

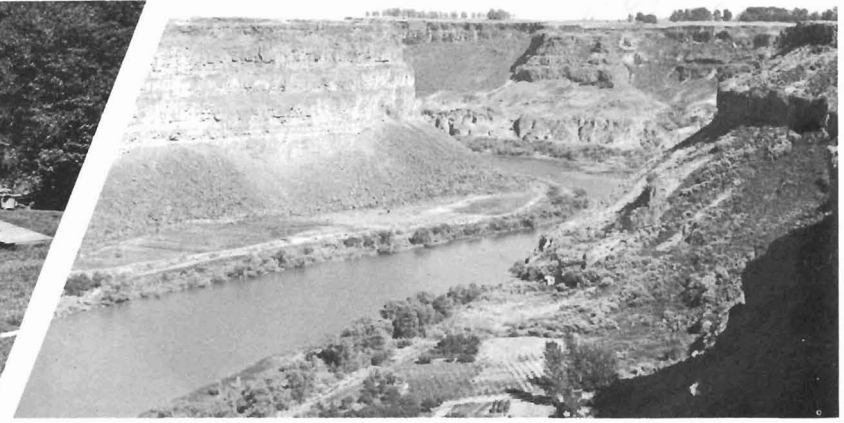
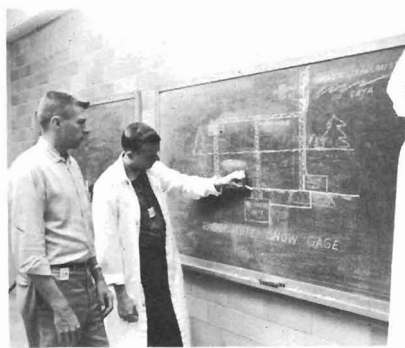
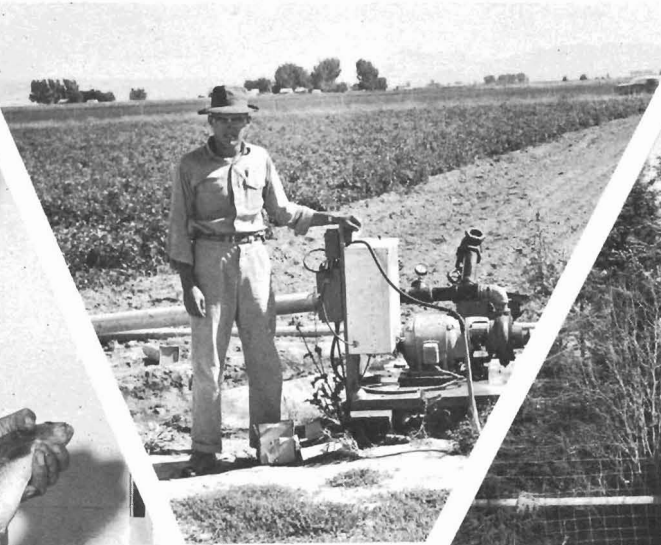


**RESEARCH IN
WATER RESOURCES
FOR IDAHO**

WATER RESOURCES COMMITTEE - UNIVERSITY OF IDAHO - FEBRUARY 1963

**RESEARCH IN
WATER RESOURCES
FOR IDAHO**

**Water Resources Committee
University of Idaho
February 1963**



INTRODUCTION

The University of Idaho, through its Policy and Coordinating Committee on Water Resources, is dedicated to assisting in the formulation of coordinated research and planning for the development of the water resources of the State of Idaho and our nation. The following Policy Statement on Water Resources was approved by the University of Idaho's Water Resources Committee on 17 January 1962.

The basic goal of the University of Idaho is to be of service to the people of this state and nation through teaching and research. The natural resources of Idaho, especially water, constitute our most valuable assets. The manner in which we utilize and develop such resources will influence our health, security, economy, and well-being for all time.

Therefore, the University of Idaho, in conformity with its tradition of service, has resolved to commit its facilities through teaching and research to assist in the formulation of coordinated plans and policies for the development of the water resources of this state. It is imperative that the information and an understanding of the issues associated with the conservation and development of water, and all its related uses thus acquired, should be brought to the attention of the people of this state. This will be accomplished through a program of disseminating information by the University of Idaho and other agencies working in unison.

Such an undertaking will give all the people of Idaho an opportunity to make informed decisions and establish goals with respect to the use of water resources within the framework of our democratic processes.

To that end the University of Idaho has established a Water Resources Committee whose membership is selected from the various Colleges with an advisory board consisting of the President of the University of Idaho and the Deans of the Colleges of Agriculture, Engineering, Forestry, and Mines.

It is the duty of the Policy and Coordinating Committee on Water Resources to implement and assist in the development of a comprehensive water resources program within the limits of the resources of the University of Idaho.

The University of Idaho's Policy and Coordinating Committee on Water Resources is comprised of people who have diverse interests and backgrounds related to water resources. This cross section representation is providing a means by which controversial uses and applications for Idaho's water resources can be discussed and evaluated. The committee is presently comprised of the following membership:

G. C. Lewis	— Agricultural Chemistry
W. E. Folz	— Agricultural Economics
D. W. Fitzsimmons	— Agricultural Engineering
G. L. Corey	— Agricultural Engineering
D. C. Larsen	— Agricultural Extension Service
C. C. Warnick	— Civil Engineering
P. Mann	— Electrical Engineering
F. D. Johnson	— Forest Management
C. MacPhee	— Wildlife Management
T. R. Walenta	— Law
P. A. Buscemi	— Letters and Science
R. R. Reid	— Mines and Geology

Advisory Council to the Committee

- D. R. Theophilus, President, University of Idaho
- J. E. Kraus, Dean, College of Agriculture
- A. S. Janssen, Dean, College of Engineering
- E. Wohletz, Dean, College of Forestry
- E. F. Cook, Dean, College of Mines

It is the Water Resources Committee's desire to help achieve a program of water use and development that will contribute the most good for the most people in the State of Idaho in the long run.

Although the report of projects that follows shows considerable research activity, it is the Water Resources Committee's belief that much more research is needed. As a guide to future work, the following priority of needs has been proposed by the committee.

Priority I

- a. *A study of ground water reserves and the basic behavior of the movement of ground water within the extensive aquifers of our region.*
- b. *A study of the economic, sociological, and legal problems concerned with water use and transfers of water as well as the changing use of water.*

Priority II

- a. *A study of pollution abatement.*
- b. *A study of fish propagation and fish migration with relation to the other uses and demands for water, particularly within the State of Idaho.*

Priority III

- a. *A study of land use practices on watersheds related to quantity and timing of waterflows.*
- b. *A study of problems in forecasting water supplies and floods for all water uses.*
- c. *A study of basic soil and water relations in nature and under irrigation practices.*
- d. *A study of the history of the use of water in Idaho, particularly related to irrigated agriculture.*

Acknowledgments

This presentation has resulted from a combined effort of the University of Idaho Water Resources Committee, but most significant in the preparation of it have been the efforts of Mrs. Carolyn Whiting as Research Associate. Acknowledgment is given for the help of Professor A. C. Dunn and Miss Karen Miles for the cover design.

IRRIGATION OF SPRING WHEAT IN SOUTHERN IDAHO

Protein content is important in wheat used by the milling trade. In dry land areas it varies considerably with the amount of rainfall. Protein content variations in wheat grown under different irrigation treatments will be determined by this study.

INVESTIGATORS

G. McMaster, M. LeBaron, R. Shaeffer, H. Steven, M. Wise

DESCRIPTION INCLUDING OBJECTIVE

A project to study the effects of soil moisture on the production of spring wheat. The objectives include:

- a. to determine the effect of soil moisture level in the root zone from planting to heading on yield, maturity, protein content, and milling qualities of spring wheat.
- b. to determine the effect of soil moisture level in the root zone from heading to maturity on yield, maturity, protein content, and milling qualities of spring wheat.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Department of Agricultural Chemistry
Department of Agronomy
Twin Falls Branch Experiment Station

FINANCIAL SUPPORT

Estimated annual budget \$5,700—State Funds

DURATION AND STATUS

Project initiated July, 1962—Probable duration five years

IRRIGATION OF BEAN SEED CROPS

Snap bean seed production in southern Idaho is a major industry which is completely dependent on irrigation. To obtain the best crop return, the seed growers must use their irrigation water efficiently. This research will help farmers scientifically apply irrigation water to their snap bean seed crops.

INVESTIGATORS

G. McMaster, G. Corey, M. LeBaron, L. Hawthorn

DESCRIPTION INCLUDING OBJECTIVE

A project to determine the effect of soil moisture levels on the yield and quality of snap beans grown for seed.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Department of Plant Pathology
Twin Falls Branch Experiment Station
Agricultural Research Service
U. S. Department of Agriculture

FINANCIAL SUPPORT

Estimated annual budget \$4,300—Federal Hatch Funds, State Funds

DURATION AND STATUS

Project initiated 1955—Project completed 1961

PUBLICATIONS AND THESES

"Irrigation of Snap Beans Grown for Seed in Idaho," G. McMaster, M. LeBaron, G. Corey, L. Hawthorn, V. Toole, Idaho Agricultural Experiment Station Bulletin 336, 1960.

SOIL MOISTURE AND FERTILITY EFFECTS ON THE PRODUCTION OF CORN SILAGE

As livestock production increased in southern Idaho, corn silage became an important part of the feeding program. Non-irrigated areas have been the major producing regions of corn grown for silage. However, new varieties now make it possible to grow corn in the Upper Snake River Plain. For successful production, efficient irrigation and fertilization programs must be determined. This study will help farmers obtain corn silage of the highest quality and yields.

INVESTIGATORS

G. McMaster, J. Walker, E. Owens

DESCRIPTION INCLUDING OBJECTIVE

A study to determine the effects of fertility levels and soil moisture levels on the yield and quality of silage corn.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Aberdeen Branch Experiment Station

FINANCIAL SUPPORT

Estimated annual budget \$4,500—State Funds

DURATION AND STATUS

Project initiated 1957—Project completed 1960

PUBLICATIONS AND THESES

"Irrigation and Fertilization of Field Corn Grown for Silage in Southeastern Idaho," G. McMaster, J. Walker, E. Owens, Idaho Agricultural Experiment Station Bulletin 392, September, 1962.

EFFECTS OF SOIL MOISTURE LEVELS FROM PLANTING UNTIL THE BEGINNING OF TUBER FORMATION ON POTATO PRODUCTION

The quality of Russet Burbank potatoes produced in Idaho depends greatly on the irrigation practices used. Early in the growing season potatoes need adequate moisture to produce uniform smooth tubers, but excessive irrigation can set up conditions under which diseases thrive. This research will provide Idaho potato growers with an irrigation water management program that should contribute to good tuber production without crop damage.

INVESTIGATORS

G. McMaster, K. Knutson

DESCRIPTION INCLUDING OBJECTIVE

A study to determine the effects of early season soil conditions on potato yields and quality. Different soil moisture levels will be maintained from prior to planting until the start of tuber formation. The objectives include:

- a. to determine the effect of planting in wet and dry seed beds.
- b. to determine the point on the soil moisture extraction curve where irrigation water should be applied for optimum growth.
- c. to investigate the possibility of maintaining low soil moisture levels early in the season and to determine the water saved.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Department of Plant Pathology
Aberdeen Branch Experiment Station

FINANCIAL SUPPORT

Estimated annual budget \$8,000—State Funds

DURATION AND STATUS

Project initiated July, 1962—Probable duration five years

A COMPARISON OF SPRINKLER AND SURFACE IRRIGATION METHODS ON YIELD, QUALITY, DISEASE, AND STORAGE OF POTATOES

The need to determine the best method of applying irrigation water increases as new lands are brought into production in southern Idaho. Because of irregular topography and the fact that water is obtained from wells, sprinkler irrigation is used extensively. Since potatoes are a major agricultural product in this region, research was focused on selecting the most suitable irrigation methods for this crop.

INVESTIGATORS

G. McMaster, G. Corey, J. Guthrie, W. Sparks, K. Knutson

DESCRIPTION INCLUDING OBJECTIVE

A project to determine the effect of sprinkler and furrow irrigation methods in potato yield and quality. The objectives include:

- a. to compare daily irrigation with normal interval irrigation by surface and sprinkler methods and to determine relative effect of each on yield, quality, disease, and storage of potatoes.
- b. to determine the effects of daily irrigation on diseases that are prevalent in potatoes, and to study the microclimate and evaporation in the area of the plant with respect to conditions favorable for increase of diseases.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Department of Plant Pathology
Department of Horticulture

FINANCIAL SUPPORT

Estimated annual budget \$1,330—Federal Hatch Funds, State Funds

DURATION AND STATUS

Field work completed—Publication being prepared

TRUNK GROWTH AS A GUIDE IN ORCHARD IRRIGATION

A special dendrometer used to measure minute increments in trunk growth of trees was developed. By correlating trunk growth with water supply in the soil, it was possible to predict the water needs of trees and work out accurate irrigation schedules. Research showed that irrigation schedules could be reduced to one-third the current schedules (8 to 40 day intervals) without causing damage to the trees or reducing their yields. Furthermore, fruit color was often improved where water was reduced.

INVESTIGATORS

W. Kochan, L. Verner, D. Ketchie, R. Taerum

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to develop a practical technique for determining the point of critical water deficit in fruit tree tissues.
- b. to measure the effects of acute water deficits on growth of the trees and fruit.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Horticulture

FINANCIAL SUPPORT

Estimated annual budget \$9,250—Federal Hatch Funds, State Funds

DURATION AND STATUS

Project in ninth year—Major work completed—Leader deceased 7/14/62—Project will continue under new personnel

PUBLICATIONS AND THESES

"You Can Reduce Your Orchard Irrigation Costs," L. Verner, W. Kochan, J. Berry, *Transactions, Idaho State Horticulture Society*, Volume 67, November 30-December 1, 1961, pp. 33-37.

"A New Kind of Dendrometer," L. Verner, Idaho Agricultural Experiment Station Bulletin 389.

"Trunk Growth as a Guide in Scheduling Orchard Irrigation," L. Verner, W. Kochan, D. Ketchie, A. Kamal, R. Braun, J. Berry, M. Johnson, Idaho Agricultural Experiment Station Research Bulletin 52, 1962.

AUTOMATIC CONTROL OF SURFACE IRRIGATION WATERS

Because most irrigation processes require skilled labor which is becoming more difficult to obtain, interest in the use of automatically controlled irrigation systems is increasing in Idaho. Sensing elements which will automatically control water regulating devices in irrigation systems are being developed under this project.

INVESTIGATORS

G. Corey, D. Works, J. Martin

DESCRIPTION INCLUDING OBJECTIVE

A project to develop and test automatic devices to control surface irrigation water. The primary objective is to develop a sensing element which will indicate when an area is sufficiently irrigated by tripping a solenoid so that automatic headgates will operate.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Department of Electrical Engineering
Agricultural Research Service (Informally)

FINANCIAL SUPPORT

Estimated annual budget \$2,400—Federal Hatch Funds, State Funds

DURATION AND STATUS

Project initiated 1960—Project will continue until 1964

INFILTRATION AS AFFECTED BY FURROW PARAMETERS AND SOIL VARIABILITY

To obtain optimum benefits from Idaho's water supplies in the future, more efficient irrigation systems must be devised. An extensive regional research project is being conducted to determine the hydraulics of surface irrigation. This study will provide information needed to design irrigation systems that will use irrigation water more efficiently from both water application and labor requirement standpoints.

INVESTIGATORS

G. Corey, L. Maxwell, D. Fitzsimmons

DESCRIPTION INCLUDING OBJECTIVE

A study of water flow from irrigation furrows into and through the surrounding soil. An electrical analog apparatus is being utilized. The objectives include:

- a. to determine the effect of furrow geometry and depth of flow within the furrow on infiltration rates and moisture penetration.
- b. to determine how the flow nets developed are affected by boundary conditions imposed by the soil variables.
- c. to determine how the flow nets developed are affected by boundary conditions imposed by surface conditions.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
Engineering Experiment Station
Western States through Regional Research Project

FINANCIAL SUPPORT

Estimated annual budget \$11,200—Federal Hatch Funds, Federal Regional Funds, State Funds

DURATION AND STATUS

Project is in third year—Project will continue indefinitely

PUBLICATIONS AND THESES

"Electric Analog Studies of Steady Flow from Irrigation Furrows," D. Fitzsimmons, M. S. Thesis, University of Idaho, 1962.

"A Procedure for Determining Equivalent Conductivities of Soils for Electric Analog Solutions of Steady Flow Problems," D. Fitzsimmons, G. Corey, Idaho Agricultural Experiment Station Research Bulletin 58.

"Infiltration Patterns from Irrigation Furrows," G. Corey, D. Fitzsimmons, Idaho Agricultural Experiment Station Research Bulletin 59.

IRRIGATION WATER-USE STUDIES NORTHSIDE PUMPING DIVISION, MINIDOKA PROJECT

In planning a large scale irrigation project it is important to know the amount of irrigation water which should be delivered through the canals. This project, in cooperation with the Bureau of Reclamation, will give a better understanding of water use and irrigation efficiency obtained by the average project farmer.

INVESTIGATORS

C. Tyler, G. Corey

DESCRIPTION INCLUDING OBJECTIVE

A project to study irrigation efficiencies on a project-wide basis and to determine how various factors affect irrigation efficiencies. The objectives include:

- a. to determine existing irrigation application efficiencies for an irrigation project.
- b. to determine how application efficiencies may be improved.
- c. to determine water requirements for an irrigation project.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Engineering
U. S. Department of Interior—Bureau of Reclamation

FINANCIAL SUPPORT

Estimated annual budget \$11,000—Bureau of Reclamation Funds

DURATION AND STATUS

Field work completed 1962—Publication being prepared

PUBLICATIONS AND THESES

"Irrigation Efficiency Studies," C. Tyler, G. Corey, Idaho Agricultural Experiment Station Progress Report No. 55, May, 1961.

EVALUATION OF THE EFFECTS OF SUPPLEMENTAL SPRINKLER IRRIGATION AND PASTURE SYSTEMS UPON THE PRODUCTIVITY OF LEGUME-GRASS PASTURE ON NORTHERN IDAHO CUT-OVER AREAS

A successful livestock program in northern Idaho is dependent on economic forage production during the summer months. The results of these tests demonstrated the economic desirability of irrigated and non-irrigated summer pastures. Information helpful in making decisions concerning pasture grazing practices was secured.

INVESTIGATORS

C. Brackney, T. Bell, A. Slinkard, J. Schwendiman

DESCRIPTION INCLUDING OBJECTIVE

A project to determine the value of supplemental sprinkler irrigation on pastures on northern Idaho cut-over areas and to compare the effects of two pasture management systems on these pastures.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Animal Husbandry
Department of Agronomy
Sandpoint Branch Experiment Station

FINANCIAL SUPPORT

Estimated annual budget \$2,500—Federal Funds, State Funds

DURATION AND STATUS

Project initiated 1952—Project completed 1961

PUBLICATIONS AND THESES

"Performance of Yearling Beef Heifers on Irrigated and Non-Irrigated Pasture Using Straight Rotational System of Grazing Compared to the Daily Rotational System of Grazing," E. Duran, M. S. Thesis, University of Idaho, 1958.

RECLAMATION STUDIES ON SLICK SPOT SOILS

Slick spots occur in the soils of southwestern Idaho and are characterized by high sodium content and low water permeability. Productivity of these spots is very low. Research has shown that deep plowing to as much as 36 inches assists reclamation on many of these soils.

INVESTIGATORS

G. Lewis, M. Fosberg, O. Lae

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to determine chemical characteristics of slick spots and associate soils after field reclamation treatments.
- b. to determine the effects of reclamation attempts using chemical methods on slick spot soils in laboratory and greenhouse studies.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Chemistry
Department of Agronomy
Agricultural Research Service
U. S. Department of Agriculture

FINANCIAL SUPPORT

Estimated annual budget \$6,200—Federal Hatch Funds

DURATION AND STATUS

Project initiated October, 1961—Probable duration five years

SOIL MOISTURE STUDIES ON "SICK" ALFALFA USING RADIOTRACERS

Farmers of northern Idaho find it difficult to grow alfalfa in certain areas, particularly cutover timberland. When this land is first cultivated, alfalfa grows vigorously. Many of these soils are characterized by a heavy subsoil and variable compaction which may affect root penetration and water movement. Physical conditions of the soil and water movement have been determined and a corrective treatment has been recommended.

INVESTIGATORS

J. Jordan, R. Harder, C. Brackney, G. Lewis

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to determine the effect of soil moisture and soil physical conditions on the availability of nutrients.
- b. to determine the pattern of soil moisture movement to observe moisture penetrability using tracers.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Chemistry
Department of Agronomy

FINANCIAL SUPPORT

Estimated annual budget \$4,500—Federal Hatch Funds

DURATION AND STATUS

Project initiated 1957—Project completed 1962

PUBLICATIONS AND THESES

"Studies on the Clay Complex of Certain Problem Soils in Idaho," C. Wyer, M. S. Thesis, University of Idaho, 1960.

ECONOMIC ANALYSIS OF IRRIGATION WATER USED ON FARMS IN IDAHO

Because water demands continue to increase, it is very important that individual farmers achieve efficient ways to utilize the available water. In order to achieve positive improvement, some economic incentives must be apparent. This study will show what economic advantages a farmer can expect when he allocates his water, labor, and other resources in accordance with profit maximization principles.

INVESTIGATOR

K. Lindeborg

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to determine physical input-output relationships for irrigation water in producing the more important major crops and how these affect profit potentials under different physical and economic conditions.
- b. to determine the optimum allocation of resources on the farm as a result of obtaining higher efficiencies in water uses. The results of the investigation should point out the economic advantages of attaining a higher level of irrigation efficiency.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Agricultural Economics

FINANCIAL SUPPORT

Estimated annual budget \$4,500—Federal Regional Funds, State Funds

DURATION AND STATUS

Project initiated July, 1960—Probable duration five years

SEEPAGE FLOW CHARACTERISTICS FROM LINED AND UNLINED CANALS

Because of Idaho's extensive system of irrigation canals, it is important to save water by preventing seepage losses and damage from seepage. This cooperative study with the Bureau of Reclamation has contributed savings of over \$50 million in the West during the past 12 years.

INVESTIGATORS

D. Hendricks, C. Warnick, G. Bloomsburg, D. Woodward

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to study the effectiveness and permanence of different types of canal linings.
- b. to study soil sediments and effect of silting action on seepage loss.
- c. to measure seepage losses to determine reaches of canals that may need to be lined.
- d. to conserve water, improve efficiency of irrigation operations, and prevent drainage problems which arise from seepage losses.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering
Department of Agricultural Engineering
Bureau of Reclamation, Region 1

FINANCIAL SUPPORT

Estimated annual budget \$10,000—U. S. Bureau of Reclamation, State Funds

DURATION AND STATUS

Project initiated 1948—A continuing project with activities centered in field studies near Caldwell, Idaho

PUBLICATIONS AND THESES

"Study of the Control of Canal Seepage," D. Hendricks, C. Warnick, Progress Report No. 2, Engineering Experiment Station, University of Idaho, July, 1961.

"An Investigation of the Use of An Air Permeameter to Measure the Site Hydraulic Conductivity of Sandy Soil," T. Anderson, M. S. Thesis, University of Idaho, 1961.

"A Study of the Measurement of Canal Seepage," D. Woodward, M. S. Thesis, University of Idaho, 1962.

INVESTIGATION OF METHODS FOR AUTOMATIC MEASUREMENT OF SNOW WATER CONTENT

In the operation of many Idaho reservoirs, it is important to know the flood producing snow conditions found in remote mountain areas of the state. This project has done much to develop better measuring devices that will decrease costs and hazards in making snow surveys.

INVESTIGATORS

C. Warnick, V. Penton, H. Singh, J. Thomas

DESCRIPTION INCLUDING OBJECTIVE

A sponsored project to study methods of automatically measuring the water equivalent of a mountain snow pack. Methods being investigated include a pressure pillow, a weighing diaphragm, capacitance of the snow, infrared absorption, neutron scattering of a moving probe, and a radioactive snow gage. The basic purpose is to present a measurement which can be electronically transmitted that is useful in runoff forecasting studies.

DEPARTMENTS AND COOPERATIVE AGENCIES

Department of Civil Engineering
Department of Mechanical Engineering
Department of Electrical Engineering
Agricultural Research Service

FINANCIAL SUPPORT

Estimated annual budget \$9,000 — Agricultural Research Service, Engineering Experiment Station furnishes an oversnow vehicle

DURATION AND STATUS

Project initiated December, 1959—First phase of project completed December, 1962

PUBLICATIONS AND THESES

"Methods for Automatic Measurement of Snow Water Content to Predict Water Supply," C. Warnick, V. Penton, H. Singh, Progress Report No. 1, Engineering Experiment Station, University of Idaho, October, 1960.

"Measurement of Snow Water Equivalent Using Infrared Radiation," H. Singh, M. S. Thesis, University of Idaho, 1961.

TELEMETERING HYDROLOGIC DATA FROM MOUNTAIN LOCATIONS

This is a developmental research project to provide electronic devices and radio systems for measuring and automatically reporting hydrologic parameters from remote mountain sites. A system is being tested that measures precipitation, temperature, water equivalent of a snowpack, and soil moisture conditions. This automatic system will provide needed water data that cannot be obtained by winter ground surveys.

INVESTIGATORS

L. Beattie, G. Hespelt, C. Warnick, D. Duncan, L. Maxwell

DESCRIPTION INCLUDING OBJECTIVE

A project to study methods of automatically measuring various hydrologic parameters such as precipitation, snow water equivalent, air temperature, soil moisture, and snow quality at remote mountain sites. The object is to develop units capable of transmitting data "on call" by radio to assist in forecasting streamflow runoff. Most units use a resistance measurement that is transmitted as a time delay pulse.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering
Department of Electrical Engineering
Corps of Engineers
Bureau of Reclamation
Soil Conservation Service
Agricultural Research Service

Washington Water Power Company
Pacific Power and Light Company

FINANCIAL SUPPORT

Estimated annual budget \$15,000—Special Research appropriation from cooperating groups, Engineering Experiment Station Funds

DURATION AND STATUS

Project initiated 1958—An active and continuing project

PUBLICATIONS AND THESES

"Telemetering Hydrologic Data From Mountain Locations," G. Hespelt, D. Duncan, C. Warnick, Progress Report No. 4, Engineering Experiment Station, University of Idaho, May, 1962.

"Automatic Measurement of Hydrologic Parameters at Remote Locations," L. Maxwell, C. Warnick, L. Beattie, G. Hespelt, **Proceedings, Western Snow Conference**, Santa Fe, New Mexico, April 12-14, 1960.

CONSERVATION OF WATER FOR RANGE STOCK

Adequate water supply is often the controlling element which determines whether grazing will be profitable and nondestructive to Idaho's extensive desert range lands. This water conservation study is providing new ideas for ways of lining ponds to prevent seepage losses. Research shows that savings can be made in evaporation from reservoirs. The monetary value of these new treatments is yet to be determined.

INVESTIGATORS

C. Warnick, F. Collett

DESCRIPTION INCLUDING OBJECTIVE

An investigation of ways to conserve water for livestock at small ponds located on range lands by lining ponds and by controlling evaporation. Construction techniques for developing lined ponds are being studied and criteria developed for locating ponds to the best advantage of the rancher and the range conservationist. The hydrology of small ponds is also under investigation as to frequency of drought conditions.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering
Department of Animal Husbandry
College of Forestry
Bureau of Land Management
Agricultural Research Service
Ranchers

FINANCIAL SUPPORT

Estimated annual budget \$8,000—State Funds, Agencies Listed, Private Ranchers

DURATION AND STATUS

Project initiated December, 1959—An active and continuing project

PUBLICATIONS AND THESES

"Idaho Reconnaissance Precipitation Gage," F. Collett, C. Warnick, Circular No. 1, Engineering Experiment Station, University of Idaho, July, 1962.

TOTAL HYDROELECTRIC POTENTIALS IN IDAHO STREAMS AND DEVELOPMENT PROB RESOURCES IN IDAHO

Hydroelectric potentials in various stream basins and methods for estimating potential power capabilities are being investigated. An inventory of and techniques for estimating power capabilities would have great value to planners of water resource projects in the state.

INVESTIGATOR

P. Mann

DESCRIPTION INCLUDING OBJECTIVE

A study of streamflow data to determine full water resource capability. The study is designed to develop estimating constants which may give a 90 per cent accuracy. A minimum of time will be spent studying the practicability of the firm estimate. New ideas of stream-to-stream diversion which have not been considered before will be investigated.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering
Department of Electrical Engineering
Published data and reports from federal agencies

FINANCIAL SUPPORT

Estimated annual budget \$2,300—State Funds

DURATION AND STATUS

Two years preliminary study with irregular help have been carried on—1962-63 should define total resources and point out specific projects

PUBLICATIONS AND THESES

"River Regulation and Energy Production," P. Mann, Unpublished paper presented to the Spokane Section, American Institute of Electrical Engineers, May 23, 1961.

MAXIMIZED POWER DEVELOPED FOR THE SALMON RIVER

The possibility for and methods of evaluating hydroelectric power potential in the Salmon River basin have been explored. A scheme of low-head power plants is theoretically feasible, but of questionable practical possibility. Several sites and plans for future power development have been suggested.

INVESTIGATORS

P. Mann, Y. Liao

DESCRIPTION INCLUDING OBJECTIVE

An investigation of the total hydroelectric potential using a premise of control of the river with several upstream reservoirs and the use of low-head dams as the means of analyzing the power potential. A theoretical study to determine range of power potential without regard to economic feasibility.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering
Department of Electrical Engineering

FINANCIAL SUPPORT

Estimated annual budget \$300—Students' personal funds and staff time devoted to supervision of project

DURATION AND STATUS

Project completed Spring, 1962

PUBLICATIONS AND THESES

"The Ultimate Hydroelectric Potential Power of the Salmon River Without High Dams," Y. Liao, M. S. Thesis, University of Idaho, 1962.

MECHANICS OF EVAPO-TRANSPIRATION

This theoretical study helps explain the process of transpiration and evaporation. A method of explaining the evapo-transpiration process has been proposed in terms of potential energy concepts of fluid mechanics. This method will be helpful in teaching the process to engineers.

INVESTIGATOR

D. Hendricks

DESCRIPTION INCLUDING OBJECTIVE

A theoretical study of mechanisms involved in transpiration and evaporation analyzed using fluid mechanics concepts.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering

FINANCIAL SUPPORT

Estimated annual budget \$300—No equipment involved, support from time allowed for research

DURATION AND STATUS

Project initiated at Utah State University 1957—Project developed at the University of Idaho and completed 1961

PUBLICATIONS AND THESES

"Mechanics of Evapo-Transpiration," D. Hendricks, V. Hansen, *Journal of the Irrigation and Drainage Division*, American Society of Civil Engineers Paper 3182, June, 1962.

INVESTIGATION OF PROBLEMS CONCERNED WITH RADIOISOTOPE SNOW GAGE TELEMETERING SYSTEM

This study of a snow gage for use in the Clearwater River Basin is being conducted especially for the Corps of Engineers. Application of radioisotope principles shows favorable indications that a useful means of remote measurement of snow conditions will result. This will be most valuable in regulating reservoirs that are planned and being constructed on the Clearwater, Snake, and Columbia Rivers.

INVESTIGATORS

L. Maxwell, D. Duncan, G. McKean, K. Wohlfarb

DESCRIPTION INCLUDING OBJECTIVE

A developmental research project aimed at perfecting the monitoring of water equivalent of a snow pack using a detection system to measure the attenuation by snow of gamma radiation. The primary objective is to develop instrumentation to assist in regulation of river flows for power and flood control purposes. This involves both laboratory and field investigations.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Electrical Engineering
Walla Walla District Corps of Engineers

FINANCIAL SUPPORT

Estimated annual budget \$15,000—Corps of Engineers, Engineering Experiment Station furnishes an oversnow vehicle

DURATION AND STATUS

Project initiated 1961—Project to be completed June, 1963

PUBLICATIONS AND THESES

"Investigation of Problems Concerned With Radioisotope Snow Gage Telemetering Equipment," L. Maxwell, Progress Report No. 1, Engineering Experiment Station, University of Idaho, August 21, 1961.

"Investigation of Radioisotope Snow Gage Components and Techniques," D. Duncan, G. McKean, Progress Report No. 3, Engineering Experiment Station, University of Idaho, September, 1962.

FLOW OF SOLID SUSPENSIONS IN PIPES

The movement and concentration of solid particles flowing in water pipe lines is being studied. This information will assist in understanding how slurries, suspensions of wastes, and chemical mixtures can be handled in various places such as treatment plants and dredging operations.

INVESTIGATORS

G. Martin, D. Edwards

DESCRIPTION INCLUDING OBJECTIVE

An investigation to obtain the concentration profile of solids suspended in water flowing through pipes. It is believed that a mathematical model, assuming a random walk with a bias, postulated by Smoluchowski, will put the experimental results on a more rational basis than other semi-empirical theories used up to now.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Chemical Engineering

FINANCIAL SUPPORT

Estimated annual budget \$2,800—National Defense and Education Act Grant, State Funds

DURATION AND STATUS

Project initiated September, 1961—Project to be completed September, 1963

RELATIVE INTENSITY AND SCALE OF TURBULENCE OF WATER FLOWING THROUGH PIPES

The behavior of fluids flowing in pipes was investigated in this basic research program. The size of eddies and intensity of turbulence was measured. This information will be beneficial for calculating any mixing flow problems such as movement of sediments or pollutants through pipes.

INVESTIGATOR

G. Martin

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to measure, using hot-film anemometer and the statistical theory of turbulence, the relative intensity of turbulence and the integral scale of turbulence which gives an idea of the average size of the eddies present in the fluid.
- b. to try to obtain a correlation between the intensity and scale of turbulence and other easily measured variables like the friction velocity.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Chemical Engineering
Department of Civil Engineering
Hydraulics Laboratory Facilities

FINANCIAL SUPPORT

Estimated annual budget \$6,000—National Science Foundation Grant

DURATION AND STATUS

Project initiated July 1, 1961—Data have been obtained, results will be written for publication July 1, 1963

WATER RESERVOIRS FOR COLD REGIONS

A study of reservoir lining materials for use in cold regions has been conducted especially for the Public Health Service. Various plastic and rubber materials have been studied under temperatures as low as -70°F . Several products have proven capable of withstanding extreme coldness. This information should be valuable to those constructing canals and reservoirs where water is used in them throughout the entire year.

INVESTIGATORS

A. Fletcher, C. Warnick

DESCRIPTION INCLUDING OBJECTIVE

A study of materials and possible designs for lining reservoirs to store water for domestic use in cold regions. Primarily a laboratory study to determine the performance of materials at temperatures as low as -70°F .

DEPARTMENTS AND COOPERATING AGENCIES

Department of Civil Engineering
Arctic Health Research Center of the U. S. Public Health Service

FINANCIAL SUPPORT

A study supported for a short term investigation, estimated budget \$6,000 for the first year—U. S. Public Health Service

DURATION AND STATUS

Project initiated April, 1962—Initial study completed January, 1963

CHARACTERISTICS OF SNOW STORAGE AND MELTING

An electronic analog has been developed that will express snowmelt in terms of available parameters which can be used on any watershed. This computer will be a powerful tool in predicting the time and magnitude of spring snowmelts in mountain locations.

INVESTIGATORS

J. Rosa, L. Beyers, J. Miller, J. Martin

DESCRIPTION INCLUDING OBJECTIVE

Snow depths and rates of melting were compared between forest plots and adjacent openings at more than 30 locations in Idaho, Wyoming, and Utah during 1949-1952. Snow distribution within forests was significantly correlated with timber volume and crown density, while melting in the open was related to temperature, aspect, elevation, and season. An equation and electronic analog is being developed for reproducing a snowbelt hydrograph with certain meteorological parameters: temperature of air, temperature of cloud base, albedo of snow, and incidence angle of the sun.

DEPARTMENTS AND COOPERATING AGENCIES

Intermountain Forest and Range Experiment Station, 1949-1952

U. S. Forest Service, Ogden, Utah, 1949-1952

Agricultural Research Service, 1960-1962

Soil Conservation Service, 1960-1962

FINANCIAL SUPPORT

Estimated annual budget \$500—Agricultural Research Service, Boise, Idaho

DURATION AND STATUS

Project initiated 1949—Project has been active through 1962

PUBLICATIONS AND THESES

"Forest Snowmelt and Spring Floods," J. Rosa, *Journal of Forestry*, Volume 54, April, 1956, pp. 231-235.

"Characteristics of Snow Storage and Melting," J. Rosa, P. E. Thesis, University of Idaho, 1961.

"Snow Melting by Electronic Analog," L. Beyers, M. S. Thesis, University of Idaho, 1962.

INFLUENCE OF LOGGING ON TROUT STREAMS IN NORTHERN IDAHO

Merchantable trees and trout streams can coexist. Securing high yields from both forested lands and trout streams would result in a maximum benefit for Idaho. This research project, including investigation to minimize soil erosion and slash in streams, will help determine what logging practices are most compatible with trout production.

INVESTIGATOR

C. MacPhee

DESCRIPTION INCLUDING OBJECTIVE

A study to evaluate the influence of logging on trout streams. An experimental and a control stream were selected in two drainage areas, the St. Joe River and the Clearwater River drainages. The project divides into prelogging, logging, and postlogging phases of study. The long-term objectives include:

- to determine by means of controlled experiments the nature and magnitude of any changes in selected physical, chemical, and biological features of the study streams following logging by locally accepted practices.
- to determine the specific cause or causes of such changes whenever possible.
- to make recommendations which will be helpful in minimizing any harmful effects and maximizing any beneficial effects which logging may have on the streams.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit

Idaho State Board of Land Commissioners

Potlatch Forests, Incorporated

U. S. Forest Service

FINANCIAL SUPPORT

Estimated annual budget \$1,200—Idaho Cooperative Wildlife Research Unit

DURATION AND STATUS

Project initiated 1955—Project is presently in the post-logging phase in the Clearwater drainage and in the logging phase in the St. Joe drainage

PUBLICATIONS AND THESES

"A Pre-logging Inventory of Four Trout Streams in Northern Idaho," W. Olen, M. S. Thesis, University of Idaho, 1957.

"The Ecology of Four North Idaho Trout Streams With Reference to the Influence of Forest Road Construction," R. Bachman, M. S. Thesis, University of Idaho, 1958.

AGE-GROWTH STUDIES OF CLEARWATER RIVER RAINBOW TROUT

Steelhead provide one of the most spectacular sport fisheries in Idaho. Distinguishing young steelhead from rainbow trout is necessary for proper management of the species. As a result of scientific management, the average steelhead run has increased about three times since 1957 compared to the runs during the eight previous years.

INVESTIGATOR

C. MacPhee

DESCRIPTION INCLUDING OBJECTIVE

Creel census estimates show that approximately 81 per cent of the trout harvest of areas accessible to steelhead trout in the Clearwater River drainage is comprised of small rainbow trout of unknown origin. Age-growth studies were initiated to determine what relationship exists between the growth rates of small rainbow trout of unknown origin and adult steelhead trout. A method to determine what proportion of this catch is juvenile steelhead trout and what proportion is resident rainbow trout would prove valuable in estimating the total contribution of steelhead to the Clearwater River sport fisheries.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
State of Idaho Fish and Game Department

FINANCIAL SUPPORT

Estimated annual budget \$1,500—Idaho Cooperative Wildlife Research Unit, State of Idaho Fish and Game Department

DURATION AND STATUS

Project initiated 1956—Project completed 1958

PUBLICATIONS AND THESES

"Age-Growth Studies of Clearwater River Rainbow Trout," C. MacPhee, Clearwater River Fisheries Investigation, Idaho Fish and Game Department Fisheries Division, July 15, 1958, pp. 17-48.

POSTLARVAL DEVELOPMENT AND DIET OF THE LARGESCALE SUCKER, *Catostomus macrocheilus*, IN IDAHO

Largescale suckers are serious competitors of game fish in Idaho. If the number of suckers can be reduced, production of trout and other game fish in Idaho waters will be greatly increased. In young suckers a series of morphological, physiological, and behavior changes occur after the absorption of the yolk sac. Studying these changes provides basic knowledge for recognition of this widely distributed rough fish and for development of control measures.

INVESTIGATOR

C. MacPhee

DESCRIPTION INCLUDING OBJECTIVE

The length-weight relationship of 189 largescale suckers 12 to 38 millimeters in fork length is described by two straight logarithmic lines which intersect at about the 20 millimeter point. Because all major physiologic changes are complete at this length, the 20 millimeter mark effectively separates postlarval and juvenile fish. A change in behavior from surface to bottom feeding is associated with a shift in the lower jaw of the mouth rather than with the ventral migration of the mouth itself. A change from discriminate to non-discriminate feeding as indicated by the ingestion of detritus and sand is linked with development of a coiled intestine.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit

FINANCIAL SUPPORT

Estimated annual budget \$1,000—Federal Aid to Fisheries program under Dingell-Johnson project, State of Idaho Fish and Game Department

DURATION AND STATUS

Project initiated 1958—Project completed 1960

PUBLICATIONS AND THESES

"Postlarval Development and Diet of the Largescale Sucker, *Catostomus macrocheilus*, in Idaho," C. MacPhee, *COPEIA*, June 29, 1960, pp. 119-125.

BIOASSAY OF ALGAL PRODUCTION IN CHEMICALLY ALTERED WATERS

Water from Bear Lake, Idaho-Utah, was tested to determine whether its characteristics could be cheaply and easily altered to increase the food supply for fish and, thus, increase the fish population in Bear Lake. This bioassay indicated that lack of sufficient nutrient chemicals was the main factor limiting the base of the food chain.

INVESTIGATOR

C. MacPhee

DESCRIPTION INCLUDING OBJECTIVE

A bioassay of water from Bear Lake, Idaho-Utah, demonstrated that, compared with a nutrient deficiency, the unique chemistry of the water was not a major factor limiting phytoplankton growth. Various chemicals were added to both natural water from Bear Lake and to water chemically simulating it. An alga, *Chlorella vulgaris* Emerson, was used as a bioassay organism. Under the experimental conditions, heavy metal ions added to either imitation or natural Bear Lake waters had no deleterious effect on cell production. Whenever nutrients were present, cell counts increased. A positive correlation existed between algal production and different concentrations of a chelating agent.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
State of Idaho Fish and Game Department

FINANCIAL SUPPORT

Estimated annual budget \$1,500—Federal Aid to Fisheries program under Dingell-Johnson project F-34-R, Water Quality Investigations, State of Idaho Fish and Game Department

DURATION AND STATUS

Project initiated 1958—Project completed 1959

PUBLICATIONS AND THESES

"Bioassay of Algal Production in Chemically Altered Waters," C. MacPhee, *Limnology and Oceanography*, Volume 6, October, 1961, pp. 416-422.

THE LIFE HISTORY OF THE COLUMBIA RIVER SQUAWFISH, *Ptychocheilus oregonensis*, IN THE CASCADE RESERVOIR, IDAHO

The squawfish is probably the most important predator of salmonoid fishes. An understanding of squawfish habits aids greatly in its control. As a result of this study, the squawfish population in the Payette River has been controlled by rotenone poisoning since 1958.

INVESTIGATORS

C. MacPhee, O. Casey

DESCRIPTION INCLUDING OBJECTIVE

A large squawfish population developed in the North Fork of the Payette River on completion of the Cascade Reservoir in 1948. The race is somewhat unique in that it occurs at a high altitude, about 5,000 feet; it is a young population; and it is adfluvial, that is, it lives in a lake and spawns in a tributary stream. The project was initiated as a preliminary step to a rough fish control program. The objectives include:

- a. to describe the characteristics of the squawfish race in the North Fork of the Payette River.
- b. to point out how this squawfish race differs from other races of squawfish.

Data were collected on the characteristics of the squawfish habitat, behavior, reproduction, age, and growth.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
State of Idaho Fish and Game Department

FINANCIAL SUPPORT

State of Idaho Fish and Game Department

DURATION AND STATUS

Project initiated 1957—Project completed 1962

PUBLICATIONS AND THESES

"The Life History of the Northern Squawfish in Cascade Reservoir," O. Casey, M. S. Thesis, University of Idaho, 1962.

LIFE HISTORY OF THE NORTH IDAHO CUTTHROAT TROUT

The ever-increasing pressure on Idaho's sport fishery resources dictates a need for fundamental information about its native fishes. On the basis of migratory behavior and scale characteristics, two separate races of cutthroat trout have been determined. As a result of this study, these races can be more effectively managed and sustained. Under certain natural conditions, cutthroat trout with inherited migratory behavior have higher survival rates than other non-migratory races and would be valuable for introduction elsewhere in Idaho.

INVESTIGATORS

C. MacPhee, R. Averett

DESCRIPTION INCLUDING OBJECTIVE

The Couer d'Alene Lake complex contains a migratory cutthroat trout that ascends the St. Joe River system for spawning. This particular strain of fish provides the bulk of angling on the St. Joe River and is thus a highly important sport fish. Resident cutthroat trout are also present in the St. Joe River. These fish never migrate to the lake but mature and spawn in the stream. Primary objectives of this study include:

- to determine age and growth of resident and migratory fish.
- to identify and describe any distinguishing morphological differences between resident and migratory fish.

- To determine the length of time young adfluvial fish spend in the stream before leaving for the lake environment.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
State of Idaho Fish and Game Department

FINANCIAL SUPPORT

Estimated annual budget \$3,500—Federal Aid in Fish Restoration Project F-47-R-1, Idaho Cooperative Wildlife Research Unit

DURATION AND STATUS

Project initiated 1961—Project to be completed with master's thesis 1963

A LIMNOLOGICAL SURVEY OF THE BACKWATER OF THE LOWER ST. JOE RIVER, IDAHO

The backwater of the St. Joe River contributes considerably to Idaho's fishery resource. Because limnological features of the backwater are somewhat unique, a knowledge of its physical, chemical, and biological characteristics and of its fish populations is basic to the development of a sound fishery program.

INVESTIGATORS

C. MacPhee, S. Davis

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- to record physical and chemical measurements of the backwater.
- to measure seasonal variations in plankton and benthic organisms.
- to ascertain the productivity of the backwater in terms of standing crop with special reference to fish food organisms.
- to investigate linear succession of plankton and bottom fauna from the lower to the upper reaches of the backwater.

The St. Joe River backwater is essentially a twenty-six mile ecotone or transition zone between Coeur d'Alene Lake and the rapid water of the St. Joe River. Because

of its long length, the backwater lends itself to a study of linear succession, or a change in plant and animal communities with a change of environment.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit

FINANCIAL SUPPORT

Estimated annual budget \$3,500—Idaho Cooperative Wildlife Research Unit

DURATION AND STATUS

Project initiated 1959—Project completed 1961

PUBLICATIONS AND THESES

"A Limnological Survey of the Backwater of the Lower St. Joe River, Idaho," S. Davis, M. S. Thesis, University of Idaho, 1961.

OCCURENCE AND SIGNIFICANCE OF DEW ON SELECTED FOREST SITES IN NORTHERN IDAHO

This basic research is to determine dew distribution on forest sites, the effect of dew on survival and growth of forest vegetation and tree seedlings, and the effect of dew on game animal populations. Results to date indicate that with certain topographical and meteorological conditions, dew is an extremely important part of the total precipitation and dew patterns can be modified through land management practices. A device is being developed to accurately measure dew precipitation. This device should also prove useful to the U. S. Weather Bureau which has initiated dew forecasting in southern Idaho. This service will be particularly valuable to agriculturalists.

INVESTIGATORS

K. Hungerford, P. Edgerton

DESCRIPTION INCLUDING OBJECTIVE

The objectives include:

- a. to determine the importance of dew in forest conditions.
- b. to develop methods of measuring dew on a quantitative basis.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
U. S. Weather Bureau

FINANCIAL SUPPORT

Estimated annual budget \$3,000 plus loan of \$7,000 worth of equipment—U. S. Weather Bureau, Forest Wildlife and Range Experiment Station

DURATION AND STATUS

Project initiated 1961—An active and continuing project

LIFE HISTORY OF THE SALMON RIVER CUTTHROAT TROUT

The Salmon River contains one of the largest single population of stream cutthroat trout in Idaho. As fishing pressures increased in primitive areas, the assessment of this valuable fishery resource was necessary. This investigation resulted in regulations being recommended that would guarantee the maintenance of Idaho's cutthroat population at a high level of productivity.

INVESTIGATORS

C. MacPhee, J. Mallet

DESCRIPTION INCLUDING OBJECTIVE

The Middle Fork of the Salmon River, located in the Idaho wilderness area, is one of the few remaining streams that contain a sizeable population of large cutthroat trout. Regardless of the fact that the Middle Fork is accessible only by trail, boat or air, fishing pressures increased in recent years. There are indications that the quality of fishing for resident trout species may be declining. The life history, movements, and harvest of trout species present in the Middle Fork were investigated.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
State of Idaho Fish and Game Department

FINANCIAL SUPPORT

State of Idaho Fish and Game Department

DURATION AND STATUS

Field work initiated 1960—Field work completed 1961
—A master's thesis is still pending

PUBLICATIONS AND THESES

"Middle Fork of Salmon River Trout Fisheries Investigation," J. Mallet, Federal Aid in Fish Restoration, Completion Report F37-R-2, 1961, pp. 1-65.

THE DETERMINATION AND DEVELOPMENT OF SPERM TOXINS FOR THE CONTROL OF UNDESIRABLE SPECIES OF FISH

Various biologically active chemicals have shown selective toxicity for various plants and animals. Development of such chemicals for rough fish control is comparatively new. Identification of a chemical which will successfully kill rough fish such as squawfish or their sex products would be worth millions of dollars to Idaho's fishery resource and to the salmon industry and sport fisheries in northwestern United States.

INVESTIGATOR

C. MacPhee

DESCRIPTION INCLUDING OBJECTIVE

A project to study the problem of coarse fish control. At the present time it is impossible to rehabilitate many lakes and streams by total poisoning because they are too large or because the use of rotenone poison destroys the stocks of desirable native species of trout and salmon. Development of a selective toxin which would not be lethal to salmonids but which would suppress coarse fish would presumably improve the production efficiency of our fishing waters. The objectives include:

- a. to determine the minimum effective concentrations lethal to fish sperm of various toxins which are sublethal to young salmonids at the concentrations tested.
- b. to test the effectiveness of sperm toxin in suppressing a natural squawfish population.
- c. to explore and develop any toxins which during the course of this investigation are noted accidentally to have detrimental effects on the eggs or larvae of the coarse fish utilized.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Cooperative Wildlife Research Unit
Bureau of Commercial Fisheries
U. S. Fish and Wildlife Service

FINANCIAL SUPPORT

Estimated annual budget \$15,000—Idaho Cooperative Wildlife Research Unit, Bureau of Commercial Fisheries, United States Fish and Wildlife Service

DURATION AND STATUS

Project initiated 1962—Project to screen a large number of chemicals over a period of two or three years—Project to screen for selective fish toxins as well as spermicides, ovicides, and larvicides

ANNUAL LIMNOLOGICAL CYCLES IN SOME IDAHO LAKES WITH SPECIAL REFERENCE TO THE FOOD OF FISH

Basic variations that exist in some of Idaho's northern lakes have been determined by this limnological study. This lake district provides every type of lake ranging from deep and poor producers to shallow and rich producers. To date, these studies indicate that dissolved organic and inorganic matter in these lake waters is more variable than particulate organic and inorganic matter. This relationship may be significant in terms of productivity.

INVESTIGATOR

P. Buscemi

DESCRIPTION INCLUDING OBJECTIVE

The State of Idaho represents a vast gap in our over-all fundamental knowledge of North American lakes. Of more than 1,500 lakes in the state, not one, to the knowledge of the investigator, has been studied intensively on an annual basis with reference to basic cycles of physical, chemical, and biological phenomena upon which the production of fish for economic purposes depends. This five year study on northern Idaho seepage and drainage lakes should partially fill this wide hiatus in our basic ecological understanding of Idaho lakes.

DEPARTMENTS AND COOPERATING AGENCIES

College of Forestry
Idaho Department of Fish and Game

FINANCIAL SUPPORT

Estimated annual budget \$1,400—University of Idaho Research Council

DURATION AND STATUS

Project initiated June, 1957—Project completed 1962

PUBLICATIONS AND THESES

"Some Aspects of the Regional Limnology of North and Central Idaho," P. Buscemi, *Proceedings of the International Association of Theoretical and Applied Limnology*, Proceedings of the Congress in Madison, Wisconsin, 1962, Volume 15.

"Hydrography and Morphometry of Two North Idaho Lakes," P. Buscemi, In Press.

"Hydrography and Morphometry of a Central Idaho Lake," P. Buscemi, In Press.

DEVELOPMENTAL STUDIES OF THE BOTTOM FAUNA OF SPRING VALLEY AND SIMPLOT RESERVOIRS, LATAH COUNTY, IDAHO

Developmental patterns of bottom fauna populations as these animals invade a new aquatic environment (Spring Valley) will be compared with the pattern of populations already established in a nearby reservoir (Simplot).

INVESTIGATOR

P. Buscemi

DESCRIPTION INCLUDING OBJECTIVE

Spring Valley reservoir, a newly created impoundment, presents an excellent opportunity to trace development and establishment of macroscopic bottom fauna organisms in a sterile environment. The objectives include:

- a. to determine which of the major classes of bottom organisms appear first.
- b. to trace the effects of developing populations on the evolution of lake sediments.

Values of oxidation-reduction potentials of lake sediments as a measure of organism effect will be employed. Some relations between redox potentials and bottom fauna populations have been implied in the

literature, but never clearly defined. Developmental sequences in Spring Valley reservoir will be compared with those already in progress in Simplot reservoir which is located in the same geographical area.

DEPARTMENTS AND COOPERATING AGENCIES

Department of Biological Sciences

FINANCIAL SUPPORT

Estimated annual budget \$400—University of Idaho Research Council

DURATION AND STATUS

Project initiated July, 1962—Project to continue for three years

COEUR d' ALENE RIVER DRAINAGE STUDY

This is a basic research study of the drainage changes in the Coeur d'Alene River system over the past 20 million years as affected by lava damming and glacial damming. The study is not yet complete, but it should give us fundamental information on old water channels that may be of great importance in future investigations of present ground-water resources and movement in the Coeur d'Alene drainage.

INVESTIGATOR

W. Dort, Jr.

DESCRIPTION INCLUDING OBJECTIVE

A project to study the history of drainage changes in the Coeur d'Alene River area as affected by lava damming and glacial damming (including outwash deposition).

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Bureau of Mines and Geology
University of Kansas

FINANCIAL SUPPORT

Annual budget \$300 from the Idaho Bureau of Mines and Geology, other funds from University of Kansas Research Funds

DURATION AND STATUS

Field studies accomplished during three summers (12 weeks total)

PUBLICATIONS AND THESES

"Glacial Lake Coeur d'Alene and Berg-raftered Boulders," W. Dort, Jr., *Idaho Academy Science Journal*, Volume I, No. 2, October, 1960, pp. 81-92.

GEOLOGY AND MINERAL RESOURCES OF TWIN FALLS COUNTY

Analysis of the changes in ground-water levels since beginning of irrigation and of annual water-level fluctuations should provide an understanding of the movement of ground water in the area. Ground-water movement and geologic factors such as stratigraphy and structure are guides in selection of areas in which to drill wells for supplemental irrigation water and for municipal or industrial use.

INVESTIGATORS

R. Jones, E. Cook

DESCRIPTION INCLUDING OBJECTIVE

A study to prepare geologic maps of Twin Falls County and to inventory and evaluate mineral resources of which the principal one is water. Well records have been studied and plotted on a map. Rise in water table and fluctuations are being studied in relation to application of irrigation water.

DEPARTMENTS AND COOPERATING AGENCIES

Idaho Bureau of Mines and Geology
U. S. Geological Survey (unofficial)
State Reclamation Engineer (unofficial)

FINANCIAL SUPPORT

Estimated annual budget \$1,500—Idaho Bureau of Mines and Geology

DURATION AND STATUS

A study requiring three summers—Field work to be completed Summer, 1963