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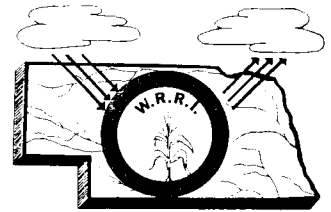
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# WATER RESOURCES NEWS

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE  
212 AGRICULTURAL ENGINEERING BUILDING

THE UNIVERSITY OF NEBRASKA  
LINCOLN, NEBRASKA 68503



Volume 5 Number 7

July 1973

## FROM THE DESK OF THE DIRECTOR . . .

The final report of the National Water Commission entitled Water Policies for the Future has been issued. Because its conclusions and recommendations may have far-reaching effects on water policy in the United States, reviews of key sections will be given in the Newsletter from time to time.

Chapter I, "Forecasting Future Demands for Water," deals with present water trends and uses, the future water situation and predicting future water demands by use of alternative futures. The Commission believes "it is impractical, and in fact undesirable, to attempt to forecast precise levels of future water use on the basis of past water use. How much water will be used, where and for what purposes will depend on the policies that are adopted."

Most estimates of future water demands and water-related activities in the past were based upon a single projection of the important variables affecting water requirements. Future water demands will depend, however, on a number of variables, including: (1) population; (2) the rate of national income growth; (3) per capita energy consumption; (4) factors affecting demands for food and fiber for domestic use and for export, including the lifestyles and eating habits of people; (5) government programs dealing with resource development and distribution, such as environmental protection goals and crop price support programs; (6) the rate of technological change; (7) recreational water uses; and, (8) the price of water to various users.

Because the concept of alternative futures is an important one which the Commission feels should become a basic part of all future water resources planning and decision making, the Commission staff analyzed the effects of changes in policy, lifestyles and technology on future demands for water and water-related services. A detailed analysis of future demands for water for agricultural purposes was made because water used for irrigated agriculture is the dominant consumptive use of water in the United States, especially in regions most likely to face water shortages in the future.

The Commission study "was not made for the purpose of suggesting that any specific alternative be adopted as a goal for national policy, but to determine the availability of water and land and the resulting economic effects in terms of commodity prices should such conditions prevail in the year 2000."

The Commission report states that U.S. agriculture would not be faced with aggregative strains on food-producing capacity and water supplies relative to needs in the year 2000 under any of the alternative futures considered. Under the assumptions of the study, even if irrigated area is not increased over the next 30 years (to the year 2000), capacity of American agriculture will be sufficiently large to meet the anticipated demands at reasonable prices. Projected food demands in the year 2000, according to the conclusions of the study, could be met by returning land idled under government programs to production with the use of less irrigated land than at present. If more vegetable protein were consumed by people, instead of being fed to livestock, the demand for irrigation water would be reduced even further. Hence, in the event of potential future water scarcities in the West, agriculture need not use more but actually could release a fairly large supply of water for industrial and urban uses. Finally, the study indicates that increasing the price of water for irrigation in the 17 western states would create the potential for release of substantial quantities of water from agriculture for uses in other sectors and locations without putting pressure on the nation's food supplies or export potentialities or having other than minimal effects on the cost of food to the nation's consumers.

#### INSTITUTE ACTIVITIES

##### Fiscal Year 1974 WRRRI Research Staff

For fiscal year 1974, 20 research projects will be conducted under the auspices of the Nebraska Water Resources Research Inst. The following researchers are associated with these projects:

Dewey R. Andersen, Assoc. Professor Department of Civil Engineering	Jerry D. Eastin, Professor Department of Agronomy
Leon Chesnin, Assoc. Professor Department of Agronomy	Paul E. Fischbach, Prof. Dept. of Ag. Engineering
Otis E. Cross, Assoc. Professor Dept. of Ag. Engineering	Loyd K. Fischer, Professor Dept. of Ag. Economics
Glen E. Dappen, Ass't. Professor Department of Biology Nebraska Wesleyan University	A.D. Flowerday, Assoc. Prof. Department of Agronomy

Dwight W. Hoxie, Research Assoc.  
Conservation & Survey Division

Peter W. Huntoon, Hydrogeologist  
Conservation & Survey Division

Edward J. Kinbacher, Professor  
Dept. of Horticulture & Forestry

Delno Knudsen, Ass't. Professor  
Department of Agronomy

Gary L. Lewis, Ass't. Professor  
Department of Civil Engineering

Charles R. Maier, Assoc. Professor  
Department of Biology  
Wayne State College

Deane M. Manbeck, Assoc. Professor  
Department of Ag. Engineering

T. L. Thompson, Professor  
Department of Microbiology  
School of Life Sciences

Glen J. Vollmar, Chairman  
Dept. of Ag. Economics

Darrell Watts  
Dept. of Ag. Engineering  
North Platte Station

A. P. Mazurak, Professor  
Department of Agronomy

Terry J. McGhee, Assoc. Prof.  
Department of Civil Engineering

Robert D. Miewald, Assoc. Prof.  
Dept. of Political Science

James T. Nichols, Assoc. Prof.  
Department of Agronomy  
North Platte Station

Robert A. Olson, Professor  
Department of Agronomy

G. A. Peterson, Assoc. Prof.  
Department of Agronomy

J.R. Steadman, Ass't. Professor  
Dept. of Plant Pathology

C. Y. Sullivan, Assoc. Prof.  
Dept. of Hort. & Forestry

Alvin J. Surkan, Assoc. Prof.  
Department of Computer Science

Howard D. Wittmus, Assoc. Prof.  
Dept. of Ag. Engineering

Isac Yomtavian  
Dept. of Civil Engineering

#### NWRRRI Administration Assistant Appointed

Karen E. Stork, formerly Staff Assistant to the Director of the NWRRRI, has been promoted to administrative assistant. This move will further strengthen the structure of the Institute and increase its flexibility. Expanded service for the research community will result.

NWRRI Hosts Energy Conference

The Nebraska Institute is sponsoring a conference entitled "The Role of Water in the Energy Crisis." It will be held on October 23-24 at the Nebraska Center for Continuing Education. The registration fee is \$17.00 per person. Excellent housing accommodations are available at the Nebraska Center.

The objective of the conference is to identify ways in which the water resources community can help solve or alleviate national and regional energy problems. Topics to be discussed will include various aspects of energy-water relationships (economic, environmental, political-social and technological); the role of water research in the energy crisis; regional energy-water problems; and an assessment of research needs.

The conference program is as follows:

TUESDAY, OCTOBER 23

8:00 - REGISTRATION . . . . . 2nd Floor  
Lobby

MORNING SESSION

9:00 - INTRODUCTION  
Warren Viessman, Jr. (Session Chairman)

9:05 - WELCOME  
James H. Zumberge, Chancellor  
University of Nebraska-Lincoln

9:15 - KEYNOTE: "The Role of Water in the Energy Crisis"  
Warren D. Fairchild, Ass't. Commissioner  
Resource Planning  
U.S. Bureau of Reclamation

10:00 - Coffee Break

10:20 - PANEL I: "Technological Aspects of Energy-Water  
Relationships"

MODERATOR: (Session Chairman)

Karen E. Stork  
Administrative Assistant  
Nebraska Water Resources Research Institute

ENERGY PRODUCTION:

Theodore P. Harding, Technical Services  
Manager, Production Division  
Omaha Public Power District

MUNICIPAL AND INDUSTRIAL WATER SUPPLY:

Walter J. O'Brien, Assoc. Professor  
Department of Civil Engineering  
University of Kansas

AGRICULTURAL WATER SUPPLY:

Darrell Watts, Extension Irrigationist  
North Platte Station  
University of Nebraska

POLLUTION CONTROL:

John W. Clark, Director  
Water Resources Research Institute  
New Mexico State University

12:00 - Lunch

AFTERNOON SESSION

Session Chairman: Hal L. Schroeder, General Manager  
Lower Platte South Natural  
Resources District, Lincoln,  
Nebraska

1:15 - "Political-Social Aspects of Energy-Water Relationships"

Ernest A. Engelbert, Director  
Public Administration Program  
University of California, Los Angeles

2:00 - "Economic Aspects of Energy-Water Relationships"

Robert K. Davis, Staff Economist for the  
National Audubon Society  
Lecturer, Department of Geography and  
Environmental Engineering  
The Johns Hopkins University

2:45 - Coffee Break

Session Chairman: Richard D. Dirmeyer, General  
Manager Central Nebraska Public  
Power and Irrigation District

- 3:00 - "Environmental Aspects of Energy-Water Relationships"  
Loyd K. Fischer, Professor  
Department of Agricultural Economics  
University of Nebraska-Lincoln
- 3:45 - "Role of Water Research in the Energy Crisis"  
Warren A. Hall, Director  
Office of Water Resources Research  
U.S. Department of the Interior
- 4:30 - Adjourn
- 7:00 - Social Hour, Banquet and Entertainment

WEDNESDAY, OCTOBER 24

MORNING SESSION

Session Chairman: Warren Viessman, Jr.

- 8:30 - WORKSHOPS: The Identification of Energy-Related Research

DISCUSSION LEADERS

Earl R. Kendle, Chief  
Research Division  
Nebr. Game & Parks Comm.

John L. Wiersma, Director  
South Dakota Water Res. Inst.  
South Dakota State Univ.

Gordon L. Byers, Chmn.  
Water Resources Res. Center  
Univ. of New Hampshire

William Garner, Research &  
Monitoring Representative  
Environmental Protection Agency

John E. Lagerstrom, Chairman  
Dept. of Electrical Engineering  
University of Nebraska

REPORTERS

Deon D. Axthelm, Extension  
Water Resources Spec.  
University of Nebraska

Gary L. Lewis, Ass't. Prof.  
Dept. of Civil Engineering  
University of Nebr.-Lincoln

James C. Warman, Director  
Water Resources Res.Inst.  
Auburn University

Ralph Palange, Director  
Water Resources Res. Center  
Washington, D. C.

Peter W. Huntoon, Research  
Hydrogeologist, Cons.  
& Survey Division  
University of Nebr.-Lincoln

- 10:30 - Coffee Break
- 11:00 - Reporters' Comments from Workshop Discussions
- 12:00 - Lunch
- 1:15 - PANEL II: Regional Energy Water Problems

MODERATOR: (Session Chairman)

M. Wayne Hall, Director  
Land & Water Resources Center  
University of Maine @ Orono

NORTHEAST:

Robert D. Varrin, Director  
Water Resources Center  
University of Delaware

SOUTH ATLANTIC GULF:

L. Douglas James  
Environmental Resources Center  
Georgia Institute of Technology

OHIO-GREAT LAKES:

John C. Frey, Director  
Institute for Research on Land & Water Resources  
Pennsylvania State University

MISSOURI RIVER:

Dale O. Anderson, Director  
Water Resources Research Institute  
North Dakota State University

PACIFIC NORTHWEST:

Calvin C. Warnick  
Water Resources Research Institute  
University of Idaho

SOUTHERN PLAINS:

J. R. Runkles, Director  
Water Resources Institute  
Texas A&M University

COLORADO RIVER-GREAT BASIN:

Norman A. Evans, Director  
Environmental Resources Center  
Colorado State University



3:15 - SUMMARY

Warren Viessman, Jr.

3:30 - Adjourn

For additional information, please contact: Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, University of Nebraska-Lincoln, East Campus 212 Ag. Engineering Bldg., Lincoln, Nebraska 68503 or phone 472-3307.

#### REGIONAL NEWS

##### Congratulations Ed McPartland!

The Nebraska Water Resources Research Institute wishes to congratulate Edward J. McPartland, Political Science Department, Doane College, Crete, Nebraska on receiving one of the recent Title II grant awards. His project "Institutional Behavior Concerning River Basin Management Legislation" will employ a case study approach to analyze institutional policy formulation in water resources in connection with Nebraska legislative actions relating to Natural Resources Districts.

This project is a continuation of a previous Title II grant entitled "Measuring and Developing Methods of Attitude and Motivational Changes in Implementing the Big Blue River Basin Water Plan." A project completion report on this phase has recently been published. Copies of this report may be obtained by contacting: Edward J. McPartland, Political Science Department, Doane College, Crete, Nebraska 68333, or phone 402-826-2161.

Secretary of the Interior Rogers C. B. Morton announced the selection of 25 research projects for the fiscal year 1974 water research program authorized under Title II of the Water Resources Research Act of 1964.

The Title II program--administered by the Office of Water Resources Research--provides for research grants, contracts, or other arrangements with educational institutions, and with private firms and individuals for the conduct of research that seeks solution to urgent water problems throughout the nation.

## FEDERAL HIGHLIGHTS

### Final NWC Report Receives Icy Reception from Westerners

The final report of the National Water Commission received an icy reception from the Senate Interior Committee.

Senator Frank Church, D-Idhao, chairman of the Committee, said the report would arouse considerable controversy. He called for a thorough study by Congress before proceeding with any of its recommendations.

Charles F. Luce, former Interior undersecretary and now chairman of Consolidated Edison Company of New York, agreed the report was controversial but supported the Commission's basic conclusion that there is enough water to meet essential needs, but that it should be treated the same as any other economic resource--with the user paying the full cost.

Senator Church cautioned, however, that adoption of the Commission's recommendations would "spell the end of the federal reclamation program as we have known it in the West" and possibly open the way to interbasin water diversions from the Pacific Northwest.

### Burec Warns White House

The House Appropriations Committee warned the Nixon Administration not to interfere with the Bureau of Reclamation's chief responsibility for irrigation without action by Congress.

The Committee recommended a \$21.5 million increase in President Nixon's \$334.8 million budget for BuRec. In its report, the Committee said they had no opposition to added emphasis on municipal and industrial water and power. The Committee does object to a change in the basic philosophy of irrigation as the Bureau's main responsibility without specific actions by Congress.

### New Office of Research and Development

In reorganizing its research activities, the Environmental Protection Agency has established a new Office of Research and Development with four main operating units.

EPA Assistant Administrator Stanley M. Greenfield will head the new organization. The operating units are the following: Office of Program Integration headed by Dr. Leland D. Attaway;

Office of Environmental Engineering directed by Albert C. Trakowski;  
Office of Environmental Sciences managed by Dr. Herbert L. Wiser;  
and the Office of Monitoring Systems headed by Willis B. Foster.

#### NWC Report Under Fire by House Committee

The House Appropriations Committee says the National Water Commission's recommendations, if adopted, would seriously reduce and possibly halt the development of U. S. water resources. Criticism of the Commission's report was expressed in the Committee's report on the \$4,671,695,000 public works appropriations bill for fiscal year 1974.

The report said "A primary thrust of the Commission appears to be to treat water and water resources services as saleable commodities to our people rather than necessary and essential public services. In short, the Commission's report constitutes a repudiation of long standing, basic principles of water resource development in the public interest which have guided these programs for decades. It reflected a grave miscalculation of the magnitude of anticipated future public needs for water supply, electric power, navigation, flood control, recreation and other aspects of water resource development.

The conclusions and recommendations in the report suggest strongly that the National Water Commission has not fully evaluated the tremendous impact that implementation of its recommendations would have on water resource development throughout the nation."

#### PUBLICATIONS

##### Bibliographies on Water Studies Available

Warren A. Hall, Acting Director of the Office of Water Resources Research has announced the release of five new bibliographies on urgent water research topics. They may be obtained from the National Technical Information Service, Springfield, Virginia 22151. Titles and pricing are as follows: "Estuarine Pollution," (PB 22019), \$12.50; "Aerial Remote Sensing," (PB 220163), \$10.60; "Irrigation Efficiency," (PB 220349), \$6.00; and "Weather Modification: Precipitation Inducement," (PB 220348), \$6.75.

RESEARCH REVIEW

PROJECT TITLE: Development of a Streamflow Simulation Model for  
Nebraska

PRINCIPAL INVESTIGATOR: Dr. Gary L. Lewis, Ass't. Professor,  
Department of Civil Engineering,  
University of Nebraska-Lincoln

This project was initiated on July 1, 1972, and has as its objectives: (1) adapt existing digital streamflow simulation models to the computer facilities at the University of Nebraska, (2) evaluate the applicability of available streamflow models to the climate, geography, and special needs of water resources planning, development, and management in Nebraska, (3) modify and/or develop one or more of the existing streamflow simulation models for effective simulation of Nebraska's hydrologic and water resources systems, and (4) translate the research results into documents of specific instructions for applications of the University of Nebraska streamflow simulation model.

Copies of three recent versions of the Stanford Watershed Model, including one self-calibrating version, have been acquired by the Nebraska Water Resources Research Institute. Two of the acquired versions have been successfully adapted to the University of Nebraska's computer facilities, and operational tests have been completed using published sample input data sets.

Applications of each version to one or more gaged watersheds in Nebraska are planned to allow comparisons between simulated and recorded streamflow hydrographs which will provide information for evaluating the applicability and determining needed modifications of the available streamflow simulation models. Data sets for a small rural watershed in Northwestern Nebraska have been prepared for initial simulation trials with acquired versions.

The acquired streamflow simulation models are primarily programmed to synthesize a continuous hydrograph of hourly or daily streamflows at a section of the stream, accomplished by transforming measured precipitation over a catchment into various surface and subsurface components which contribute to changes in moisture storage or appear as streamflow at the watershed outlet. Modifications to isolate the surface runoff component from the contributions to infiltration and groundwater flows are planned to allow a more sophisticated simulation of Nebraska's subsurface hydrology.

PUBLICATIONS RECEIVED BY INSTITUTE

1. Hydraulic and Geomorphic Characteristics of Rivers in Alberta, R. Kellerhals, C.R. Neill, D.I. Bray, Research Council of Alberta.
2. Water Pollution Potential of Manufactured Products Catalog Section II - Product Listing, J.B. Berkowitz, G.R. Schimke, V.R. Valeri, for EPA, April 1973.
3. Water and Wastewater Management in Dairy Processing, R.E. Carawan, V.A. Jones, A.P. Hansen, North Carolina State Univ., December 1972.
4. Oil/Sorbent Harvesting System for Use on Vessels of Opportunity, J.D. Sartor, C.R. Foget, R.W. Castle, for EPA, April 1973.
5. Assessing the Water Pollution of Manufactured Products, J.B. Berkowitz, G.R. Schimke, V.R. Valeri, for EPA, April 1973.
6. Water Pollution Potential of Manufactured Products, Catalog Section I - Summary, J.B. Berkowitz, G.R. Schimke, V.R. Valerie, for EPA, April 1973.
7. Aerobic Secondary Treatment of Plywood Glue Wastes, J.L. Graham, for EPA, April 1973.
8. Oil Spillage-A Bibliography, Vol. II, U.S. Dept. of the Interior, May 1973.
9. Nitrate Reduction in the Vicinity of Tile Drains, L. A. Davenport, W.D. Lembke, B.A. Jones, Jr., University of Illinois, at Urbana-Champaign, March 1973.
10. Effects of Pesticides in Water, A Report to the States for EPA.
11. Identification of Water Resources Planning Problems in the Metropolitan Area of Greater San Antonio and Its Associated Counties, J.K. Garner, C.S. Shih, Texas A&M University, June 1973.
12. The Limnology of Stockbridge Bowl, Stockbridge, Massachusetts, S.D. Ludlam, K.S. Hutchison, G.E. Henderson, University of Massachusetts at Amherst, 1973.
13. A Study to Improve Dissolved Oxygen Analysis Techniques to Facilitate Water Quality Field Survey Applications, R.W. Raible, M.K. Testerman, University of Arkansas, 1973.

14. Temporary State Commission on the Water Supply Needs of Southeastern New York, Second Year Report, Albany, New York, March 1, 1973.
15. Secondary Waste Treatment for a Small Diversified Tannery, J.J. Westrick, J. Kreissl, for EPA, April 1973.
16. The Development and Demonstration of an Underwater Oil Harvesting Technique, R.A. Bianchi, G. Henry, for EPA, April 1973.
17. Fluorescent Probes in the Detection of Insecticides in Water, C.H. Himel, University of Georgia, for EPA, April 1973.
18. Steam Stripping Odorous Substances from Kraft Effluent Streams, B.F. Hrutfiord, L.N. Johanson, J.L. McCarthy, for EPA, April 1973.
19. Development of a Mobile System for Cleaning Oil-Contaminated Beaches, F.X. Dolan, J.P. Bowersox, for EPA, May 1973.
20. Characterization of the Activated Sludge Process, R.D. Bargman, J. Borgerding, Bureau of Sanitation, Los Angeles, Calif. for EPA, April 1973.
21. Effects of Logging on Growth of Juvenile Coho Salmon, P.M. Iwanaga, J.D. Hall, Oregon State University, for EPA, April 1973.
22. Eighteenth, Nineteenth, and Twentieth Biennial Reports of the State Engineer of New Mexico, July 1, 1946-June 30, 1972.
23. Pyrographic Gross Characterization of Water Contaminants, I. Lysyj, P.R. Newton, for EPA, May 1973.
24. Using Fire Streams with A Self-Propelled Oil Spill Skimmer, A.C. Roberts, for EPA, May 1973.
25. Chemical Treatment of Plating Waste for Removal of Heavy Metals, J.J. Martin, Jr., for EPA, May 1973.
26. Standard Dispersant Effectiveness and Toxicity Tests, L.T. McCarthy, Jr., I. Wilder, J.S. Dorrlor, Edison Water Quality Research Laboratory, for EPA, May 1973.
27. Economic Feasibility of Minimum Industrial Waste Load Discharge Requirements, H.C. Bramer, for EPA, April 1973.
28. Upper Mississippi River Comprehensive Basin Study Vol. 1-9, UMRCBS Coordinating Committee.

29. The Origin, Effects and Control of Turbidity in an Urban Recreational Lake, C. Carranza, S.M. Bembien, University of Massachusetts at Amherst, February 1973.
30. Methodological Improvements in Measuring Economic Effects of Multipurpose Water Resource Projects, Louis Berger, Inc., for Office of Water Resources Research, March 1973.
31. The Optimization of Wellton-Mohawk Drainage Operations, U.S. Dept. of the Interior, R.A. Morrill, C.W. Corcoran, November 1972.
32. Financial and Institutional Arrangements for Wastewater Management, Denver SMSA, G.H. Aull, Jr., R.J. Zuelsdorf, for EPA, April 1973.
33. Water Quality Hydrology of Lands Receiving Farm Animal Wastes, D.L. Reddell, G.G. Wise, R.E. Peters, P.J. Lysterly, Texas A&M University, June 1973.
34. Methodology for Assessment of Urban Water Planning Objectives, W.L. Meier, B.M. Thornton, Texas A&M University, June 1973.
35. A Principles Study of Factors Affecting the Hydrological Balance of the Lemon Glacier System and Adjacent Sectors of the Juneau Icefield, Southeastern Alaska, 1965-69, M.M. Miller, Michigan State University, 1972.
36. Nebraska Natural Resources Data Bank Information System, Nebraska Natural Resources Commission, June 1973.
37. Groundwater: From Windmills to Comprehensive Public Management, R.S. Harnsberger, J.C. Oeltjen, R.J. Fischer, reprinted from the Nebraska Law Review, Vol. 52, No. 2, 1973.
38. The Computer-Systems Approach to Environmental Protection, Planning, and Management: The Malibu Watershed, E.S. Flowers, D. May, University of California, December 1971.
39. A Case Study in Interstate Resource Management: The California-Nevada Water Controversy, W.T. Jackson, D.J. Pisani, University of California-Davis, May 1973.
40. Conceptual System Design for an Environmental Information Base for Management of Water and Related Resources by States, H.O. Banks, for Office of Water Resources Research, March 1973.
41. HEC-5 Reservoir System Operation for Flood Control, Users Manual, May 1973, U.S. Army Corps of Engineer.

42. Phosphorus Removal, A Bibliography, Vol. II, U.S. Department of the Interior, May 1973.
43. Marine Sanitation System Demonstration, E.L. Kaminsky, W.F. Roberts, J.C. Volk, Jr., for EPA, May 1973.
44. A Summary-Digest of State Water Laws-National Water Commission, R.L. Dewsnap, D.W. Jensen, R. W. Swenson, May 1973.
45. Water Resources Review for Streamflow and Groundwater Conditions, U.S. Dept. of the Interior, Geological Survey, May 1973.
46. Agricultural Engineers Yearbook, American Society of Ag. Engineers, 1973.
47. An Economic Evaluation of a Water-Based Urban Tourist Attraction in San Antonio, Texas, W.L. Trock, R.D. Lacewell, Texas A&M University, April 1973.
48. Effects of Industrial Effluents on Primary Phytoplankton Indicators, F.C. Larson, R.J. Staub, University of Tennessee, April 1973.
49. Bacteriological Water Quality Characteristics of Fort Loudoun Reservoir, J.B. Asthana, J.C. Burdick, III, University of Tennessee, June 1972.
50. A Worldwide Directory of Stream Ecologists, K.W. Cummins, Michigan State University, February 1973.
51. Metropolitan Denver and South Platte River and Tributaries Colorado, Wyoming, and Nebraska, Preliminary Draft Plan of Study, May 1973.
52. Microbial Changes and Possible Ground Water Pollution from Poultry Manure and Beef Cattle Feedlots in Georgia, J. Giddens, A.M. Rao, H.W. Fordham, Georgia Institute of Technology, May 1973.
53. Systems Analysis of the Great Lakes, R.A. Deiningner, S.Y. Su, University of Michigan, May 1973.
54. The Development of an Automated Biological Monitoring System for Water Quality, J. Cairns, Jr., Virginia Polytechnic Institute and State University, February 1973.
55. Water Resources Review for Streamflow and Groundwater Conditions, U.S. Dept. of the Interior, Geological Survey, June 1973.



56. Growth, Public Policy and Environmental Quality, Proceedings of the Third Annual Alabama Environmental Conference, Auburn University, November 1-2, 1972.
57. Management of Recycled Waste-Process Water Ponds, C.E. Renn, for EPA, May 1973.
58. Distribution of Mercury, Cadmium, Lead and Thallium in Eutrophic Lakes, B.J. Mathis, N.R. Kevern, Michigan State University, June 1973.
59. Hydrodynamic Flux Control for Waste Water Application of Hyperfiltration Systems, D.G. Thomas, R.B. Gallaher, J.S. Johnson, Jr., for EPA, May 1973.
60. Oil Spill Surveillance System Study, D.Mohr, K. McCormack, G. Brewster, G. Fournier, for EPA, May 1973.
61. Comprehensive Survey of the Monongahela River, M.S. Baloch, E.N. Henry, J.C. Burchinal, West Virginia Dept. of Natural Resources, 1973.
62. Effects of Mosquito Control Ditching on Estuarine Ecosystems, E.J. Kuenzler, H.L. Marshall, University of North Carolina, February 1973.
63. The Effects of Ditching on the Mosquito Populations in Some Sections of Juncus Salt Marsh in Carteret County, North Carolina, R.N. Lasalle, K.L. Knight, University of North Carolina, June 1973.
64. Publications List, Vol. VI, No. 1 Spring 1973, Water Resources Research Center, University of Hawaii.
65. Hydrologic Research in the Catchment of the Hupselse Beek Netherlands, Study Group Hupselse Beek, April 1970-April 1972.
66. Water Quality and Water Quantity Control in Arkansas as of August 1971: A Legal Overview, W.W. Nixon, J.M. Redfern, A.M. Witte, N.C. Williams, University of Arkansas, June 1973.
67. Anaerobic-Aerobic Treatment of Textile Wastes with Activated Carbon, C.P.C. Poon, P.P. Virgadamo, for EPA, May 1973.
68. Metropolitan Water Intelligence Systems, N.S. Grigg, J.W. Labadie, G.L. Smith, D.W. Hill, B.H. Bradford, Colorado State University, June 1973.

69. A Topologically Optimum River Sampling Plan for South Carolina, W.E. Sharp, University of South Carolina, April 1973.
70. The Interflow Process on Sloping Watershed Areas, T.V. Wilson, J.T. Ligon, Clemson University, March 1973.
71. A Worldwide Directory of Stream Ecologists, D.W. Cummins, Michigan State University, February 1973.
72. Water Reuse: A Bibliography Vol. I., U.S. Dept. of the Interior, Office of Water Resources Research, June 1973.
73. Phosphorus Removal: A Bibliography, Vol. I, U.S. Dept. of the Interior, Office of Water Resources Research, May 1973.
74. Water Resource Observatory Wind and Solar Radiation Data Water Year 1972, V.E. Smith, University of Wyoming, June 1973.
75. Mechanism of Organic Adsorption on Activated Carbon, J.T. Cookson, Jr., University of Maryland, April 1973.
76. Studies on the Interactions of Bacteria and Nematodes, G.R. Wilt, M.M. Joshi, J. Metcalf, Auburn University, January 1973.
77. Hydrologic Inventory of the Bear River Study Unit, F.W. Haws, T.C. Hughes, Utah Water Research Laboratory, February 1973.
78. Head Losses Due to Ring-Tite Filament Wound Elbows and Tees and Frictional Losses in Pipes of Polyvinylchloride, R.W. Jeppson, Utah Water Research Laboratory, February 1973.
79. Financing Private Water Resource Development Analysis of a State Loan Program, T.L. Dobbs, C.E. Olson, Wyoming Water Research Institute, February 1973.
80. Effects of Land Use on Water Quality: Summit Creek, Smithfield, Utah, D.W. Meyers, E.J. Middlebrooks, D.B. Procella, Utah Water Research Laboratory, June 1972.
81. On-Site Digital Accumulation and Storage of Hydrologic Data for Use In Data Acquisition Systems, D.G. Chadwick, Utah Water Research Laboratory, June 1972.
82. Investigation of the Public and Private Interests in the Chesapeake Bay Area, J.W. Longest, University of Maryland, February 1973.
83. The Hydraulics of Waste Stabilization Ponds, G.Z. Watters, K.A. Mangelson, R.L. George, March 1973.

INQUIRIES

Newsletter items and inquiries should be sent to Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, 212 Ag. Engineering Bldg., East Campus, Lincoln, Nebraska 68503 (402) 472-3307.