *On the role of groundwater and soil texture in the regional water balance: An investigation in the Nebraska Sand Hills, USA*, Under review of revised version, **Water Resources Research**.

Wang, T.J., D. Wedin, and V.A. Zlotnik. *Field Evidence of a Negative Correlation between Saturated Hydraulic Conductivity and Soil Carbon in a Sandy Soil*, **Water Resources Research**, in press.

Wang, T.J., V.A. Zlotnik, J. Šimuněk, and M.G. Schaap. 2009. *Using pedotransfer functions in vadose zone models for estimating groundwater recharge in semiarid regions*, **Water Resources Research**, 45, W04412, doi:10.1029/2008WR006903.

Wang, T.J., V.A. Zlotnik, D. Wedin, and K.D. Wally. 2008. *Spatial Trends in Saturated Hydraulic Conductivity of Vegetated Dunes in the Nebraska Sand Hills: Effects of Depth and Topography*, **Journal of Hydrology**, 349, 88–97.

Zlotnik, V.A., T.J. Wang, J.L. Nieber, and J.A. Šimuněk. 2007. *Verification of numerical solutions of the Richards equation using a traveling wave solution*, **Advances in Water Resources**, 30, 1973-1980.

Wang, T.J., X.L. Zheng, and J.F. Cui. 2006. *Study of nitrate contamination of groundwater from fertilization in the Laixi region*, **Periodical of Ocean University of China**, 36, 307-312 (In Chinese).

Wang, T.J., X.L. Zheng, and S.M. Zhao. 2005. *Advance in the vadose zone deterministic numerical model*, **Transactions of Oceanology and Limnology**, 2, 93-98 (In Chinese).

BRIAN D. WARDLOW, Assistant Research Professor, 60% Research, 38% Scholarly Service, 2% University Service

Areas of Interest: Remote Sensing, Geographic Information Systems (GIS), Natural Hazards (Drought), Land Use/Land Cover Characterization

Contact: bwardlow2@unl.edu, 402/472-6729

EDUCATION

B.S. Geography, Northwest Missouri State University (1994)

M.S. Geography, Kansas State University (1996)

Ph.D. Geography, University of Kansas (2005)

PROFESSIONAL EXPERIENCE

2006-present Assistant Research Professor, National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln

2001-2006 NASA Earth System Science Graduate Research Fellow, Kansas Applied Remote Sensing Program, University of Kansas

1999-2001 Graduate Research Assistant, Kansas Applied Remote Sensing Program, University of Kansas

1996-1999 Remote Sensing Scientist, U.S. Geological Survey's Earth Resources Observation Science Center

1994-1996 Graduate Teaching Assistant, Department of Geography, Kansas State University

HONORS AND AWARDS

Best Scientific Paper in Remote Sensing Award, American Society of Photogrammetry and Remote Sensing (2007)

John I. Davidson President's Award for best practical paper in remote sensing, American Society of Photogrammetry and Remote Sensing (2007)

GIS/Remote Sensing Specialty Group Best Illustrated Paper, Association of American Geographers Meeting (2003)

NASA Earth System Science Graduate Research Fellowship (2002)

U.S. Geological Survey's Group Achievement Award for the National Land Cover Data Set (2000)

Distinguished Graduate Assistantship Award, Department of Geography, Kansas State University (1996)

TEACHING AND ADVISEMENT

Masters and Doctoral Students Advised

Eric Hunt (Ph.D. Natural Resource Science, expected 2011) Coursework in progress.

Sharmistha Swain (Ph.D. Geography, expected 2011) Coursework in progress.

Masters and Doctoral Student Committees

Jeff Nothwehr (M.S. Natural Resource Science, 2007) Thesis title: Regional Evaluation of the Decile Method as a Drought Index for the United States.

Iwake Masialeli (Ph.D. Geography, University of Kansas, 2008) Dissertation title: Assessment of Time-Series MODIS Data for Cropland Mapping in the U.S. Central Great Plains.

Sandra Jones (M.S. Natural Resources Sciences, expected 2009) Coursework completed.

Jane Okalebo (Ph.D. Natural Resource Science, expected 2011) Coursework in progress.

Nicole Wall (Ph.D. Natural Resources Science, expected 2012) Coursework in progress.

RESEARCH

I am involved in drought monitoring research focused on the development of new remote sensing-based approaches for characterizing and predicting large-area vegetation stress, which has led to the creation of operational monitoring tools such as the Vegetation Response Drought Index (VegDRI), as well as predictive tools such as the Vegetation Outlook (VegOut). Additional research has investigated the use of thermal data and microwave sensors for estimating evapotranspiration and soil moisture. I am also involved in several land use/land cover (LULC) characterization investigations using time-series, satellite-based vegetation index observations for LULC mapping, phenological monitoring, and estimation of biophysical vegetation measures.

EXTENSION/OUTREACH

I conducted numerous workshops nationally to introduce agricultural producers and other decision makers to new drought monitoring tools being developed at the NDMC and educate them on the use of information from these

tools for specific applications. I presented remote sensing-based drought monitoring research and applications at several national and international professional meetings and workshops.

UNIVERSITY SERVICE

I serve as the advisor for two Ph.D. students and, also serve on the committees for five graduate students, who are pursuing degrees in either Geography or Natural Resources.

SELECTED GRANTS AND CONTRACTS

- Drought Mitigation – Nebraska Project* (with M. Hayes, C. Knutson, and M. Svoboda), U.S. Department of Agriculture Cooperative State Research, Education, and Extension Service (CREES), \$347,246; October, 2008– September, 2009.
- Integrating Enhanced GRACE Water Storage Data into the U.S. and North American Drought Monitor* (with M. Svoboda and seven investigators), NASA, \$597,000; October 2008–October 2011.
- Incorporating Remote Sensing Information into the U.S. Drought Monitor* (with M. Svoboda, D. Wilhite, and T. Tadesse), U.S. Geological Survey, \$152,598; October 2007–October 2010.
- Rangeland and Forage Geospatial Decision Support System for Drought Risk Management* (with D. Wilhite and four investigators), U.S. Department of Agriculture Risk Management Agency (RMA), \$1,023,039; October 2005–September 2009.

SELECTED PUBLICATIONS

- Wardlow, B.D. and S.L. Egbert. 2009. *A comparison of MODIS 250-m evi and ndvi data for crop mapping in the U.S. Central Great Plains*, **International Journal of Remote Sensing**, In press.
- Gu, Y., E. Hunt, B.D. Wardlow, J.B. Basara, J.F. Brown, and J.P. Verdin. 2008. *Evaluation and validation of modis ndvi and ndwi for vegetation drought monitoring using Oklahoma mesonet soil moisture data*, **Geophysical Research Letters**, doi:10.1029/2008GL035772.
- Tadesse, T., M. Haile, G. Senay, C. Knutson, and B.D. Wardlow. 2008. *Building integrated drought monitoring and food security systems in sub-Saharan Africa*, **Natural Resources Forum**, 32, 265-279.
- Brown, J.F., B.D. Wardlow, T. Tadesse, M.J. Hayes, and B.C. Reed. 2008. *The vegetation drought response index (VegDRI): a new integrated approach for monitoring drought stress in vegetation*, **GIScience and Remote Sensing**, 45(1), 16-46.
- Wardlow, B.D. and S.L. Egbert. 2008. *Large-area crop mapping using time-series MODIS 250 m ndvi data: an assessment for the U.S. Central Great Plains*, **Remote Sensing of Environment**, 112, 1096-1116.
- Gitelson, A.A., B.D. Wardlow, G.P. Keydan, and B. Leavitt. 2007. *Green leaf area index estimation in crops using MODIS 250 meter data*, **Geophysical Research Letters**, 34, L20403, doi:10.1029/2007GL031620.
- Wardlow, B.D., S.L. Egbert, and J.H. Kastens. 2007. *Analysis of time-series MODIS 250-meter vegetation index data for crop discrimination in the U.S. Central Great Plains*, **Remote Sensing of Environment**, 108, 290-310.
- Gu, Y., J.F. Brown, J.P. Verdin, and B.D. Wardlow. 2007. *A five-year analysis of MODIS ndvi and ndwi for grassland drought assessment over the central great plains of the United States*, **Geophysical Research Letters**, 34, L06407, doi:10.1029/2006GL029127.
- Brown, J.C., W. Jepson, J. Kastens, B.D. Wardlow, J. Lomas, and K. Price. 2007. *Multi-temporal, moderate spatial resolution remote sensing of modern agricultural production and land modification in the Brazilian Amazon*, **GIScience and Remote Sensing**, 44(2), 1-32.
- Wardlow, B.D., J.H. Kastens, and S.L. Egbert. 2006. *Using USDA crop progress data for the evaluation of greenup onset date calculated from MODIS 250-meter data*, **Photogrammetric Engineering and Remote Sensing**, 72(11), 1225-1234.

OTHER PROFESSIONAL ACTIVITIES

- Associate Editor*, agricultural and remote sensing sections of *Earthzine* (2009)
- Book Editor*, *Remote Sensing and Drought – New and Emerging Monitoring Approaches*, CRC Press (2009)
- Member*, National Phenology Network (NPN) Remote Sensing Working Group (2008 – present)
- Member*, NASA Soil Moisture Active Passive (SMAP) Satellite Applications Working Group (2008 – present)
- Courtesy Faculty*, Geography Program, University of Nebraska-Lincoln (2007 – present)
- Faculty Research Fellow*, Center for Advanced Land Management Information Technologies (CALMIT), University of Nebraska-Lincoln (2006 – present)

DAVID A. WEDIN, Professor, 40% Teaching, 55% Research, 5% University Service

Areas of Interest: Ecosystem Science, Grassland/woodland ecology

Contact: dwedin1@unl.edu, 402/472-9608

EDUCATION

B.A. Paracollege and Biology, St. Olaf College (1981)

Ph.D. Ecology, University of Minnesota (1990)

PROFESSIONAL EXPERIENCE

2008-present Professor, School of Natural Resources, University of Nebraska-Lincoln

2000-2008 Associate Professor, School of Natural Resources, University of Nebraska-Lincoln

1998-2000 Assistant Professor, School of Natural Resources, University of Nebraska-Lincoln

1997-1998 Associate Professor, Dept. of Botany, University of Toronto

1992-1997 Assistant Professor, Dept. of Botany, University of Toronto

1990-1992 Post-doctoral Research Assoc., NRRI, University of Minnesota-Duluth

HONORS AND AWARDS

Certificate of Recognition for Contributions to Students, University of Nebraska (1999, 2007, 2009)

Junior Faculty Excellence in Research Award, Agriculture Research Division, University of Nebraska (1999)

National Science Foundation Graduate Fellow, University of Minnesota (1983-1987)

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 220/222 Principles of Ecology (F04-09)

NRES 424/824 Forest Ecology (S04, S05, S07, S08)

NRES 492 Study Tours (Su04, Su06, Su08)

NRES 404 Senior Seminar (S09)

Masters and Doctoral Students Advised

Kimberly Payne (M.S. Natural Resource Sciences exp 2009) Linking plants, microbes and soils: geomorphic and ecological stability of the Nebraska Sand Hills.

Phillip A. Dobesh (M.S. Natural Resource Sciences 2007) Carrion Beetle (Coleoptera: Silphidae) Community Ecology in Relation to the Land Cover on the Nebraska National Forest (Bessey Ranger District)

Cullen R. Robbins (M.S. Natural Resource Sciences 2005) Analyses of high resolution hyperspectral imagery for characterization of ponderosa pine woodlands.

RESEARCH

From 2000-2007 I coordinated the Sand Hills Biocomplexity project (NSF). This interdisciplinary team studied the interactions of grassland ecology, dune geomorphology, hydrology and climate to understand the stability of the Nebraska Sand Hills over the last 2000 years. An ongoing major field experiment at University of Nebraska-Lincoln's Barta Brothers Ranch measures the ecohydrologic consequences of grassland loss and recovery, and the impacts of belowground ecological processes on dune stability and erosion. Related research at the Nebraska National Forest examines the impacts of woody species encroachment in the Sand Hills.

EXTENSION/OUTREACH

The Sand Hills Biocomplexity project had an active research program. We have partnered for 5 years with the Sand Hills Discovery Experience, a community-based science education program in Ainsworth NE that hosts an annual summer event and field trips. In addition, I have given over a dozen public seminars on our biocomplexity research.

UNIVERSITY SERVICE

From 2000 – 2008 I chaired, or co-chaired, the Natural Resources Undergraduate Curriculum Committee, which coordinates curriculum revision, recruiting and scholarships for SNR. Since 2007, I have been Director of Nine Mile Prairie, a 230-acre tallgrass prairie remnant managed for research and education by UNL. At the request of University of Nebraska-Lincoln's administration, in 2008-2009 I led a five university proposal to NSF for a major Science and Technology Center (Center for Integration of Climate and Landscape Dynamics).....we didn't get it.

SELECTED GRANTS AND CONTRACTS

- Trees, Shrubs, Grasses and the Nebraska Sandhills: Experimental Ecohydrology and Belowground Ecology*, USDA McIntire-Stennis Program, \$200,000; 2005-2010.
- Sand Hills Biocomplexity: Integrating Biogeophysical Processes across Space and Time* (with D. Loope and G. Henebry), NSF (Biocomplexity in the Environment), \$1,800,000; 2003-2007.

ELECTED PUBLICATIONS (list up to 10, emphasize last five years)

- Wang, T., D.A. Wedin, and V.A. Zlotnik. 2009. *Field evidence for a negative correlation between saturated hydraulic conductivity and soil carbon in a sandy soil*, **Water Resources Research**, in press.
- Eggemeyer, K.D., T. Awada, F.E. Harvey, D.A. Wedin, X. Zhou, and C.W. Zanner. 2008. *Seasonal changes in depth of water uptake for encroaching trees *Juniperus virginiana* and *Pinus ponderosa* and two dominant C₄ grasses in a semi-arid grassland*, **Tree Physiology**, 29, 157-169.
- Wang, T., V.A. Zlotnik, D. Wedin, and K.D. Wally. 2008. *Spatial trends in saturated hydraulic conductivity of vegetated dunes in the Nebraska Sand Hills: effects of depth and topography*, **Journal of Hydrology** 349, 88-97.
- Liang, Z., R.A. Drijber, D.J. Lee, I.M. Dwiekat, S.D. Harris, and D.A. Wedin. 2008. *A DGGE-cloning method to characterize arbuscular mycorrhizal community structure in soil*, **Soil Biology & Biochemistry**, 40, 956-966.
- Mousel, E.M., W.H. Schacht, C.W. Zanner, and D.A. Wedin. 2007. *Comparison of botanical composition, soil carbon content, and root distribution of subirrigated meadows in the Nebraska Sandhills*, **Great Plains Research** 17, 47-60.
- Wedin, D.A. and M.P. Russelle. 2006. *Nutrient cycling in forage production systems*, Pages 137-148 in K.J. Moore, R.F. Barnes, C.J. Nelson, and M. Collins (eds.), **Forages: the Science of Grassland Agriculture**, Blackwell Publishing, Ames, IA.
- Sridhar, V., K.G. Hubbard, and D.A. Wedin. 2006. *Assessment of soil moisture dynamics of the Nebraska Sandhills using long-term measurements and a hydrology model*, **J. of Irrigation and Drainage Engineering**, 132, 463-473.
- Eggemeyer, K.D., T. Awada, D.A. Wedin, F.E. Harvey, and X. Zhou. 2006. *Ecophysiology of two native invasive woody species and two dominant warm-season grasses in the semiarid grasslands of the Nebraska Sandhills*, **International Journal of Plant Science**, 167, 991-999.
- Tjoelker, M.G., J.M. Craine, D. Wedin, P.B. Reich, and D. Tilman. 2005. *Linking leaf and root trait syndromes among 39 grassland and savannah species*, **New Phytologist**, 167, 493-508.
- Wedin, D.A. 2004. *C₄ Grasses: Resource use, ecology and global change, 2004*, Pages 15-50 in Moser, L.E., B.L. Burson, and L.E. Sollenberger (eds.), **Warm-Season (C₄) Grasses**, Monograph No. 45. ASA, CSSA, SSSA. Madison, WI.

OTHER PROFESSIONAL ACTIVITIES

- Ecosystems Panel Member* (2008-2009), National Science Foundation (2008-2009)
- Reviewer for "Ecological Impacts of Climate Change"*, National Research Council

ALBERT WEISS, Professor, 15% Teaching, 83% Research, 2% University Service

Areas of Interest: Crop Simulation Modeling, Agricultural Climatology

Contact: aweiss1@unl.edu, 402/472-6761

EDUCATION

B.S. Meteorology, City College of New York (1962)

M. S. Climatology, Rutgers University (1969)

Ph. D. Micrometeorology, Cornell University (1975)

PROFESSIONAL EXPERIENCE

1997-present Professor, School of Natural Resources, University of Nebraska-Lincoln

1992-1997 Professor, Department of Agricultural Meteorology

1985-1992 Associate Professor, Department of Agricultural Meteorology

1981-1985 Associate Professor, Panhandle Research and Extension Center

1974-1981 Assistant Professor, Panhandle Research and Extension Center

TEACHING (last five years)

Courses Taught (Fall, Spring)

NRES 906 Crop Growth and Yield Modeling (S04, S06, S08)

NRES 907 Agricultural Meteorology (S05, S07, S09)

RESEARCH

Research efforts are devoted to two areas of crop simulation modeling. The first area is to develop or improve –simple,” robust models of crops for managerial decisions. Examples of this effort are a recently developed model of switchgrass and soybean. The second area focuses on phenotypic plasticity. An example of this area is efforts to incorporate genetic information into crop simulation models using plant height as a prototype system. Plant height is influenced by major genes that are discrete and well characterized genetically and phenotypic ally. Our goal of simulating final plant height for different height classes across environments was successful.

UNIVERSITY SERVICE

I am a member of the Department of Agronomy and Horticulture Graduate Committee representing the area of Agricultural Meteorology. I have been on this committee for the past five years. I have been on the SNR Nominating Committee for the past two years. I was the chair of the Search Committee for the Applied Climate Scientist/Director, High Plains Regional Climate Center position, March and April 2009.

SELECTED PUBLICATIONS

Grassini, P., E.D. Hunt, R.B. Mitchell, and A. Weiss. 2009. *Simulating switchgrass growth and development under potential and water limiting conditions*, **Agronomy Journal**, 101, 564-571.

Setiyono, T.D., A. Weiss, J.E. Specht, K.G. Cassman, and A. Dobermann. 2008. *Leaf area index simulation in soybean grown under near-optimal conditions*, **Field Crops Research**, 108, 82-92.

Setiyono, T.D., A. Weiss, J. Specht, A.M. Bastidas, K.G. Cassman, and A. Dobermann. 2007. *Understanding and modeling the effect of temperature and daylength on soybean phenology under high-yield conditions*, **Field Crops Research**, 100, 257-271.

Weiss, A. and A. Moreno-Sotomayer. 2006. *Simulating grain mass and nitrogen concentration in wheat*. **European Journal of Agronomy**, 25, 129-137.

Weiss, A. and W.W. Wilhelm. 2006. *The circuitous path to the comparison of simulated values from crop models with field observations*, **Journal of Agricultural Science (Cambridge)**, 144, 475-488.

Weiss, A. and C.J. Hays. 2005. *Calculating daily mean air temperatures by different methods: implications from a non-linear algorithm*, **Agriculture and Forest Meteorology**, 128, 57-65.

Xue, Q., A. Weiss, T.J. Arkebauer, and P.S. Baenziger. 2004. *Influence of soil water status and atmospheric vapor pressure deficit on leaf gas exchange in field-grown winter wheat*, **Environmental Experimental Botany**, 51, 167-179.

Xue, Q., A. Weiss, and P.S. Baenziger. 2004. *Predicting phenological development in winter wheat*. **Climate Research**, 25, 243-252.

Weiss, A. and C.J. Hays. 2004. *Simulation of daily solar irradiance*. **Agriculture and Forest Meteorology**, 123, 187-199.

Baenziger, P.S., G.S. McMaster, W.W. Wilhelm, A. Weiss, and C.J. Hays. 2004. *Putting genes into genetic coefficients*, **Field Crop Research**, 90, 133-143.

Moreno-Sotomayer, A. and A. Weiss. 2004. *Improvements in the simulation of kernel number and grain yield in CERES-Wheat*, **Field Crops Research**, 88, 157-169.

Xue, Q., A. Weiss, and P.S. Baenziger. 2004. *Predicting leaf appearance in field-grown winter wheat: evaluating linear and non-linear models*, **Ecology Modeling**, 175, 261-270.

OTHER PROFESSIONAL ACTIVITIES

Guest Managing Editor for a special issue of NJAS-Wageningen Journal of Life Sciences based on papers presented at the International Symposium on Crop Modeling and Decision Support held 19-22 April 2008, Nanjing, China.

Co-author of the second edition of *Principles of Ecology in Plant Production*, which is currently being revised.

DONALD A. WILHITE, Director and Professor, 100% Administration

Areas of Interest: Drought monitoring, mitigation, and policy; climate change

Contact: dwilHITE2@unl.edu, 402/472-4270

EDUCATION

B.S. Geography, Central Missouri State University (1967)

M.A. Geography and Climatology, Arizona State University (1969)

Ph.D. Geography (Climatology), University of Nebraska-Lincoln (1975)

PROFESSIONAL EXPERIENCE

2007-present Director, School of Natural Resources, University of Nebraska-Lincoln

1995-2007 Director, National Drought Mitigation Center and Professor, School of Natural Resources, University of Nebraska-Lincoln

1979-1995 Assistant/Associate/Professor, Department of Agricultural Meteorology, University of Nebraska-Lincoln

1977-1979 Water Management Specialist, Water Resources Center, University of Nebraska-Lincoln

HONORS AND AWARDS

Recipient, Omtvedt Innovation Award in recognition of exceptional service, Institute of Agriculture and Natural Resources, University of Nebraska (2005)

Recipient, W.R. Boggess Award, American Water Resources Association, for most outstanding paper published in the Water Resources Bulletin (1991)

TEACHING

Courses Taught (Spring)

NRES 452/852 Climate and Society (S02, S04, S06)

Masters and Doctoral Students Advised

Jeffrey Nothwehr (M.S. Natural Resource Sciences, Climate Assessment and Impacts 2007) Regional Evaluation of the Decile Method as a Drought Index for the United States.

Melissa Melvin (M.S. Natural Resource Sciences, Climate Assessment and Impacts 2006) Collecting and Reporting Drought Impacts at the State Level: Experiences, Lessons Learned, and Guidelines for Improvement.

Donna Woudenberg (Ph.D. Natural Resource Sciences, Human Dimensions 2006) Perception of the Drought Hazard on the Great Plains and the Sociological Impacts.

Tsegaye Tadesse (Ph.D. Natural Resource Sciences, Climate Assessment and Impacts 2002) Identifying Drought and Its Associations with Climatic and Oceanic Parameters Using Data Mining Techniques.

Hong Wu (Ph.D. Natural Resource Sciences, Climate Assessment and Impacts 2002) Agricultural Drought Risk Assessment: An Operational Model for Nebraska.

RESEARCH

My research program has focused on drought monitoring, impact assessment, and mitigation/planning/policy aspects of drought. I founded the National Drought Mitigation Center in 1995 and provided administrative leadership for the development of this center until August 2007 when I was appointed Director, School of Natural Resources.

SCHOLARLY SERVICE

An important aspect of my appointment prior to 2007 was the dissemination of information on drought management, planning, and policy to state, national, and international clientele.

SELECTED GRANTS AND CONTRACTS (2002-2007)

Estimating Impacts of Complex Climatic Events (with M.J. Hayes), NOAA, \$300,000; 2006-2009.

National Drought Mitigation Center, Funding received from the USDA, \$495,300; 2005-2007.

Drought Mitigation Project (Operating support for National Drought Mitigation Center), CSREES/USDA, \$402,412; 2005-2007.

Rangeland and Forage Geospatial Decision Support System for Drought Risk Management, USDA/RMA, \$1,023,038; 2005-2010.

Drought Risk, Impact, and Mitigation Information System (with S. Goddard), USDA/RMA, \$6,407,472; 2005-2010.

Climate and Soil Risk Information System (with S. Goddard and K. Hubbard), USDA FCIC/RMA. \$1,212,055; 2005-2008.

National Drought Monitoring System for Drought Early Warning Using Hydrologic and Ecologic Observations from NASA Satellite Data (with S.V. Nghiem, G.R. Brakenridge, R. Dole, D. LeComte, E.G. Njoku, and J. Verdin), NASA, \$798,364; 2005-2008.

SELECTED PUBLICATIONS

Iglesias, A., A. Cancelliere, F. Cubillo, L. Garrote, and D. Wilhite (eds.). 2009. *Coping with Drought Risk in Agriculture and Water Supply Systems. Drought Management and Policy Development in the Mediterranean*, Springer Publishers.

Knutson, C.L. and D.A. Wilhite. 2009. *New Developments and Opportunities for Drought Risk Reduction in Asia*, in **Global Change and Sustainable Development: Asia-Pacific Perspectives** (P.K. Low, ed.), Cambridge, England: Cambridge University Press.

Wilhite, D.A. 2007. *Preparedness and Coping Strategies for Agricultural Drought Risk Management: Progress and Trends*, in **Agricultural Risk Management: Challenges and Opportunities** (M.K.V. Sivakumar and R. Motha, eds.), Springer Publishers.

Wilhite, D.A. 2006. *Drought Monitoring and Early Warning: Concepts, Progress, and Future Challenges*, World Meteorological Organization, Geneva, Switzerland.

Wilhite, D.A. 2005. *Drought Policy and Preparedness: The Australian Experience in an International Context*, in **From Disaster Response to Risk Management: Australia's National Drought Policy** (L. Courtenay Botterill and D.A. Wilhite, eds.), Dordrecht, The Netherlands: Springer Publishers, 157-176.

Botterill, L. Courtenay and D.A. Wilhite (eds.). 2005. *From Disaster Response to Risk Management: Australia's National Drought Policy*, **Dordrecht, The Netherlands**: Springer Publishers.

Wilhite, D.A. 2005. *The Role of Disaster Preparedness in National Planning with Specific Reference to Drought*, in **Natural Disasters and Extreme Events in Agriculture** (M.K.V. Sivakumar, R.P. Motha, and H. Das, eds.), Berlin: Springer Publishers, 23-37.

Wilhite, D.A., L. Botterill, and K. Monnik. 2005. *National Drought Policy: Lessons Learned from Australia, South Africa, and the United States*, in **Drought and Water Crises: Science, Technology, and Management Issues** (D.A. Wilhite, ed.), Boca Raton, FL: CRC Press, 137-172.

Wilhite, D.A. and M. Buchanan-Smith. 2005. *Drought as Hazard: Understanding the Natural and Social Context*, in **Drought and Water Crises: Science, Technology, and Management Issues** (D.A. Wilhite, ed.), Boca Raton, FL: CRC Press, 3-29.

Wilhite, D., M. Svoboda, and M. Hayes. 2005. *Monitoring Drought in the United States: Status and Trends*, in **Monitoring and Predicting Agricultural Drought: A Global Study** (V.J. Boken, A.P. Cracknell, and R.L. Heathcote, eds.), New York: Oxford University Press, 121-131.

OTHER PROFESSIONAL ACTIVITIES

Technical Program Chair, Managing Drought and Water Scarcity in Vulnerable Environments: Creating a Roadmap for Change in the U.S. 2006. Sponsored by the Geological Society of American.

International Team Leader, National Drought Strategy Technical Cooperation Project: Jordan. Food and Agriculture Organization. Cairo, Egypt. 2005-2007.

Chair, WMO Forum on the Socio-economic Benefits of Weather, Climate, and Water Services, World Meteorological Organization. Geneva, Switzerland. 2006-present.

Editorial Board memberships: Disaster Prevention and Management: An International Journal/Advances in Natural and Technological Hazards Research, Book Series, Springer Publishers.

DAVID J. WISHART, Professor, 60% Teaching, 30% Research, 10% Service

Areas of Interest: Historical Geography, Great Plains, Dispossession of Indigenous Peoples, Epistemology of Geography and History.

Contact: egp@unl.edu, 402/472-3576

EDUCATION

B.A. University of Sheffield, England (1967)

M.A. University of Nebraska-Lincoln (1968)

Ph.D. University of Nebraska-Lincoln (1971)

PROFESSIONAL EXPERIENCE

2008-present Professor, Faculty of Geography, University of Nebraska-Lincoln

2002–2008 Professor and Chair, Department of Anthropology and Geography, University of Nebraska-Lincoln

1986–2002 Professor, Department of Geography, University of Nebraska-Lincoln

1978–1986 Associate Professor, Department of Geography, University of Nebraska-Lincoln

1974–1978 Assistant Professor, Department of Geography, University of Nebraska-Lincoln

1972–1974 Assistant Professor, Department of Geography, University of Nebraska-Lincoln

HONORS AND AWARDS

Encyclopedia of the Great Plains: Best Reference Source, **Library Journal**, 2004; *Outstanding Reference Source*, American Library Association, 2005; *Editors Choice*, **Booklist** 2004; *Outstanding Academic Title*, **Choice**, 2005

Invited to give the Chancellor's Distinguished Lecture (2004)

National Endowment for the Humanities Fellowship (2003)

J.B. Jackson Prize for Best Scholarly Book in North American Human Geography (for **An Unspeakable Sadness: The Dispossession of the Nebraska Indians**). *Also nominated for a Pulitzer Prize* (1995)

Distinguished Teaching Award, University of Nebraska-Lincoln, College of Arts and Sciences (1978)

TEACHING

Courses Taught (Fall, Spring)

Geog 140 Introductory Human Geography (F08)

Geog 334 Historical Geography of the Great Plains (F03, F04, F05, F06, F07, F08)

Geog 402 Undergraduate Seminar (S04, S06, F08)

Geog 903 History and Philosophy of Geography (S05, S07)

Geog 935 Seminar in Historical Geography (S06)

Master's and Doctoral Students Advised

Rebecca A. Buller (M.A. Geography, 2004). –Settlements of Holt County, Nebraska”

Darcy L. Boellstorff (Ph.D. Geography, 2004). –Impacts of the European Unions' Common Agricultural Policy Set-Aside Scheme on Soil erosion in Castilla-La Mancha”

Cody L. Knutson (Ph.D. Geography, 2004). –Rural Water Development for Marginal Regions with a Case Study of South Dakota's Mni Wiconi Project”

Matthew R. Engel. (Ph.D. Geography, 2007). –When a Prison Comes to Town: Siting, Location, and Perceived Impacts of Correctional Facilities in the Midwest”

Ezra J. Zeitler (Ph.D. Geography, 2008). –Geographies of Indigenous-based Team Name and Mascot use in American Secondary Schools”

RESEARCH

My major research over the last five years has focused on the Great Plains region. Publications include the *Encyclopedia of the Great Plains* (2004) and *Encyclopedia of Great Plains Indians* (2007). I am co-author of *The Great Plains: America's Lingering Wild*, to be published by the University of Chicago Press (August, 2009).

UNIVERSITY SERVICE

University service includes six years (2002-2008) as Chair of the Department of Anthropology and Geography,

and thirty-five years as Geography Undergraduate Advisor Service. Beyond the University service includes being a Trustee of the Board of the Nebraska State Historical Society (2006-present) and lectures to the Lincoln Public Schools History Teachers' Workshops every summer since 2000.

GRANTS

I have held no grants in the last five years. I was previously co-principal investigator on \$400,000 worth of grants to support the *Encyclopedia of the Great Plains* from 1995-2002.

SELECTED PUBLICATIONS

Wishart, D.J. 2004. *Period and Region*, **Progress in Human Geography**, **28**, 305–319.

Wishart, D.J., Editor. 2004. *Encyclopedia of the Great Plain*, **University of Nebraska Press**.

Wishart, D.J. 2006. *Natural Areas, Regions, and Two Centuries of Environmental Change on the Great Plains*, **Great Plains Quarterly**, **26**, 147–166.

Wishart, D.J., Editor. 2007. *Encyclopedia of Great Plains Indians*, **University of Nebraska Press**.

Wishart, D.J. 2007. *True West: Cycles of Violence*, **Times Literary Supplement**, May 25, 2007.

OTHER PROFESSIONAL ACTIVITIES

Associate Editor, **Great Plains Quarterly** (1982–present)

Consultant, **Standing Bear Project**, Nebraska Educational T.V. (2006 – present)

WAYNE E. WOLDT, Associate Professor, 25% Extension, 75% School of Biological Sciences
(15% Teaching, 35% Research, 25% Extension)

Areas of Interest: Water Resources and Environmental Engineering, Modeling, Hydrologic Information Systems
Contact: wwoldt1@unl.edu, 402-472-8656

EDUCATION

B.S. Civil Engineering, Colorado State University (1978)
M.S. Civil Engineering, University of Nebraska – Lincoln (1986)
Ph.D. Civil Engineering, University of Nebraska – Lincoln (1990)

PROFESSIONAL EXPERIENCE

1997 to present Associate Professor, Dept. of Biological Systems Engineering and School of Natural Resources,
University of Nebraska-Lincoln
1991 to 1997 Assistant Professor, Depts. of Biological Systems Engineering and Civil Engineering. University
of Nebraska-Lincoln
1990 - 1991 Visiting Assistant Professor, Dept of Civil Engineering, University of Nebraska-Lincoln

TEACHING

Courses Taught (Fall, Spring, Summer)

BSEN/CIVE 458/858	Groundwater Engineering (S05, S06, S07, S08, S09)
BSEN/CIVE 498/496/898/896	GIS in Water Resources (F06)
CIVE 498	Pollution Prevention (Su05, Su06, Su07)

Master and Doctoral Students Advised

Ram Marahatta (Ph.D. Engineering 2005) Multi-scale Modeling of a Submerged Vegetative Bed Wastewater
Treatment System

Krishan Ginige (M.S. Environmental Engineering 2006) Protection of Community Water Supply in Agricultural
Watershed

Mahesh Pun (M.S. Environmental Engineering 2008) Implementing an Integrated Surface-Groundwater Model in
Multiple Computational Environments

RESEARCH

I am involved in adaptive infrastructure management for environmental and water resources systems, model-based control systems for water environment infrastructure, simulation modeling of watershed systems with emphasis on surface/groundwater interaction, watershed simulation using high performance computing, multi-scale modeling of water environment systems.

EXTENSION

I am involved in advancing the onsite wastewater (i.e., septic system) industry in Nebraska through targeted curriculum development, extension workshops, education, training and evaluation. Additional extension efforts include development of private water supply educational resources.

SERVICE

I have served as Chair for the Modeling Committee for the National Science Foundation initiative WATERS Network, with a charge to develop a vision for modeling advances within the water environment. Also served on the Cyberinfrastructure Committee.

SELECTED GRANTS AND CONTRACTS

Research Leading Toward a Great Plains Environmental and Hydrologic Observatory, UNL Office of Research, total funding \$5,000; 2007-2008.

Simulation Modeling of Surface and Groundwater Interaction in a High Performance. Computing Environment, UNL Cyberinfrastructure Research Development Program, total funding \$25,000; 2006-2007.

Adaptive Management of Groundwater Supply Systems Using Soft Computing Approaches, University of Nebraska-Lincoln Agriculture Research Division; 2005-2010.

Advancing Onsite Wastewater Treatment in Nebraska: Alternative Treatment Systems and Focused Training for Industry and Agencies, Nebraska Department of Environmental Quality, total project funding \$259,742; 2005-2009.

SELECTED PUBLICATIONS

- Woldt, W., M. Pun, and G. Yeh. 2008. *Watershed Modeling for Surface-Groundwater Interaction*, **Proceedings, World Environmental and Water Resources Congress**, American Society of Civil Engineers, Honolulu, HI, May 12-16.
- Woldt, W., B. Beck, P. Kumar, and T. Papanicolaou. 2007. *WATERS Network Modeling Plan*, open file report to WATERS Network Project Office, <http://www.watersnet.org/plngdocs.html>, June 8.
- Finholt, T., J. Van Briesen, A. Costello, M. Mazurek, J. Myers, B. Minsker, W. Woldt, R. Hobby, M. Piasecki, and I. Zaslavsky. 2007. *WATERS Network Cyberinfrastructure Plan*, open file report to WATERS Network Project Office, <http://www.watersnet.org/plngdocs.html>, March 19.
- Woldt, W. and M. Dahab. 2006. *Adaptive Infrastructure Management in Environmental and Water Resource Systems*, **Proceedings, ASCE, Environmental and Water Resources Institute, 2006 World Water Congress**, Omaha, NE, May 21-25.
- Ginige, K. and W. Woldt. 2006. *Protection of Community Water Supply in an Agricultural Watershed*, **Proceedings, ModFlow and More 2006**, Golden, CO, May 22-24.
- Dou, C., W. Woldt, M. Dahab, and I. Bogardi. 1997. *Transient Groundwater Flow Simulation Using a Fuzzy Set Approach*, UNL Agricultural Research Division Journal Series No. 11042, **Ground Water**, V.35, N.2, p.205-215.
- Dou, C., W. Woldt, I. Bogardi, and M. Dahab. 1997. *Numerical Solute Transport Simulation Using Fuzzy Sets Approach*, UNL Agricultural Research Division Journal Series No. 11390, **Journal of Contaminant Hydrology**, V.27, p.107-126.

OTHER PROFESSIONAL ACTIVITIES

University of Nebraska Designated representative for the Consortium of Universities for the Advancement of Hydrologic Sciences, Incorporated (CUAHSI).

Active member of ASCE Groundwater Management technical committee.

DONNA L. WOUDEMBERG, Postdoctoral Research Associate, 70% Research, 30% Scholarly Service

Areas of Interest: Human Interactions with the Environment; Perception of the Drought Hazard; Social Impacts of Drought and Climate Change; Bridging the Gap between Science and Decision-Making; Education and Outreach; Women's, Children's & Minority Issues as related to the Environment; Global Sustainability and Equity

Contact: dwoudenberg2@unl.edu, 402/472-8287

EDUCATION

B.S. University of Nebraska-Lincoln, Natural Resources/Environmental Studies (2000)

M.S. University of Nebraska-Lincoln, Natural Resources/Climatology Focus (2002)

Ph.D. University of Nebraska-Lincoln, Natural Resources/Human Dimensions (2006)

PROFESSIONAL EXPERIENCE

01/07-Present Postdoctoral Research Associate, Natl. Drought Mitigation Ctr., University of Nebraska-Lincoln

09/03-12/06 Graduate Research Assistant, Natl. Drought Mitigation Ctr., University of Nebraska-Lincoln

01/03- 08/03 Staff, High Plains Regional Climate Center, University of Nebraska-Lincoln

01/01-12/02 Graduate Research Assistant, High Plains Regional Climate Center, University of Nebraska-Lincoln

HONORS AND AWARDS

Fellow, Center for Great Plains Studies, 2008

TEACHING

Courses Taught (Fall, Spring, Summer)

NRES 498/898 Gender and Cultural Perspectives on the Environment (S 09)

NRES 496/896 Gender and Cultural Perspectives on the Environment (F 07, S 08)

AGRI 103 Food, Agriculture and Natural Resource Systems; Recitation Section 124 (F 07)

Courses Taught in the role of Teaching Assistant

AECN 896 Ecological Economics (S 06)

NRES 323 Natural Resources Policy (S 03)

RESEARCH

Research is focused on identifying the social impacts of drought and determining effective ways to mitigate those impacts, and/or to assist individuals/agencies & organizations/municipalities/state & tribal governments in planning for and mitigating against drought. Particular interest is given to the differential impacts on women, children, minorities, and indigenous groups.

EXTENSION/OUTREACH

I initiated a collaboration between NDMC and Project WET International to develop K-12 educational materials and an educator's guide related to 1) water (50,000 copies pending), and 2) climate (soliciting funding). Active in NDMC and SNR education and outreach activities, particularly those aimed at grade school children.

UNIVERSITY SERVICE

The following is University service in which I am currently or have been involved:

Center for Great Plains Studies Board of Governors, UNL, Lincoln, NE, 04/09–present; will serve a three-year term as board member beginning in September 2009.

SNR Human Dimensions Faculty Group, School of Natural Resources, Lincoln, NE, 01/09–present, co-leader of faculty group.

Building Sustainable Partnerships, School of Natural Resources & City of Lincoln, Fall 08–present; organizer of forum to facilitate university and community collaboration: first forum, 02/09; planning next.

Committee Member, *Environmental Studies Coordinating Committee*, 09/08–present.

Committee Member, *Center for Great Plains Studies Planning & Program Committee*, UNL, Lincoln, NE, 08/08–present.

SNR 2009 Five-Year Review, School of Natural Resources, Lincoln, NE, 07/08–present; Physical Infrastructure, Human Dimensions & Applied Climate Sciences Teams.
 Committee Member, *School of Natural Resources Sustainability Committee*, UNL, Lincoln, NE, 05/08–present.
Postdoctoral Advisory Council, UNL, Lincoln, NE, 04/08–present; Secretary to the Council.
Faculty Advisor to Sigma Alpha Sorority, CASNR, Lincoln, NE, 4/07–present; Advisor to the CASNR Agricultural Sorority.
Women and Natural Resources Group, 01/07–present; & *EcoEco Interest Group*, 09/06–present, UNL; Co-founder of both informal networking groups.
Nebraska Symposium on Interdisciplinary Graduate Science Research, 04/05–09/05, University of Nebraska-Lincoln, Steering Committee; 1st Annual Symposium.
School of Natural Resources External Advisory Committee, 09/04–6/07, University of Nebraska-Lincoln; Graduate Student Representative.
School of Natural Resources Graduate Committee, 05/04–05/06, University of Nebraska-Lincoln Graduate Committee; Graduate Student Representative.
School of Natural Resources Graduate Student Association Board, 05/04–05/06, University of Nebraska-Lincoln; Student Representative to Graduate Committee.
SNR 2003 Five-Year Review Team, School of Natural Resources, Lincoln, NE, Fall 03, Review team member, SNR Graduate Student Representative.

SELECTED GRANTS AND CONTRACTS

Funded:

Low-flow Impacts Database Project for the Upper Colorado River Basin, \$87,000; 10/01/08-09/30/09; Co-PI.
Low-flow Impacts Database Project for the Alabama, Coosa, & Tallapoosa (ACT) and Apalachicola, Chattahoochee, & Flint (ACF) River Basins, \$24,999; 09/15/08-09/14/09; Co-PI.
Discover the Waters of Nebraska, \$85,000; 10/31/2007-11/01/2009; Co-PI.
Development of a "Drought Ready Communities" Program, \$288,670; 07/01/08-06/30/2010; Co-PI.

Pending:

Discover Climate Education Program, \$220,000; Co-PI.
UNL Initiative for Teaching and Learning Excellence: Course Development: Sustainable Societies Great Plains, \$20,000; Co-PI.

SELECTED PUBLICATIONS

Woudenberg, Donna L., Donald A. Wilhite, and Michael J. Hayes. April 2008. *Perception of Drought Hazard and its Sociological Impacts, South-Central Nebraska*, **Great Plains Research**, Vol. 18, No. 1, 93-102.
 Woudenberg, Donna L., Cody L. Knutson, Mark D. Svoboda, and Sandra Jones. October 2007. *Low Flow/Stage Related Impacts in the Red River of the North and Upper Mississippi Basins, North Dakota and Minnesota: Low Water Impact Information Database Project*, **Grant Technical Report**, 58 pages.
 Woudenberg, Donna L., Cody L. Knutson, Mark D. Svoboda, and Sandra Jones. August 2007. *Low Flow/Stage Related Impacts in the Upper Trinity River Basin, Texas: Low Water Impact Information Database Project*, **Grant Technical Report**, 53 pages.
 C.L. Knutson, P. Basabe, D. Wood, D. Woudenberg, M.E. Sittler, K.H. Smith, and D. Gutzmer. 2007. *Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hyogo Framework for Action*, United Nations Secretariat of the International Strategy for Disaster Reduction (UN/ISDR), Geneva, Switzerland, Peer Reviewed Public Education Material, 144+vi pp.
 Woudenberg, Donna L. 2006. *Perception of the Drought Hazard on the Great Plains and Its Sociological Impacts*, **Dissertation**, University of Nebraska-Lincoln.
 Woudenberg, Donna L. 2002. *The Role of Climate in Modern Water Planning and Related Decisions: A Nebraska Case Study*, **Thesis**, University of Nebraska-Lincoln.

OTHER PROFESSIONAL ACTIVITIES

Invited keynote speaker, Lincoln-Lancaster County Environmental Leadership Awards Luncheon, Lincoln, NE, 06/08.
Mayor's Environmental Task Force, Lincoln, NE, 07/08 to present.
Member, Education & Communication Sub-committee.
Conference Planning Committee Changing Natural Landscapes: Ecological and Human Dimensions, Lincoln, NE, 06/04–09/05.

JINSHENG YOU, Research Assistant Professor, 90% Research, 8% Scholarly Service,
2% University Service

Areas of Interest: Climatology, Hydrology, Geographic Information Systems
Contact: jyou2@unl.edu, 402/472-8765

EDUCATION

B.S. Hydrology and Water Resources, Hohai University, China (1993)
M.S. Hydrology and Water Resources, Hohai University, China (1996)
Ph.D. Civil Engineering, Utah State University (2004)

PROFESSIONAL EXPERIENCE

2006-present Research Assistant Professor, University of Nebraska, School of Natural Resources
2003-2006 Postdoctoral Research Associate, University of Nebraska, School of Natural Resources
1996-1999 Water Resources Engineer, Nanjing Institute of Hydrology and Water Resources, China

HONORS AND AWARDS

Layman Award, University of Nebraska, 2008.
Prize of National Science and Technology Advances by State Council of China (Second place) for Long Term Planning of Water Supply in China, 2001.
Prize of Science and Technology Advances in Water Sciences by China Water Resources Ministry (First place) for Long Term Planning of Water Supply in China, 1999.

TEACHING

Masters and Doctoral Students Advised
Deming Wang (M.S. Hydrology 2008)

RESEARCH

My recent research was mainly on the quality control of weather data, through which a quality control system has been developed to automatically review the weather data such as air temperature, precipitation, and soil moisture. The system has been in operation in the Applied Climate Information System (ACIS) and the data review procedures in the Automated Weather Data Network in Nebraska. Efforts were also placed to develop the serially complete data for multiple purposes, e.g., provide data support to the National Agricultural Decision Support System (NADSS).

UNIVERSITY SERVICE

I have been called upon to serve on different committees, such as the search committees for several hirings in the High Plains Regional Climate Center. As a member, I also worked with 9 other members to explore the cooperation between the School of Natural Resources and the Department of Statistics. I was also called upon to review research proposals submitted to the Office of Research of UNL.

SELECTED GRANTS AND CONTRACTS

Interactions among Climate Forcing, Soil Water, and Groundwater for Enhanced Water Management Practices in Nebraska, University of Nebraska Layman Award (PI: Jinsheng You, CO-PI: Xunhong Chen, Kenneth G Hubbard), \$10,000; July 2008–June 2009.
The base funding of the HPRCC in 2007 (PI: K.G. Hubbard, CO-PI: Jinsheng You, Xiaomao Lin), \$325,000; April 2007–March 2008.
Adding daily solar radiation and dew point temperature to historical weather records of the U.S. Cooperative Observer Network in the High Plains Region (PI: Kenneth G. Hubbard, CO-PI: Haishun Yang, Kenneth G. Cassman, Achim Dobermann, Jinsheng You), \$68,927; August 1–December 31, 2007.
Refinements to ACIS Quality Assurance Techniques (PI: Kenneth G. Hubbard, CO-PI: Jinsheng You), \$25,000; April 1, 2007–March 31, 2008.
Base funding for the operation of the High Plains Regional Climate Center (PI: K.G. Hubbard, Collaborators: J. You, K. Dewey, X. Lin), \$230,000; May 2006–January 2007.

SELECTED PUBLICATIONS

- Hubbard, K.G., J. You, E. Hunt, V.R. Sridhar, S. Korner, and G. Roebke. 2009. *State-Wide Soil Moisture Monitoring Networks: Nebraska Case Study*, **Great Plains Research**, 45-54.
- Sridhar, V., K.G. Hubbard, J. You, and E.D. Hunt. 2008. *Development of the Soil Moisture Index to Quantify Agricultural Drought and Its "User Friendliness" in Severity-Area-Duration Assessment*, **Journal of Hydrometeorology**, 9, 660–676.
- You, J., K.G. Hubbard, and S. Goddard. 2008. *Comparison of Methods for Spatially Estimating Station Temperatures in a Quality Control System*, **International Journal of Climatology**, 28, 777–787.
- You, J. and K.G. Hubbard. 2007. *Relationship of Flagging Frequency to Confidence Intervals in the Statistical Regression Approach for Automated Quality Control of Tmax and Tmin*, **International Journal of Climatology**, 27(9), 1257.
- You, J., K.G. Hubbard, S. Nadarajah, and K.E. Kunkel. 2007. *Performance of Quality Assurance Procedures on Daily Precipitation*, **Journal of Atmospheric and Oceanic Technology**, Vol. 24, No. 5, 821–834.
- Luo, B. and J. You. 2007. *A Watershed Simulation and Hybrid Optimization Modeling Approach for Water Quality Trading in Sediment Load Abatement*, **Advances in Water Resources**, 30(9), 1902-1913.
doi:10.1016/j.advwatres.2007.03.001.
- Hubbard, K.G., N. Guttman, J. You, and Z. Chen. 2007. *An Improved QC Process for temperature in the Daily Cooperative Weather Observations*, **Journal of Atmospheric and Oceanic Technology**, 24(2), 206–213.
- Chen, Z., S. Goddard, K.G. Hubbard, W.S. Sorensen, and J. You. 2006. *A Serially Complete U.S. Dataset of Temperature and Precipitation for Decision Support Systems*, **Journal of Environmental Informatics**, 8(2), 86-99.
- You, J. and K.G. Hubbard. 2006. *Quality Control of Weather Data during Extreme Events*, **Journal of Atmospheric and Oceanic Technology**, 23(2), 184–197.
- Hubbard, K.G. and J. You. 2005. *Sensitivity Analysis of Quality Assurance using Spatial Regression Approach -- A Case Study of the Maximum/Minimum Air Temperature*, **Journal of Atmospheric and Oceanic Technology**, 22(10), 1520–1530.

OTHER PROFESSIONAL ACTIVITIES

- Associate Editor:* American Association of State Climatologists Journal of Service Climatology
- Committee member:* HPRCC search committee member
- SNR Advising committee member:* interdisciplinary graduate program with Department of Statistics
- Organizer:* The 25th Anniversary of Automated Weather Data Network or Nebraska, May 2007; The Central Plains Severe Weather Symposium, 2005; Lincoln, Nebraska, USA, March 2005
- Reviewer:* Grant proposals submitted for funding from National Oceanic and Atmospheric Administration
- Journals:* **Hydrological Processes, Chinese Journal of Ecology, Risk Analysis – An International Journal, Chinese Journal of Applied Ecology, International Journal of Climatology, Environmental Management, Journal of Stochastic Environmental Research & Risk Assessment (SERRA)**
- Invited reviewer:* The 16th Congress of Asia and Pacific Division of International Association of Hydraulic Engineering and Research /The 3rd IAHR International Symposium On Hydraulic Structures, Oct. 20-28, 2008, Nanjing China

XINHUA ZHOU, Research Assistant Professor, 98% Research, 2% University Service

Areas of Interests: Bio-hydrology, Boundary Meteorology, Meteorological Instrumentation, Shelterbelt Ecology

Contact: xzhou2@unl.edu, 402/472-9889

EDUCATION

B.S. Forestry, Northeast Forestry University, China (1982)

M.S. Forest Meteorology, Northeast Forestry University, China (1987)

Ph.D. Horticulture and Forestry, University of Nebraska, USA (1999)

PROFESSIONAL EXPERIENCE

2002-present Research Assistant Professor, University of Nebraska-Lincoln

1999-2002 Postdoctoral Fellow, University of Nebraska-Lincoln

1992-1993 Research Associate Professor, Institute of Applied Ecology, Chinese Academy of Sciences

1987-1992 Research Assistant Professor Institute of Applied Ecology, Chinese Academy of Sciences

1982-1984 Course Instructor, Zhalantun Forestry College

HONORS AND AWARDS

Graduate Student Research Award. Nebraska Statewide Arboretum (1994)

Young Scientist Prize. Chinese Academy of Sciences (1993)

State Special Honorarium. State Council of the People's Republic of China (1993)

National Award, for progress in sciences and technologies, to "Sustained Yield and Regeneration of Farmland Shelterbelts". State Committee of Sciences and Technologies, China (1993)

TEACHING

Course Invited to Lecturer

NRES 406/806 Plant Ecophysiology: Theory and Practice

Master and Doctoral Students Advised as a Member of Advisory Committees

Kathy Eggemeyer (M.S. Tree Physiology, 2005) *Ecophysiology of Trees and Warm Season Grasses in the Nebraska Sandhills*.

Bryan Neal (Ph.D. Tree Physiology, expected 2009) *Consequences of Tree Expansion in the Nebraska Sandhills: Grassland Productivity, Composition, Forage Quality, and Water Use*.

RESEARCH

Shelterbelt aerodynamics: Defined the three-dimensional (3D) aerodynamic structure, developed a method to describe the 3D structure, and modeled the aerodynamic influence of the 3D structure.

Carbon sequestration of shelterbelt: Evaluated the use of forest-derived biomass equations for open-grown trees and developed a biomass equation for open-grown multiple-stemmed tree species.

Ecological impacts of tree invasive species on grassland: Described ecophysiology of native invasive woody species and warm season grass in Nebraska Sandhills.

Evapotranspiration as influenced by land management options: Three long-term eddy covariance systems were established in west of Nebraska, and three systems to monitor the water use by invasive tree species along the Republican River were established.

EXTENSION/OUTREACH

I provide landowners with data of water use as influenced by land management. Evapotranspiration over native grassland and non-irrigated cropland has been reported to landowners every year.

UNIVERSITY SERVICE

I serve as a member of the Research Committee, School of Natural Resources (2005~2008) and as a member of the Search Committee (2008, 2009).

SELECTED GRANTS AND CONTRACTS

- Estimation of evapotranspiration from riparian and invasive species using remote sensing, modeling and in situ measurements in the Republican River Basin*, Nebraska Department of Natural Resources (Investigator, PI: Dr. D. Martin), \$1,101,925; October 2007–October 2011.
- Effects of eastern redcedar invasion on the hydrology of cottonwood stands in the Republic Basin*, Burlington Northern Endowment (Co-PI with Dr. J. Huddle), \$20,000; June 2008–June 2010.
- Establishing integrated agricultural systems in western Nebraska*, IANR, University of Nebraska (co-PI with T. Awada), \$9,570; June 2007–June 2008.
- Measuring turbulent flows as influenced by shelterbelts and forests*, IANR, University of Nebraska (co-PI with Dr. J.R. Brandle), \$6,791; June 2004–June 2005.
- Woody species expansion in the Nebraska Sandhills: Ecological and socio-economic consequences*, Interdisciplinary Research Grant, University of Nebraska Agricultural Research Division (co-PI with Dr. T. Awada), \$40,000; June 2004–June 2006.
- Biomass in Montana windbreak species*, Montana Department of Natural Resources (co-PI with Dr. J.R. Brandle), \$14,500; June 2004–June 2005.

SELECTED PUBLICATIONS

- Eggemeyer, K.D., T. Awada, F.E. Harvey, D.A. Wedin, X.H. Zhou, and C.W. Zanner. 2009. *Seasonal changes in depth of water uptake for encroaching trees *Juniperus virginiana* and *Pinus ponderosa* and two dominant C4 grasses in a semi-arid grassland*, **Tree Physiology**, 29(2), 157-169.
- Zhou, X.H., J.R. Brandle, E.S. Takle, and C.W. Mize. 2008. *Relationship of three-dimensional structure to shelterbelt function: A theoretical hypothesis*, **Ecological Basis of Agroforestry**, 287-300.
- Zhou, X.H., J.R. Brandle, M.M. Schoeneberger, and T. Awada. 2007. *Developing above-ground woody biomass equations for open-grown, multi-stemmed tree species: Shelterbelt-grown Russian-olive*, **Ecological Modeling**, 202, 311-323.
- Eggemeyer, K.D., T. Awada, D.A. Wedin, F.E. Harvey, and X.H. Zhou. 2006. *Ecophysiology of two native invasive woody species and two dominant warm-season grasses in the semi-arid grasslands of the Nebraska Sandhills*, **International Journal of Plant Sciences**, 167, 991-999.
- Zhou, X.H., J.R. Brandle, C.W. Mize, and E.S. Takle. 2005. *Three dimensional aerodynamic structure of a tree shelterbelt: Definition, characterization and working models*, **Agroforestry Systems**, 63(2), 133-147.
- Brandle, J.R., L. Hodges, and X.H. Zhou. 2004. *Windbreaks in North American agricultural systems*, **Agroforestry Systems**, 61, 65-78.

OTHER PROFESSIONAL ACTIVITIES

- Member* of an editorial advisory board of **Acta Ecologica Sinica** (2000–present)
- Member* of an editorial advisory board of **Chinese Journal of Ecology** (2006–present)
- Member* of an editorial advisor board of **Forest Studies in China** (2007– present)
- Reviewer* of an international journal: **Ecological Modelling** (2006, 2007)
- Reviewer* of an international journal: **Agriculture, Ecosystems and Environment** (2009)