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The National Wildlife Research Center Research Update

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THE NATIONAL WILDLIFE RESEARCH CENTER

RESEARCH UPDATE

United States Department of Agriculture
Animal and Plant Health Inspection Service

Summer 2006

Wildlife Services – Vision and Strategic Goals

The U.S. Department of Agriculture's Wildlife Services (WS) program provides Federal leadership in managing problems caused by wildlife. Four important goals have been identified as part of WS' strategic plan to improve the coexistence of people and wildlife: Developing Methods, Providing Wildlife Services, Information and Communication, and Valuing and Investing in People. This research update contains short summaries of WS National Wildlife Research Center (NWRC) activities supporting these goals that occurred between October 1, 2005 and May 31, 2006. It also includes a spotlight article on NWRC's work with economics and highlights several new partnerships between NWRC and other organizations. For a more comprehensive description of the NWRC's research and related activities, please see the Center's annual "Innovative Solutions to Human-Wildlife Conflicts" report, which is available on the NWRC web site at <http://www.aphis.usda.gov/ws/nwrc/is/publications.html>.

Spotlight: The Economics of Wildlife Damage Management



How much does it cost to raise an endangered Puerto Rican parrot in captivity? What is the fine for killing an endangered sea turtle? How much are you willing to pay to see wolves in a national park? Answers to these types of questions are used to assign a dollar value to wildlife species. These values, in turn, are needed to assess the benefits and costs of wildlife damage management.

"There is more fiscal accountability these days," said Dr. Stephanie Shwiff, NWRC economist. "We have to justify why we are spending money".

Because wild animals are a public resource, property rights cannot be assigned. The government then "owns" the resource on behalf of its citizens, and is called upon to manage it for all. This government intervention is designed

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The best way to measure the efficiency of a government intervention is the benefit-cost analysis (BCA).



to ensure the resource is allocated in ways that are acceptable to citizens with multiple interests.

One way to measure the efficiency of a government intervention is the benefit-cost analysis (BCA). This procedure was developed specifically to evaluate government programs. The private sector uses market analysis and profit-loss accounting to allocate and value materials efficiently.

In a BCA both benefits and costs must be identified. Costs are usually not difficult to itemize. In wildlife damage management, costs for an activity such as trapping may include the cost of the traps, the cost of the baits or lures, and the labor costs of monitoring the traps and removing animals.

Benefits usually accrue from a reduction in damage over time or by an increase in numbers or amount of the resource being protected. Benefits can be difficult to assign because they are often dispersed among the many. Benefits can be direct (e.g., antelope increase in numbers because predators have been removed), indirect (e.g., livestock numbers increase because predators have been removed to protect the antelope) or intangible (e.g., people enjoy seeing large herds of antelope when driving down the road).

Once benefits of an action have been determined, a value has to be assigned. This is the most difficult and sophisticated part of the BCA analysis and is something done by the economist. Some resources such as cattle or corn, that are bought and sold as market goods, are easily assigned a value. But, how does one assign a value to an endangered Puerto Rican parrot, a coyote, a blackbird, an antelope, or enhanced wildlife viewing?

One solution is to use a range of values from different sources. Economists can employ values derived from such sources as civil penalties (e.g., fines levied for killing an animal), consumptive uses (e.g., hunting licenses, food, lodging, guide services, travel costs), replacement costs, captive breeding costs for endangered species, or contingent valuation studies.

“In the Wyoming antelope predation study, we used hunter-killed value because a lot of the antelope in the area are hunted,” said Shwiff. “The hunters generate a value to the local economy. In the study on the endangered sea turtles, we used the figure representing the civil penalty for killing one as the value of the turtle.” In a study on the Puerto Rican parrot, replacement costs (captive breeding costs divided by the number on individuals produced) were used to value the birds.

The least reliable but sometimes only available value is that derived from contingent valuation (CV) surveys. CV is used to determine “existence value” of a resource by defining people’s “willingness to pay” for that resource. CV studies are most often used in relation to the environment and natural resources.

“If you set up a study of the leatherback turtle, you can develop a survey that asks, ‘how much would you be willing to pay to keep this turtle from extinction?’” said Shwiff. “Alternatively, you could ask, ‘how much would you be willing to pay to have more turtles?’” The CV value is a stated preference, but because scenarios are hypothetical, responses may not be valid. People may not have a realistic sense of what they would pay, or may intentionally exaggerate what they would pay to further their interests.

People may argue that willingness to pay and other valuations of animals or environments aren't important – that the animals have a right to exist, regardless. However, dollars matter. “If you can't give something a dollar value, then, unfortunately, in our world you're not giving it a voice,” notes Shwiff.

Early BCAs at NWRC were fairly simple and looked at the economics of such actions as removing predators for protecting marine turtle nests, removing feral swine to protect habitat, and protecting the Puerto Rican parrot. However, economic analysis can be used at an even higher level.

“We can do a BCA as the first step in a study, but one of the last steps we can take is a sensitivity analysis,” said Shwiff. “We can look at how to make a study better by analyzing what variables are sensitive to changes that would make the benefit/cost ratio even better.” Scientists can run computer simulations that will manipulate variables like man-hours removing predators and weather, etc. and perhaps determine the variables that impact the study the most. This data can then be applied to make field work more efficient.

Additionally, input-output models (I/O) can be employed. An input-output model is a social accounting matrix developed by Nobel-prize winner Wassily Leontief to classify economic relationships of different production functions. Leontief argued that all sectors of the economy (manufacturing, agriculture, retail, services, etc.) are interrelated.

“If predation to livestock increases in California, for example, and run that figure through the California economy in an I/O model, you can determine how the agriculture sector is affected,” said Shwiff. “The I/O model can also be used to estimate damage avoidance, which is a way to value benefits. We can say that by having WS work to prevent ‘X’ from happening, you're saving ‘Y,’ and that figure is the benefit of our services. We can't always employ the I/O model, but we can when working on livestock protection, because the agriculture sector in the matrix has numbers for sheep and numbers for beef cattle.” Scientists could also, for example, use the I/O model to look at the impact NWRC has on the local economy (using the social accounting matrix for Larimer County, Colo.).



The various economic analyses discussed above can assign dollar amounts to management actions as well as provide a measurement of the social effects of such actions on humans and their values. Wildlife can affect attributes of our environment that, in turn, affect the ability of the environment to provide services that affect our everyday activities or happiness. Economic analyses incorporated into research studies help NWRC scientists to not only justify expenditures made to increase resources valued by society but to do so more efficiently. In short, economics is just one of many tools that can be used by wildlife damage managers everywhere to enhance decision-making and maximize agency efforts in resolving human-wildlife conflicts.

NEW PARTNERSHIPS

NWRC works with numerous partners to design, develop, test, and implement new wildlife damage management tools and techniques.

NWRC Participates in North Dakota Avian Influenza Working Group – An NWRC, Bismarck, N.D., scientist attended a multi-agency meeting on avian influenza in November 2005. The meeting was hosted by North Dakota/South Dakota WS. The U.S. Fish & Wildlife Service, the North Dakota Board of Animal Health, the North Dakota Game & Fish Department, and the North Dakota Board of Public Health joined WS in planning for surveillance and communication with the public. The working group discussed surveillance of wild and domestic birds for signs of the disease. An APHIS Veterinary Services veterinarian presented a seminar on the history, epidemiology and biology of the disease. Potential birds suitable for intense surveillance include waterfowl, shorebird species and the European starling. Waterfowl are known for interacting and breeding with backyard domestic flocks; whereas, European starlings form large migratory flocks during the nonbreeding season and interact with humans in urban and rural environments. The working group suggested that the North Dakota Board of Public Health coordinate future meetings.

Wetlands Ecological Research Aviary Grand Opening – NWRC employees at the Gainesville, Fla., field station, along with University of Florida partners, hosted a grand opening ceremony on November 2, 2005, for the newly built Wetlands Ecological Research Aviary. The 13,000-sq.-ft. outdoor aviary was designed to study the effects of environmentally relevant contamination levels of mercury on aquatic bird life. The development of the aviary is a collaborative effort between the University of Florida's Department of Wildlife Ecology and Conservation and the WS Program. It was funded by the Florida Department of Environmental Protection, the U.S. Fish and Wildlife Service, the U.S. Geological Survey and the U.S. Army Corps of Engineers. The mercury study is expected to last 5 years after which ownership of the aviary will be transferred to Wildlife Services. Approximately 50 people attended the grand opening, including a representative from U.S. Senator Bill Nelson's office and local Florida State Representative Edward Jennings.

APHIS Collaborates to Improve Toxicity Estimations for Risk Assessments – NWRC scientists are collaborating with the Chemistry Industry Institute for Toxicology in North Carolina to develop a model for toxicity estimation in wildlife. This work, conducted in February 2006, should lead to improvements in estimating toxicity of pesticides and drugs to target and nontarget wildlife species. Such information will be valuable in helping Wildlife Services produce more accurate risk assessments in wildlife damage management projects which use toxicants.

Potential birds suitable for intense surveillance include waterfowl, shorebird species, and the European starling. Waterfowl are known for interacting and breeding with backyard domestic flocks.



NWRC Scientist Discusses Collaboration with Los Alamos National Laboratory (LANL), NM – In October 2005, an NWRC scientist gave an overview to the LANL Earth and Environmental Science Division and established collaborative links between the two organizations. The NWRC scientist met with scientists and Directors from the LANL Geographic Information Systems Group, Theoretical Biology Unit, Avian Influenza Laboratory Group, and Influenza Sequence Database Unit. Common applied and basic research areas were identified and arrangements for field testing of newly developed field diagnostic kits for avian influenza were explored. Reciprocal visits by LANL scientists to the NWRC were conducted to further these areas of potential collaboration.

DEVELOPING METHODS & PROVIDING WILDLIFE SERVICES

NWRC applies scientific expertise to the development of practical tools and methods for use in wildlife damage management that protect agriculture, wildlife and other natural resources, property, and human health and safety.

Product Development

Scientists Participate in Hog Immunocontraception Research – An NWRC scientist from Fort Collins, Colo., traveled to Pennsylvania State University in October 2005 to participate in research associated with an ongoing study of immunocontraception in domestic hogs. The relative effectiveness of several injectable contraceptive vaccines is being tested on adult female hogs in a 1-year study with captive animals. The domestic hog is being used as a model for the eventual oral contraception of feral hogs. NWRC has been collaborating in contraception studies with Dr. Gary Killian, a reproductive physiologist at Pennsylvania State University, since 1992. Several contraceptive vaccine formulations for white-tailed deer, wild horses, and domestic and feral hogs have been investigated.



Careful evaluation and application of damage management tools and strategies is needed to ensure protection of human and natural resources in the area and to reduce the likelihood of the transport of invasive species to other sites.

Invasive Species

NWRC Biologist Trains Electric Utility Personnel to Trap Monk Parakeets –

During November 2005, a biologist from the NWRC Gainesville, Fla., field station collaborated with personnel from the Massachusetts/Connecticut/Rhode Island Wildlife Services office and Pandion, a Gainesville consulting firm, to conduct training in monk parakeet trapping for employees of a Connecticut electric utility company. Connecticut has one of the fastest growing monk parakeet populations in the United States. As in other parts of the country where parakeets are numerous, Connecticut electric utility companies are facing increasing maintenance and reliability problems resulting from the large stick nests that the parakeets build on electric distribution poles and equipment. Based on a successful parakeet management program developed by Pandion and NWRC in Florida, over 30 linemen and supervisors received instruction in monk parakeet biology, trapping methodology, handling, and euthanasia, as well as information regarding pertinent regulations, public relations, and safety issues. Parakeets collected as a result of the trapping program will be sent to the Gainesville field station for additional research.

Understanding Nilgai

Antelope Movements –

In mid-April 2006, scientists from the NWRC Kingsville, Texas, field station, King Ranch, Inc., and the Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville initiated an investigation of nilgai antelope movements. During 1 day, 23 nilgai (13 bulls and 10 cows) were captured using the helicopter net-gun technique and outfitted with radio collars. Nilgai antelope



populations are expanding (>30,000 in Texas) and they are increasingly causing problems for American agriculture. Nilgai are suitable hosts for cattle fever ticks and represent a threat to the national eradication program. This study will evaluate nilgai home-range size, dispersal patterns, transience, and movements relative to management activities and disturbance. Data will be used to implement cattle fever tick eradication strategies by WS and state agricultural agencies.

More Work For APHIS in the Fight Against Invasive Species –

APHIS WS Operational personnel and NWRC scientists are currently working on two important initiatives to address ongoing invasive species problems critical to resource protection on Guam and Cocos Island. In one project, they are fine-tuning the use of toxicants to control the spread of brown treesnakes. In the other, they are looking at the feasibility of invasive rodent eradication for the ecologically sensitive Cocos Island, a 30-ha island about 2 kilometers south of Guam, where several important species are threatened. Careful evaluation and application of damage management tools and strategies is needed to ensure protection of human and natural resources in the area and to reduce

the likelihood of the transport of invasive species to other sites. These are collaborative efforts involving a number of partners with similar interests being threatened by invasive species.

NWRC Scientist Aids Florida Biologists in Invasive Species and Endangered Species Efforts – In February 2006, an NWRC scientist from Fort Collins, Colo., met with, variously, the Wildlife Services Florida State Director and Assistant Director, the Exotic Species Coordinator for the Florida Fish and Wildlife Conservation Commission, an environmental biologist for Cape Coral, Fla., an Everglades National Park biologist, Florida Keys parks biologists, and a researcher from the University of Tampa concerning increasing invasive species problems in Florida. Species of interest include the Nile monitor, a carnivorous African lizard expanding its range from Cape Coral, Fla.; the Burmese python, a native Asian snake (up to 16-20 ft long) established in Everglades National Park; and the Gambian giant pouch rat, a large African rodent proliferating on Grassy Key. Habitats and conditions were examined, and eradication approaches and methods discussed. Activities were laid out and data needs assessed for a test of eradication efforts for the Gambian giant pouch rats, slated to start in March 2006. The NWRC scientist also met with Key Largo biologists concerning predator removal efforts to protect the highly endangered Key Largo woodrat. To optimize ongoing Florida Wildlife Services removal efforts, the NWRC scientist developed an indexing method for feral cats based on sand plots created atop the island's coral substrate along expected travel routes for cats.

Human Health and Safety

Aviary Construction at NWRC Sandusky, Ohio, Field Station – Construction of the first phase of a new aviary and research building at the NWRC Sandusky, Ohio, field station was completed in November 2005. This building will provide space for housing birds used in the research and development of devices, techniques, and chemicals to deter and repel birds that present hazards to civil aviation. The building will also house a research laboratory for behavioral and physiological studies and storage space for equipment and animal care.

Grasses May Help Reduce Wildlife Strike Threats to Aviation – NWRC scientists at the Sandusky, Ohio, field station have determined that certain varieties of tall fescue grass are not attractive to some wildlife species, such as Canada geese. Several state-level Wildlife Services programs across the country are participating in this 2-year study. In the latest effort, begun in November 2005, North Carolina Wildlife Services professionals are helping to plant experimental plots at selected airports in the state. These sites should provide data that could help airport managers address wildlife problems at their airports by planting fescues less attractive to wildlife.



Threatened and Endangered Species

Kirtland's Warbler Conservation Efforts – Biologists at the NWRC Sandusky, Ohio, field station captured brown-headed cowbirds in April 2006 to be used in the cooperative recovery effort for the endangered Kirtland's warbler in Michigan. This is the 30th consecutive year NWRC biologists have participated in this project. The 400 cowbirds trapped in Ohio were taken to Michigan by the U.S. Fish and Wildlife Service on April 17, 2006, to be used as decoys to lure other cowbirds to traps in areas of jack pine forest where warblers nest, thereby reducing the incidence of nest parasitism during May and June. Since 1972, cowbird parasitism has been reduced from over 50 percent to less than 5 percent of nests, and the nesting population of warblers has increased from about 180 to over 900 pairs. Other agencies cooperating in this project include the Michigan Audubon Society, Michigan Department of Natural Resources, and U.S. Forest Service.



Supporting Student Research

Thesis on Wildlife Conservation Sunflower Plots Defended – In May 2006, a graduate student from North Dakota State University successfully defended his thesis on the benefits of Wildlife Conservation Sunflower Plots (lure plots) as habitat for resident and nonresident migratory birds. The research was supported by NWRC and the WS North Dakota/South Dakota operational program. Blackbirds annually damage over \$5 million worth of sunflowers. One method of reducing crop damage while also benefiting nonblackbird species is to plant an alternative food source for the birds. In 2004 and 2005, WS sponsored a graduate research project to evaluate wildlife conservation sunflower plots (WCSP) for reducing blackbird damage to commercial sunflowers. From August through October, the graduate student used point counts and mist nets to monitor avian abundance and richness in 23 8-ha plantings and nearby commercial sunflower and small grain fields. Local land use and vegetative characteristics were correlated with increased avian use of WCSP. Bird density was significantly greater in WCSP than in commercial sunflowers or small grain crops. Grasses, weeds, shelterbelts, wetlands, and sunflower acreage were positively correlated with bird density. Producers seeking to promote bird use of WCSP should allow some weeds to grow, along with sunflower. A second graduate student will be analyzing the value to WCSP for reducing blackbird damage to sunflowers.

Dissertation on Coyote Space Use Defended – In March 2006, a Utah State University graduate student, supported by the NWRC Logan, Utah, field station, successfully defended her Ph.D. dissertation related to coyote space use at the Welder Wildlife Refuge in Texas. The research showed that coyote territories and space use

One method of reducing crop damage while also benefiting nonblackbird species is to plant an alternative food source for the birds.

patterns were remarkably similar between 1978 and 2004. Coyotes were also extremely resistant to changing their diet and territory use even during periods of intense supplemental feeding. These results suggest that coyotes follow space use patterns that are maintained over many generations, and that short-term changes in food supply will not necessarily change coyote movement patterns. Thus, supplemental feeding in itself may not be enough to draw coyotes away from areas containing human resources that need protection.



Chemical Repellents and Barriers

Scientists Analyze Redcedar Foliage for Repellency – During October 2005, NWRC scientists collected the final samples in a multi-year collaborative study to assess the effects of fertilization on western redcedar phytochemistry. In cooperation with the Oregon timber industry, researchers subjected test trees to treatments in which fertilizer was applied to the soil and elemental sulfur was applied to the foliage. Scientists are now trying to determine if these treatments promote chemical changes that deter deer browsing. To date, chemical analyses of the foliage have demonstrated that site and temporal variability in the chemical constituents of redcedar foliage far exceed any treatment effects. These data from the first 2 years of the study indicate that fertilization is not an effective strategy for producing browse resistance in redcedar.

Deer Repellent Research Presentation and Meeting – In April 2006, an NWRC scientist presented, “Development of hydrolyzed casein deer repellent” at the Agricultural Research Service (ARS) Eastern Regional Research Center (ERRC). The scientist



also met with several ERRC scientists and discussed opportunities for collaborative research with the goal of producing a cheap, effective, and durable deer repellent from animal by-products. There is tremendous interest in capitalizing on the engineering and scientific expertise of the 2 research centers to expand the understanding of herbivore repellents and develop new wildlife management tools. The meeting was a direct result of NWRC access to the ARS Office of Technology Transfer.

Researchers Test Xcluder® Fence – In February 2006, researchers from the NWRC Hilo, Hawaii, field station assisted the U.S. Fish and Wildlife Service (USFWS) in testing the Xcluder® pest-proof fencing. This new fencing product was designed in New Zealand to exclude all invasive mammals from protected natural areas. Though the Xcluder® fence has been very successful in New Zealand, Hawaii’s rugged terrain and lava substrates

This new fencing product was designed in New Zealand to exclude all invasive mammals from protected natural areas. Though the Xcluder® fence has been very successful in New Zealand, Hawaii's rugged terrain and lava substrates proved more challenging.

proved more challenging. In previous trials with the fencing, all mammals were prevented from crossing the fence, but mice were able to go under the fences by accessing subterranean passages. During the February trial, a modified design prevented mice from getting past the fence. The USFWS is considering using this fence in sensitive areas to protect native plants and animals.

Genetics

Genetic Markers for Mountain Beaver Studies – An NWRC scientist traveled to the American Museum of Natural History in New York City in April 2006 to collaborate on development of genetic markers for studies of mountain beavers. These markers will be used in a study conducted by the University of British Columbia and the NWRC Olympia, WA, field station to examine population demographics of mountain beavers.

Coyote Lure Operative Devices Tracked – In March 2006, NWRC scientists traveled to California to work with WS field personnel to facilitate collection of genetic material from activated Coyote Lure Operative Devices (CLODs). CLODs are used to orally deliver substances, such as toxicants, to coyotes. This work will allow researchers to track activation of CLODs by coyotes and nontarget species, such as raccoons, bobcats and skunks.

Wildlife Disease

NWRC Supports VS Program at Plum Island Animal Disease Center – In December 2005, an NWRC bioscience technician from Fort Collins, Colo., visited the Plum Island Animal Disease Center, N.Y., to assist with animal care during a Foreign Animal Disease Diagnostic Laboratory (FADDL) course for veterinary pathologists. Animal care support during previous course offerings has been supplied by USDA Veterinary Services (VS) staff from Ames, Iowa. In addition to providing support for the course, the technician had a chance to learn biocontainment principles and practice them in a live animal facility. This should prove valuable in the NWRC's ongoing expansion into animal disease research. It also provided the technician a rare first-hand opportunity to see and learn about numerous foreign animal diseases. (How many?) bioscience technicians have now assisted in this course. NWRC is looking into future opportunities to work with VS, not only at Plum Island, but also at Ames, Iowa.

Wildlife Services Scientists Travel to Asia to Assist with Avian Influenza – During November and December 2005, WS' National Wildlife Disease Coordinator and a NWRC scientist from Fort Collins, Colo., visited several Asian countries, including Taiwan, China, Cambodia, and Thailand, to meet with biologists working on avian influenza issues in Asia. The primary objective of the trip was to finalize arrangements for training workshops on wildlife disease surveillance and monitoring techniques, particularly for avian influenza in wild birds. The workshops were hosted by Wildlife Services and are funded through a grant from the U.S. Agency for International Development.



Population Studies

NWRC Biologists Collaborate to Protect Island Vegetation – In October 2005, NWRC Starkville, Miss., field station scientists completed the first year of a cooperative research project with New York and Vermont Wildlife Services. The project was initiated to study the effectiveness of management activities to reduce damage to native vegetation caused by nesting double-crested cormorants. Researchers attached 30 radio-transmitters to cormorants nesting on Young Island, Vt., to monitor their response to egg oiling and culling. Following control activities, cormorant numbers steadily declined on the island, as compared to cormorants radio-marked on Four Brothers Islands, N.Y., where no control activities occurred. Although cormorants dispersed from Young Island, they did not move to a nearby great blue heron rookery at the Missisquoi National Wildlife Refuge, a major concern of many interest groups. In spring 2006, researchers will determine if cormorants have returned to Young Island to nest, or if they have permanently abandoned the site as a result of the control activities.



Movements of Starlings at a Winter Roost in Omaha, Neb.

– In January 2006, scientists from the NWRC Bismarck, N.D., field station and Nebraska WS attached 25 radio transmitters to starlings roosting at abandoned buildings in Omaha, Neb. These transmitters, along with 25 transmitters attached earlier, are being used to track daily movements of the birds. The European starling, a well-known invasive species, can potentially spread disease among

feedlots and dairies, and create unsanitary conditions that result in human illness. Omaha is known for high winter starling populations that cause damage to buildings and create hazardous conditions for pedestrians and sanitary workers. Scientists tracked the starlings to high-use forage and roost sites both in and around Omaha city limits. Movement patterns among individuals varied greatly. Some birds were highly local and never left the city limits, while other radio-tagged birds were found up to 15 miles from capture sites and made only sporadic returns to Omaha roosts.

Researchers also tracked starlings to a previously unknown large roost of over 30,000 starlings using a railroad overpass within the city limits. High activity sites and staging areas outside of Omaha were also identified. Data was gathered until late February 2006.

DayGlo™ Particle Marker Tested on Blackbirds – During March 6, 2006, NWRC Fort Collins, Colo., scientists completed a study using the NWRC Outdoor Animal Research Facility to determine the longevity and degradation rate of DayGlo™ fluorescent particle marker when used as a mass-marking technique for roosting blackbirds. Fifty-two male red-winged blackbirds were sprayed with a fire-orange marker formulation, visually inspected under UV light, rated for the presence of marker and released into the outdoor flight pen. Blackbirds were exposed to a number of environmental factors, such as rain, snow, and rough vegetation, that could affect marker degradation. Monthly inspection of the blackbirds indicated that the marker first started to degrade on breast and tail feathers within the first two months. Degradation of the marker on wings did not become apparent until about five months post-marking. All birds retained some degree of the marker nine months post-marking, indicating that the marker can be used for different types of studies to determine the movement and distribution of birds.

Rodent Management

Researchers Assist Organic Farmer in Hawaii – In January 2006, two researchers from the NWRC Hilo, Hawaii, field station consulted with an organic farmer in the Kona district of the island of Hawaii on rodent damage management in macadamia nut orchards. Many established macadamia nut and fruit orchards in Hawaii are now using organic farming methods that prohibit use of most chemicals, including rodenticides, within the orchard boundaries. These orchards have reported significant nut losses to rats (>10 percent of crop) in past seasons. Field station staff demonstrated various integrated pest management techniques, including cultural methods to reduce harborage for rats and in-tree rat trapping. Follow-up surveys are planned and assistance will be provided to the organic farmers group to assess rodent species composition, and to determine relative rat population levels and nut damage distribution patterns within the orchard.



NWRC Scientist Assists Primate Center with Rat Problems – An NWRC research scientist from Fort Collins, Colo., together with the Wildlife Services Georgia State Director and Orkin Pest Control personnel visited the Yerkes National Primate Research Center in Atlanta, GA, in February 2006, to assess rodent control measures. Large, outdoor pens housing the primates have continuously available food and water and bare-soil floors, all of which are attractive to rats. Primates are smart, curious, strong, and dexterous. To ensure their safety and minimize disturbances, use of standard rodent control measures is greatly restricted. The WS personnel recommended that small, pelleted baits or tracking powder baits be used deep within the burrows. The use of liquid rodenticides at water stations during dry periods and away from the primates reach may also be effective. Ways to reduce rodent burrowing by using screening or metal flashing slightly below the pen soil and at the cement foundations were also proposed.



INFORMATION AND COMMUNICATION

NWRC is committed to providing valid, objective, and biologically sound information of the highest quality to its partners, stakeholders, and the public.

Conferences – To help promote collaboration and the exchange of scientific information, NWRC scientists often present at, host or attend various national and international scientific meetings. Some of the meetings recently attended or hosted by NWRC scientists include the following:

National Meetings and Conferences

- 8th Annual USDA Rabies Management Team Meeting
- 62nd Annual Northeast Fish and Wildlife Conference
- Annual Meeting of the Organization of Fish and Wildlife Information Managers
- Annual Sponsor's meeting at the Monell Chemical Senses Center
- Brown Treesnake Working Group Technical Meeting
- Crop Improvement Association Meeting
- Florida Chapter of The Wildlife Society
- John F. Kennedy International Bird Hazard Task Force
- Missouri Rice Producers Conference
- New York Nonlethal Canada Goose Management Steering Committee Meeting
- Northern Plains Biological Symposium
- Oregon Northwest Chapter of the American Society of Foresters
- Science and Policy of Wildlife and Salmon Conference
- Sunflower Research Workshop





International Meetings and Conferences

- Ecological Society of America's International Conference
- Second International Wildlife Fertility Control Workshop – hosted by NWRC

Outreach – NWRC scientists also educate the public about wildlife damage management issues. The following are examples of the educational events supported by NWRC:

Scientist Presents Predator Research – On September 30 and October 1, 2005, a scientist from the NWRC Logan, Utah, field station gave two presentations. The first (for the general public) was given in Durango, Colo., at the invitation of the La Plata County Animal Damage Advisory Committee. The talk, entitled, “Methods and Concepts for Minimizing Conflicts Between Humans and Predators” discussed recent developments in methods for managing predation. The second presentation, “Research and Development in Livestock Protection,” which discussed predation management methods, coyote behavior, and capture device development, was delivered to producers attending the Four Corners Small Farm and Ranch Conference.

Scientist Speaks at Hawaii Career and Technical Education Workshop – An NWRC Hilo, Hawaii, field station scientist gave a presentation on invasive species at the Hawaii Career and Technical Education Workshop on November 10, 2005. The workshop was held by the Hawaii Department of Education for the state's high school and middle school teachers and administrators. The scientist discussed the major Hawaiian invasive species threats (e.g., rats, coqui frogs, and brown treesnakes) as well as potential management options. The scientist also discussed agricultural job opportunities.

Public Educated About Coqui Frogs – On May 6, 2006, two scientists from the NWRC Hilo, Hawaii, field station and two Hawaii Wildlife Services operational employees presented educational material at a booth for the Lehua Jaycees Springfest carnival. The booth was the result of a collaboration among county, state, and federal agencies to showcase coqui frog research and management. The primary purpose of the information presented was to educate the public about ways to manage coqui frogs and how to use resources available to them such as the USDA community-sprayer loan program and spray operations, Hawaii County community grants, and discounts on hydrated lime and citric acid.

Publications – NWRC scientists publish their research findings in peer-reviewed journals and other literature. Between October 2005 and May 2006, NWRC scientists published a total of 52 articles. Examples of some of the articles include the following:

BRECK, S. W., N. LANCE, AND P. CALLAHAN. 2006. A shocking device for protection of concentrated food sources from black bears. *Wildlife Society Bulletin* 34:23-26.

CLARK, L., J. HALL, R. MCLEAN, M. DUNBAR, K. KLENK, R. BOWEN, AND C. A. SMERASKI. 2006. Susceptibility of greater sage-grouse to experimental infection with West Nile virus. *Journal of Wildlife Diseases* 42:14-22.

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VALUING AND INVESTING IN PEOPLE

NWRC values and invests in its people to support their professionalism, competency, and innovation as Federal leaders of wildlife damage management.

Firearms Safety Training – Wildlife management work is often conducted under difficult or unusual conditions in both rural and urban settings. Some situations can be high profile. When firearms are used, Wildlife Services (WS) personnel must be highly competent and demonstrate a thorough understanding of firearm safety. To ensure proper use of firearms, training was conducted for 16 NWRC and two WS operations employees in Fort Collins, Colo., in June 2006. Ken Gruver, WS District Supervisor and former NWRC employee, is a certified firearms instructor and provided the training. The course involved classroom instruction and live-fire exercises. Proper use, handling, transportation and storage of firearms were covered. All trainees completed a written firearms-safety exam.

Immobilization and Euthanasia Training – Wildlife Services (WS) personnel independently use controlled substances to immobilize or euthanize animals in the course of performing their assigned duties. In late April 2006, 27 NWRC and WS operations employees from several states attended three days of classroom and hands-on training on a variety of related topics such as the WS drug policy; state and federal laws regarding the use of drugs; delivery systems including remote darting systems; drug dose calculations; pharmacology, drug dosages and methods for specific species; animal handling and monitoring, and veterinary emergencies; and personal safety, euthanasia, and zoonotic diseases. These training sessions enable NWRC to maintain a pool of certified individuals able to carry out research activities requiring chemical immobilization or euthanasia of animals.

Scientist Elected ACS Program Chair – In May 2006, Dr. John J. Johnston, research chemist at NWRC, was elected Program Chair of the American Chemical Society (ACS) Agrochemicals Division for 2007 and Chair-Elect (President) for 2008. The division has 1200 members from government, industry and academia. In 2007, Dr. Johnston will be responsible for organizing the Agrochemical Division symposia at two National ACS meetings in Chicago, Ill., and Boston, Mass. Symposia topics will include biofuels, glyphosate resistance, GIS for environmental risk assessment, drought and sustainable agriculture, urban and forest pest management, veterinary pharmaceuticals in the environment, nutrient and contaminant analyses in soils, and rodenticides for protection of agriculture and public health.



Scientists Receive Publication Awards – Two NWRC scientists were the recipients of NWRC 2005 Publication Awards. Dr. Larry Clark co-authored a paper providing basic research information on the effects of methyl anthranilate and capsaicin on bird behavior. The data can be used as a foundation for developing effective repellents from these compounds. Dr. Bradley F. Blackwell and others reported applied research with important management applications. His paper concerned retrofitting of airplanes for pulsing landing lights resulting in increased aviation safety.

Town Hall Meeting with APHIS Deputy Administrator – APHIS Deputy Administrator Dr. Ron DeHaven visited NWRC on June 15, 2006 for a town hall meeting with APHIS employees. The event gave employees the opportunity to discuss recent activities, challenges and priorities with the Deputy Administrator. Dr. DeHaven also presented his goals and expectations for the agency's future. In addition to the facilities in Fort Collins, Colo., Dr. DeHaven visited offices in Riverdale, Md.; Raleigh, N.C.; and Minneapolis, Minn.

**United States Department of Agriculture
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*“Solutions to problems depend upon knowledge
which only research can provide.”*

H. Kalmbach