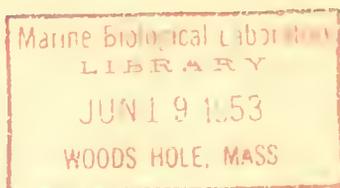


SURVEY OF FISHERY ACTIVITIES

1953



CIRCULAR NO. 21

FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

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SURVEY OF FISHERY ACTIVITIES 1953

A Catalogue of Current Research and
Management Projects Pertaining to
the Sport Fisheries of the
United States



CIRCULAR 21

Fish and Wildlife Service, Albert M. Day, Director
United States Department of the Interior, Douglas McKay, Secretary

Compiled by the Branch of Federal Aid

May 1953

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PURPOSE AND DESCRIPTION OF THE SURVEY

This publication reports information gathered from the principal agencies and institutions engaged in sport-fish research and management activities in the United States. As such, it is probably the first organized attempt to bring together the current programs in these fields of fish conservation. The objective of the survey is to provide a catalog which will encompass work in progress to provide fishery administrators, technicians, and any others who might be interested, means for keeping abreast of modern developments in fish conservation practices. It is believed that the publication will stimulate greater exchange of ideas between those engaged in projects of a similar nature, will aid in preventing needless duplication of effort, and will for the first time furnish a comprehensive picture of the status of our fisheries' programs.

In planning the Survey, it was necessary to establish a suitable limitation on types of projects which would be covered. The principal criteria, that the Survey should include projects relating only to sport fishes and features of their habitat, was established in an effort to scale down the field covered by the report in its first year. To maintain interest in the publication, it was found desirable to exclude reporting on routine management operations, such as law enforcement, public relations, fish stocking, et cetera. Finally, the Survey deals exclusively with work in progress. Neither past accomplishments nor future plans have been included unless these are related directly to the current work.

Reports on individual projects are necessarily brief, and the space assigned does not reflect the importance of the project. In the case of some of the Federal projects, the sphere of operations may include several States. Projects are listed under the State where headquarters are established. The subject index will assist in locating the description of any project. Insofar as possible the Fish and Wildlife Service has limited its editing of completed questionnaires to the bare essentials necessary for standardization of format and attainment of clarity. Readers are urged to direct inquiries to the responsible agency as given under each project description rather than to the Fish and Wildlife Service, except where the project is listed as an undertaking of the Service.

As there is no single comprehensive directory of agencies and institutions engaged in projects covered by the Survey, it is doubtless possible that some have been overlooked in this first publication. It is hoped that more complete coverage can be obtained with next year's edition of the Survey. Questionnaires will be circulated to correspondents in January of each year with the expectation that publication will take place near the first of March. The issuance of the first report was unavoidably delayed.

All State Fish and Game Departments provided reports except California and Texas. Federal Aid in Fish Restoration projects currently approved were included by the Fish and Wildlife Service for California. Inasmuch as Texas had no Dingell-Johnson projects in operation prior to April 15, 1953, no report of the Game and Fish Commission projects could be made.

ACKNOWLEDGMENTS

Acknowledgment is made of the enthusiastic response on the part of all contributors. The Survey is a purely cooperative venture in which the Fish and Wildlife Service is serving only as the clearing house and means of publication. Without the voluntary contributions of the agencies whose programs appear herein, a survey and this publication would not have been possible.

The need for bringing together information on current fishery programs has been recognized by the American Fisheries Society for many years. In a resolution passed by the Society at its September 1952 meeting, the Fish and Wildlife Service, through the Branch of Federal Aid, was requested to undertake the Survey. This has now been accomplished with the publication of the first year's reports.

*****:*****

EXPLANATION OF PROJECT DESCRIPTIONS

Material reported by the several game and fish departments, universities, federal and private agencies, is arranged in the following order:

- (1) Title of project
- (2) Objectives and description
- (3) General explanatory information
 - (a) Area covered and/or location of headquarters
 - (b) Cooperating agencies
 - (c) Date project began and expected life
 - (d) Estimated cost of current segment
 - (e) Name of the project leader
 - (f) Availability of project reports
- (4) Person or office to receive communications

If a project is being carried out under the Federal Aid in Fish Restoration (Dingell-Johnson) program, it will carry the designation FA: and the project number after the title. For projects which are given an identifying number or symbol by the sponsoring agency, this will likewise be included in parentheses after the title. If the sponsor stated that reports on the project are or will shortly be available, this is indicated. For information on the availability of reports on Fish and Wildlife Service projects, write to the person indicated in that particular project. The cost figure given is that reported for the current year or segment only and does not represent the entire cost of projects with a life of more than one year.

ALABAMA

Department of Conservation

1. Oak Mountain Public Fishing Lake (FA: F-2-D).

A dam, which will impound about 75 acres of public fishing water, is under construction. The new lake will be fertilized and managed to provide a maximum amount of fishing in an area where fishing waters are scarce and population high.

Oak Mountain State Park, Shelby County, near Birmingham; began August 1, 1952, planned for one year; \$52,899.88.

Address correspondence to: I. E. Byrd, Fisheries Biologist, Depr. of Conservation, Montgomery, Ala.

Alabama Polytechnic Institute

1. Farm Ponds Investigations.

One hundred and forty-two experimental ponds are being operated by the experiment station to study the use of farm ponds to produce sport fishing and for bait minnow and commercial fish production. This is being accomplished by determining: The relationship of soil types to pond productivity; methods of increasing abundance of fish foods in ponds; the biology of various species of pond fishes; the combination of species giving the highest yield of fish per acre; pond weed control; factors affecting the balance between species; fish parasite and predator control; and proper management practices.

Auburn, Ala.; began 1934, continuing; \$70,000; reports in A. P. I. Bulletins available on request.

Address correspondence to: H. S. Swingle, Proj. Ldr., Farm Ponds Laboratory, Auburn, Ala.

Fish and Wildlife Service, Branch of Game-fish and Hatcheries

1. Warm-water Pondfish Culture.

Existing methods of producing warm-water species of pondfishes under hatchery conditions are critically examined with the objective of improving present procedures and techniques in hatchery management. Production methods for warm-water species of fish which show promise of improving the quality and quantity of the hatchery output are tested. Techniques of fertilization and weed control are being tried out under hatchery conditions.

U. S. Fish Cultural Station, Marion, Ala.; began January 3, 1950, continuing; \$7,080;

Address correspondence to: Jack R. Snow, Proj. Ldr., U. S. Fish Cultural Station, Marion, Ala.

ARIZONA

Game and Fish Commission

1. Survey of the Fisheries Resource of the Colorado River (Now FA: F-2-R).

A basic data survey of the Lower Colorado River Fisheries Resource has been completed. The recreational value of the fishery and the species of fish present, their relative abundance and food supply, were the major objectives of the project. A management and development plan for the Colorado River has been instituted. Research is being continued on problems that are evident as a result of the basic data survey.

Mohave and Yuma Counties; \$10,000; R. A. Wagner, Proj. Ldr.

Address correspondence to: Jack Hemphill, Fisheries Biologist, Arizona Game and Fish Commission, Phoenix, Ariz.

2. Luna Lake Development Project (FA: FW-2-D).

The height of Luna Lake Dam has been increased to insure permanent dead water storage for fish and waterfowl. A permanent dead storage of 550 acre-feet covering 67 surface acres was created through this project. A total storage of 1,390 acre-feet covering 151 surface acres was developed.

Apache County; completed in 1952; \$47,512 total cost.

Address correspondence to: Jack Hemphill, Fisheries Biologist, Arizona Game and Fish Commission, Phoenix, Ariz.

3. Rough Fish Control.

Lyman Reservoir, Kinnikinick and Becker Lake were poisoned with toxaphene for the eradication of rough fish. Toxaphene was applied at the rate of 0.1 ppm at temperatures ranging from 52 to 79° Fahrenheit. In the latter two lakes, a 100 percent kill of all fish life was accomplished. The lakes were suitable for restocking six weeks after the date of treatment. Cost of treatment averaged \$0.18 per acre-foot.

Apache and Coconino Counties; completed in 1952.

Address correspondence to: Jack Hemphill, Chief Fisheries Biologist, Arizona Game and Fish Commission, Phoenix, Ariz.

4. Basic Data Fisheries Research of the Lakes of Anderson Mesa (FA: FW-1-R).

Anderson Mesa is located in Central Arizona at a general elevation of 7,000 feet. This project was instituted to gain basic data upon which to base a comprehensive fisheries management program for the seven lakes of Anderson Mesa; a complete limnological and fish population survey constituted the major work of this project.

Coconino County; completed in 1952, \$12,000; Richard A. Wagner, Proj. Ldr.

Address correspondence to: Jack Hemphill, Fisheries Biologist, Arizona Game and Fish Commission, Phoenix, Ariz.

ARIZONA (Cont.)

Fish and Wildlife Service, Branch of Game-fish and Hatcheries

1. Fishery Management in Semi-desert Country.

The Navajo-Hopi Indian Reservation in Arizona is typical of much of this type of country. The interest and cooperative effort of those in charge of the reservation, and from many of the Indians, warrant development of angling opportunities for the Indians and for visitors. The best opportunities are in the larger reservoirs and deep charcos (tanks) which retain sufficient water through drought periods to maintain fish populations. Development of proper species compositions, stocking densities, and corrective stocking measures are the principal management problems in these areas.

The Navajo-Hopi Indian Reservation; continuing; Lynn Hutchins, Regional Fishery Management Biologist; progress reports available.
Address correspondence to: Regional Director, U. S. Fish and Wildlife Service,
P. O. Box 1306, Albuquerque, N. M.

2. "Management Area" Method of Fishery Management Administration and Field Conduct.

The Ft. Apache Indian Reservation in Arizona is being used as the proving ground for the system. Special survey procedures, methods of determining stocking factors, and coordination of hatchery production with management area requirements are being developed which are intended to permit adequate fishery management.

Ft. Apache Indian Reservation; began July 1952, continuing; Lynn Hutchins, Regional Fishery Management Biologist; progress reports available.
Address correspondence to: Regional Director, U. S. Fish and Wildlife Service,
P. O. Box 1306, Albuquerque, N. M.

ARKANSAS

State Game and Fish Commission

1. A Statewide Fisheries Survey (FA: F-1-R).

A project to obtain information on the location and physical features of the State's public streams and lakes; to secure data on the success of fish reproduction, survival, growth, and age; and to determine the principal uses of waters involved and their effects on sport fishing. Future management measures and investigation and development work will be recommended on the basis of the data obtained.

Statewide in scope; planned for 3 years beginning August 1, 1951; \$36,080; Andrew Hulse, Asst. Proj. Ldr.
Address correspondence to: Joe Hogan, Supervisor of Fisheries, Lonoke, Ark.

CALIFORNIA

Department of Fish and Game

1. Yellowtail Study (FA: F-1-R).

Studies are being made as to the best techniques to be used in tagging yellowtail and in determining the age of specimens taken. All possible data on reproduction and food habits are being gathered. Efforts are being made to determine the areas in which young fish occur and their rate of growth. Data on oceanographic conditions which appear tied in with the yellowtail distribution and movements will be recorded.

Along the Southern California coast and adjoining Mexican waters; The Scripps Institute of Oceanography cooperating; began July 1, 1952, planned for 3 years; \$27,200; Robert D. Collyer, Proj. Ldr.

Address correspondence to: Frances N. Clark, Dept. of Fish and Game, Terminal Island, San Pedro, Calif.

2. A Study of the Catfish Fishery of California (FA: F-2-R).

The objectives of this study are to determine the reasons for the apparent decline in catfish fishery. Information on population numbers, life history, and rate of recruitment of the more important species are being studied. At least 9,000 fish are to be tagged employing several methods. Efforts will be made to recover the tags and analyze all available data.

Statewide; began July 1, 1952, planned for 3 years; \$14,742.12; J. Bruce Kinsey, Proj. Ldr.

Address correspondence to: Alexander J. Calhoun, Dept. of Fish and Game, 916 - J St., Sacramento 14, Calif.

3. Experimental Back-country Fish Management (FA: F-3-R).

This study aims to evaluate the potentialities of a large number of streams and lakes for public fishing in the higher country of northern California and the Sierra Nevada. It provides a means of keeping a running account of fish populations, harvest, and the steps which might be taken in improving the habitats for fish. The State's trout stocking program will be modified along lines indicated by this investigation and various types of developmental work will be carried out when practicable.

Headquarters at B shop; began July 1, 1952, planned for 3 years; \$13,000; Scott M. Soule, Proj. Ldr.

Address correspondence to: Alexander J. Calhoun, Dept. of Fish and Game, 916 - J St., Sacramento 14, Calif.

4. North-coastal Stream Restoration and Improvement (FA: F-4-D).

California is continuing activities directed toward the improvement of conditions for migrating and spawning fish in its coastal streams in the northern part of the State. Removal of log jams and natural barriers and deepening of riffle areas will be undertaken.

The Smith and Klamath Rivers in Del Norte County and the Elk, Mad, Eel, and Garcia Rivers in Humboldt County; began July 1, 1952, planned for 10 years; \$37,708.47; J. Bruce Kinsey, Proj. Ldr.

Address correspondence to: Alexander J. Calhoun, Dept. of Fish and Game, 916 - J St., Sacramento 14, Calif.

CALIFORNIA (Cont.)

5. Surf Fishing Investigation (FA: F-5-R).

These studies are designed to gather data as to the rate of growth, spawning requirements, and habitat preference of important sport fishes such as corbina, yellowfin croaker, spotfin croaker, opaleye, and barred perch. Catch data for the important species, fish distribution, and angling techniques will be given attention. The relation of fisherman success to special areas, condition of the beach, tides, and other factors will be observed.

Southern California from Point Conception to the Mexican border; began July 1, 1952, planned for 3 years; \$19,600; Frederick B. Hagerman, Proj. Ldr.

Address correspondence to: Frances N. Clark, Dept. of Fish and Game, Terminal Island, San Pedro, Calif.

6. Sacramento-San Joaquin River Salmon and Steelhead Study (FA: F-7-R).

The salmonoid fishes form the basis for the most important sports fishery in the State, however, extensive losses of these important fish are known to occur during their journey to the sea. This project is to be a thorough study to provide information as to the extent of the losses and to develop means of relieving this condition. The first year's studies have emphasized a reconnaissance of possible experimental streams and diversions, the setting up of experimental procedures, and initial sampling techniques, including creel census.

Statewide; began July 1, 1952, planned for 3 years; \$42,000; Harry A. Hanson, Proj. Ldr.

Address correspondence to: Alexander J. Calhoun, Dept. of Fish and Game, 916 - J St., Sacramento 14, Calif.

State Water Pollution Control Board

1. Design and Testing of a Plan for the Biological Aspects of the Periodic Stream Sampling Program.

The project is designed to review and evaluate existing techniques for biological sampling of polluted and unpolluted water, to devise a plan for periodic biological sampling of California streams, to classify California stream sections into characteristic types, and prepare outlines for additional related fundamental investigations needed to improve stream sampling methods.

Berkeley, Calif., and Sage Hen Trout Experiment Station of the Univ. of Calif. near Truckee, Calif.; began March 1, 1953, to be completed June 30, 1954; \$4,000; Professors R. L. Usinger and P. R. Needham, Proj. Ldrs.; final project report will be available on request.

Address correspondence to: Vinton W. Bacon, Executive Officer, State Water Pollution Control Board, 927 Tenth Street, Sacramento 14, Calif.

CALIFORNIA (Cont.)

University of California, Dept. of Zoology

1. Sagehen Creek Experimental Wildlife and Fisheries Project.

Survival and migration of trout on a year-round basis are being studied by using two-way fish traps for catching trout moving in and out of streams and by diversion through side channels. These movements are being correlated with records of water and seasonal conditions. A fish marking program is being developed to enable accurate record keeping.

Located 15 miles north of Truckee, in the Truckee River drainage; began June 1951, planned for an indefinite, long term; \$10,000.

Address correspondence to: Dr. Paul R. Needham, Dept. of Zoology, Univ. of California, Berkeley 4, Calif.

Fish and Wildlife Service, Branch of Fishery Biology

1. Limnology and Biology of High Sierra Lakes (Proj. 25).

The object of this project is to determine the relationship between biological, physical, chemical, thermal, climatic, and seasonal conditions and the growth and abundance of trout as a means of understanding those factors that limit or control productivity to improve basic fertility and trout management practices.

Convict Creek Basin, Calif.; Hdqtrs.: Reno, Nevada; began July 1951, to be completed in September 1953; Norman Reimers, Leader.

Address correspondence to: Reed S. Nielson, Chief, California-Nevada Inland Fishery Investigations, Reno, Nev.

2. Survival of Hatchery-reared and Wild Trout in Streams (Proj. 26).

The objective is to evaluate the extensive and expensive practice of stocking hatchery-reared, catchable-size rainbow trout in streams and to determine the factor or factors that limit their survival as a means of establishing improved stocking practices and procedures.

Hdqtrs.: Reno, Nev.; began October 1950, to be completed October 1955; Reed S. Nielson, Leader.

Address correspondence to: Reed S. Nielson, Chief, California-Nevada Inland Fishery Investigations, Reno, Nev.

COLORADO

Game and Fish Department

1. Parvin Lake Studies (FA: F-1-R) in part).

The objectives are to study fishing methods, use of the lake by anglers, and the return to the creel of all plants of hatchery-reared fish. Also, the limnology, ecological relationships, food habits of all species present, loss of throwback trout, and spawning migrations are studied. A complete check on fishermen is possible. Stocked trout are marked.

COLORADO (Cont.)

Larimer County; began April 1949, expected to close November 1959; \$10,000; James Boyd, Leader; a limited number of mimeographed reports are available. Address correspondence to: W. D. Klein, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

2. Fishhook and Lost Lake Studies (FA: F-1-R in part).

This investigation is designed to give return-to-the-creel information on marked plants of rainbow and native trout fry, 3- and 5-inch fish, and information on fishing pressure and success. Also, limited limnological studies, food habit studies, and age and growth studies are being conducted. The lakes are above the 10,000-foot elevation and are reached only by a 6-mile pack.

On the Continental Divide, northwest portion of Colorado; began June 1948, planned for 5½ years; #3,500; C. A. Weberg, Proj. Ldr; limited number of mimeographed reports available after August 1, 1953. Address correspondence to: W. D. Klein, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

3. Experimental Fertilization of the High Elevation, Relatively Unproductive Trout Lake (FA: F-1-R in part).

The objective of the study is to determine the relative effectiveness of commercial fertilizer in increasing the productivity of a high, unproductive trout lake. The water in these lakes contains only minute quantities of dissolved solids. Plankton has been used as the indices of the value of the fertilization program initiated.

Near top of Medicine Bow Range of Mountains, Larimer County; began June 1951, planned for 4½ years; \$3,500; limited number of mimeographed reports available after August 1, 1953. Address correspondence to: Dr. John R. Olive, Dept. of Zoology, A. & M. College, Fort Collins, Colo.

4. Skaguay Reservoir Studies (FA: F-1-R in part).

These studies are designed to provide information for the management of fluctuating water level trout reservoirs. The return to the creel of marked plants of hatchery-reared rainbow trout of legal size is being studied. Kokanee salmon have been stocked on an experimental basis. The spawning migration is being studied by means of a trap in the inlet stream. Food habit studies of the more important species is under way and limnological studies are being carried out in detail.

Teller County; began April 1952, continuing; \$10,000; R. L. Moore, Proj. Ldr.; limited number of mimeographed reports available after August 1, 1953. Address correspondence to: W. D. Klein, Game & Fish Dept., 1530 Sherman St., Denver, Colo.

5. Forest Lake Return-To-The-Creel Studies (FA: F-1-R in part).

The objective of this study is to obtain data on contribution to the creel of similar plants of rainbow and brook trout approximately two inches long. The fishing intensity, methods, and fisherman success are recorded, accompanied by observations on food habits, and rate of growth of the fish.

COLORADO (Cont.)

Delta County; began June 1952, planned for 2½ years; \$3,500; P. T. Barrows, Proj. Ldr.; a limited number of mimeographed reports will be available after August 1, 1953.

Address correspondence to: W. D. Klein, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

6. Holbrook Lake Project.

Rough fish control and corrective stocking initiated in 1948, are being continued, and accompanied by a creel census. Brush shelters will be installed on an experimental basis. A comprehensive survey of the physical, chemical and biological conditions is scheduled to start in 1953.

Otero County; began March 1948, planned to January 1957; \$7,500; Gene Cook, Proj. Ldr.

Address correspondence to: Tom Lynch, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

7. Jumbo Reservoir Study.

Initial phases of the study included the food and growth of crappie and yellow perch. Two hundred and fifty thousand rainbow trout were fin-clipped and stocked, along with 12,000 tagged rainbows 6 inches and over in length, to determine the success of these fish in warm water reservoirs. An intensive creel census is in progress.

Sedgwick County; began June 1949, planned for 4½ years; \$7,500; Rex Taliferro, Proj. Ldr.; a limited supply of mimeographed reports entitled "Food and Growth Studies, Major Game Fishes in Jumbo Reservoir" by Robert L. Evans, are available.

Address correspondence to: Robert L. Evans, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

8. Limnology and Fish Population of Two Buttes Reservoir.

This was a study to determine the existing conditions and what might be necessary to improve the fishing conditions of the impoundment.

Baca County; began April 1950, completed January 1952; \$15,000; Phil Buscemi and Dave Lemons, Leaders; report not available before fall of 1953.

Address correspondence to: Tom Lynch, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

9. Introduction of New Fish Species, Walleye, White Bass, and Drum.

The walleye and the white bass were introduced into a number of impoundments. Each year periodic checks are made to determine survival, growth, and reproductive success. Drum were stocked in one reservoir to determine if fishing could be improved for anglers using the still fishing method.

Impoundments in the Platte and Arkansas River drainages; began July 1948, planned for 6½ years; \$5,500; a report "The White Bass in John Martin Reservoir" will be available during the fall of 1953.

Address correspondence to: Tom Lynch, Supt. of Warm Water Fish, Game and Fish Dept., 1530 Sherman St., Denver, Colo.

COLORADO (Cont.)

Fish and Wildlife Service, Branch of Fishery Biology

1. Spawning Periods for the Various Game and Major Forage Fishes (Proj. 28).

The objective is to determine when and where the various fishes spawn in order to evaluate the results of natural spawning and to determine where corrective measures might be used to increase the reproduction of desired species.

Hdqtrs. : Forestry Bldg. , Colo. A and M College, Fort Collins; began June 1951, continuing; William C. Beckman, Leader.

Address correspondence to: Dr. William C. Beckman, Coop. Fishery Research Unit, Colo. A & M College, Forestry Bldg. , Fort Collins, Colo.

2. Food Habits of Major Game Species (Proj. 29).

The objective is to determine the foods used by the major species and to find where any weaknesses may occur in the food chain and possibly some corrective measures which might be instituted to provide more adequate food supplies.

Hdqtrs. : Forestry Bldg. , A and M College, Fort Collins; began June 1950, continuing.

Address correspondence to: Dr. William C. Beckman, Leader, Forestry Bldg. , Colo. A & M College, Fort Collins, Colo.

3. Biological Inventory of Jackson Lake and Lonetree Reservoirs (Proj. 30).

The objective is to acquire needed basic data on physical, chemical and biological factors which are influencing the fish production in typical fluctuating-water-level reservoirs.

Hdqtrs. : A and M College, Fort Collins; began June 1950 to be completed in October 1954; William C. Beckman, Leader.

Address correspondence to: Dr. William C. Beckman, Forestry Bldg. , A & M College, Fort Collins, Colo.

4. Age and Growth Studies on Major Game Species (Proj. 31).

The objective is to set a standard by which the changes in growth rates may be evaluated, and to determine success or failure of year-classes.

Hdqtrs. : A and M College, Fort Collins; began 1950, continuing.

Address correspondence to: Dr. William C. Beckman, Leader, Forestry Bldg. , A & M College, Fort Collins, Colo.

CONNECTICUT

State Board of Fisheries and Game

1. Development of Field Testing Procedures for Inorganic Plant Nutrients Dissolved in Pond Waters (FA: F-3-R).

The project aims to develop simple field tests for nitrogen, phosphorus, and potassium compounds used by plants in water. The procedure to be followed falls into three steps: A review of the pertinent literature, development in the laboratory

CONNECTICUT (Cont.)

of colorimetric methods for determination of plant nutrients, and testing the new methods in the field for accuracy and usability by men not trained as chemical analysts.

Conducted in cooperation with the University of Connecticut; began September 16, 1952; planned for 1 year; \$2300.

Address correspondence to: Frank L. Wagner, Proj. Ldr., Chemistry Dept., Univ. of Conn., Storrs, Conn.

2. Population and Harvest Studies (FA: F-6-R).

Information from tagging and creel returns is being used to determine the population of game fishes in Stillwater Reservoir. Complete harvest of marked and unmarked fish is known.

Torrington, Conn.; began April 1952, planned to December 1953; \$2,000.

Address correspondence to: Lyle M. Thorpe, Supvr. of Fish Culture, State Office Bldg., Hartford, Conn.

3. Studies of Populations, Marking Techniques and Yellow Perch Production in a Small Pond.

The objectives of this study are to determine the most efficient method of marking or tagging fish, the population of each species present, and the annual production of yellow perch.

Lang's Pond, Glastonbury.

Address correspondence to: Lyle M. Thorpe, Supvr. of Fish Culture, State Office Bldg., Hartford, Conn.

4. A Fisheries Survey of the Impounded Waters of Connecticut (FA: F-4-R).

The object of this project is to complete the biological and physical survey of the impounded waters of the State.

Statewide; began January 16, 1953, planned for 3 years; \$21,333.

Address correspondence to: Lyle M. Thorpe, Supvr. of Fish Culture, State Office Bldg., Hartford, Conn.

5. Reclamation of Suitable Ponds for Trout Management.

Small ponds suitable for trout management are treated with rotenone to remove all fish and are planted with rainbow trout. These ponds are being put into trout management as they become available to the Fish and Game Department by ownership, lease, or agreement.

Statewide; continuing.

Address correspondence to: Lyle M. Thorpe, Supvr. of Fish Culture, State Office Bldg., Hartford, Conn.

DELAWARE

Board of Game and Fish Commissioners

1. Fresh Water Investigations (FA: F-1-R).

After determining which streams in New Castle County will be available to the public, limnological studies are conducted to determine whether or not fishing can be provided on these streams. Also, five ponds in Kent County will be covered by creel censuses, limnological studies, growth and age determinations made from fish and scale collections, fish and population surveys.

Streams in New Castle County and ponds in Kent County; began July 1, 1952, planned for 1 year; \$7,035; mimeographed reports available.

Address correspondence to: Jay L. Harmic, Leader, Board of Game and Fish Commissioners, Dover Delaware.

2. Fresh Water Developments (FA: F-2-D).

Waters with high carp and stunted pan fish populations will be rotenoned and restocked with desired species. Maintenance improvements on dams, watershed and bank plantings, construction of fish shelters, etc. will be carried out. Signs warning against reintroduction of undesirable fish will be posted.

Statewide; began July 1, 1952, planned for 1 year; \$2,380; mimeographed reports available.

Address correspondence to: Jay L. Harmic, Proj. Ldr., Board of Game and Fish Commissioners, Dover, Delaware.

U. S. Fish and Wildlife Service, Branch of Fishery Biology

1. Survey of the Sport and Commercial Fisheries of the Delaware Bay Area (Proj. 66).

The objective of this project is to obtain data on the areas, seasons, relative abundance, fluctuations in availability, and intensity of fishing, in terms of individual species as a means of determining the most suitable locality for waste disposal and of evaluating the probable effects of such disposal on the sport and commercial fisheries of this area.

Hdqtrs.: Woods Hole, Mass.; began in 1951, scheduled to close in October 1953; Fred C. June, Proj. Ldr.

Address correspondence to: Fred C. June, Box 531, Univ. of Delaware, Newark, Delaware.

FLORIDA

Game and Fresh Water Fish Commission

1. Fish Management Extension Service.

Technical assistance is provided in the management of private and public waters.

Analyses and recommendations are made; and, where needed, renovating, weed control and stocking are done. Work is directed by technicians assigned to each of five administrative divisions. Interested local groups and individuals assist in the program.

FLORIDA (Cont.)

Statewide; continuing; \$30,000; F. G. Banks, Northwest Div., Ed Zagar, Central Div., George Horel, South Div., Harry M. Frish, Everglades Div., Leaders. Address correspondence to: John F. Dequine, Chief Fisheries Biologist, Game and Fresh Water Fish Commission, Tallahassee, Fla.

2. Noxious Vegetation Control (FA: F-2-D).

The control of aquatic plants, principally water hyacinths, which interfere with fishing success, is being accomplished through the application of chemical herbicides by especially equipped aircraft and a boat spray unit. Most of the materials are provided by local interests.

Statewide; began March 1, 1952, planned for 3 years; \$35,000.

Address correspondence to: Don R. Luethy, Proj. Ldr., P. O. Box 77, Williston, Florida.

3. Fish Population Control Experiment (FA: F-3-R).

This project attempts to manipulate the fish populations of three large Florida lakes toward a composition more favorable to the angler than that now existing; to create a continuously expanding fish population; to correlate removal activities with growth rates, food habits, reproduction and survival of important game fishes; and to evaluate the effects of removal on angler success. Fish removal activities are performed by licensed commercial fishermen using haul seines under the direction of project personnel and include the removal of all adult fishes taken except largemouth bass.

Lakes Harris and Eustis in Lake County, and Lake Reedy in Polk County; began April 1, 1952, planned for 3 years; \$60,000; Melvin T. Huish and Edward T. Heinen, Asst. Proj. Ldrs.

Address correspondence to: Barry O. Freeman, Proj. Ldr., P. O. Box 569, Leesburg, Fla.

4. Fish Population Control Experiment.

This project attempts to manipulate the fish populations of large Florida lakes toward a composition more favorable to the angler than that now existing; to create a continuously expanding fish population; to correlate removal activities with growth rates, food habits, reproduction and survival of important game fishes; and to evaluate the effects of removal on angler success. Fish removal activities are performed by licensed commercial fishermen using haul seines under the direction of project personnel and include the removal of all adult fishes taken except largemouth bass.

Lakes George and Crescent in Putnam County, and Lake Okeechobee in Okeechobee County; planned for 3 years; \$160,000; William M. McLane and James A. DeJean, Fish Management Supervisors.

Address correspondence to: John F. Dequine, Chief Fisheries Biologist, Game and Fresh Water Fish Commission, Tallahassee, Fla.

Florida State Board of Health

1. Investigation of Pollution in the Peace and Alafia Rivers of Florida.

A study has been undertaken to determine the effects of phosphate mining, citrus, abattoir and tannery wastes, as well as domestic sewage, upon these waters. Recommendations were made for remedial action. Continual observations on the effects of various types of pollution discharged and on the benefits resulting from remedial action have been made during the study.

Peace and Alafia River Basins located principally in Hillsborough, Polk, Hardee, and DeSoto Counties; began in 1949, planned for approximately 4 years; \$20,000; William R. Clary, Proj. Ldr.; mimeographed progress reports available through Bureau of Sanitation, Florida State Board of Health.

Address correspondence to: David B. Lee, Dir., Bureau Sanitation, Fla. State Board of Health, Jacksonville, Fla.

University of Miami

1. Fish Life History Project.

The identity, distribution, and life history of fish larvae appearing in the marine plankton is being studied with special reference to game fish.

Hdqtrs.: Marine Laboratory, throughout the southeastern coast of the U. S.; National Geographic Society cooperating; began January 1, 1953, continuing; \$14,000; F. G. W. Smith, Ldr.

Address correspondence to: H. B. Moore, Marine Laboratory, Univ. of Miami, Coral Gables, Fla.

2. Snook Project.

The life history of the snook is being studied with reference to size, age, growth rates, food, fecundity, occurrence, and related questions.

Lower West coast; in cooperation with the State Board of Conservation; began January 1953, planned for 2 years; Ronald Eisler, Ldr.; quarterly reports (mimeographed) will be available.

Address correspondence to: C. P. Idyll, Marine Lab., Univ. of Miami, Coral Gables, Fla.

3. Western North Atlantic Bluefin Tuna Cooperative Research Program.

A study of the life history of the western north Atlantic bluefin tuna including taxonomy, occurrence, migrations, ecology, habits, development, etc.

Caribbean Sea to Nova Scotia; supported by the Chas. F. Johnson Research Foundation; began January 1953, planned for 1 year; \$5,000; Luis Rene Rivas, Research Associate; mimeographed progress reports available.

Address correspondence to: F. G. Walton Smith, Dir., Marine Lab., Univ. of Ad Miami, Miami, Fla.

FLORIDA (Cont.)

4. Sailfish Project.

The life history of the sailfish, including growth rates, size frequencies, food, fecundity, migrations, and related questions are being studied. Also, the fish's survivability after release from fishing tackle will be determined.

East coast of Florida, Key West to Stuart; began summer, 1950, indefinite; H. P. Mefford, Ldr.; mimeographed quarterly reports available.
Address correspondence to: C. P. Idyll, Marine Laboratory, Univ. of Miami, Coral Gables, Fla.

GEORGIA

State Game and Fish Commission

1. Warm Water Streams and Reservoir Investigations.

The value of commercial fishing as a management tool for the improvement of sport fishing is being determined through the use of creel censuses made before and during commercial fishing activities to find out if and when the catch and weight of sport fish increase. The depths at which commercial gear are used, as well as the types and sizes of gear are also being studied as to their effects on sport fishing.

South central part of the State; began December 1951, planned for 3 years; \$21,000; reports available upon request.
Address correspondence to: Otho D. May, Jr., Proj. Ldr., Uvalda, Ga.

IDAHO

Fish and Game Department

1. Utilization of Idaho Waters by Spring Chinook Salmon (FA: F-1-R).

A survey is being made of the State's water areas to determine the extent of use by salmon and the number of salmon utilizing each area.

Tributaries of the Salmon River; planned for 1 year; \$5,100.

Address correspondence to: Forrest R. Hauck, Fisheries Biologist, State Fish and Game Dept., 518 Front St., Boise, Idaho.

2. Biological and Economic Survey of Fishery Resources in Lake Pend Oreille (FA: F-3-R).

A biological survey and creel census are being conducted on Lake Pend Oreille to determine the status and value of the present fishery resource. Kokanee salmon, cutthroat trout, Dolly Varden, Kamloops, and eastern brook trout are involved. The study is important because of the development of Albeni Falls and Cabinet Gorge dams.

Boundary and Kootenai Counties; began July 1, 1951, planned for 4 years; \$11,800.
Address correspondence to: Paul Jeppson, Asst. Fisheries Biologist, State Fish and Game Dept., Route 1, Sagle, Idaho.

IDAHO (Cont.)

3. Mirror Lake Fisheries Development (FA: F-4-D).

This project is aimed at the eradication of present fishes in Mirror Lake, and its restocking with cutthroat or rainbow trout.

In Bonner County; planned for 1 year and 7 months; \$6,000.

Address correspondence to: Paul Jeppson, Asst. Fisheries Biologist, State Fish and Game Dept., Route 1, Sagle, Idaho.

4. Extending the Range of the California Golden Trout in Idaho (FA: F-6-D).

Spawn is being obtained from native brood stock and fingerlings are being reared in State hatcheries to stock virgin waters. The objective is to spread fisherman interest.

Lakes are located in Custer, Lemhi, Valley, Idaho, and Boise Counties; began June 1, 1952, for 1 year; \$2,700.

Address correspondence to: Forrest Hauck, Fisheries Biologist, State Fish and Game Dept., 518 Front St., Boise, Idaho.

5. A Random Creel Census of the Little Salmon River (FA: F-7-R).

Present management measures used on approximately 24 miles of the Little Salmon River are being studied to determine if they are detrimental to the fisheries resources of these waters. Measures under examination are the present open season and stocking program.

Idaho and Adams Counties; began April 15, 1952, planned for 2 seasons; \$3,500.

Address correspondence to: Leon W. Murphy, Fisheries Biologist, State Fish and Game Dept., 506 N. State, Grangeville, Idaho.

6. Effect of Hydroelectric Developments on the Fishery Resources of Snake River (FA: F-8-R).

The effects of fluctuating hydroelectric impoundments upon the fishery resources of the Snake River are being evaluated in that portion of the River in Gooding, Twin Falls, Elmore, Ada, and Owyhee Counties.

From Castle Buttes area to Upper Salmon Falls impoundment; began July 1, 1952, planned for 2 1/2 years; \$8,900; Robert B. Irving and Forrest R. Hauck, Leaders.

Address correspondence to: James C. Simpson, Fish Culturist, State Fish and Game Dept., 518 Front St., Boise, Idaho.

7. Development of Caldwell Gravel Ponds (FA: F-9-D).

This project was established to provide public fishing for warm water fish and supply brood stock for transplanting purposes.

Canyon County; began November 1, 1952, for 1 year; \$2,000.

Address correspondence to: Forrest R. Hauck, Fisheries Biologist, State Fish and Game Dept., 518 Front St., Boise, Idaho.

IDAHO (Cont.)

8. Fisheries Investigations on Bear Lake (FA: F-10-R).

This project is aimed at determining the best possible management policies for the sport fish species in Bear Lake. Creel census records, biological and chemical data are being obtained.

Bear Lake County; began January 1, 1953, for 3 years; \$4,000.

Address correspondence to: William J. Clark, Asst. Fisheries Biologist, Utah State Agriculture College, Logan, Utah.

9. An Analysis of Anadromous Fish Runs up Clearwater River.

The size of the runs of steelhead using Clearwater River is being determined. A study is being made of the possibly deleterious effects of wastes from a paper mill near the mouth of the river upon migratory and resident fishes. The effectiveness of fish ladders over Lewiston Power Dam will be evaluated.

Vicinity of Lewiston; planned for 3 years; \$15,000.

Address correspondence to: Leon Murphy, Fisheries Biologist, State Fish and Game Dept., 506 N. State, Grangeville, Idaho.

10. Rehabilitation of Spring Chinook Salmon in Clearwater River Drainage.

A run of spring chinook salmon is being re-established in Clearwater River. The run was destroyed by the construction of a power dam.

Clearwater and Idaho Counties; 7 years; \$8,000.

Address correspondence to: James C. Simpson, Fish Culturist, State Fish and Game Dept., 518 Front St., Boise, Idaho.

11. A Statistical Analysis of the Fish Harvest on the Portneuf River.

This project is aimed at determining the effectiveness of brown trout plantings in the Portneuf River.

Bannock County; in cooperation with the Utah State Agricultural College; 1 year; \$1,200; Don Andriano, Proj. Ldr.

Address correspondence to: James C. Simpson, Fish Culturist, State Fish and Game Dept., 518 Front St., Boise, Idaho.

12. Ecology of the Cutthroat Trout, Salmo clarki Richardson, of Henrys Lake, Idaho.

The age, growth, and food habits of the trout and the lake's productivity of the species are being studied.

Fremont County; Utah State Agriculture College cooperating; 1 year; \$1,200.

Address correspondence to: Robert B. Irving, Asst. Fisheries Biologist, State Fish and Game Dept., Box 254, Gooding, Idaho.

13. Twin Lakes Reservoir.

In order that the Reservoir may be restocked with trout, the present fish population is being eradicated.

Franklin County; 1 week; \$4,500; Don Andriano, Proj. Ldr.

Address correspondence to: James C. Simpson, Fish Culturist, 518 Front St., Boise, Idaho.

Department of Public Health

1. Investigation of the Pollution of the Clearwater and Lower Snake Rivers, and of Anadromous Fish Migration in the Clearwater River.

The objective is to determine the effects of industrial and domestic pollution on the waters of the Clearwater and Lower Snake Rivers. Physical, chemical, biochemical, and biological samples have been collected and analyzed, and the results have been correlated with the studies of the wastes from the cities of Lewiston, Idaho, and Clarkston, Washington, and from the Kraft pulp mill of the Potlatch Forests, Inc., at Lewiston. At the same time these investigations have been underway, there have been daily counts made of passage of salmon and steelhead trout over the fishways at the dam of the Washington Water Power Company near Lewiston.

From Spalding, Idaho, on the Clearwater River to the Snake River at Lewiston and Clarkston, and the Snake River one-half mile above Lewiston to a point several miles below Clarkston; Department of Fish and Game Cooperating; began August 1950, indefinite; Aleck Alexander, Proj. Ldr., Idaho Dept. of Health; Leon Murphy, Proj. Ldr., Fish and Game Dept.

Address correspondence to: Idaho Dept. of Health, Box 640, Boise, Idaho.

University of Idaho

1. A Limnological Survey of Pend Oreille Lake, Idaho, with Special Consideration of the Food Habits of the Kokanee.

Two major power dams, now under construction on the major inlet and outlet of Pend Oreille Lake, will block completely fish passage into and out of the lake and will cause great seasonal fluctuations in water level. This project is an attempt to evaluate the effects of these structures on certain limnological features of the lake and particularly on the food supply and habits of the kokanee. The first phase of the study is concerned with conditions existing prior to completion of the dams.

Idaho Fish and Game Dept. (FA: F-3-R) cooperating; began June 1952, planned for 2 years; \$3,000; Raymond G. Stross, Graduate Student.

Address correspondence to: Virgil S. Pratt, Wildlife Research Unit, Forestry Bldg., Univ. of Idaho, Moscow, Idaho.

2. Age, Growth and Migration of the Steelhead Trout in the Clearwater River.

This is a cooperative study of certain life history phases of an important Idaho game fish. Present work is restricted to collection and analyses of length, weight measurements, scales and tagging data from adult steelheads on their spawning migration.

Washington Water Power Dam on the Clearwater River, Lewiston; Idaho Fish and Game Dept. cooperating; began January 1952, planned for 1 year, 9 months; \$2,000; Charles Whitt, Graduate Student.

Address correspondence to: Virgil S. Pratt, Wildlife Research Unit, Forestry Bldg., Univ. of Idaho, Moscow, Idaho.

ILLINOIS

Department of Conservation

1. Fish Stocking in the Management Program.

Fish will be stocked in waters that have been inspected and approved for stocking by a fisheries biologist. Most of these waters are new or rehabilitated impoundments. About 115,310 bass and bluegill were stocked in ponds and small lakes under a management program in 1952.

Statewide; continuing; \$36,026.78.

Address correspondence to: Sam A. Parr, Supt., Div. of Fisheries, Room 121, State Capitol Bldg., Springfield, Ill.

2. State Lake Fisheries Management and Investigations.

Fisheries investigations, management, and development procedures are being performed on all state-owned waters to insure the highest possible number of fish are available to anglers. On large lakes, much of this work consists of educating the fishermen to fish for the kinds of fish available.

Statewide; continuing; \$10,000.

Address correspondence to: Sam A. Parr, Supt., Div. of Fisheries, Room 121, State Capitol Bldg., Springfield, Ill.

3. Fish Management and Development on Other Than State-owned Waters.

Fisheries biologists work with pond and lake owners to maintain existing good fishing areas, improve habitats, and plan for new waters. They recommend and supervise such work as fish population studies, coarse fish removal, population manipulations, plant control, etc.

Statewide; continuing; \$49,687.

Address correspondence to: Sam A. Parr, Supt., Div. of Fisheries, Room 121, State Capitol Bldg., Springfield, Ill.

4. Reconnaissance and Inventory of Waters.

Reconnaissance and inventory of waters are carried on in each of the six fisheries districts during the winter. Information derived from this project has been found essential in the formulation of sound fisheries management policies for all waters in the State.

Statewide; continuing; \$6,500.

Address correspondence to: Sam A. Parr, Supt., Div. of Fisheries, Rm. 121, State Capitol Bldg., Springfield, Ill.

5. Cooperative Research.

The objective of this study is to determine proper management techniques for the over-all enhancement and utilization of the fisheries resources of the State.

Statewide; Natural History Survey and Southern Ill. Univ. cooperating; continuing; \$12,759.04.

Address correspondence to: Sam A. Parr, Supt., Div. of Fisheries, Rm. 121, State Capitol Bldg., Springfield, Ill.

ILLINOIS (Cont.)

6. Fox Lake Fisheries Investigations (FA: F-2-R).

This project, involving creel censusing, fish population studies, and surveys of environmental conditions, is being conducted with a view toward aiding future investigational and developmental projects in the Chain O'Lakes Region.

Lake County; began March 15, 1952; continuing; \$22,000.

Address correspondence to: Maurice A. Whitacre, Fisheries Biologist, Div. of Fisheries, Box 591, Fox Lake, Ill.

7. Illinois-Mississippi Canal Fishery Investigation (FA: F-1-R).

As the abandonment of this waterway has been proposed, this project was launched to determine the annual fishing pressure, harvest, and possible future management procedures for this fishery.

Bureau, Henry, Rock Island, and Whiteside Counties; began March 15, 1952, planned for 1 year; \$13,500.

Address correspondence to: Morris L. Brehmer, Fisheries Biologist, Div. of Fisheries, Room 121, State Capitol Bldg., Springfield, Ill.

Southern Illinois University

1. Survey of the Fishes of the Big Muddy River.

This is a general survey to obtain an understanding of the importance of the river for both commercial and recreational fishing, to point up any particular problems, and to determine if the full potentialities of the river are being realized.

Dept. of Conservation cooperating; began June 1950; \$1,000; reports being prepared. Address correspondence to: Dr. William Lewis, Southern Illinois Univ., Carbondale, Ill.

2. Survey of the Fishes and Waters of the Hutchins and Clear Creeks.

The possibility of producing recreational fishing in some of the streams in Southern Illinois was investigated and feasible management procedures determined. The desirability of acquiring some of the stream courses to protect public fishing was brought out.

Dept. of Conservation cooperating; began August 1950, field work completed; \$1,500; one paper will appear in the Trans. of the American Fisheries Society for 1952.

Address correspondence to: Dr. William Lewis, Southern Ill. Univ., Carbondale, Ill.

3. General Survey of the Streams of the Kaskaskia Drainage and South.

General information relevant to the potential recreational value of various streams in the Southern Illinois area is being obtained in order to obtain a better understanding as to what waters are available, the possibilities they offer for development and recreation.

Dept. of Conservation cooperating; began August 1950, planned for 4 years; \$5,000. Address correspondence to: Dr. William Lewis, Southern Ill. Univ., Carbondale, Ill.

ILLINOIS (Cont.)

4. Life History Study of the Freshwater Drum.

This study was aimed at obtaining information of value in improving management techniques for the freshwater drum.

Dept. of Conservation cooperating; began December 1951, field work completed; \$800.

Address correspondence to: Dr. William Lewis, Southern Ill. Univ., Carbondale, Ill.

5. Carp Removal from Crab Orchard Lake.

The object of this project was to investigate the practicability of removing undesirable fish from lakes by use of electricity. It has been demonstrated that the method is at least fairly practical and has pointed the way to what may be a very successful technique of management.

Dept. of Conservation cooperating; began March 1952, indefinite; \$5,000; a preliminary publication is planned for the fall of 1953.

Address correspondence to: Dr. William Lewis, Southern Ill. Univ., Carbondale, Ill.

6. Water Quality Study.

Information relevant to quality of stream waters in the Southern Illinois region is being accumulated.

Dept. of Public Health cooperating; began June 1952, indefinite; \$2,500; a paper relating to the surveys was presented at the Mid-west Wildlife Conference, Des Moines, Iowa, December 1952.

Address correspondence to: Dr. William Lewis, Southern Ill. Univ., Carbondale, Ill.

7. Minnow Production and Farm Pond Management.

This project was set up to demonstrate the proper management of farm ponds. One pond has been stocked with highly recommended species combinations, and other ponds have been or will be stocked with bait species. The ponds are included in a general demonstration of proper farm management both for students and the public.

University farm ponds; Dept. of Agriculture, S. I. U., cooperating; began November 1952, continuing; \$200.

Address correspondence to: Dr. William Lewis, Southern Ill. Univ., Carbondale, Ill.

Natural History Survey

1. The Development of Fish Management Practices for the Small, Warm-water Streams of Illinois.

This is an intensive investigation of the fish populations of a few small streams in the Vermilion River drainage to determine the ecological factors which influence

ILLINOIS (Cont.)

stream fishes. Artificial manipulation of some populations has given information on the importance of competition among the different species.

Vermilion County; Dept. of Conservation cooperating; continuing; \$10,500.
Address correspondence to: Dr. R. Weldon Larimore, Asst. Aquatic Biologist,
Ill. Natural History Survey, Natural Resources Bldg., Urbana, Ill.

2. Experimental Stocking of Farm Ponds.

The value of various combinations of fishes in the production of high hook-and-line yields in farm ponds is being investigated.

Statewide; continuing; \$3,000.
Address correspondence to: Dr. George W. Bennett, Head of Section, Ill. Nat.
Hist. Survey, Nat. Resources Bldg., Urbana, Ill.

3. Interspecific Competition Among Pond Fishes.

The two ponds used in this experiment (2.5 and 114 acres) are subjected to moderate fishing pressures. At 2-year intervals, the ponds are drained and the fish populations of several species of warm-water fishes are artificially adjusted with the objective of studying various degrees of interspecific competition.

State 4-H Club Camp at Monticello, Piatt County; Univ. of Ill. cooperating;
indefinite; \$1,500.
Address correspondence to: Dr. George W. Bennett, Head of Section, Ill. Nat.
Hist. Survey, Nat. Resources Bldg., Urbana, Ill.

4. An Investigation of the Sport and Commercial Fisheries of Some Flood Plain Lakes of the Illinois River: Chautauqua, Quiver, and Matanzas Lakes.

The values of sport and commercial fisheries of the Illinois River bottomland lakes will be determined while management practices designed to increase the yield of sport and commercial fishes are being developed. The biology of the fishes in the lakes is being studied and the dynamics of the fish populations are being estimated.

Mason County; The Dept. of Conservation and the U. S. Fish and Wildlife Service
Cooperating; indefinite; \$10,000.
Address correspondence to: Dr. William C. Starrett, Assoc. Aquatic Biologist,
Ill. Natural History Survey Laboratory, Havana, Ill.

5. Management of Largemouth Bass at Ridge Lake.

This study is aimed at finding the factors controlling development of fishable populations of largemouth bass, the relationship of bass to other fishes, and its vulnerability to angling.

Fox Ridge State Park, Coles County; indefinite; \$2,000.
Address correspondence to: Dr. Geo. W. Bennett, Head of Section, Ill. Nat. Hist.
Survey, Nat. Resources Bldg., Urbana, Ill.

ILLINOIS (Cont.)

6. Fish Management in Reservoirs on Forest Soils.

Techniques are being developed for the management of the bass-bluegill combination in an impoundment built over clay and rock land of poor quality in Lake Glendale in the Shawnee National Forest.

Pope County; indefinite; \$2,000.

Address correspondence to: Dr. Donald F. Hansen, Asst. Aquatic Biologist, Natural Resources Bldg., Urbana, Ill.

7. The Value of Pond Fertilization as a Means of Improving Fishing.

Six ponds (three fertilized and three controls) are being tested through controlled fishing to determine the amount of improvement attributable to the addition of inorganic fertilizer.

Dixon Springs Station, Pope County; Univ. of Ill. Agriculture Exp. Station cooperating; 10 years; \$1,000.

Address correspondence to: Dr. Donald F. Hansen, Asst. Aquatic Biologist, Ill. Nat. Hist. Surv., Nat. Resources Bldg., Urbana, Ill.

8. Life History and Ecology of the Warmouth, Chaenobryttus coronarius.

This is a study of the ecological life history of the warmouth with the objective of determining its suitability as a companion species with largemouth bass in ponds.

Farm ponds in central Illinois; 7 years; \$900.

Address correspondence to: Dr. Weldon Larimore Asst. Aquatic Biologist, Nat. Resources Bldg., Urbana, Ill.

9. Collection of Commercial Fisheries Statistics.

An Annual Inventory is being made of the commercial fish taken from the larger rivers of the State.

Statewide; Dept. of Conservation cooperating; continuing; \$5,000.

Address correspondence to: Dr. William C. Starrett, Assoc. Aquatic Biologist, Natural History Survey Laboratory, Havana, Ill.

10. Abundance and Distribution of Native Lampreys.

The species of lampreys native to Illinois Rivers are being studied to determine their abundance and distribution, also the locations of potential spawning streams, should the sea lamprey invade the State's rivers from Lake Michigan.

Statewide; Dept. of Conservation cooperating; 5 years; \$1,000.

Address correspondence to: Dr. William C. Starrett, Assoc. Aquatic Biologist, Natural History Survey Laboratory, Havana, Ill.

ILLINOIS (Cont.)

11. The Role of Predators in Fisheries Management.

A study of the predation on pond fish populations by piscivorous fishes and fish-eating birds is being conducted on scattered ponds throughout the State.

Dept. of Conservation cooperating; 3 years; \$1,000.

Address correspondence to: Leonard Durham, Research Asst., Natural Resources Bldg., Urbana, Ill.

12. The Value of ÇMU (DuPont) and Other New Herbicides in the Control of Aquatic Plants.

The toxicity of CMU to fishes and aquatic plants is being tested with the objective of determining its usefulness in aquatic plant control.

Scattered locations; 2 years; \$500.

Address correspondence to: Dr. Geo. W. Bennett, Head of Section, Ill. Nat. Hist. Survey, Nat. Resources Bldg., Urbana, Ill.

INDIANA

Department of Conservation

1. Lake Access Acquisition.

It is the intent of the project to acquire by purchase tracts of land on the lakes and streams of the State, to be later developed as public fishing sites.

Statewide; began April 14, 1952, indefinite; \$15,000.

Address correspondence to: Chas. E. Scheffe, Acquisition Specialist, Div. of Fish & Game, Indiana Dept. of Conservation, 311 W. Washington St., Indianapolis, Indiana.

IOWA

State Conservation Commission, Div. of Fish & Game

1. Lake and Stream Public Access.

Principal objective of this project is to provide free public access to lakes and streams for anglers and other recreational purposes. Shorelines and access are being purchased on lakes, and tracts of lands adjacent to streams, including timbered hill-sides, to provide public access and perpetually retain the natural beauty of these areas. Several areas are in the process of being purchased at this time in addition to those already in State ownership. Current acquisitions include 17 acres of shoreline on Silver Lake in Palo Alto County (FA: F-5-L) and 37 acres along the Des Moines River near Des Moines (FA: F-6-L).

Statewide; continuing; Lloyd P. Bailey, Proj. Ldr.

Address correspondence to: R. W. Beckman, Chief, Fish and Game Div., East 7th and Court Sts., Des Moines, Iowa.

IOWA (Cont.)

2. Purchase of Fishing Areas.

The purpose is to acquire additional fishing areas in sections of the State where water is limited. This project includes the purchase and development of a 126-acre area containing an abandoned 26-acre lake formerly used as a water supply by the Rock Island railroad.

Statewide; began in 1952, planned for 2 years; \$20,000; Lloyd P. Bailey, Proj. Ldr. Address correspondence to: Lester F. Faber, Supt. of Federal Aid, East 7th and Court Sts., Des Moines, Iowa.

3. Acquisition and development of Abandoned Strip Coal Mines (FA: FW-1-L, in part).

Three abandoned coal strip-mine areas totaling 758 surface acres have been purchased in an area without natural lakes. A series of small lakes will be developed by construction of earth dykes on each of the areas to impound water in the excavated pits. The over-burden hillocks will be leveled sufficiently to permit grasses and wildlife cover plantings, and the general area will be developed for maximum wildlife habitat and recreational use.

Statewide, principally in southern Iowa; began in 1951, indefinite; \$52,000; Lloyd P. Bailey, Proj. Ldr.; quarterly Federal Aid progress reports available. Address correspondence to: Lester Faber, Supt. of Federal Aid, East 7th and Court Sts., Des Moines, Iowa.

4. Acquisition and Development of Spawning Areas (FA: F-1-L - Joenk's Slough and F-2-L - Garlock Slough).

The objectives are to acquire natural fish spawning areas adjacent to major natural lakes. A total of 92 acres has been purchased including a shallow marsh and shoreline access adjacent to a natural lake.

Statewide; began in 1952, planned for 2 years; \$6,100; Lloyd P. Bailey, Proj. Ldr. Address correspondence to: Lester F. Faber, Supt. of Federal Aid, East 7th and Court Sts., Des Moines, Iowa.

5. A Population Study of the Walleyes of Spirit Lake.

A long-term walleye fry stocking experiment is coupled with this study. This is the fifth year of the stocking program. In addition to the fry, a limited number of fingerlings have been stocked from nursery units. The progress of the walleye population has been followed by extensive gillnetting during the spawning runs and through the summer surveys with 500 feet of 1/4-inch seine.

Spirit Lake; began April 1944, continuing; \$500; E. T. Rose and Tom Moen, Proj. Ldrs. Address correspondence to: E. B. Speaker, Supt. of Biology, East 7th and Court Sts., Des Moines, Iowa.

6. A Population Study of the Bullheads of Center Lake.

An exceptionally large year-class (1947) of bullheads in this lake resulted in an over-crowded condition. During October of 1950, 10,232 bullheads were fin-clipped and released. Calculations based on ratio of marked recaptures after

IOWA (Cont.)

five days of netting the following spring produced an estimate of 1,503,959 bullheads or about 800 pounds per acre. Removal of one-half of this population failed to produce a satisfactory growth in the following two seasons. Marked fish have been stocked in Center Lake prior to ice breakup this spring, to form the basis for another population estimate.

Center Lake, Dickinson County; began October 1950, to close November 1953; \$200; E. T. Rose and Tom Moen, Proj. Ldrs.; Quarterly Biology Report, Vol. III(2), 1951, available.

Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa State Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

7. A Study of Hatchery Techniques.

The project was set up to study general hatchery procedures as they are concerned with the hatching and stocking of yellow pike-perch and northern pike. Basic data is collected on production (total number of eggs), number of eggs per quart (size), size at various stages of development, fertility, temperatures, and numbers and sex of fish handled. Some experimental work is being carried on in methods of handling both eggs and fish.

Spirit Lake and Clear Lake hatcheries; began in April 1946, continuing; \$500; Tom Moen, Proj. Ldr.; some reports available.

Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa State Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

8. Blue-green Algae Control.

Several fishing and general recreation lakes of Iowa develop large blooms of blue-green algae which are unsightly and occasionally toxic to waterfowl and domestic animals. Aid of a technical nature is provided to communities or organizations in administering copper sulfate to control these growths. A study of toxic algae is receiving special consideration due to waterfowl losses in the fall of 1952.

State Lakes; began June 1952, indefinite; Earl T. Rose, Proj. Ldr.; Mid-West Wildlife Conference Report, 1952 and Quarterly Report Dec. 1952, available.

Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa State Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

9. The Value of Stocking Walleyes in Iowa Streams.

The object of this investigation is to study the possibility of supplementing our stream fisheries by the introduction of hatchery-reared walleyes. Stocking in on an alternate year basis. Collections of scales are made to determine whether or not the majority of fish caught come from the years in which walleye are planted.

In streams in the northeast quarter of the State; began May 1950, continuing; R. E. Cleary and Harry M. Harrison, Proj. Ldrs.

Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

IOWA (Cont.)

10. Factors Affecting Smallmouth Bass Production in Northeastern Iowa Streams.

This project involves a multi-phase study of the life history and ecology of the smallmouth bass in 17 test streams in the area. Data is gathered annually on the nests seen per mile, condition and location of nests, effect of changed environment, effect of stream flow, turbidity, number of fingerlings per 500 feet of seining, age and growth data, quantitative bottom fauna. Tied in with this are observations on the effect of climatic factors such as temperature and rainfall. Effort is also being made to correlate good and poor natural hatches with age and survival data on minnows to attempt to discover forage indicator species which will give accurate insights into annual reproduction success of the smallmouth bass.

Began May 1949, continuing; \$2,000; R. E. Cleary, Project Leader.
Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa Conservation Commission, 7th and Court Sts., Des Moines, Iowa.

11. Modified Voluntary Creel Census - Northeastern Iowa Streams.

This project was started to give an insight into the per hour take of especially picked anglers who are deemed "experts" and who fish primarily in the flowing waters of northeastern Iowa. The contacts are picked on a fixed ratio from each county and serve to furnish us with season catch data on a weekly report basis. Their data indicate a measure of the available crop, season take, selectivity of stream and species, and to correlate against test netting results.

Streams of northeastern Iowa; began April 1950, continuing; \$1,000; R. E. Cleary, Project Leader; data in quarterly biology reports.
Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

12. Creel Census.

Principal objective of this project is to determine success in the major fishing lakes of Iowa. Annual sampling of anglers is conducted from May 15 to July 1, on seven lakes in northern Iowa. One clerk is employed for each lake. He contacts shore, dock, and some boat fishermen collecting information on their catches and amount of time spent in angling. Some voluntary reports by cooperating boat lines are incorporated in the census. Comparisons of tabulated total catch by species and unit effort are made from season to season to indicate trends and evaluate management practices.

Northern Iowa Lakes (Spirit, East and West Okoboji, Lost Island, Storm, Clear and Blackhawk); began May 1946, continuing; \$2,000; Earl T. Rose, Project Leader, some reports available.
Address correspondence to: E. B. Speaker, Supt. of Biology, Iowa Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

13. Lake and Stream Improvement.

The objectives of this project include inlet channeling in lakes, installation of fish traps in bays and estuaries to control use of spawning areas for desirable species, experimental lake and stream devices to improve the habitat for game fishes, and rip-rapping of lake shores to prevent serious erosion.

Statewide; continuing.

Address correspondence to: K. M. Madden, Supt. of Fisheries, East 7th and Court Sts., Des Moines, Iowa.

14. Rough Fish Studies.

This project involves a general collection of data on carp, buffalo, sheepshead and gizzard shad. The primary portion of this study has concerned food habits, but data have also been collected on ecology, age and growth, reproduction, sexual maturity, number of eggs per fish, and condition factors in an over-all effort to determine the interrelations existing between rough fish and their environment and between rough fish and game fish.

The natural lakes of northwest Iowa; began January 1946, continuing; \$1,000; Tom Moen, Project Leader; data in quarterly biology reports.

Address correspondence to: E. B. Speaker, Supt. of Biology, East 7th and Court Sts., Des Moines, Iowa.

15. Rough Fish Removal.

Principal objective of this project is to reduce the population of rough fish in state-owned waters in an effort to increase game fish populations. This includes some work on streams, however, the principal emphasis is placed on the natural and artificial lakes. In some instances, attempts are made to reduce stunted populations of crappie and other pan fish. An average of one million pounds of rough fish are removed from the inland lakes of the State annually.

Statewide; began 1909, continuing; \$60,000 (less 75 percent cash return from the sale of fish), reports included in the biennium reports of the State Conservation Commission.

Address correspondence to: K. M. Madden, Supt. of Fisheries, East 7th and Court Sts., Des Moines, Iowa.

16. Lake Dredging.

The purpose is to desilt the shallow natural lakes where silt deposits have accumulated to the extent that they pose a hazard to recreation, fish life, and public use. Areas deepened by hydraulic dredging average from 70 to 160 surface-acres in each lake. In addition to the 10 lakes completed, two are in the process of being deepened at this time.

IOWA (Cont.)

Statewide; began in 1936, continuing.

Address correspondence to: Glen Powers, Supt. of Engineering Construction,
State Conservation Commission, East 7th and Court Sts., Des Moines, Iowa.

17. Natural Lake Survey.

All of the natural lakes of Iowa managed for angling are surveyed by the Biology section each year. This involves test seining with 500 feet of 1/4-inch mesh (bar) seine at several stations on each lake. In addition, stationary gear (pound and gill nets) are used to supplement the seine catch. The small-mesh seine hauls are designed to determine primarily the magnitude of reproduction each year, and the nets to determine population fluctuations and status of the adult fishes. Fishes taken are sorted into young-of-the-year and older groups, weighed, measured, and scale samples taken from representatives for age and growth analyses. Data on vegetation, amount of bottom foods (dredge samples) turbidity and lake chemistry are also obtained. This information is recorded on forms and recommendations presented for possible improvement of fishing.

Northern half of Iowa; began July 1940, continuing; \$5,000; Earl T. Rose, Proj. Ldr.; reports available.

Address correspondence to: E. B. Speaker, Supt. of Biology, East 7th and Court Sts., Des Moines, Iowa.

18. Artificial Lakes Survey.

A continuing inventory is maintained in the form of an annual netting survey and limited limnological investigations of the artificial lakes. Although special emphasis is placed on the relative abundance of each species and extent of reproduction, other items such as age and growth (determined from subsamples), abundance of bottom fauna, extent and species of vegetation, turbidity, and extent of chemical and thermal stratification are also determined. These items are recorded on standard forms for comparison from year to year.

Statewide, but primarily in southern half of the State; began September 1947, continuing; \$1,500; Tom Moen, Proj. Ldr.; form reports available.

Address correspondence to: E. B. Speaker, Supt. of Biology, East 7th and Court Sts., Des Moines, Iowa.

19. Techniques of Fish Surveys in Streams.

This project involves a study of the effectiveness of various types of gear used to make stream and river surveys. At present, special emphasis is placed upon determining the best gear suited to the rivers and streams of the type found in Iowa and at what time of year and under what conditions they work best. The types of equipment under observation include the conventional electrical gear, traps and seines of various design used under a variety of conditions, and the use of several instruments to drive fish into traps. In addition to this, studies are underway to determine the possibility of making stream surveys under ice.

Statewide; began July 1948, planned to November 1955; \$2,000; R. E. Cleary and Harry M. Harrison, Proj. Ldr.

Address correspondence to: E. B. Speaker, Supt. of Biology, East 7th and Court Sts., Des Moines, Iowa.

20. Continuing Inventory of the Fishes of Iowa.

The project involves population trend determinations by netting surveys at fixed stations. Each survey station is visited annually at the same time each successive year to approximate similar ecological conditions. Specimens are taken with trap and hoopnets and the data is handled on a catch and weight per net-hour basis. Reproduction indices are gathered at the station by use of a 25-foot drag seine. Attempts to use a mark and recapture system of determining specific population size has met with indifferent results. The geographical distribution of the various species in the State is recorded.

Statewide; began June 1949, continuing; R. E. Cleary and Harry Harrison, Proj. Ldrs.; data in biology quarterly reports.

Address correspondence to: E. B. Speaker, Supt. of Biology, East 7th and Court Sts., Des Moines, Iowa.

State College

1. Compilation of Data on Fish Growth and Biology.

This project attempts to summarize all growth, length-weight, and similar data on freshwater fishes of the United States and Canada and publishes tabular summaries in a handbook and periodical supplements.

State Conservation Commission cooperating; began January 1947, continuing; \$1,000; report available is "Handbook of Fresh-water Fishery Biology" (1950; the first supplement (1953).

Address correspondence to: Dr. Kenneth D. Carlander, Dept. of Zoology and Entomology, Iowa State College, Ames, Iowa.

2. Management of Small Ponds for Fish Production.

Tests of marking and recovery methods used in estimating fish populations are being made; bluegills are being trapped in one pond to determine effects of population reduction on growth and rate production; and population changes which have taken place in ponds where fingerling and adult fish were added to unbalanced populations are being studied.

Knoxville and Ames, Iowa; State Conservation Commission cooperating; began June 1947, continuing; \$2,500; quarterly progress reports (mimeographed) are available for limited distribution.

Address correspondence to: Dr. Kenneth D. Carlander, Leader, Dept. of Zoology and Entomology, Iowa State College, Ames, Iowa.

3. Effect of Stream Conditions on Fish Populations.

The emphasis this coming year will be upon the effects of water levels during the winter months upon fish distribution and feeding and survival of food organisms. Studies on reproduction will also be continued.

Des Moines River, Boone County; State Conservation Commission cooperating; began June 1946, continuing; quarterly progress reports (mimeographed) are available for limited distribution.

Address correspondence to: Dr. Kenneth D. Carlander, Proj. Ldr., Dept. of Zoology & Entomology, Iowa State College, Ames, Iowa.

IOWA (Cont.)

4. Fish Populations in Artificial Lakes.

The principal emphasis this year will be on evaluating the changes in fish abundance and growth in Lake Ahquabi in which turbidity has been greatly decreased. Research will also be continued on other artificial lakes in which population changes are being studied.

Indianola, Iowa; State Conservation Commission cooperating; began June 1948, continuing; \$4,500; quarterly progress reports (mimeographed) available for limited distribution.

Address correspondence to: Dr. Kenneth D. Carlander, Dept. of Zoology and Entomology, Iowa State College, Ames, Iowa.

5. Effect of Dredging on Fish and Fish Food Organisms in Shallow Prairie Lakes.

This study is aimed at the evaluation of changes in fish populations and fish food organism production before and after dredging operations. Bottom fauna studies are emphasized. Improvement of conditions for boating and recreation and reduction in winter kill of fishes are the objectives of the dredging.

North Twin and Lizard Lakes, Munson, and Little Wall Lake, Jewell, Iowa; State Conservation Commission cooperating; began May 1951, continuing; \$3,000; quarterly reports (mimeographed) are available for limited distribution.

Address correspondence to: Dr. Kenneth D. Carlander, Dept. of Zoology & Entomology, Iowa State College, Ames, Iowa.

6. Population Studies on Walleye Pike in Clear Lake, Iowa.

This project is part of a long-term investigation of fish population changes in Clear Lake. It includes extensive tagging during spawning run, followed by creel census and experimental gill netting to estimate population, rate of exploitation, and mortality rates. Fry plantings have been made in alternate years since 1948 to test value of such propagation. Data are collected on all species to determine population dynamics.

State Conservation Commission cooperating; began June 1947, continuing; \$5,000; quarterly progress reports (mimeographed) available for limited distribution.

Address correspondence to: Dr. Kenneth D. Carlander, Dept. of Zoology and Entomology, Iowa State College, Ames, Iowa.

KANSAS

Forestry, Fish and Game Commission

1. Montgomery County State Lake Project (FA: F-1-L).

This is the first of several projects planned for the purpose of creating new lakes. An area of 410 acres of land in Montgomery County is being acquired. This will be followed by a project for the construction of a dam to impound 105 acres of water on the above tract.

Near Independence, Montgomery County; began March 1953, to close September 1953; \$172,000; Roy Schoonover, Proj. Ldr.

Address correspondence to: Dave Leahy, Dir., Forestry, Fish and Game Comm., Pratt, Kans.

KANSAS (Cont.)

Fish and Wildlife Service, Branch of Game-fish and Hatcheries

1. Culture of Threadfin Shad (*signalosa*).

During the spring of 1952, adult threadfin were transferred from vicinity of Tupelo, Mississippi, and propagated at Farlington, Kansas, Station. Releases of about 1,000 adults have been accomplished in each of two impoundments, Farlington and Kanapolis Lakes, in cooperation with the Kansas Forestry Fish and Game Commission.

U. S. Fish Culture Station, Farlington; began in 1952, planned for 2 years; \$70.00. Address correspondence to: Regional Director, U. S. Fish and Wildlife Service, P. O. Box 1306, Albuquerque, N. M.

KENTUCKY

Department of Fish and Wildlife Resources

1. Kentucky Lake Investigations (FA: F-2-R).

A project designed to evaluate the effectiveness of various types of netting gear used under different conditions for the harvest of rough fishes, as well as their selectivity for game fishes. Data on percentage of harvest, degree of movement and age and growth of important game species are also being collected in the lake and in the river below the dam.

Kentucky Lake and Lower Tennessee River; began July 1951, planned for 2½ years; Ellis R. Carter, Proj. Ldr.

Address correspondence to: Minor E. Clark, Dir., Div. of Fisheries, Dept. of Fish and Wildlife Resources, Frankfort, Ky.

2. Farm Fish Pond Investigation (FA: F-3-R in part).

The objective of this project is to improve upon stocking ratios and species combinations now being used so as to provide the best fishing possible in small reservoirs. Attention is also being given to diversity of soil types, chemistry of the water, pond size and location, and the use of fertilizer.

Statewide; began January 1948, continuing; William Smith, Proj. Ldr.; first report in the Journal of Wildlife Management, Vol. 16, No. 3.

Address correspondence to: Minor E. Clark, Dir., Div. of Fisheries, Dept. of Fish and Wildlife Resources, Frankfort, Ky.

3. Warm-water Stream Investigation (FA: F-4-R).

Changes in species composition are being manipulated in streams carrying an almost wholly rough fish population. Two streams have already had the entire population removed and have been restocked with game and pan fishes. No effort has been made to control migration. In some cases, an electrical screen will be placed down stream to prevent migration into treated areas.

Statewide; began July 1951, planned for 4 years; James Charles, Proj. Ldr.

Address correspondence to: Minor E. Clark, Dir., Div. of Fisheries, Dept. of Fish and Wildlife Resources, Frankfort, Ky.

KENTUCKY (Cont.)

4. Pollution Control.

The purpose of this project is to detect and eliminate pollution which adversely affects fishing and to indict and prosecute offenders who fail to remedy such conditions.

Statewide; began August 1945, continuing; special reports are available.
Address correspondence to: Mercer Peters, Chief Chemist, Div. of Fisheries,
Dept. of Fish and Wildlife Resources, Frankfort, Ky.

5. Regional Fishery Investigations.

Fish populations and the conditions thereof are being inventoried in all major waters of the State in an effort to determine what, if any, measures should be undertaken for the improvement of fishing.

Statewide; began April 1937, continuing; Bernard Carter and Charles Bowers, Leaders; some reports are available.
Address correspondence to: Minor E. Clark, Director, Div. of Fisheries, Dept. of Fish and Wildlife Resources, Frankfort, Ky.

LOUISIANA

Department of Wildlife and Fisheries

1. Fish Population Investigation (FA: F-1-R).

This project was set up to sample fish populations in selected areas. Collections will be made by using rotenone, nets, traps, and seines. The relationship between game and non-game species, growth rate of important species, and success of natural reproduction will be determined. This information will be used in planning the distribution of fish obtained through fish rescue operations.

Statewide; began April 1, 1953, planned for 3 years; \$7,001.50; James A. DeJean, Proj. Ldr.
Address correspondence to: L. D. Young, Jr., Executive Director, Wildlife and Fisheries Commission, New Orleans, La.

2. Aquatic Vegetation Control (FA: F-2-D).

An area lying in the south-central portion of the State between Alexandria and the Gulf contains waters now choked with water hyacinths. These plants will be removed from the water areas by means of 2,4-D. The compound will be sprayed from power units mounted on small barges.

Began April 1, 1953, to close June 30, 1954; \$44,697.95; John G. Dutton, Proj. Ldr.
Address correspondence to: L. D. Young, Jr., Executive Director, Wildlife and Fisheries Commission, New Orleans, La.

LOUISIANA (Cont.)

Soil Conservation Service

1. Corney Lake.

Corney Lake covers 1,900 acres of a 2,100-acre recreational area. The facilities offered include fishing, duck hunting, boating, picnicing and overnight cabins. The value of the lake for fishing, however, has gradually decreased due to weed infestation and salt water pollution from oil fields in Arkansas. An intensive program of mechanical control was carried out during 1952, and experiments with different types of chemicals, Esteron, Ten-ten, Esteron 245, Esteron Brush killing and others have been undertaken but results are discouraging.

Corney Creek watershed, Claiborne Parish in the northwest portion of Louisiana; began November 1, 1938, continuing; \$3,626.84.

Address correspondence to: June O. Terry, Soil Conservation Service, Box 479, Homer, La.

MAINE

Department of Inland Fisheries and Game

1. Study of the Metazoan Parasites of the Fresh-water Fishes of the State.

The objective of this project is to determine the species of parasites present in the waters of the State, the host species in which they are found, their effects on these fishes at various stages, their distribution in different waters, and their importance in relation to the economic production of hatchery stock and fish of natural waters.

Statewide; began June 1952, planned for 1 year; \$1,900; Dr. W. Harry Everhart, Ldr. Address correspondence to: Dr. Marvin C. Meyer, 23 Coburn Hall, Univ. of Maine, Orono, Maine.

2. An Investigation of the Smallmouth Black Bass Fishery in Big Lake Drainage.

Exploitation of the smallmouth black bass is being studied through an analysis of creel census and age-and-growth data. Particular attention is being paid to the early fly fishing season regulations and their effects. Observations are also being made on movements into spawning areas, food habits, and effects of parasitism.

Washington, Hancock, and Penobscot Counties; began June 15, 1952, planned for 3 years; \$2,586.67.

Address correspondence to: John E. Watson, Proj. Ldr., c/o Fishery Office, Univ. of Maine, Orono, Maine.

3. An Investigation of the Branch Lake Fisheries with Emphasis on the Brown Trout. (FA: F-8-R in part).

The objective of the project is to gain information as to the interrelationships between brown trout and other game fishes, their spawning habits and movements, food habits, and age and growth studies. A thorough study of the fishery is also in progress including summer and winter creel censuses, intensive lake survey, and the marking or tagging of both wild and hatchery raised fish.

MAINE (Cont.)

Began June 1952, planned for 2 years; \$3,548; mimeographed reports are available. Address correspondence to: Carll N. Fenderson, Proj. Ldr., Dept. of Inland Fisheries and Game, Augusta, Maine.

4. Investigation of Eastern Brook Trout, Land-locked Salmon and Lake Trout in Cold Stream Watershed (FA: F-5-R).

The above species are being studied with relation to life history and survival, population estimates, age and growth characteristics. Creel censuses are conducted, and fish movements observed.

Enfield and Lincoln Twps.; began November 1950, planned for 3 $\frac{1}{2}$ years; \$3,447; mimeographed reports available.

Address correspondence to: Lyndon H. Bond, Project Leader, Dept. of Inland Fisheries and Game, State House, Augusta, Maine.

5. Trout Stream Management Investigation (FA: F-1-R).

The project is a study of the eastern brook trout fishery, including creel census, population studies in the headwaters and larger down-stream areas, and beaver-trout relationships. Fish migration and spawning requirements are being checked with the work centered on Sunkhaze Stream.

Hancock and Penobscot Counties; began October 1950, planned for 2 years; \$4,400; mimeographed reports available.

Address correspondence to: Robert S. Rupp, Project Leader, Fishery Office, Univ. of Maine, Orono, Maine.

6. Statewide Lake and Stream Investigations (FA: F-8-R).

Biological surveys of the reconnaissance type are being continued on Maine waters with special emphasis on large and heavily fished lakes and ponds. The principal objective is to collect essential basic data on limnological characteristics and fish populations of each body of water. Analysis of results will permit proper classification of lakes and formulation of management policies.

Began December 1951, planned for 4 years; \$29,160; printed reports available.

Address correspondence to: Dr. W. Harry Everhart, Project Leader, Coburn Hall, Univ. of Maine, Orono, Maine.

7. Investigation of the Fisheries of the Belgrade Lakes, Kennebec County, With Special Emphasis on the Smallmouth Black Bass and White Perch Fisheries. (FA: F-8-R in part).

This is one phase of a statewide project involving many lakes and streams. It is designed to provide information necessary for the proper management of the warm-water fishes in these waters. Objectives are: Harvest studies, age and growth studies, and food habits investigations of white perch and bass.

Began June 1952, planned for 2 years; \$3,000; mimeographed report available.

Address correspondence to: Robert E. Foye, Project Leader, Dept. of Inland Fisheries and Game, State House, Augusta, Maine.

MAINE (Cont.)

8. An Investigation of the Fresh-water Fisheries of Mount Desert Island (FA: F-2-R).

Two coastal lakes deemed suitable for management of the land-locked salmon and eastern brook trout are being surveyed to obtain information on interrelationships of existing populations of warm-water and cold-water game species; to increase natural reproduction of salmon; to establish a natural run of alewives by stocking; to determine the effects of ice-fishing on salmon trout; and to study spawning habits, survival rates, and returns to the angler of hatchery-reared, land-locked salmon and eastern brook trout planted in the lakes.

Began April 1950, planned for about 4 years; \$1,320; mimeographed report available. Address correspondence to: Keith A. Havey, Project Leader, Sullivan, Maine.

9. Reclamation of Potential Trout Ponds (FA: F-6-R).

Seven ponds were reclaimed in the State during the summer of 1951. These ponds are being studied to determine the results of restocking. Information gathered will be used in determining the possibilities of reclaiming other ponds, the proper methods to be used, and the probable value to the angler.

Kennebec County; began June 1951, planned for 3 years; \$2,799; mimeographed report available.

Address correspondence to: Robert E. Foye, Dept. of Inland Fisheries and Game, State House, Augusta, Maine. (Project Leader).

U. S. Fish and Wildlife Service, Branch of Fishery Biology

1. Atlantic Salmon Restoration (Proj. 86c).

The objectives of this project are to obtain biological information in cooperation with state agencies in Maine to aid restorative measures. The Aroostook River will be surveyed above and below dams to reinstitute cooperation in fishway construction with Canadians. It also includes a detailed study of river discharges and fishway designs. A survey of spawning and rearing areas was completed in 1951.

Hdqtrs.: Orono; began in 1941, to be completed in 1954; \$4,120.

Address correspondence to: J. E. Mason, Chief, Atlantic Salmon Investigations, Orono, Maine.

MARYLAND

Game and Inland Fish Commission

1. Land Acquisition and Development of Prospective Fishing Sites and Facilities.

Lands will be acquired through purchase or lease to be developed for public fishing.

Statewide; planned for 10 years.

Address correspondence to: Edwin M. Barry, Chief, Inland Fish Management, 516 Munsey Bldg., Baltimore 2, Md.

MARYLAND (Cont.)

2. Inland Fish Habitat Restoration Program.

This project was established to supplement the Farm Game Program in planting trees and shrubs and erosion control, which will directly and indirectly improve inland waters for fresh water fishes.

Statewide; planned for 5 years; \$50,000.

Address Correspondence to: Edwin M. Barry, Chief, Inland Fish Mgt., 516 Munsey Bldg., Baltimore 2, Md.

3. Community Pond Project (FA: F-1-D).

A total of 46 ponds (1.3 acre per pond) are scheduled for construction within the next 3-year period for the use of the general fresh-water angling public.

Statewide; began July 1, 1952, planned for 3 years; \$26,327; Frank N. Swink, Asst. Leader.

Address correspondence to: Edwin M. Barry, Chief, Inland Fish Management, 516 Munsey Bldg., Baltimore 2, Md.

MASSACHUSETTS

Bureau of Wildlife Research and Management

1. Pan and Weed Fish Control.

The purpose is to restore balance to unbalanced fish populations and so improve angling possibilities. Four methods are being used to control overcrowded pan and weed fishes. These are by netting (modified fyke nets), destruction of spawn, partial poisoning, and draining. Funds available require selection of a relatively few important waters as demonstration areas.

Statewide; began April, 1950, continuing; Richard H. Stroud and Harold Bitzer, Project Leaders; reports available.

Address correspondence to: Richard H. Stroud, Phillips Wildlife Laboratory, Upton, Massachusetts.

2. Pond Reclamation.

Project is divided in two parts: (a) Cold Water, and (b) Warm Water. The fundamental purpose is to rehabilitate fishing ponds by complete eradication of existing fish populations and restocking with desired species. Some form of rotenone is employed to eradicate the fish. Cold-water ponds are restocked with brook, brown or rainbow trout. One or more of several possible "forage" fish (smelt, alewives, or possibly killifish) are to be stocked in some of the ponds. Warm-water ponds are restocked with a game species (largemouth bass, smallmouth bass, or chain pickerel) and a "forage" fish (a popular pan species--white perch, yellow perch, or brown bullhead--or a minnow).

Statewide; began September 1950, continuing.

Address correspondence to: Richard H. Stroud, Phillips Wildlife Laboratory, Upton, Mass.

3. Fertilization of Sandy Pond, Ayer.

Purpose is to control excessive growths of submerged aquatic vegetation principally *Myriophyllum* in order to permit harvest of the fish crop. Sandy Pond, Ayer (Middlesex County), covering 70 acres, is currently being treated at the rate of about 1,100 pounds per acre per year of commercial fertilizer. Fertilizer is applied at 2-to 3-week intervals in a narrow horseshoe-shaped pattern extending half around the margin of the pond each way from the inlet side.

Sandy Pond, Ayer; began April 1951, to be completed September 1953; averaged \$40 per acre.

Address correspondence to: James Shepard, Project Leader, Bureau of Wildlife Research and Management, R. F. D. 2, Concord, Mass.

4. Harvesting Studies.

Objective is to determine rates of harvest of game and pan species by anglers. The means employed are two-fold: (a) creel censuses on experimental ponds, and (b) tagging of fishes both extensively and intensively. About 15,000 fish are being tagged annually. Six experimental ponds are authorized but only two have been employed so far.

Statewide; began April 1950, planned for 5 years; Richard H. Stroud and Harold Bitzer, Project Leaders.

Address correspondence to: Richard H. Stroud, Phillips Wildlife Laboratory, Upton, Mass.

5. "Salter" Brook Trout Investigation.

Objectives are three-fold: (a) To add to life history knowledge of the "Salter" tendency in eastern brook trout, (b) To learn whether runs of "Salters" may be generated by overstocking, and (c) To determine what are some of the limiting factors to the development of large "Salter" trout populations. The project involves overstocking a once-famed "Salter" trout stream on Cape Cod with various sizes of fin-clipped hatchery brook trout at various times of the year. This is preceded and followed by periodic intensive sampling of the fish population in this and a number of other streams in the area (connected only via the sea) by electro-fishing and limited use of cresol and angling.

Several trout streams of southwestern Cape Cod; began April 1949, to be completed October 1954; \$7,000.

Address correspondence to: John H. Ryther, Project Leader, Woods Hole Oceanographic Institute, Woods Hole, Mass.

6. Fish Population Estimates.

Objectives are two-fold: (a) To evaluate possible trends of change in composition of warm-water fish populations correlated with pan fish control activities, and (b) To supplement pond survey analyses. Modified fyke nets are employed to catch the fish. These are marked by removing one fin and subsequent captures of marked and unmarked fishes serve as a basis for Schanbel-type population estimates. These are conducted one or more times annually and are repeated each year in selected ponds.

MASSACHUSETTS (Cont.)

Statewide; began May 1950, continuing; Richard H. Stroud and Harold Bitzer, Project Leaders.

Address correspondence to: Richard H. Stroud, Phillips Wildlife Laboratory, Upton, Mass.

7. Stream Investigations (FA: F-1-R).

Primary purposes are to determine to what extent major stream systems may be classed as trout or warm-water streams, what is the actual nature and extent of the fishery they support, the extent of management improvements that can be instituted to improve the trout fisheries. Virtually all trout being stocked are marked (tagging as many as possible with Shetter-type jaw tag). A creel census is operated. Summer fish population inventories are made with a shocker and with chemicals. The findings are analyzed with respect for the objectives, and recommendations are made.

Statewide; began October 1951, planned for 5 years; \$22,000.

Address correspondence to: James W. Mullan, Phillips Wildlife Laboratory, Upton, Mass.

8. Pond Management Investigations (FA: F-3-R).

Survey reports are being prepared with recommendations on 206 individual ponds surveyed in 1951 and 1952. All material is collected to develop detailed management programs for both cold and warm-water fishes. Chemical and physical data of the waters and their basins, and biological data, particularly that of fish samples (including scale samples) is being analyzed. Growth analysis of several thousand fishes by the scale method is involved.

Statewide; Phillips Wildlife Laboratory; began March 1952, to be completed December 1954; \$9,000.

Address correspondence to: Richard H. Stroud, Phillips Wildlife Laboratory, Upton, Mass.

University of Massachusetts

1. Management of a Marginal Pond for Trout.

The objective of this project is to experiment with various management procedures to determine the methods to be used in obtaining the maximum in trout fishing from a border line pond in the Connecticut River Valley.

Sunderland, Hampshire County; indefinite; \$200.

Address correspondence to: R. E. Trippensee, Project Leader, Univ. of Mass., Amherst, Mass.

U. S. Fish and Wildlife Service, Branch of Fisheries Biology

1. Biology of Tuna (Project 59).

To obtain information on the life history of the bluefin and other species of tuna in the western North Atlantic.

Hdqtrs. : Woods Hole, Mass. ; the Woods Hole Oceanographic Institution cooperating; began 1951, continuing; \$14,000; Howard A. Schuck and Frank J. Mather, Project Leaders.

Address correspondence to: Herbert W. Graham, Chief, North Atlantic Fishery Investigations, Woods Hole, Mass.

2. Biology of Ocean Perch (Sebastes marinus) (Proj. 61).

The objective of this study is to evaluate the effect of fishing pressure on the abundance of redfish and to determine the factors that control the size of the population as a means of predicting landings under varying conditions and management practices.

Hdqtrs. : Woods Hole, Mass. ; began 1950, continuing; \$22,000.

Address correspondence to: George F. Kelly, Project Leader, North Atlantic Fishery Investigations, Woods Hole, Mass.

3. Census of New England Fishing Banks (Proj. 62).

The project is aimed at determining the distribution and abundance of the several fish stocks on the banks, relating changes in distribution or abundance to environmental factors, and assessing these factors so that changes in distribution or abundance may be understood or predicted.

Hdqtr. : Woods Hole, Mass. ; began 1948, completed in 1952.

Address correspondence to: Clyde C. Taylor, Project Leader, North Atlantic Fishery Investigations, Woods Hole, Mass.

4. Changes in Climate and Abundance of Fish (Proj. 63).

The objective of this study is to determine the relation between year-class fluctuations of stocks of fish and meteorological and hydrographic conditions, as an aid to the understanding and prediction of such fluctuations.

Hdqtrs. : Woods Hole, Mass. ; began 1951, to be completed 1953; \$5,000.

Address correspondence to: John B. Colton, Jr., Project Leader, North Atlantic Fishery Investigations, Woods Hole, Mass.

MICHIGAN

Department of Conservation

1. Fishes of Michigan.

A comprehensive reference book on fishes of the State, on their structure, habits, distribution, abundance, etc., with illustrations and keys for general use of sportsmen, biologists, and students is under preparation.

Statewide; began in 1946, indefinite; \$3,267; Gerald P. Cooper and Reeve M. Bailey of Univ. of Mich., Museum of Zoology, cooperating.

Address correspondence to: Institute for Fisheries Research, Univ. Museum Annex, Ann Arbor, Mich.

2. Fish Population Studies.

Determination of the size of populations of legal-sized game fish is the basis for interpretation of creel census data, and effects of special regulations. Estimation techniques are evaluated by use of mark and recapture methods.

Five war-water lakes in Mich.; began October 1952, planned to June 1953; \$5,940; G. P. Cooper, Proj. Ldr.; published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museum Annex, Ann Arbor, Mich.

3. Lake Inventory (FA: F-2-R in part).

The project is a physical-chemical-biological survey of lakes on a statewide basis to obtain basic information for management program, growth rates, habitat requirements of fish fauna of Michigan.

Statewide; began in 1932, continuing; \$19,008; C. M. Taube, Proj. Ldr., some published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museum Annex, Ann Arbor, Mich.

4. Stream Inventory (FA: F-2-R in part).

A physical-chemical-biological survey of streams is conducted to obtain basic information for management program, distribution, growth, habits, etc., for stream fish fauna in Michigan.

Statewide; began in 1952, continuing; \$15,741; C. M. Taube, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

5. Lake Inventory Reports.

Research findings on some of the larger, popular lakes of the State are briefly explained and the purpose and methods of inventory made available for public distribution.

Various of the larger, more popular lakes of the whole State; began in 1952, indefinite; \$551; C. M. Taube, Proj. Ldr.; some reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

6. Winter Lake Mapping (FA: F-3-R).

The project is providing maps of inland lakes showing shape, size, depths, and bottom soil types for use in fisheries management.

Statewide; began in 1939, continuing; \$17,820; B. V. Huges, Proj. Ldr.; some printed reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

7. General Creel Census.

Random creel census records secured by conservation officers are compiled and interpreted.

Statewide; began in 1927, continuing; \$3,564; K. G. Fukano, Proj. Ldr.; some published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

8. Statistical Analysis of Creel Census Methods.

Present creel census techniques are evaluated to determine optimum sampling levels by analysis of existing records using statistical models.

Various waters in Mich.; began June 1952, planned for completion January 1953; \$4,752; H. D. Tait, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

9. Survival to the Creel of Spring Versus Fall Planted Brown and Rainbow Trout.

Determine, by planting equal numbers of legal-sized brown and rainbow trout in spring and fall, relative survival to the creel of spring versus fall planted fish.

Four trout streams in Mich.; began October 1951, completed December 1952; \$9,504; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

10. South Branch AuSable River Trout Management.

The project was set up to evaluate special regulation on South Branch AuSable Creel Census, population, and growth rate checks.

South Branch AuSable River, Crawford County; began Spring 1952, planned for 5 years; \$5,643; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

11. Trout Management, Pine River, Lake County.

Creel census, population checks, and growth analysis are employed to determine the effect of a 10-inch size limit.

MICHIGAN (Cont.)

Pine River, Lake County; began Spring 1952, planned for 5 years; \$5,568; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

12. Life History of Brown Trout in Michigan.

Attention is being given the lesser known facts relative to management of the species, through age and growth studies, and studies on its reproduction and ecology.

Manistee River, Rifle River, AuSable River, Pigeon River, Cooks Run; began September 1, 1949, completed in 1952; \$3,509; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

13. Birch Lake Fish Management.

The project is designed to determine value and effects of planting trout and small-mouth bass, effect of cisco gill netting, need for screen in outlet, and effect of May 15 opening, by creel census, marked plantings, two way weir in outlet, etc.

Birch Lake, Cass County; began in 1937, planned for 6 years; \$2,376; A. S. Hazzard, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

14. Deep Lake Fish Management.

Periodic fish collections are taken to study survival and growth of species planted since lake was poisoned in 1941. Present population is composed of bluegills, largemouth bass, rainbow trout.

Deep Lake, Oakland County; began in 1952, continuing; Walter R. Crowe, Proj. Ldr.; earlier published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

15. Fingerling Trout Planting, Pigeon River Lakes.

Survival to the creel of fingerling brook trout planted in the fall is determined by creel census.

Pigeon River Lakes, Otsego and Montmorency Counties; began in 1952, indefinite; \$1,188; E. L. Bacon, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

16. Relative Survival of Wild Versus Hatchery Reared Fingerlings.

The project expects by creel census and population estimates through two to three years of stream life to determine survival of wild versus hatchery reared fingerlings.

MICHIGAN (Cont.)

Pigeon River, Otsego and Cheboygan Counties; began August 1951, planned to 1954; \$1,485; E. H. Bacon, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

17. Experimental Planting of Sub-legal Trout.

Plantings of sub-legal brook and brown trout are being made in a section of trout stream where natural reproduction is limited to determine the benefits of this type of stocking.

Pigeon River, Otsego County; began in 1952, planned to 1954; \$594; E. L. Bacon, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

18. Management of Special Trout Ponds.

Various stocking programs are tested by creel census and counts of residual populations after draining.

Hillsdale Ponds, Hillsdale County; began in 1946, continuing; \$2,376; Walter R. Crowe, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

19. Hillsdale Ponds, Angling Experiments.

Complete angling record is secured under a permit system enabling study of the rate of removal by angling from a known fish population.

Hillsdale County; began in 1946, continuing; \$2,376; K. G. Fukano, Proj. Ldr.; published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

20. Creel Census, Rifle River Area.

From records of all angling, angling pressure is determined and trends noted in angling quality throughout Rifle River Area.

Rifle River Area; began in 1945, continuing; \$9,504; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

21. Stream Bottom Fauna - Rifle River Improvement Project.

The objective is to determine abundance and composition of bottom fauna in Houghton Creek and other tributaries of Rifle River over a period of years by quantitative and qualitative sampling. The importance of bottom fauna in trout production is part of the study.

Houghton Creek and other tributaries in upper end of Rifle River drainage; began in 1950, indefinite; \$4,669; Robert J. Ellis, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

22. Trout Population - Rifle River.

Through various techniques the population trends of trout in Upper Rifle River are followed as a method of evaluating effects of watershed improvement.

Upper Rifle River, Ogemaw County; began in 1950, indefinite; \$4,752; Howard Gowing, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

23. Experimental Planting of Fingerling Brown Trout.

The project will determine survival of marked fingerling brown trout through creel census and periodic population checks.

Rifle River, Ogemaw County; began in 1952, planned for 6 years; \$297; Howard Gowing, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

24. Creel Census, Pigeon River.

The project, aided by a permit system, secures complete record of angling pressure, and fishing quality on 4.8 miles of Pigeon River.

Pigeon River Area; annually throughout trout season; \$5,049; E. L. Bacon, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

25. Limiting Factors in Trout Populations.

By physical chemical, biological analyses of certain sections of a trout stream, effort is being made to ascertain which limnological features limit density of the trout population.

Pigeon River, Otsego and Cheboygan Counties; began September 1950, completed September 1952; \$2,784; N. G. Benson, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

26. Hunt Creek Creel Census.

By securing records of all fishing on the experimental area, trends are followed in angling pressure and success. Creel census results are also used to evaluate the experimental program.

Hunt Creek Trout Research Station; began in 1939, continuing; \$9,504; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

27. Brook Trout Spawning Studies.

The project is set up to secure exact information on length on spawning season, number of redds in which eggs are deposited, preferred sites for redds, and number of young resulting from spawning of known numbers of adults of known sizes. This information is secured from experimental stream, and from screened natural raceways.

Experimental sections of Hunt Creek, Montmorency County; began October 1943, indefinite; \$1,102; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

28. Population Studies, Hunt Creek.

The objective is to determine residual populations of brook trout through the use of various estimation techniques in waters of Hunt Creek drainage at the close of angling season.

Hunt Creek, Montmorency County; began September 1949, continuing; \$1,782; D. S. Shetter, Proj. Ldr.; some reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

29. Trout Migration Studies, Hunt Creek.

Determination of extent of movement into or out of experimental sections of Hunt Creek is possible by operation of weirs and maintenance of marking records.

Experimental sections of Hunt Creek, Montmorency County; began April 1949, continuing; \$6,757; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

30. Hunt Creek Age and Growth Studies.

Growth analysis is made of brook trout in anglers catch from various experimental waters, and of the residual population of brook trout.

Hunt Creek Trout Experiment Station, Montmorency County; began in 1950, continuing; \$5,568; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

31. Age and Growth, Michigan Game Fishes.

Activities are carried out which enable determination of statewide average growth and sex ratio of each species for comparisons between waters, and comparison of growth in individual waters with statewide averages.

Statewide; began in 1932, continuing; \$6,989; J. E. Williams, Proj. Ldr.; for reports see Beckman, Trans. Amer. Fish. Soc. Vols. 75 and 76.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

MICHIGAN (Cont.)

32. Periodicity of Fish Growth.

By analysis of scale samples collected throughout the year from fish in four lakes, the investigation seeks to determine time of year during which fish grow and the percentage of growth in the various months of the growing season.

Four Michigan lakes; began in 1946, to be completed in 1953; \$1,566; J. E. Williams, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

33. Cycles in Growth Rate of Fish.

The project is set up to determine if natural cycles in rate of growth of game and pan fish occur in Michigan lakes; to compare growth rates of fish from lakes known to have slow growing fish 10 years ago with fish known to have had good growth 10 years ago; to make yearly scale sample collections from experimental lakes for growth comparisons.

Eighteen lakes throughout the State; began in 1947, to be completed in 1954; \$1,566; J. E. Williams, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

34. Food of Brook and Brown Trout in Pigeon River.

Collection of all stomachs from trout caught by anglers is the basis for determining correlation between volume of stomach contents and growth rate of trout; also the correlation of stomach contents with seasonal changes in condition and growth rate.

Pigeon River; began September 1952, completed December 1952; \$928; E. L. Cooper and N. G. Benson, Proj. Ldrs.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

35. Availability of Fish Food Organisms in Selected Southern Michigan Lakes.

Year around quantitative and qualitative samples of fish food organisms are taken from selected warm water lakes in Michigan to determine the factors which influence the availability and utilization of fish food organisms. Also, limnological studies on plankton, nitrogen and phosphorus, and chemical characteristics of bottom soils are made.

Seven selected lakes in southern Michigan; began October 1952, indefinite; \$4,669; Frank F. Hooper, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

36. Life History and Ecology of Stream Chironomids.

The study aims to secure a better knowledge of the kinds and abundance of midges in trout streams, and to learn their habitat requirements and importance as trout food.

MICHIGAN (Cont.)

Hunt Creek, AuSable River, Pigeon River, Rifle River; began June 1952, indefinite; \$1,566; Laverne L. Curry, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

37. Lake and Pond Fertilization.

The project aims to determine the practical value of commercial fertilizer as a tool in warm water fish production by experiments in lakes and ponds.

South Twin Lake, Cheboygan County, Hatchery Ponds at Hastings and Wolf Lake Hatcheries; began in 1946, indefinite; \$3,861; R. C. Ball, Proj. Ldr.; published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

38. Increasing Productivity of Marl Lakes.

Additions of organic matter and inorganic fertilizers are made to marl soils to determine their factors limiting production of fish food organisms in marl lakes. Methods of modifying marl lakes so as to increase their productivity are being investigated.

North Lake, Pintail Pond, Ogemaw County; Fish Lake, Barry County; began June 1952, indefinite; \$2,376; David L. Shull, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

39. Chemical Modification of a Soft-water Lake.

Effort is being made to accomplish alkalization through addition of CaO and CaCO₃. Evaluation of the charges is being made by chemical and biological investigation.

Stoner Lake, Delta County; began in 1952, indefinite; \$1,566; R. C. Ball, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

40. Introduction of Redear Sunfish.

Introductions into selected ponds are being made to test the value of the species for farm ponds.

Ponds at Hastings and Wolf Lake Hatcheries; began in 1949, indefinite; \$297; R. C. Ball, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

41. Walleye Sport Fishery Management.

Introductions of marked (or unmarked) fingerlings are made into selected lakes to determine survival and value of maintenance plantings.

MICHIGAN (Cont.)

About 10 Michigan Lakes, various locations; began in 1951, indefinite; \$297; Walter R. Crowe, Proj. Ldr.; Proc. Tri-State Fisheries Conf., Escanaba, Mich., 1951, mimeographed report available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

42. Walleye Sport Fishery, Muskegon River System.

This study of the walleye fishery on the Muskegon River system is concerned with the effectiveness of power dams as barriers, effect of turbines on walleyes passing through them, fate of immature walleyes in Hardy Reservoir, possibility of using an electric screen for walleyes, and magnitude and exploitation of spawning run. Most of these data are secured from tagging studies.

Lower Muskegon River system, from Big Rapids Reservoir to Lake Michigan; began April 1947, indefinite; \$377; Walter R. Crowe, Proj. Ldr; Bulletin No. 3, Institute for Fisheries Research available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

43. Life History of Black Crappie.

A synthesis of earlier studies on the species is being compiled through library research and investigations of lesser known facts concerning it by studies on growth, habits, and ecology.

Duck Lake, Calhoun County and other waters; began February 1950, indefinite; \$1,160; K. E. Christensen, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. of Museums Annex, Ann Arbor, Mich.

44. Smallmouth Bass in the Great Lakes Water of Michigan.

Intensive investigation through study of ecology, exploitation, and distribution is conducted to set up the conservation and management program for the smallmouth bass.

Statewide, Great Lakes Waters; began in 1953, indefinite; \$3,861; A. S. Hazzard, Karl F. Lagler (Univ. of Mich.), Leaders.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

45. Sea Lamprey Investigations in Inland Waters.

By observation of spawning migrations, extent of scarring of fish populations, and inventory of populations of larval sea lampreys, the project expects to determine the extent to which the sea lamprey is established in inland lakes of Michigan.

About 30 inland lakes and their tributary streams; began in 1952, scheduled for completion in 1953; \$3,564; Truman T. Guard, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

46. Brook Trout and Brown Trout Fishing Regulations.

The project is designed to test the effect of higher size limits and bait restrictions on angling quality for brook and brown trout.

North Branch AuSable River, Crawford and Otsego Counties; began in 1949, indefinite; \$1,782; D. S. Shetter, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

47. Experimental Fishing Regulations on Lakes.

Creel census, age, growth, and population studies are being used to determine the effect of relaxed fishing regulations on 14 "experimental" lakes.

Fourteen selected lakes, various parts of Michigan; began April 1951, planned for 6 years; \$38,313; K. E. Christensen, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

48. Artificial Circulation, West Lost Lake.

The project aims to determine if small stratified lakes can be circulated by pumping bottom water to surface; and what influence, if any, such an artificial circulation has on plankton production.

West Lost Lake, Otsego County; began July 1952, planned to close September 1952; \$2,320; F. F. Hooper, R. C. Ball, Proj. Ldrs.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

49. Control of Fish Population by Partial Kill.

The objective is to determine effect of lowered population density or growth rates before and after poisoning.

Sand Lake, Newaygo County; began in 1949, scheduled for completion in 1953; \$2,376; J. E. Williams, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

50. Sucker Control, Big Bear Lake.

Population analysis, growth study, food study, creel census aid in determining the economic position of suckers in inland lakes and their relation to certain other species.

Big Bear Lake, Otsego County; began in 1940, completed in 1952; Walter R. Crowe, Proj. Ldr.; reports in press.

Address correspondence to: Institute for Fisheries Research, University Museums Annex, Ann Arbor, Mich.

MICHIGAN (Cont.)

51. Water Level Control, South Twin Lake.

Determine effect of raised water level in a shallow lake by before-and-after comparison of growth and general abundance of fish population.

South Twin Lake, Cheboygan County; began in 1947, to be completed in 1953; Walter R. Crowe, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

52. Lower Gamble Creek Weirs.

By tagging in late fall and early spring, observations are conducted on the nature of spawning run of brown trout and other species from Devoe Lake and Rifle River through Gamble Creek and diversion. Also the species composition, numerical abundance, and age and growth of weir catch over a period of years are recorded.

Waters in Rifle River Area; began October 1952, indefinite; \$377; Howard Gowing, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

53. Bluegill-Trout Relationship in Ford Lake.

The competition for food between trout and bluegills; growth rates of both species; length of time necessary for bluegills to become stunted and assume dominant position; possible introduction of a predator species as a control; poisoning and population analysis are under investigation.

Ford Lake, Otsego County; began in 1949, planned for completion in 1953; \$551; Robert C. Ball, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

54. Black River Lamprey - Rainbow Trout Research.

In conjunction with operation of the Black River barrier to block spawning run of sea lampreys, studies are being conducted to find its effectiveness as a barrier to rainbow run. A management program is being developed for the rainbow run based on age and growth studies, observations on extent of spawning above barrier, and exploitation by anglers.

Black River, Mackinac County; began in 1946, continuing; \$3,886; Thomas M. Stauffer, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

55. Beaver-Trout Relations.

By collection of physical, chemical, and biological data, the project expects to determine effects of beaver on Michigan trout streams, and establish management procedures on a sound factual basis.

MICHIGAN (Cont.)

Three selected trout streams in Mich.; began in 1947, planned for completion in 1953; \$2,320; A. K. Adams, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

56. Hooking Mortality Experiments on Brook Trout.

Under experimental conditions the relative mortality of brook trout caught by flies and by worms on various sized hooks is being determined and the results tested statistically.

Hunt Creek, Montmorency County; began May 1950, planned to September 1953; \$1,782; D. S. Shetter, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

57. Autopsy of Brook Trout from Hooking Loss.

Post mortem examination of trout from hooking experiment is made to determine cause of death.

Hunt Creek, Montmorency County; began June 1952, planned for 1 season; \$594; L. N. Allison, Proj. Ldr.; reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

58. Minnow Propagation and Sale of Bait.

Experimental propagation of minnows at two state hatcheries provides information on care and culture of fish baits, and furnishes stock to minnow dealers.

Wolf Lake and Hastings Hatcheries; began in 1944, indefinite; \$2,069; R. C. Ball, Proj. Ldr.; published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

59. Parasites and Diseases of Fish.

Macro- and microscopic examination is made of sick fish in hatcheries with recommendations for treatment. Study and identification of fish parasites and diseases is conducted on a statewide basis.

Statewide; began in 1942, continuing; \$2,320; L. N. Allison, Proj. Ldr.; published reports available.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

60. Check List of Fish Parasites in Michigan.

Preparation and maintenance of a host-parasite-distribution list of parasites found in fish from Michigan waters is under way.

Statewide; began June 1942, continuing; \$2,784; L. N. Allison, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

61. Use of Oxygen in Transportation of Trout.

Tests of the value of oxygen in transporting trout are under way.

Harrietta Fish Hatchery; began in 1951, indefinite; \$377; L. N. Allison, Proj. Ldr.
Address correspondence to: Institute for Fisheries Research, Univ. Museums
Annex, Ann Arbor, Mich.

62. Effect of Anesthetization of Brood Stock Brown Trout on Fry.

Anesthetization of brood stock during stripping operations facilitates the operation, and reduces mortality of brood stock. Under experimental procedure, growth and survival of fry from anesthetized and unanesthetized brood stock is compared.

Paris Fish Hatchery; began January 1952, planned to end May 1952; L. N. Allison, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums
Annex, Ann Arbor, Mich.

63. Value of Various Diets for Hatchery Trout.

Under experimental procedure Head Tide pellets, Lewis Men, etc., are compared for conversion factor, costs, mortality.

Various state fish hatcheries; began February 1952, to be completed June 1953; \$297; L. N. Allison, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums
Annex, Ann Arbor, Mich.

64. Section Z Feeding Experiment.

Artificial feeding (with Head Tide) is being evaluated on a population of wild brook trout. Pre-feeding data are available for trout population in stream section under consideration.

Section Z, Hunt Creek, Montmorency County; began April 1952, planned for 1 season; \$2,970; D. S. Shetter, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums
Annex, Ann Arbor, Mich.

65. Development of Fish Cultural Station for Experimental Work.

Search for a possible site with adequate water supply and other necessary attributes, together with plans for personnel and equipment needed, is under way.

Began in 1952, indefinite; \$891; A. S. Hazzard, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums
Annex, Ann Arbor, Mich.

66. Effect of Terramycin on Furunculosis in Brown Trout.

Experiments are under way to find an antibiotic which is effective and feasible for control of furunculosis in brown trout at hatcheries where a sulfa-resistant strain has developed. Test treatment with terramycin is employed against control.

State Fish Hatchery, Grayling; began July 1952, for one season; \$377; L. N. Allison, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, Univ. Museums Annex, Ann Arbor, Mich.

67. Occurrence of Furunculosis in Rainbow Trout from Great Lakes.

The incidence and origin of furunculosis is being investigated in "wild" lake run rainbows specifically from Lake Huron into the East Branch of the Au Gres River where disease was first reported. Histological examination of preserved kidneys and cultures of fresh material is made when available.

Streams tributary to Great Lakes, specifically the East Branch of the Au Gras River; began April 1952, indefinite; \$551; L. N. Allison, Proj. Ldr.

Address correspondence to: Institute for Fisheries Research, University Museums Annex, Ann Arbor, Mich.

68. Pine River Watershed Project (FA: F-5-D).

This is an operational land use program designed to improve fishing conditions by the installation of practices and/or devices on both the uplands and the stream channels of the watershed. Work includes; stream improvement structures (deflectors, covers, dams, etc.); bank stabilization; and streamside fencing. The upland work includes: tree planting for shade and erosion control; grass waterways; small impoundments; and general farm program conservation measures. Compared to the Rifle River program, the Pine River operations include a considerably higher percentage of the work on the stream program, primarily on erosion control of the stream channels.

Pine River drainage in Wexford, Lake, and Osceola Counties; planned for 3 years; \$70,000.

Address correspondence to: Wayne H. Tody, Watershed Management Supervisor, Watershed Management Office, Dept. of Conservation, Lansing 13, Mich.

69. Watershed Surveys and Management Plans (FA: F-4-R).

The project will feature compilation of technical information on all watersheds of the State and provide plans for development of improved fishing conditions within them. Work will involve the assembly of available information, the classification of watershed areas, establish detailed priority for work and develop necessary maps and plans for the management to follow.

Statewide; began (FA) October 1952, indefinite; \$35,000.

Address correspondence to: Wayne H. Tody, Watershed Mgt. Supvr, Watershed Mgt. Office, Dept. of Conservation, Lansing 13, Mich.

70. Rifle River Watershed Development.

This is an experimental land use program designed to improve fishing conditions by the installation of practices and/or devices on both the uplands and the stream channels of the watershed. Work includes: stream improvement structures (deflectors, covers, dams, etc.); bank stabilization; streamside fencing. The upland work includes; tree planting for shade and erosion control; grass waterways; small impoundments; and general farm program conservation measures.

Rifle River north of Michigan Highway 55 in Ogemaw County; planned through 1953; \$25,000.

Address correspondence to: Wayne H. Tody, Watershed Management Supvr., Watershed Mgt. Office, Dept. of Conservation, Lansing 13, Mich.

Michigan State College

1. Farm Pond Management.

Species of pond fish not presently occurring in the State will be introduced in certain ponds. Desirable stocking ratios and species composition will be determined, and through improved methods of harvesting and processing, better utilization of fish produced may be brought about.

Ponds in southern area of Mich.; Dept. of Conservation cooperating; began 1946, continuing; reprints of reports available.

Address correspondence to: Robert C. Ball, Dept. of Fisheries & Wildlife, Mich. State College, East Lansing, Mich.

2. Production and Harvesting of Bait Fish.

Methods are being developed for rearing and harvesting bait fish, and pond owners are being encouraged to use artificial ponds and natural water areas as a source of supplemental income through raising bait fish. Pituitary hormones are being used to permit collection of eggs of stream and lake fish that will not spawn in ponds.

Ponds in southern Mich.; Dept. of Conservation cooperating; began 1946, continuing; reprints of reports available.

Address correspondence to: Robert C. Ball, Dept. of Fisheries & Wildlife, Mich. State College, East Lansing, Mich.

3. Fertilization of Natural Lakes.

This project is a study of biological changes resulting from application of inorganic nutrients to warm water and trout lakes. Included are evaluation of increases in plankton, bottom fauna, fish and probability of winter-kill under the snow and ice cover. Relationships of calcium to lake productivity is being studied.

Statewide; Dept. of Conservation cooperating; began 1947, continuing; reprints available.

Address correspondence to: Robert C. Ball, Proj. Ldr., Dept. of Fisheries and Wildlife, Mich. State College, East Lansing, Mich.

4. Studies of Basic Food Relationships of Pond and Lake Fishes.

This project is concerned with the amount of food at different trophic levels necessary to support a growing population of forage fishes. The effects of altering the predation load on the lower levels of the food chain are under observation.

Southern Mich.; Dept. of Conservation cooperating; began 1950, continuing; reprints available.

Address correspondence to: Robert C. Ball, Dept. of Fisheries and Wildlife, Mich. State College, East Lansing, Mich.

5. Trout Stream Management.

The purpose of this project is to test different trout management practices on a 2 to 4 mile length of stream where controlled observations are possible.

Augusta Creek, Kalamazoo County; began in 1934, continuing; \$200; P. I. Tack, W. F. Morofsky, and W. A. Lemmien; some reprints available.

Address correspondence to: Dr. P. I. Tack, Dept. of Fisheries & Wildlife, 405 Natural Science Bldg., East Lansing, Mich.

6. Farm Fish Pond Management.

This project is designed to test the applications and limitations of the farm pond in Michigan, and to devise, if possible, management practices suitable to this region.

North Central Mich.; began in 1944, continuing; P. I. Tack and W. F. Morofsky; reprints available.

Address correspondence to: Dr. P. I. Tack, Dept. of Fisheries & Wildlife, Mich. State College, East Lansing, Mich.

Sharples Chemical Inc.

1. Evaluation of Plant Wastes and Necessary Dilution Ratios.

The objective of this project is to determine toxicity of plant wastes and find minimum dilution ratios needed for fresh water fish.

Continuing.

Address correspondence to: Leslie Gillette, Chief Chemist, Sharples Chemical Inc., Wyandotte, Mich.

Fish and Wildlife Service, Branch of Fishery Biology

1. Development of an Electro-Mechanical Sea Lamprey Weir and Trap (Proj. 1a).

The objective of this project is to develop a simple sea lamprey trapping device utilizing ordinary alternating current line power in which an electrical field in the water is substituted for the screens or "racks" of a conventional fish weir and trap.

MICHIGAN (Cont.)

Lakes Huron, Superior, and Michigan; Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1951, preliminary work completed June 1953; Bernard R. Smith, Leader.

Address correspondence to: James W. Moffett, Chief, 1220 E. Washington St., Great Lakes Fishery Investigation, Ann Arbor, Mich.

2. Development of Fish "Leading" or "Assembling" Devices (Proj. 1b).

The objective is to develop a device utilizing some form of pulsed direct current which may be used as an accessory to the electro-mechanical weir and trap to aid in the rapid transfer upstream of food and game fishes migrating with the sea lampreys.

Lakes Huron, Superior, and Michigan; Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1951, preliminary work completed June 1953; Alberton L. McLain and Willis L. Nielsen, Leaders.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fishery Investigation, 1220 E. Washington St., Ann Arbor, Mich.

3. Development of a Selective Electrical Barrier to Lamprey and Fish Migrations (Proj. 1c).

The objective of this project is to determine whether a Burkey-type electric fish screen can be so adapted as to block the upstream movement of spawning-run sea lampreys while permitting the passage upstream of migrating food and game fishes.

Lakes Michigan, Superior, and Huron; Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1951, preliminary work completed June 1953; Leo F. Erkkila, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fishery Investigations, 1220 E. Washington St., Ann Arbor, Mich.

4. Survey of Great Lakes Tributary Streams (Proj. 2).

The objectives are to determine the location of all streams in the Superior, Michigan and Huron basins in which successful reproduction of the sea lamprey can occur, and to determine the degree to which such streams are or may be utilized by the species, to determine therefrom where control structures must be located.

Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1950, planned for completion in 1954; Howard A. Loeb, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fishery Investigations, 1220 E. Washington St., Ann Arbor, Mich.

5. Chemical Control Techniques (Proj. 3).

The objectives are to determine whether a specific toxicant exists which will be lethal to larval lampreys but harmless to other aquatic life occupying the same environment and to determine whether this toxicant can be applied in streams in an efficient and economical manner.

Lake Michigan; Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1950, continuing; Philip J. Sawyer, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fishery Investigations, 1220 E. Washington St., Ann Arbor, Mich.

6. Interrelationships of the Sea Lamprey with Other Fishes (Proj. 4).

The objectives are to determine the role of the sea lamprey in the ecology of the Great Lakes fishes and to evaluate the effect of the lamprey on the density and composition of fish populations.

- Lake Huron; Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1950, continuing; Albert E. Hall, Jr., Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fishery Investigations, 1220 E. Washington St., Ann Arbor, Mich.

7. Feeding Habits of the Sea Lamprey (Proj. 5).

Objectives of this project are to determine the frequency and duration of feeding by the sea lamprey, the effects of attacks on different species of fishes, the percentage of fatal attacks in relation to the size of predator and prey and to locality of attachment, and the causative mechanisms of lethal sea lamprey attacks.

Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1950, to be completed June 1953; Robert E. Lennon, Albert E. Hall, Jr., Leaders.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

8. Movements and Dispersion of Parasitic-Phase Sea Lampreys (Proj. 6).

The objective of this project is to determine the movements and dispersal of actively feeding, parasitic adult lampreys as a means of evaluating control measures taken on a zonal or single-lake-basin basis.

Lakes Huron, Michigan, and Superior; Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1950, continuing; Bernard R. Smith, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

9. Scale Structure of Lake Trout (Proj. 8).

The objectives are to determine the validity of the annulus as a year-mark and to derive a body-scale regression curve for use in the calculation of growth.

All available sources; Hdqtrs.: Ann Arbor, Mich.; began January 1950, to be completed December 1953; Louella E. Cable, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

10. Abundance of Small Trout in Lake Michigan and Lake Superior (Proj. 9).

The objective is to follow annual, seasonal, and local fluctuations in the abundance of small lake trout as reflected in numbers taken in chub gill nets as a means of measuring trends in the stocks and later of judging the results of attempts at rehabilitation.

Hdqtrs.: Ann Arbor, Mich.; began May 1950, will be completed January 1954; Paul H. Eschmeyer, Leader.

Address correspondence to: James W. Moffett, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

MICHIGAN (Cont.)

11. Movements of Lake Trout in Lake Superior (Proj. 10).

Through the tagging of both legal-sized and under-sized lake trout in different regions of Lake Superior to determine the extent of migrations with special reference to the possible presence of local races and movements across inter-state and international boundaries.

Hdqtrs.: Ann Arbor, Mich.; began June 1950, continuing; Paul H. Eschmeyer, Ldr.
Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

12. Limnological Studies of Lake Michigan (Proj. 11).

This project is aimed at accumulating information on the physical, chemical, and biological limnology of the Lake for the purpose of establishing typical conditions and their seasonal changes and of defining major limnological problems and determining the best approach to obtain solutions to them, through a series of transects and repeated occupancy of established stations.

Operations of research vessel Cisco; began summer 1951, continuing.
Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

13. Experimental Fishing in Lake Michigan (Proj. 12).

The objective is to test various types of experimental gear (as specially constructed gill nets, bottom trawls, mid-water trawls) to learn their efficiency and limitations in various situations and to obtain information on the distribution and abundance of various species with special reference to the smaller parasitic stages of the sea lamprey, small stages of commercially important species, and small species not sampled by commercial gear.

Operations of research vessel C. sco; began July 1952, continuing.
Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

14. Food Relations of Lake Trout (Proj. 14).

The objective of this project is to determine from stomach contents the food relationships and the utilization of the potential foods, including the amount, frequency of occurrence, and variation as related to size of trout, seasons, localities and depths of water.

Hdqtrs.: Marquette, Mich.; began January 1950, to be completed in December 1954;
Leo F. Erkkila, Leader.
Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

15. Life History Studies of Lake Superior Fishes (Proj. 15).

The objectives of this project are to obtain fundamental information on the life histories of commercially important species in such matters as identity of populations, movements, seasonal and local abundance, fluctuations in growth and strength of year classes.

MICHIGAN (Cont.)

Hdqtrs. : Marquette, Mich. ; began May 1950, continuing; Leo F. Erkkila, Leader.
Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries
Investigations, 1220 E. Washington St. , Ann Arbor, Mich.

16. Fluctuations in Growth and Strength of Year Classes (Proj. 20).

The objective is to accumulate, through scheduled sampling, materials (scales, length, weight, and sex data) on principal species for a study of fluctuations and as opportunity affords to relate these fluctuations to environmental conditions, fishing activities and other factors.

Lakes Huron and Erie; Hdqtrs. : Ann Arbor, Mich. ; began 1930, continuing; Ralph Hile, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries
Investigations, 1220 E. Washington St. , Ann Arbor, Michigan.

17. Food of Blue Pike in Lake Erie (Proj. 21).

From study of stomach contents at different seasons and localities the project is planned to determine the food habits of blue pike with special reference to the possible role of the blue pike in determining the abundance of such prey species as the cisco.

Hdqtrs. : Ann Arbor, Mich. ; began 1951, to be completed in 1955; Willis S. Glidden, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries
Investigations 1220 E. Washington St. , Ann Arbor, Mich.

18. The Effect of Mesh Size in Chub Nets on the Escape of Young Lake Trout (Proj. 55).

A survey to determine the best size of mesh to use to minimize destruction of lake trout.

All Great Lakes, Hdqtrs. : Ann Arbor, Mich. ; began 1928, scheduled for completion April 1954.

Address correspondence to: John Van Oosten, Chief, Biology of Great Lakes Fishes,
Ann Arbor, Mich.

19. Effect of Abundance on Growth Rate of Smelt (Proj. 56).

A project to determine the potential productivity of the smelt runs by noting the relation between abundance and growth.

Hdqtrs. : Ann Arbor, Mich. ; began 1943, to be completed December 1954.

Address correspondence to: John Van Oosten, Chief, Biology of Great Lakes Fishes,
Ann Arbor, Mich.

MINNESOTA

Department of Conservation, Division of Fish and Game

1. Yield and Dynamics of a Lake Trout Lake.

Information on yield, fish mortality and population structure of a typical trout lake is being gathered with a view toward better management.

Lake near Grand Marais; began January 1951, indefinite; Donald Franklin, Robert E. Schmacher, Aquatic Biologists.

Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

2. Development of Better Methods of Pond Management for Rearing Minnows and Warm-water Game Fishes.

Better methods of pond management will be determined through detailed studies of pond dynamics, including water and soil chemistry, and fish yield.

Statewide; began January 1948, continuing; John Dobie, Aquatic Biologist; a bulletin on minnow rearing is available.

Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

3. Development of a Better Trout Diet.

The objective of this project is to determine by experimental feeding the best trout diet for Minnesota hatcheries.

Statewide; began January 1949, continuing; Robert Schumacher, Aquatic Biologist.

Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

4. Mortality of Adult Walleyes in a Typical Walleye Lake.

The aim of this study is to determine mortality from and recruitment to the adult walleye population in a typical walleye lake.

Lake near Grand Rapids; began May 1950, planned for 4 years, some progress reports available.

Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

5. Survival of Walleye from Fingerlings to Yearlings.

The objective is to determine the survival rate of planted walleye fingerlings under varying degrees of competition.

Lake near Brainerd; began September 1951, continuing; John E. Maloney, Aquatic Biologist; limited number of progress reports available.

Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

MINNESOTA (Cont.)

6. Effect of Stream Improvement on Trout Populations and Fishing.

The value of stream improvement of the usual type to survival of planted trout, stream carrying capacity, and fishing yield of trout is being investigated.

Split Rock River in northeastern Minnesota; began May 1950, planned for 5 years; John Hale, Aquatic Biologist; limited number of progress reports available. Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

7. Relationship of Net Catches to Size and Structure of Fish Population and Angling Harvest.

A study to obtain better methods for evaluation of fish management procedures and for interpreting lake survey data is being carried out on 12 lakes scattered over the State. Some of the desired information will be obtained by means of creel censuses (FA project F-4-R). Evaluation of the effectiveness of various types of nets for sampling populations, and the relationships between net catches, angling harvest, fish populations and environmental factors are being examined. Data on fish mortality and interspecific competition are being gathered.

Began December 1951, planned for 4 years; Creel census report for 1952 available in limited numbers.

Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

8. Lake Inventory and Mapping.

Detailed information on physical, chemical, and biological characteristics of Minnesota lakes is being gathered for use in fish management.

Statewide; began in 1931, continuing; Charles R. Burrows, Aquatic Biologist. Address correspondence to: John B. Moyle, Supvr., Fisheries Research Unit, 355 Shubert Bldg., St. Paul, Minn.

University of Minnesota, Department of Zoology

1. Distribution and Intraspecific Variation in Minnesota Fishes.

Investigations are under way to determine the distribution of fishes in various types of waters in Minnesota and to discover if any structural differences occur in the same species in different drainages.

Minnesota; began April 1952, planned for 2 years; \$3,000.

Address correspondence to: James Underhill, Project Leader, Dept. of Zoology, Univ. of Minn., Minneapolis, Minn.

2. Toxicity of the Eggs of the Longnose Gar.

The project is concerned with the effect of feeding eggs of longnose gar to various animals including fishes, and proposes to isolate and determine the toxic agent present in the eggs of the longnose gar.

MINNESOTA (Cont.)

University of Minn., Dept. of Zoology; began May 1952, to be completed January 1954; \$500.

Address correspondence to: Samuel Eddy, Prof. of Zoology, Univ. of Minn., Minneapolis, Minn.

3. Taxonomy and Habits of the Siscowet of Lake Superior.

The objective of the project is to determine the taxonomic relationship of the siscowet to the lake trout and to study its feeding habits and distribution. Two summers have been devoted to netting and collecting specimens. Stomach analyses have been made. Studies have been made on the structures and measurements of both siscowets and lake trout to determine the taxonomic relationship.

Minnesota waters of Lake Superior; began June 1946, planned to January 1954; \$2,000.

Address correspondence to: Samuel Eddy, Prof. of Zoology, Univ. of Minn., Minneapolis, Minn.

4. The Social Behavior of the Northern Largemouth Bass Under Laboratory Conditions.

The object of this project is to determine what type of territories may be claimed and their relationship to the social hierarchies established under laboratory conditions. The work includes experiments with water at various temperatures and various volumes of water per fish. Experiments have been done or are planned using several fresh water species, although most extensive work has been with the largemouth bass.

Univ. of Minn.; began November 1952, to be completed June 1953; \$200.

Address correspondence to: Alfred H. Grewe, Project Leader, Dept. of Zoology, Univ. of Minn., Minneapolis, Minn.

MISSISSIPPI

State Game and Fish Commission

1. Land Acquisition for a Public Access Area on Moon Lake (FA: F-1-L).

Moon Lake is one of the better sport fishing areas of the Delta. Private ownership of all land surrounding the lake has restricted free public access for boat launching, shore fishing and other recreational use. A six-acre tract was acquired and is being developed as a public access area. Development will include grading and leveling the area, construction of sanitary, boat launching and parking facilities, and the digging of a water well.

Moon Lake, Coahoma County near Clarksdale, Miss.; began September 1952, to be completed June 1953; \$8,800.

Address correspondence to: Spencer H. Smith, Chief, Fisheries Div., Miss. Game and Fish Comm., P. O. Box 451, Jackson, Miss.

MISSISSIPPI (Cont.)

U. S. Forest Service

1. Yazoo - Little Tallahatchie Flood Prevention and Watershed Improvement Project.

Flood prevention and erosion control measures have been inaugurated on badly gullied, worn-out former farm and pasture land in the headwaters of the Yazoo and Little Tallahatchie Rivers. Work consists of intensified fire protection; site preparation by construction of brush and desilting dams and by planting love grass and other herbaceous species for intermediate control of soil movement; and planting pine trees to provide permanent land cover with resultant elimination of erosion and soil movement. The effect of this project on fisheries management lies in reduction of stream silt load and turbidity.

North Mississippi; began in 1947, continuing; Supervision Forest Supervisor, Mississippi National Forests.

Address correspondence to: Regional Forester, U. S. Forest Service, 50 Seventh St., N. E., Atlanta 5, Ga.

MISSOURI

Conservation Commission

1. August A. Busch Memorial Wildlife Area Lake Development.

Primarily this area is managed as a field trial unit and for public fishing. Thirty-two lakes and ponds, with a total area of 145 acres, have been constructed and managed for largemouth bass, bluegill, and channel catfish fishing. The numbers and kinds of fish caught on the area are reported by the anglers and the total creel for each lake, insofar as possible, is computed for each year's fishing.

St. Charles County; began in 1947, continuing; \$18,000; William E. McDannold, Project Leader.

Address correspondence to: G. B. Herndon, Chief, Fisheries Section, Conservation Commission, Jefferson City, Mo.

2. Trimble Wildlife Area Development

Fishing is available in a 170-acre lake on this area which was developed primarily for waterfowl hunting and as a waterfowl refuge. This fishing area will be open to public fishing for the first time in May 1953. The record of the creel will be maintained on each fishing trip on the lake. The lake is being managed for largemouth bass, bluegill, and channel catfish fishing.

Clinton County; began in 1950, continuing; \$29,700; Harry Deming, Project Leader.

Address correspondence to: G. B. Herndon, Chief, Fisheries Section, Conservation Commission, Jefferson City, Missouri.

3. Lake Paho Public Fishing Area Development.

The objective of this project was to establish a large lake (270 acres) for public fishing of largemouth bass, bluegill, and channel catfish. Intensive watershed control is also being carried on in order to create interest in watershed management on private land in the drainage area.

MISSOURI (Cont.)

Mercer County; began 1945, continuing; \$16,000; Eugene M. Holman, Project Leader; reports available.

Address correspondence to: G. B. Herndon, Chief, Fisheries Section, Conservation Commission, Jefferson City, Mo.

4. Trout Stream Management.

Special trout fishing programs are maintained at Bennett Spring, Montauk, and Roaring River State Parks. Ten-inch trout are stocked daily in an amount governed by fishing pressure on the various streams. The trout fishermen carry a material part of the cost through a special tag system which makes trout fishing available for the fee of \$1 per day.

Statewide; began September 1938, continuing; \$73,000; A. G. Morris, Hatchery Supervisor; reports available.

Address correspondence to: G. B. Herndon, Chief, Fisheries Section, Missouri Conservation Commission, Jefferson City, Mo.

5. Lake Management Service.

The objective of this project is to assist the public in managing and developing small impounded waters. This service includes guidance in developing new lakes and in restoring old ones to satisfactory fishing. The latter involves renovating the lakes by poisoning and then restocking them with largemouth bass and bluegills.

Statewide; began in 1950, continuing; \$9,000; Gilbert Weiss, Project Leader.

Address correspondence to: G. B. Herndon, Chief, Fisheries Section, Conservation Commission, Jefferson City, Mo.

6. Investigations of Stream Pollution.

This is a project to investigate the effect of water pollution upon fish in Missouri streams and to provide information for law enforcement and pollution abatement. Analyses of contaminated waters are made, the source of contamination is traced, and its effect upon the fish determined.

Statewide; began 1941, continuing; \$2,850.

Address correspondence to: Herbert J. Fisher, Project Leader, 201 A South 8th St., Columbia, Mo.

7. A Study of the Effect Upon Fish of the Drawdown of Navigation Pools in the Missouri Section of the Mississippi River (Project 10).

Conservation agents and commercial fishermen assist on this project by making daily observations of river conditions relating to the fishery during critical periods and by reporting their findings to the project supervisor. Each report of fish mortality is investigated and detailed study of the situation and an estimate of the extent of the fish kill is made. The U. S. Corps of Engineers cooperate by making available daily records of temperature, ice condition, snow cover, and pool elevation at each lock and dam in the study area.

Mississippi River between Alton, Ill. and Keokuk, Iowa; began December 1946, continuing; \$805.

Address correspondence to: Herbert J. Fisher, Project Leader, 201 A South 8th St., Columbia, Mo.

MISSOURI (Cont.)

8. The Rate of Growth of the Rock Bass in Several Ozark Streams of Missouri (Project 120).

This project is a comprehensive study of the age, rate of growth, and other aspects of the biology of the rock bass in eight Ozark streams. Several thousand scale samples were collected between 1947-1951. In addition to the analysis of growth and age composition of the populations, material is available for a study of food habits and the reproductive potential of this species.

Statewide; began December 1948, to close June 1954; \$200.

Address correspondence to: Mercer H. Patriarche, Project Leader, 201A South 8th St., Columbia, Mo.

9. An Intensive Creel Census of Clearwater Reservoir on the Black River in Missouri (Project 200).

A year-around intensive creel census is conducted on Clearwater Reservoir to obtain a record of the catch and compare the species composition each year; to derive an estimate of the annual yield and fishing pressure to measure changes in fishing quality.

Reynolds County; began May 1949, continuing; \$4,000; paper presented at the 18th North American Wildlife Conference.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

10. An Intensive Creel Census of the Niangua Arm of Lake of the Ozarks, an Impoundment on the Osage River (Project 201).

A year-around intensive creel census is being conducted to determine annual catch and fishing pressure, detect changes in fishing quality, recover tags, and obtain weights and measures of fish caught with a view toward proper management improvement.

Camden County; began May 1950, to close December 1953; \$4,000.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

11. An Intensive Creel Census of the Missouri Portion of Norfork Lake, an Impoundment on the North Fork of the White River (Project 202).

The objective of this project is to determine fishing yield and pressure and fishing quality by seasons in order to institute proper fish management procedures.

Ozark County; began August 1950, indefinite; \$2,000.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

MISSOURI (Cont.)

12. An Intensive Creel Census of Lake Taneycomo, an Impoundment on the White River, Missouri (Project 203).

The objective of this project is to determine fishing yield, pressure and quality by seasons in order to institute proper fish management procedures.

Taney County; began August 1950, indefinite; \$4,000.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

13. An Intensive Creel Census of Lake Wappapello, an Impoundment on the St. Francis River, Missouri (Project 204).

The objective of this project is to determine fishing yield, pressure and quality by seasons in order to institute proper fish management procedures.

Wayne County; began May 1951, indefinite; \$4,000.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

14. A Fish Tagging Program for the Large Impoundments of Missouri (Project 205).

This project is designed to determine the annual harvest of game fish in relation to the population in the body of water. Except for catfish, which are tagged in the gill cover, fish are tagged in the jaw during the latter part of March and until June. The fish for tagging are caught with nets on three impoundments.

Statewide; began April 1951, indefinite; \$3,500.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

15. An Intensive Creel Census of the Missouri Portion of the Little North Fork Arm of the Bull Shoals Lake, an Impoundment on the White River (Project 206).

An intensive creel census is conducted each year to determine fishing yield, pressure and quality by seasons, on order to establish needs and for proper fish management.

Ozark County; began January 1953, indefinite; \$2,000.

Address correspondence to: Joseph W. Kathrein, Project Leader, 201A South 8th St., Columbia, Mo.

16. Test Net Sampling of Fish Populations in the Large Impounded Waters in Missouri (Project 220).

Test netting is being carried out in many of the large Missouri impoundments in September and October of each year to measure trends in abundance of several species of fish, follow the development of populations in new reservoirs, and obtain material for age and growth studies. Data are evaluated on the basis of catch per type of gear used in conjunction.

Statewide; began August 1949, indefinite; \$4,700.

Address correspondence to: Mercer H. Patriarche, Project Leader, 201A South 8th St., Columbia, Mo.

MISSOURI (Cont)

17. An Investigation of the Spawning Success of Important Game and Non-game Fishes in the Large Impounded Waters in Missouri (Project 225).

The two objectives of this project are: (1) to obtain a measure of the yearly spawning success of important fishes; and (2) to acquire a knowledge of the species composition and relative abundance of the forage fishes in the large impoundments. Specified areas are seined and all fish caught are counted and a sample is preserved for laboratory examination.

Statewide; began July 1950, indefinite; \$4,100.

Address correspondence to: Mercer H. Patriarch, Project Leader, 201A South 8th St., Columbia, Mo.

18. Censusing Fish Populations in Small Sample Areas of the Large Impounded Waters With Emulsifiable Rotenone (Project 230).

The objective of this project is to obtain quantitative population data for certain species and sizes of fish, which is used in conjunction with other studies to evaluate the status of the fish populations in the reservoirs.

Statewide; began August 1950, indefinite; \$4,100.

Address correspondence to: Mercer H. Patriarche, Project Leader, 201A South 8th St., Columbia, Mo.

19. A Study to Determine the Suitability of Pumpkinseed and Redear Sunfish as Forage Species in Combination with Largemouth Bass (Project 311).

This project was set up to test a combination of largemouth bass with pumpkinseed and redear sunfish. A series of 10 ponds are being used for this project. They are seined in mid-summer to check on the success of reproduction, and the populations are sampled in the fall for age and rate of growth determinations.

Boone County; began September 1949, indefinite; \$2,100.

Address correspondence to: Ralph M. Burress, Project Leader, 201A South 8th St., Columbia, Mo.

20. A Study to Determine the Effect of Reversing the Order of Stocking of Bass and Bluegills on the Growth Rates and Composition of Their Populations (Proj. 312).

This project is designed to compare the effects of two methods of stocking fingerling fish: (1) bass stocked in early summer and bluegills in the fall of the same year, (2) bluegills stocked in the fall and bass introduced the following summer. In mid-summer, the ponds used are seined to evaluate the reproductive success of both species. In the fall, data are collected for the analyses of the rates of growth of the populations.

St. Charles County; began July 1950, to close December 1953; \$2,100.

Address correspondence to: Ralph M. Burress, 201A South 8th St., Columbia, Mo.

MISSOURI (Cont.)

21. Control and Eradication of Aquatic Vegetation with Several Weed Control Agents (Project 325).

This project is designed to test various herbicides on a number of plants with the object of determining their effectiveness over a period of time, concentrations necessary for control, and their effectiveness when used with various carriers.

St. Charles and Boone Counties; began June 1950, indefinite; \$2,100.

Address correspondence to: Ralph M. Burress, Project Leader, 201A South 8th St., Columbia, Mo.

22. The Use of Inorganic Fertilizers for Fish Production in Small Lakes and Ponds (Project 330).

The objective of this project is to measure the availability of several plant nutrients when added to water, and to determine the most economical and efficient method of fertilization in Missouri farm ponds. The experimental ponds have been stocked with bass and bluegill.

St. Charles and Boone Counties; began May 1951, to close December 1953; \$5,000.

Address correspondence to: Charles R. Walker, Project Leader, 201A South 8th St., Columbia, Mo.

23. Fisheries Management Planning and Research Project (FA: F-1-R).

This project includes four principal activities:

- (a) Creel census and estimates of total fishing pressure.

A statewide, continuing, general creel census is being carried on to determine the utilization of the fishery resources within the State, detect trends, and determine the effect of regulations. Fishing pressure determination is made from information gathered from the creel census and from an analysis of fishing licenses sold and questionnaires submitted.

Statewide; began May 1946, continuing.

Address correspondence to: John L. Funk, Project Leader, 201A South 8th St., Columbia, Mo.

- (b) A study of fish populations in selected streams.

The population densities of the various species are determined and evaluated in relation to each other in three test sections in each of 10 watersheds. Samples are collected at each station three times annually. Fish tagged and released in this study are used also to determine migration patterns for the species. Special data is being collected with regard to abundance, distribution and ecology of forage fishes caught in these study streams. On the White River and Salt River, emphasis is being placed on a study of the growth rate of important stream fishes.

Statewide; began 1946, continuing; John L. Funk, Perry E. Robinson, Edward M. Lowry, Charles A. Purkett, Jr., Leaders.

Address correspondence to: John L. Funk, 201 A South 8th St., Columbia, Mo.

(c) Smallmouth bass studies.

Ozark streams are the location for these intensive studies to determine abundance, species composition, estimates of annual yield, and effects of stocking of this species.

The Big Piney and Niangua Rivers; began August 1950, continuing.

Address correspondence to: George G. Fleener, Project Leader, 201 A South 8th St., Columbia, Mo.

(d) Largemouth bass stocking study and investigation of reproduction of channel catfish.

The economic feasibility and practicality of rearing bass in bottomland lakes and stocking one pound largemouth bass is being investigated. An investigation is being made to determine the conditions necessary for effective natural reproduction of channel catfish and methods for creating these conditions are being studied.

Statewide; began March 1952, continuing.

Address correspondence to: Richard C. Marzolf, Project Leader, 201A South 8th St., Columbia, Mo.

(Work reported above is encompassed in a single D-J Project, the cost for which is estimated at \$51,732 for the current year.)

University of Missouri, Wildlife Research Unit

1. Age and Growth of the White Crappie in Missouri.

The objectives of the project are to verify the scale method for the white crappie by raising known age fish; to compare the growth rates of five white crappie populations from different reservoirs within the State; to compare the growth rate of a new population with that of old populations, to describe the seasonal growth picture of the white crappie by an intensive study at the Niangua Arm of the Lake of the Ozarks.

Statewide; Conservation Commission and Univ. of Mo. cooperating; began in 1949, planned for 3 years.

Address correspondence to: Arthur Witt, Jr., Project Leader, E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

2. Limnological and Fishery Investigation at the Niangua Arm of the Lake of the Ozarks.

The project includes: a long-term study of the growth rate of the white crappie, description of the growth rates of rough and game fishes within this arm of the lake, determination of the influence of inflowing spring water on the limnology of this arm, description of the summer migration of the white bass into this inflowing spring water.

Niangua Arm of the Lake of the Ozarks; Conservation Commission and Univ. of Mo. cooperating; began in 1949, indefinite.

Address correspondence to: Arthur Witt, Jr., E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

MISSOURI (Cont.)

3. The Fishery of Clearwater Reservoir.

The project is designed to provide a measure of species composition, relative species abundance, age and growth of game and rough fishes; a detailed study of the small-fish population; a study of population dynamics of both small-fish and large-fish populations within a virgin reservoir; a study of the limnology of the reservoir with emphasis upon the benthos.

Clearwater Reservoir, Southeast Mo.; Conservation Commission and Univ. of Mo. cooperating; began July 1948, planned for 5 years; Robert S. Campbell and Mercer Patriarche, Project Leaders; paper being prepared for publication.

Address correspondence to: Dr. Robert S. Campbell, E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

4. The Fishery of Ashland Reservoir.

The project is designed to evaluate the fishery of Ashland Reservoir, a 14-year-old impoundment of 19 acres. The study includes species composition, relative species abundance, age and growth of the population, a measure of harvest by creel census, and a study of the limnology of the reservoir, including a measure of the rate of siltation.

Vicinity of Columbia; Conservation Commission and Univ. of Mo. cooperating; began in 1948, planned for 5 years.

Address correspondence to: Dr. Robert S. Campbell, E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

5. The Limnology of Missouri Farm Ponds with Reference to Fishes.

Workers investigate the limnology of several representative Missouri farm ponds. The studies emphasize the limnology of ponds with emphasis on nitrogen and phosphorus levels; a comparison of fertilized and unfertilized ponds; comparison of growth rates of fishes in fertilized and unfertilized farm ponds; and evaluation of the effect of bottom-feeding fishes upon the limnology.

Vicinity of Columbia; Conservation Commission and Univ. of Mo. cooperating; began in 1945, planned for 10 years; Robert S. Campbell, Howard Zeller, Ralph M. Burress, and Joseph Hendricks, Project Leaders.

Address correspondence to: Dr. Robert S. Campbell, E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

6. The Limnology of a Strip-mine Waste Polluted Stream and the Relation of Pollution to Kill and Distribution of Fishes.

The limnology of Cedar Creek, a stream subject to pollution by acid waters from strip-mine spills, is being studied to evaluate the effect of intermittent pollution on the chemistry and the biota, including fishes, of the stream; to measure the abundance and distribution of fishes with reference to intermittent pollution; and to study the dynamics of pollution spread and kill. Regular sampling of Cedar Creek is involved.

MISSOURI (Cont.)

Vicinity of Columbia; Conservation Commission and Univ. of Mo. cooperating; began in 1952, planned for 3 years; Robert S. Campbell and John D. Parsons, Project Leaders.

Address correspondence to: Dr. Robert S. Campbell, E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

7. Age and Rate of Growth of Several Species of Fishes.

Standard techniques are employed in studying age and growth rates on channel catfish, bluegill and largemouth bass. This information is to serve as basic data for fisheries management.

Reservoirs and rivers in Missouri; Conservation Commission and Univ. of Mo. cooperating; began in 1951, planned for 2 years; Robert S. Campbell, Richard Marzolf, Theodore Lane, and Hudson M. Nichols, Project Leaders; papers now being prepared for publication.

Address correspondence to: Dr. Robert S. Campbell, E. Sydney Stephens Hall, Univ. of Mo., Columbia, Mo.

MONTANA

Department of Fish and Game

1. Grayling Study (FA: F-2-R).

All aspects of grayling ecology in the study streams are being investigated to determine the importance of various habitat characteristics. Competition for food between grayling and trout, effect of water diversion, and grayling-beaver relationships are under study. Population studies will be made before and after the opening of the fishing season, with a mid-season check in July. Suitable spawning territory appears to be very limited in this drainage, therefore, a special effort is being made to determine the habitat requirements for successful spawning.

Red Rock Creek drainage; began June 1951, planned for 2 years; \$2,882.

Address correspondence to: Perry H. Nelson, Project Leader, Zoology and Entomology Dept., Mont. State College, Bozeman, Mont.

2. Effects of Irrigation Diversions on Stream and Lake Fish Populations (FA: F-3-R).

Experiments are being made with devices intended to prevent the entry of trout into irrigation canals from the west Gallatin River. Electric shockers will be employed to estimate the fish population before and after the use of experimental structures. Measures of water volume and velocity, temperature, and direction flow are recorded in relation to the general experiments. The study continues a statewide survey of fish loss in irrigation canals with emphases on particular problem areas.

Statewide; Electrical Engineering Dept. of Mont. State College cooperating; began June 1950, planned for 3 years; \$8,380; William D. Clothier, Jr., Project Leader. Address correspondence to: Montana State Fish and Game Dept., Helena, Mont.

MONTANA (Cont.)

3. Statewide Creel Census (FA: F-4-R).

This census is being conducted as a field survey by wardens, with statistical data being compiled and analyzed for use in planning future seasons and development and management procedures.

Statewide; began July 1951, planned for 3 years; \$2,600; Clinton G. Bishop, Project Leader.

Address correspondence to: Montana State Fish and Game Dept.; Helena, Mont.

4. Trout Disease and Nutrition Study (FA: F-8-R).

The objective of this project is to determine the nutritional requirements of the various species of hatchery reared fish through the study of available literature on the subject, chemical analyses, etc. Experiments will be made with various diets including commercial products and rough fish. Studies are also being made to detect fish diseases, testing of methods of treatment, and means of disease control.

Statewide; Chemistry Dept. of Montana State College cooperating; began December 1951, planned for 3 years; \$7,400; Jack E. Bailey, Project Leader.

Address correspondence to: Montana State Fish and Game Dept., Helena, Mont.

5. The Contribution of Hatchery Reared Trout to the Total Catch (FA: F-5-R, F-7-R, F-9-R).

This project is designed to measure, under various conditions, the relative contribution to the creel of hatchery-produced and wild trout. Total creek census is not made, but spot checks are made in sufficient volume to assure significant results.

Statewide; began June 1950, continuing; Frank A. Stefanich, Nels Thoreson, Boyd Opheim, Project Leaders.

Address correspondence to: Montana State Fish and Game Dept., Helena, Mont.

6. Cataloging the Lakes and Streams of Montana (FA: F-5-R, F-7-R, F-9-R).

The purpose of this project is to determine the chemical, physical and biological characteristics of the waters of the State. Emphasis is placed on those waters which are most important to recreational fishing. Depending upon the water involved, qualitative and/or quantitative measures of trout stream populations are made by electric fish census methods.

Statewide; began April 1951, continuing; Frank Stefanish, Nels Thoreson, Boyd Opheim, Arthur Whitney, Project Leaders.

Address correspondence to: Montana State Fish and Game Dept., Helena, Mont.

7. Effectiveness of Smith Lake Rearing Pond (FA: F-7-R).

The primary objective of this project is to measure the economics of the operation of Smith Lake as a cutthroat trout rearing pond. The cost of the installation, the cost of the fry planted, the cost of the operation are compared with the value of the yearling trout produced. Production figures are obtained by draining the pond and by making actual counts of the fish captured.

MONTANA (Cont.)

Flathead County; began July 1951, expected closing date of July 1953.

Address correspondence to: Frank A. Stefanich, Project Leader, Kalispell, Mont.

8. Establishing Measures of Abundance of Cutthroat Trout in Ashley Lake (FA: F-7-R).

At one time the cutthroat trout was abundant in Ashley Lake, but in recent years the number of cutthroat has dwindled to a dangerous low. Trout in Ashley Lake are a source of spawn for hatchery use, and traps are operated on four tributaries. The purpose of this project is to determine the relative efficiency of creel census and counts at the spawning weirs as measures of the size of the cutthroat population.

Flathead County; began May 1951, indefinite.

Address correspondence to: Frank A. Stefanich, Project Leader, Kalispell, Mont.

9. Natural Reproduction of Kokanee in Flathead Lake and Tributaries (FA: F-7-R).

The water level of Flathead Lake is lowered considerably in the winter months by withdrawal of water for a hydro-electric plant. The spawning beds of kokanee are exposed during these periods. The purpose of this study is to establish the extent of kokanee spawning in Flathead Lake and its tributaries together with the degree of successful spawning.

Flathead Lake, Lake County; began October 1951, planned for approximately 2½ years.

Address correspondence to: Frank A. Stefanich, Project Leader, Kalispell, Mont.

10. The Effects of Logging on Pinkham Creek's Fish Population (FA: F-7-R).

Pinkham Creek, containing a population of eastern brook and rainbow trout, drains an area of virgin timber in northwestern Montana. Logging operations began in 1952 by controlled cutting under the supervision of the U. S. Forest Service. Annual observations of the stream's fish population are made by the use of an electric shocker. These observations will be continued over a period of years, as the logging operations progress, so that any changes in the fish population may be noted.

Pinkham Creek, Lincoln County; began August 1951, indefinite.

Address correspondence to: Frank A. Stefanich, Project Leader, Kalispell, Mont.

11. Relationship of Trout and Yellow Perch in Middle Thompson Lake (FA: F-7-R).

Many trout lakes in the western half of Montana have had yellow perch introduced with the usual result of a high population of stunted perch and a seemingly decreased trout population. This project is designed to determine the most economical and effective methods of restoring either or both perch and/or trout fishing to this type of lake.

Thompson Lakes, Lincoln County; began June 1952, expected to close April 1954.

Address correspondence to: Frank A. Stefanich, Project Leader, Kalispell, Mont.

MONTANA (Cont.)

12. Classification of Public Lands (FA: F-10-R).

Montana statutes provide that the State Board of Land Commissioners may reserve from sale to the public lands adjacent to lakes and streams which have value for recreational purposes, including fishing. This project provides the means by which the State will make the on-the-site inspections of the various areas, with the objective of reserving lands with particular value from sale to private interests.

Statewide; began July 1952, planned for 3 years; \$5,845; Clinton G. Bishop, Project Leader.

Address correspondence to: Montana State Fish and Game Dept., Helena, Mont.

NEBRASKA

Game, Forestation and Parks Commission

1. Aquatic Plant Collection.

Information to benefit the management of fish habitats is being gathered, and, when opportunity and time permit, aquatic plants, including algae are collected and mounted for study, comparison, reference and permanent record.

Statewide; began 1946, continuing; Walter Kiener, Project Leader.

Address correspondence to: Paul T. Gilbert, Exec. Secretary, State Capitol Bldg., Lincoln 9, Nebr.

2. Construction of Crappie Beds.

Brush shelters are placed in reservoirs to attract crappies and make them available to fishermen. It is believed this will also help in crappie reproduction.

Platte River Valley System of Reservoirs; began January 1948, continuing; Walter Kiener, Project Leader.

Address correspondence to: Paul T. Gilbert, Exec. Secretary, Game, Forestation and Parks Commission, State Capitol Bldg., Lincoln 9, Nebr.

3. Fish Growth Studies and Stomach Analysis.

Data is being gathered on the growth rates of different fish in various waters of the State. Food preferences and availability of foods for different species are being recorded. As time permits, fish scales and stomach contents are being preserved for future study and analysis.

Statewide; Laboratory in Lincoln; began 1946, continuing; Walter Kiener, Project Leader.

Address correspondence to: Paul T. Gilbert, Exec. Secretary, Game, Forestation and Parks Commission, State Capitol Bldg., Lincoln 9, Nebr.

4. Fish Reference Collection.

In order to establish a good fish reference collection for study by fisheries people, archeologists, zoologists, and others, fish, fish skeletons and parts thereof are collected, preserved, labeled, and organized in cases.

NEBRASKA (Cont.)

Statewide; began in 1946, continuing; Walter Kiener, Project Leader.

Address correspondence to: Paul T. Gilbert Executive Secretary, Game, Forestation and Parks Commission, State Capitol Bldg., Lincoln 9, Nebraska.

5. Limnological Investigations.

Whenever other work permits, the physical, chemical and biological conditions of all types of waters in the State are studied and recorded.

Statewide; began 1946, continuing; Walter Kiener, Leader.

Address correspondence to: Paul T. Gilbert, Executive Secretary, Game, Forestation and Parks Commission, State Capitol Bldg., Lincoln 9, Nebr.

6. Grove Lake--Public Fishing Area.

Construction of a new dam is planned on North Branch of Verdigre Creek to form a public fishing lake in an area where there is little fishing available. The dam will form a lake of approximately 57 acres of surface area, with a maximum depth of 30 feet. Source of water is all from springs with a flow at the dam of 44 sec. feet. Drainage area around the lake is mostly native grazing land.

Antelope County; began spring of 1953, planned for 6 months.

Address correspondence to: Paul T. Gilbert, Executive Secretary, Game, Forestation and Parks Commission, State Capitol Bldg., Lincoln 9, Nebr.

NEVADA

Fish and Game Commission

1. Stream and Lake Surveys (FA: F-2-R).

An inventory of the biological, physical, and chemical features of the lakes and streams of the State is being made. This information will furnish a sound basis upon which to formulate stocking procedures, stream improvement programs, and other pertinent methods of improving the angling of the State.

Statewide; 3 years; \$12,647; Ted Frantz and Don Thurston, Project Leaders.

Address correspondence to: Either of the above, Fish and Game Commission, 139 N. Virginia, Reno, Nev.

2. Lakes Mead and Mohave Investigations (FA: F-1-R).

A survey is being made of Lakes Mead and Mohave in an effort to determine the best techniques for fishery management in these waters. Lake Mohave is just coming into production. Investigations are expected to show the changes that took place as the Colorado River was converted into this reservoir. Data will then be compared to Lake Mead data to see what similarities, differences, and trends exist. Catch by fishermen, evidences of natural reproduction, and analyses of the fish populations are receiving attention.

Clark County; 3 years; \$18,559; Al Jonez and Robert C. Sumner, Project Leaders.

Address correspondence to: Al Jonez, Fisheries Technician, Fish and Game Commission, Nelson, Nev.

NEW HAMPSHIRE

Fish and Game Department

1. A Statewide Survey of Fishing Pressure and Fish Resources in New Hampshire (FA: F-2-R).

The establishment of the New England-New York Inter-Agency Committee has made essential the accumulation of data relative to fishing pressure, natural reproduction of fish, and the economic importance of fishing within New Hampshire. All data of a similar nature collected in the past will also be summarized and analyzed.

Statewide; continuing; \$15,000; David L. White, Statistician, Arthur Riel, Assistant Leader.

Address correspondence to: Sumner A. Dole, Jr., New Hampshire Fish and Game Dept., Concord, N. H.

2. A Study of Bass Production in New Hampshire Waters (FA: F-3-R).

This is a study of the warm water game fish in the State. Activities will include investigations of fish population densities and species ratios, reproductive capacities of largemouth and smallmouth bass, effects of fishing pressure upon bass in Bow Lake, and the relationship of bass to forage fish and invertebrates.

Statewide, headquarters Bow Lake, Strafford; continuing; \$10,000.

Address correspondence to: Paul E. Giguere, Project Leader, New Hampshire Fish and Game Dept., Concord, N. H.

3. Game Fish Management (FA: F-4-D).

This project was set up as a medium through which to apply currently known fish management measures, and as a proving ground for new techniques as they are developed in research projects. Small pools are being operated in cooperation with sportsmen's clubs, in which bass fry are raised to fingerling size aided by the application of fertilizers and then planted where surveys indicate they are needed. Several ponds are being reclaimed; crayfish are being stocked in bass ponds; and fish shelters constructed where needed.

Statewide; continuing; \$5,000.

Address correspondence to: Roger K. Warren, Project Leader, New Hampshire Fish and Game Dept., Concord, N. H.

4. Trout Streams Investigation (FA: F-5-R).

This is a long-term study in two watersheds, one of which has short trout streams and the other, borderline trout streams. Attempts will be made to determine angling intensity and success; composition of fish populations by species, age, and size groups; natural reproductive success; stocking success; and beaver-trout relationships. Fish migrations will also be studied.

Swift River and its tributaries in Albany and Livermore, and Stevens Brook and its tributaries in Sutton; indefinite; \$11,257.

Address correspondence to: Arthur E. Newell, Project Leader, New Hampshire Fish and Game Dept., Concord, N. H.

NEW HAMPSHIRE (Cont.)

5. Ecological Study of the Squam Lakes (FA: F-6-R).

The goal of this study is to make a comprehensive ecological survey of one of the State's more important salmonoid and bass lakes by gathering information relative to: Interspecies relationships; effects of angling; extent and effectiveness of natural spawning; effectiveness of present stocking program; evidence of disease and parasitism.

Squam Lakes in Holderness, Sandwich and Moultonboro; Federal Aid began July 1, 1952, planned for 5 years; \$9,442.

Address correspondence to: Ronald E. Towne, Project Leader, New Hampshire Fish and Game Dept., Concord, N. H.

6. Pond Reclamation.

From 15 to 20 ponds, ranging in size from 10 to 300 acres, are reclaimed annually through the use of rotenone. These ponds are potentially good salmonoid waters, but are presently overpopulated with undesirable fishes or fishing in them has deteriorated.

Statewide; continuing; \$500 per pond.

Address correspondence to: Robert B. Knowlton, Supvr. of Fish and Game Distribution, New Hampshire Fish and Game Dept., Concord, N. H.

NEW JERSEY

Division of Fish and Game

1. Aquatic Weed Control (FA: F-1-R).

Methods of eradicating and controlling aquatic weeds are being studied in order that aid may be given to those interested in weed control in waters throughout the State.

Statewide; began January 1, 1952, planned for 2 years; \$10,000.

Address correspondence to: Robert Huckins, Project Leader, 126 Main St., Milltown, N. J.

2. An Inventory of New Jersey Saltwater Fisheries (FA: F-2-R).

In order to evaluate the marine fisheries resource and to formulate a basis on which to make recommendations for research, management, and regulations, data is being collected on the catch of game fish by commercial and sports fishermen and the ratio of catch to methods used.

New Jersey coast; began February 1, 1952, planned for 3 years; \$12,000.

Address correspondence to: Roy Younger, Project Leader, 126 Main St., Milltown, N. J.

NEW JERSEY (Cont.)

3. Fisheries Management in New Jersey Lakes and Ponds (FA: F-3-R in part).

Fish populations are being manipulated in certain ponds through the State to produce better fishing. Predaceous species are being introduced in some lakes and in the bass-rearing ponds at the State Hatchery forage species such as the freshwater shrimp, spearing and anchovy are being tested. The desirability of using fish concentrators to increase the panfish harvest and the practicality of alkalizing larger acid waters supporting bass and bluegills are being investigated.

Statewide; began November 1, 1952, continuing; \$12,000.

Address correspondence to: Jules W. Marron, Jr., Project Leader, 126 Main St., Milltown, N. J.

4. Landlocked Salmon Investigation.

The possibility of establishing landlocked salmon fisheries in certain New Jersey lakes will be determined. A creel census is being conducted on trout lakes and the movements and reproduction of trout in the lakes is being studied.

Sussex and Warren Counties; indefinite; \$2,000.

Address correspondence to: Jules Marron, Jr., Project Leader, 126 Main St., Milltown, N. J.

5. Pickerel Investigation.

This project is aimed at determining the annual harvest of pickerel in certain New Jersey lakes, the effects of ice fishing and a possible increase in minimum size limit upon the abundance of this species.

Northern New Jersey, indefinite; \$2,000.

Address correspondence to: Roland F. Smith, Fisheries Biologist, 126 Main St., Milltown, N. J.

6. Pond Reclamation.

The success in the reclamation of a 20-acre park pond will be determined.

Newark; 4 years; \$400.

Address correspondence to: Roland F. Smith, Fisheries Biologist, 126 Main St., Milltown, N. J.

7. Bass Stocking Experiments.

The objectives of this project are to establish the minimum size of bass that may be stocked in certain lakes and to determine the practicability of stocking large-mouth bass in acid lakes where it is known they do not reproduce.

Statewide; 5 years; \$2,000.

Address correspondence to: Roland F. Smith, Fisheries Biologist, 126 Main St., Milltown, N. J.

NEW JERSEY (Cont.)

8. Lake and Stream Inventory.

This project is a survey of the physical and biological characteristics of public lakes, ponds, and streams.

Statewide; continuing; \$5,000; Jules Marron, Jr., Richard Gross, Biologists.
Address correspondence to: Roland F. Smith, Fisheries Biologist, 126 Main St., Milltown, N. J.

9. Management of Park Ponds.

The State Fisheries Laboratory is cooperating with municipal, county, and State agencies in the management of park ponds.

Statewide; continuing; \$1,000; Jules Marron, Jr. and Alban Essbach, Biologists.
Address correspondence to: Roland F. Smith, Fisheries Biologist, 126 Main St., Milltown, N. J.

10. Distribution of Fishes in New Jersey.

This project is a general survey to determine the distribution of fishes in the State.

Statewide; continuing.
Address correspondence to: Roland F. Smith, 126 Main St., Milltown, N. J.

11. Small Pond Management.

Selected farm fish ponds and other small ponds are being alkalized to improve conditions for the production of bass and bluegills.

Southern New Jersey; 5 years; \$200.
Address correspondence to: Roland F. Smith, Fisheries Biologist, 126 Main St., Milltown, N. J.

NEW MEXICO

Department of Game and Fish

1. Survey of the Gila and Mimbres Drainage (FA: F-1-R).

A complete study of the fisheries resources of the drainage is being carried out upon which recommendations for improved management policies will be based.

Eastern-Central New Mexico; began July 1, 1952, planned for 3 years; \$10,000.
Address correspondence to: Earl H. Huntington, Fisheries Biologist, 2007 Pope St., Silver City, N. M.

2. Hopewell Lake (FA: F-2-D).

A dam is being built to produce additional trout fishing waters in this mountain area. About 19 acres of water will be developed.

East side of Rio Arriba County, on a tributary to Placer Creek; began September 1952, planned for about 9 months; \$10,000.
Address correspondence to: Fred A. Thompson, State Dir. of Fisheries, Dept. of Game and Fish, Santa Fe, N. M.

NEW MEXICO (Cont.)

3. Los Pinos Land and Stream Acquisition (FA: FW-1-L).

The objective of this project is to increase the State's recreational area through the procurement, for public benefit, of perpetual fishing rights on 5 miles of the Los Pinos River.

Rio Arriba County adjacent to Colorado; began July 1950, planned for 3 years; \$18,000; Fred A. Thompson and Paul Russell, Project Leaders.

Address correspondence to: Fred A. Thompson, Dir. of Fisheries, Dept. of Game and Fish, Santa Fe, New Mexico.

4. Survey of the Canadian and Cimarron Rivers Drainage System (FA. F-5-R).

Complete information is being gathered regarding the fish and fishing waters of two drainages in northeastern New Mexico. Recommendations for better management procedures will be based upon this survey.

Seven counties in northeastern New Mexico; began spring, 1953; planned for 3 years; \$11,000; W. H. Wolfrum, Project Leader.

Address correspondence to: Fred A. Thompson, Dir. of Fisheries, Dept. of Game and Fish, Santa Fe, New Mexico.

University of New Mexico

1. The Spawning Habits of the Long-nosed Dace, Rhinichthys cataractae transmontanus Cope.

The objectives of this project are to determine the reproductive habits and requirements and the fecundity of this trout associate and to describe the eggs and larval stages.

Northern New Mexico, chiefly in Valencia and Sandoval Counties; began June 1948, planned for 6 years.

Address correspondence to: William J. Koster, Dept. of Biology, Univ. of N. M., Albuquerque, N. M.

2. The Reproductive Habits of Agosia chrysogaster Girard, the Mountain Dace.

Studies are concerned with the reproductive habits, requirements, fecundity and description of the early stages of this important bait minnow. Age and growth studies are planned.

Gila basin in S. W. New Mexico, Rio San Francisco, Rio Mimbres Rivers; began August 1949, planned for 5 years.

Address correspondence to: William J. Koster, Dept. of Biology, Univ. of N. M., Albuquerque, N. M.

NEW MEXICO (Cont.)

3. The Life History of the Rio Grande Cutthroat Trout, Salmo clarki virginalis Girard.

Biological studies undertaken include a generalized life-history study: general behaviour, habitat, reproductive requirements and habits, fecundity, food and feeding habits.

Northern New Mexico, primarily in the Rio la Junta, Tres Ritos, Taos County; began September 1939, continuing.

Address correspondence to: William J. Koster, Dept. of Biology, Univ. of N. M., Albuquerque, N. M.

4. The Fishes of New Mexico.

This project is conducted as a survey to determine the fish fauna of the State and its distribution, and to determine the requirements and habits of the various species.

Statewide; began September 1938, continuing.

Address correspondence to: William J. Koster, Dept. of Biology, Univ. of N. M., Albuquerque, N. M.

5. The Spawning Habits of the Rio Grande Mountain Sucker, Pantosteus plebeius (Baird and Girard).

The objectives of this project are to determine the reproductive habits and requirements, and the fecundity of this trout associate and to describe the eggs and larval stages.

Rio Mimbres in Grant County; and various streams in Sandoval and Valencia Counties; began June 1948, planned for 6 years.

Address correspondence to: William J. Koster, Dept. of Biology, Univ. of N. M., Albuquerque, N. M.

6. The Spawning Habits of the Rio Grande Chub, Gila nigrescens (Girard).

Objectives and description of the project: To determine the reproductive habits and requirements and the fecundity of this trout associate and to describe the eggs and larval stages.

Northern New Mexico, chiefly in Valencia and Sandoval Counties; began June 1948, planned for 6 years.

Address correspondence to: William J. Koster, Dept. of Biology, Univ. of N. M., Albuquerque, N. M.

NEW YORK

Conservation Department

1. Studies in Nutrition and Disease Control on Hatchery Fish.

In order to improve propagation methods continuous research on specific problems including diets and disease control is carried on. Nutrition work is centered mostly at Cortland and disease control is centered at the Rome hatchery laboratory.

NEW YORK (Cont.)

Cortland and Rome; U.S. Fish and Wildlife Service and Cornell Univ. cooperating; began in 1934, continuing; \$20,000; Louis E. Wolf (Disease Control), and D. R. Brockway (Nutrition, Project Leaders; several publications available. Address correspondence to: J. R. Greeley, Chief Aquatic Biologist, Conservation Dept., Albany, N. Y.

2. Selective Breeding of Trout for Disease Resistance (FA: F-2-R).

This project aims to develop methods for decreasing loss in rearing trout, through testing of partially disease resistant strains (especially ulcer disease and furunculosis) and selective breeding from the best strains.

Rome laboratory, Rome; began in April 1952, indefinite; \$8,500; L. E. Wolf, Project Leader. Address correspondence to: J. R. Greeley, Conservation Department, Albany, New York.

3. Stocking Survivals and Population Studies on Brown Trout.

The project tests stocking methods, evaluates natural maintenance and gathers other related data. This involves a continuous tagging study with newspaper and radio publicity to get tag returns to test survivals of yearling and two-year-old sizes. During 1952, a population study was made in Crystal Creek after 10 years without stocking, to compare with previous survival data involving stocking.

West Canada Creek and Unadilla River (Oneida Co.), Cherry Valley Creek (Otsego Co.), and Crystal Creek (Lewis Co.); began in 1940, indefinite; \$500; progress reports in N. Y. Dept. of Conservation Annual Report.

Address correspondence to: C. W. Greene, Sr. Aquatic Biologist, Conservation Dept., Albany, N. Y.

4. Landlocked Salmon Project.

The study endeavors to determine practical methods for increasing landlocked salmon in New York State waters and to guide in the management of salmon in waters where fishing has been built up. Results have been obtained with Atlantic salmon as well as with supposed landlocked strains of this species. Experiments with red salmon (sock-eye) in lakes are included.

Statewide, in suitable waters; began in 1944, indefinite; \$12,000; Information Bulletin 1948 and progress reports in New York Conservation Dept. Annual Reports.

Address correspondence to: J. R. Greeley, Chief Aquatic Biologist, Conservation Dept., Albany, N. Y.

5. Stillwater Pond Trout Project.

Work is under way to determine methods for managing brook trout and to manage the fishing on a practical scale in a lake on a state park, adapted to accurate creel census, stocking and population control.

Stillwater Pond, Fahnestock Park (Putnam Co.); began in 1941, indefinite; \$500; reprint available from 1952 Trans. Amer. Fish. Soc.

Address correspondence to: C. W. Greene, Sr., Aquatic Biologist, Conservation Dept., Albany, N. Y.

6. Adirondack Trout Restoration Project.

This is a combination of research and management work to develop methods for reclaiming Adirondack trout ponds and lakes for trout production.

Northern New York region, on State-owned lands; began in 1950, indefinite; \$17,000; Progress reports in New York Conservation Dept. Annual Reports.

Address correspondence to: R. G. Zilliox, Sr. Aquatic Biologist, Conservation Dept., Ray Brook, N. Y.

7. Restoration of Trout Fishing in a Chain of Connected Waters (FA: F-5-R).

A chain of lakes, ponds and streams located at headwaters of West Branch St. Regis River comprises the project area for developing methods of destroying populations of yellow perch and other species undesirable for trout management. By use of barrier dams the area is subdivided so as to be handled by rotenone treatment over a 3-year period, effects being evaluated.

Franklin County, West Branch St. Regis River; began in April 1952, planned for 3 years; \$5,339.44; R. G. Zilliox, Project Leader.

Address correspondence to: J. R. Greeley, Chief Aquatic Biologist, Conservation Dept., Albany, N. Y.

8. Surveys and Recommendations for Fish Management.

In view of the extensive waters in New York a large number require surveys to bring up-to-date recommendations for fish management.

Statewide; began in 1940, continuing; \$75,000; revised maps and lists available for some areas.

Address correspondence to: W. M. Lawrence, Chief, Bureau of Fish, Conservation Dept., Albany, N. Y.

9. Investigations Leading to Control of Water Pollution.

The information from field investigations bears upon enforcement of Conservation Laws and upon classification of waters by the Water Pollution Control Board. Experimental work on toxicity is included.

Statewide, Hdqtrs. Rochester and Rome; began in July 1940, continuing; approximately \$20,000; several publications available or in progress, also N. Y. Conservation Dept. Annual Reports.

Address correspondence to: G. E. Burdick, Sr. Aquatic Biologist, Conservation Dept., Albany, N. Y.

10. Great Lakes Fisheries Investigations.

In order to provide a continuous record of catch and status of the fishery in New York waters of the Great Lakes, a survey is in progress through the commercial fishermen. Species of interest to anglers are included.

Lake Erie, Lake Ontario; began in 1951, indefinite; \$3,000; W. J. Bentley, Project Leader; some parts of project covered in N. Y. Conservation Dept. Annual Reports.

Address correspondence to: U. S. Stone, Bureau of Fish, 383 E. Main St., Rochester 4, N. Y.

NEW YORK (Cont.)

11. Planning Fish Management on New York City Water Supply Areas.

In the extensive area represented by existing and new reservoirs, projected or under construction coordination in planning of fish management is being handled through special investigations, conferences and preparation of definite plans for minimum flow release, barrier dams, fishways, stocking and other management.

Southeastern New York region; began in 1948, continuing; approximately \$4,000; in Annual Report 1950 and 1951, New York Conservation Dept., also mimeographed data.

Address correspondence to: C. E. Heacox, Sr. Aquatic Biologist, Conservation Dept., 311 Mill St., Poughkeepsie, N. Y.

12. Hudson River Shad Investigation.

In order to evaluate relative success of reproduction from year to year, annual sampling of young shad is carried on by seining in late summer.

Lower Hudson River; began in July 1948, continuing; approximately \$800.

Address correspondence to: C. E. Heacox, Sr. Aquatic Biologist, Conservation Dept., 311 Mill St., Poughkeepsie, N. Y.

13. St. Lawrence River and Lake Ontario Smallmouth Bass Investigation.

The purpose of this investigation is to obtain facts basic to management of the important bass resource of the large area of eastern Lake Ontario and upper St. Lawrence, following up through tagging and migration studies previous work which indicated localized nature of bass populations.

Lake Ontario and St. Lawrence River; began in 1941, indefinite; approximately \$1,000; project reports in New York Conservation Dept. Annual Reports and Research Bulletins.

Address correspondence to: D. G. Pasko, Conservation Dept., 95 Public Square, Watertown, N. Y.

14. Management of Farm Fish Ponds and Bait Ponds (FA: F-4-R).

This project, handled through Cornell University (contract basis) is designed to test and improve management methods applicable to warm-water ponds, trout ponds and bait minnow ponds so as to improve facilities for advising the owners of a growing number of farm ponds.

Hdqtrs. at Cornell Univ., statewide coverage in selected ponds; began in April 1952, planned for 3 years; \$14,000; A. W. Eipper, Project Leader.

Address correspondence to: J. R. Greeley, Conservation Dept., Albany, N. Y.

15. Chautauqua Lake Muskalonge Investigations.

This is a continuing study of the resource, involving checks during the annual netting for spawn, tagging work and inventory of angling catch for management purposes.

Chautauqua Lake; began in 1941, continuing; approximately \$500; summaries in N. Y. Conservation Dept. annual reports.

Address correspondence to: U. B. Stone, Conservation Dept., 383 E. Main St., Rochester, 4, N. Y.

16. Lake Champlain Ice Fishing Census.

The project involves creel census sampling by game protectors, aeroplane counts of anglers and analysis of catch data to obtain factual information as a basis for management.

Lake Champlain; in cooperation with the State of Vermont; began in December 1950, planned for 8 years; approximately \$1,000; summaries in N. Y. Conservation Dept. annual reports.

Address correspondence to: R. G. Zilliox, Conservation Dept., Ray Brook, N. Y.

17. Development and Improvement of Electric Shocker (FA: F-1-R).

Objectives of the project are to test, design and improve electric shockers, including A. C. and D. C. types. Includes special work on back-pack apparatus and research on design adapted to use in deeper waters such as ponds.

State Fish Hatchery, Rome; began in April 1952, planned for 3 years; \$4,200; D. C. Haskell, Project Leader.

Address correspondence to: J. R. Greeley, Conservation Dept., Albany, N. Y.

18. Marine Fisheries Research.

In order to provide information basic to better utilization and conservation, the commercial and recreational fisheries of Long Island are being studied by catch records and by field biological investigations.

Long Island waters; began in June 1938, continuing; approximately \$10,000; Alfred Perlmutter, Project Leader; several publications available.

Address correspondence to: Marine Fisheries Unit, Conservation Dept., 65 W. Sunrise Highway, Freeport, L. I., N. Y.

19. Study of Weakfish, Long Island Waters (FA: F-3-R).

This is a study of the weakfish resource in Long Island waters to determine factors affecting maintenance. The decline in this resource is not sufficiently well understood to apply remedial action without such basic study.

Long Island, Marine Dist.; began in April 1952, planned for 3 years; \$25,000; Alfred Perlmutter, Project Leader.

Address correspondence to: J. R. Greeley, Chief Aquatic Biologist, Conservation Dept., Albany, N. Y.

20. Stream Development on Public Fishing Rights Areas.

This work is for the purpose of improving trout carrying capacity and public utilization of streams on which permanent easements affording public fishing have been obtained. It includes structures such as cribbing of eroding banks, planting, marking with signs and development of car parking areas.

Statewide, on public fishing rights streams; began in 1936, indefinite; approximately \$100,000; summaries in N. Y. Conservation Dept. annual reports.

Address correspondence to: Emerson James, Bureau of Fish, Port Henry, N. Y.

NEW YORK (Cont.)

21. Public Fishing Rights and Reconnaissance (FA: FW-46-C-5).

Preliminary work of developing projects in acquisitions of public fishing rights on streams and public access points on lakes is carried on. Several acquisition projects are pending.

Statewide; began June 1952, to be completed March 1955; \$7,683.60; W. A. Flick, Project Leader; mimeographed monthly reports available.

Conservation Department and Cornell University

1. Studies of Rainbow Trout: Survival, Strains, and Management.

The project involves tests in streams and in Cayuga Lake with rainbows of several supposed strains, marking by fin-clipping and checks of survivals by use of electric shocker, test netting and creel census.

Cayuga Lake, Eaton Brook (Madison Co.), Canasawacta Creek (Chenango Co.), Cherry Valley Creek (Otsego Co.); began in 1950, indefinite; \$1,000; Prof. D. A. Webster and A. C. Petty, Project Leaders; progress reports in N. Y. Conservation Dept. annual reports.

Address correspondence to: J. R. Greeley, Chief Aquatic Biologist, Conservation Dept., Albany, N. Y.

2. Testing of Lake Trout Stocking.

To follow survivals of plantings and natural reproduction and obtain other information basic to management of lake trout, a coordinated study involving numerous lakes is being carried on, involving fin-clipping and test netting.

Statewide, and especially in Cayuga, Seneca, Big Moose, and Sylvania Lakes; began in 1951, indefinite; \$1,500; Fish Mgt. Dists. and Prof. D. A. Webster, Project Leaders.

Address correspondence to: C. W. Greene, Sr. Aquatic Biologist, Conservation Dept., Albany, N. Y.

3. Survival of Brown Trout Reared Under Different Hatchery Methods.

This study, an outgrowth of the Cortland Cooperative Research Program (U. S. Fish and Wildlife Service, Conservation Dept., Cornell Univ.) is designed to follow up under actual stream conditions, the relative survival of brown trout having been subjected to different hatchery methods.

Fall Creek and Cascadilla Creek (Tompkins Co.); began in 1949, indefinite; \$1,500; Progress reports in N. Y. Conservation Dept. annual report.

Address correspondence to: Prof. D. G. Webster, Fernow Hall, Cornell Univ., Ithaca, N. Y.

NEW YORK (Cont.)

Fish and Wildlife Service, Branch of Fishery Biology

1. Biology of the Dwarf Sea Lamprey in Cayuga Lake, New York (Proj. 7).

The objective of this project is to determine the life history of the dwarf sea lampreys in Cayuga Lake where they have long been established for comparison with the populations recently established in the upper Great Lakes.

Hdqtrs.: Hammond Bay Fishery Lab., Rogers City, Mich.; began 1950, completed January 1953; Roland L. Wigley, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Washington St., Ann Arbor, Mich.

2. Vitamin Requirements of Trout (Proj. 33).

The objective is to determine the vitamin requirements of trout and the symptoms of deficiencies by means of vitamin test diets and microbiological assays.

Hdqtrs.: Cortland, N. Y.; continuing, began 1940.

Address correspondence to: Arthur M. Phillips, Jr., Chief, Fish Nutrition Lab., Cortland, N. Y.

3. Development of Practical Diets for Trout (Proj. 34).

The objective is to determine the value of various dietary mixtures in terms of growth, cost of production and mortality of the fish.

Hdqtrs.: Cortland N. Y.; began 1935, continuing.

Address correspondence to: Arthur M. Phillips, Jr., Chief, Fish Nutrition Lab., Cortland, N. Y.

4. Effect of Diet Upon the Chemical Composition of the Trout Body (Proj. 35).

The objective is to determine the effect of the diet upon the fat, protein, and ash content of the trout body so that optimum levels for the major food groups (fat, protein and carbohydrate) may be tentatively established.

Hdqtrs.: Cortland, N. Y.; began 1935, continuing.

Address correspondence to: Arthur M. Phillips, Jr., Chief, Fish Nutrition Lab., Cortland, N. Y.

5. Use of Radio-active Isotopes in Trout Nutrition Studies (Proj. 37).

The objective is to study the absorption, utilization, and retention of dissolved minerals and their role in trout nutrition and physiology.

Hdqtrs.: Cortland, N. Y.; began July 1951, continuing; Floyd E. Lovelace, Leader.

Address correspondence to: Arthur M. Phillips, Jr., Chief, Fish Nutrition Lab., Cortland, N. Y.

NEW YORK (Cont.)

6. 6 Effect of Metabolic Products Upon the Carrying Capacity of Ponds and Troughs (Proj. 38).

The objective is to study the products of metabolism that limit the numbers and weight of fish that may be held in hatchery equipment and to develop methods for their control.

Hdqtrs.: Cortland, N. Y.; began 1950, continuing; Donald R. Brockway, Leader. Address correspondence to: Arthur M. Phillips, Jr., Chief, Fish Nutrition Lab., Cortland, N. Y.

NORTH CAROLINA

Wildlife Resources Commission

1. Fishing Access Areas.

It is the aim of this project to make available to the fishing public of the State those waters which provide good sport fishing, but are unavailable because of limitations of private property or physical terrain. The project is carried out by purchasing small tracts, by obtaining transfers from other public agencies, or by long-term lease arrangements. These areas are cleared and developed as parking sites for cars and boat trailers, and boat launching points are provided. It is being carried out on waters of the State which provide fishing for warm-water species.

Statewide; began July 1952, indefinite; \$25,000; Buford Tatum, Project Leader. Address correspondence to: J. H. Cornell, Chief, Fish Div., N. C. Wildlife Resources Commission, Box 2919, Raleigh, N. C.

2. Fish Management Investigations of Coastal Streams (FA: F-2-R).

The basic objective is to discover the corrective measure necessary to increase the abundance of game fish in the coastal streams of North Carolina. This includes determination of the game fish and non-game fish populations in representative streams, the limiting factor in game fish production, the most practical means of eliminating the limiting factor with emphasis on the removal of the unwanted fish species with a minimum of harm to the desired game species, and the effect of the removal of the limiting factor on game fish species. Legislation or regulations will be recommended consistent with the findings. Methods will include standard fish sampling techniques. Comparative populations will be collected before non-game fish removal and after this operation. Tagging, age and growth, numerical abundance, and angling success will be used as indices of effect on populations on three representative areas.

NORTH CAROLINA (Cont.)

Little River, Brice's Creek, Northeast Cape Fear River; began July 1, 1951, planned for 4 years; \$24,000; A. W. Dickson, Project Leader; quarterly reports (mimeographed) available on request.

Address correspondence to: D. F. Raver, Coordinator, N. C. Wildlife Resources Commission, Box 2919, Raleigh, N. C.

3. Fish Management Investigations of Farm Ponds (FA: F-3-R).

Data are being secured which will lead to the more efficient management of farm ponds by determining the most successful stocking ratios and species combinations for North Carolina, obtaining general information on farm pond failures and reasons they failed, and by following the results of various stocking procedures, angling techniques and harvest from experimental ponds. Representative experimental farm ponds are being chosen over the entire State and these ponds placed under stocking plans of various types.

Statewide; began December 1, 1951, planned for 3½ years; \$13,000; W. E. Ellis, Project Leader; quarterly progress reports, mimeographed, available for distribution.

Address correspondence to: D. F. Raver, Coordinator, N. C. Wildlife Resources Commission, Box 2919, Raleigh, N. C.

4. Fish Management Investigation on Trout Streams (FA: F-4-R in part).

This project is designed to obtain data on trout streams and their carrying capacities, present populations, annual yields, angling pressures, and catch per unit of effort. Streams on closely supervised management areas are stocked with varying numbers and species and sizes of trout during the spring, prior to opening of fishing season, and during the season. These stockings are designated by a distinguishing fin clip marking. Each trout caught is brought through the respective checking stations, and thus numbers, species, weights, and fin-clipped fish are recorded. Each fisherman records time fished and stream fished as well as numbers and species caught.

Western N. C.; began July 1, 1952, continuing; \$14,000; H. M. Rattledge, Leader; quarterly reports available for distribution.

Address correspondence to: D. F. Raver, Coordinator, N. C. Wildlife Resources Commission, Box 2919, Raleigh, N. C.

5. Fisheries Management Investigation on Trout Streams (FA: F-4-R, Coweeta Segment).

The effects of various land use practices on trout streams, with particular emphasis on bottom food, temperature of water, stream flow, and turbidity are being studied. Trout populations, food habits, and stream fertility are also under investigation. The project is using several study areas developed by the U. S. Forest Service Experiment Station on the Coweeta Area. These areas have different land use practices being carried out on them, such as

NORTH CAROLINA (Cont.)

cutting, farming, grazing, burning, etc. Sampling stations have been set up on each of these streams which measure temperature and flow, and from which bottom samples are collected regularly.

Coveeta Hydrologic Lab., Nantahala National Forest; began July 1, 1952, planned for 4 years; \$5,000; L. B. Tebo, Jr., Leader; mimeographed quarterly reports available upon request.

Address correspondence to: D. F. Raver, Coordinator, N. C. Wildlife Resources Commission, Box 2919, Raleigh, N. D.

U. S. Fish and Wildlife Service, Branch of Fishery Biology.

1. Biology of Shad (Proj. 87).

The objectives of this project are to better understand the fluctuations in abundance and to determine whether shad can be restored to a stream by transplanting adults. Adults will be placed (in cooperation with the Pennsylvania Fish Commission) above Susquehanna River dams.

Hdqtrs.: Beaufort; began in February 1950, planned for 6 years; \$67,500; R. A. Fredin, Project Leader.

Address correspondence to: G. B. Talbot, Chief, Middle Atlantic Fishery Investigations, Beaufort, N. C.

NORTH DAKOTA

Game and Fish Department

1. Evaluation of Fry and Fingerling Plantings in Establishing Northern Pike Populations.

This project was initiated to determine the values of fry plantings as compared to fingerling plants in establishing northern pike in areas where they are not normally found.

Statewide; began May 1952, planned for 3 years.

Address correspondence to: Dale L. Henegar, Project Leader, N. D. Game and Fish Dept., Bismarck, N. D.

OHIO

Department of Natural Resources, Division of Wildlife.

1. Aquatic Vegetation Control.

Project operations provide fishing channels, create openings for new fishing areas, maintain bank fishing, etc. Vegetation cutters are being used until such time as a more efficient and practical means can be found.

OHIO (Cont.)

Statewide; continuous; Fish Management Supervisors are: Robert Cummins, Dist. 1; Clarence Clark, Dist. 2; Daniel C. Armbruster, Dist. 3; Mark O. White, Dist. 4; Ray Riethmiller, Dist. 5; and John D. Walker, Dist. 6. Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of A Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

2. Evaluation of Coarse Fish Regulations.

The Ohio Wildlife Council passed an order to allow the taking of carp, quillback, suckers, dogfish, garfish, buffalofish, gizzard shad, and goldfish by any means except by the use of explosives, poisoning, firearms, electricity, chemicals, nets, seines, and traps. Field men are checking on the results.

Statewide; began 1953.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

3. Test Netting.

This is an inventory to obtain routine data such as length-weight, scale samples, marking for movements, etc., in lakes and streams.

Statewide; continuous; Fish Mgt. Supervisors.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

4. Acquisition of Public Fishing Areas.

Nine short-term lake fishing agreements, 17 long-term lake fishing easements, and 1,500 miles of stream bank fishing easements including 3,597 parcels of land are now held by the State. The program is continuing.

Statewide; began 1936, continuing; see department annual reports.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

5. Shore Seining.

Fish management supervisors obtain young fish of the year, follow through hatch for mortality, growth, and to check forage such as minnows, etc.

Statewide; continuous; Fish Mgt. Supervisors.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

OHIO (Cont.)

6. Northern Pike.

This project in experimental propagation is being conducted at the St. Marys fish farm. Experimental stocking is under way in two districts.

Work carried out in northern Ohio; began 1951, continuing.

Address correspondence to: Clarence F. Clark, Fish Mgt. Supvr., St. Marys Fish Farm, St. Marys, Ohio.

7. Redear Sunfish.

Experimental propagation and stocking is being conducted in waters in two districts.

Kincaid Fish Farm; indefinite; Ray Reithmiller, Fish Mgt. Supvr.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

8. Creel Census.

Information is gathered on fishing pressure, kinds and number of fish caught, time, etc., on lakes and streams. The County Wildlife Management Agents are the primary sources for collecting this information.

Statewide; continuing; Fish Mgt. Supervisors.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

9. Walleye Culture.

The program includes propagation and experimental stocking in lakes which appear to have a potential for this species.

Put-in-Bay and St. Marys, stocking in lakes of 5 dists.; indefinite; Robert Cummins, Put-in-Bay, and Clarence Clark, St. Marys, Fish Mgt. Supvrs.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

10. New Fishing Lakes.

Three new lakes, including Oxbow, Forked Run, and Rocky Fork, will be opened to public fishing during 1953. Other lakes are under consideration.

Began 1930; see Dept. Annual Reports.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

11. Fishery Research.

Dr. T. H. Langlois, Dir. Franz Theodore Stone Institute of Hydrobiology is specializing in our Lake Erie work and Dr. George D. Morgan at Denison University is working on the bluegill, white and black crappie.

Stone Laboratory, Ohio State Univ., Put-in-Bay; and Denison Univ., Granville, cooperating; continuing; Ray H. Riethmiller, Fish Mgt. Supvr.

Address correspondence to: Dr. T. H. Langlois, Dir. Franz Theodore Stone Institute of Hydrobiology, Put-in-Bay, Ohio; and Dr. George D. Morgan, Denison Univ., Granville, Ohio.

12. Effects of Land Use Improvement on Stream Fisheries (FA: F-1-R).

This project, located in southwestern Ohio, is set up to study and apply the best known techniques for land use in the Little Miami River drainage area. The objective being to basically tie down the soil and try to control streamflow, thereby affording more fishing days and increasing the range for desirable stream species.

Little Miami River, Clark and Green Counties; began May 1, 1952, planned for 3 years; \$40,000.

Address correspondence to: Paul V. Shafer, Project Leader, State Fish Farm, R. D. #3, Xenia, Ohio.

13. Improving Facilities at State-owned and Controlled Lakes.

This project provides for the construction and maintenance of access roads, parking areas, boat ramps, deep shoreline channels, posters, and fishing piers. Lakes may be lowered in the fall to provide better fishing, or may be drained, filled, and restocked. An experimental catch box is operated at Forked Run Lake.

Statewide; continuing; Fish Mgt. Supvrs.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

14. Liberalized Fishing Experiments.

The Ohio Wildlife Council passed an order to continue "liberalized fishing" in all Ohio lakes and streams. "Liberalized fishing" means no closed season, no legal length, and no bag limit on any fish. Field men are checking carefully on results and public reaction.

Statewide; began in 1945, continuing; Field Mgt. Supvrs.

Address correspondence to: E. L. Wickliff, Supvr. Fish Mgt. Section, Div. of Wildlife, Dept. of Natural Resources, Hangar Bldg., 1500 Dublin Rd., Columbus 12, Ohio.

15. Muskellunge Culture.

Effort is being made to find out how to efficiently propagate and rear "muskie" for stocking in suitable waters as a game and predator species. This work will be confined to the Ohio River Drainage muskellunge.

OHIO (Cont.)

Kincaid Fish Farm; continuing.

Address correspondence to: Ray H. Riethmiller, Fish Mgt. Supvr., Chillicothe Savings Bank Bldg., Chillicothe, Ohio.

16. Raccoon Creek Improvement.

Effort is being made to clear up the Raccoon Creek system of the acid mine wastes which is the factor limiting fishing. This stream has a drainage area of 684 square miles.

Southeastern Ohio; began in 1952, indefinite; Vernon W. Cole, Project Leader.

Address correspondence to: Mark O. White, Fish Mgt. Supvr., 216 N. Illinois St., Wellston, Ohio.

OKLAHOMA

Game and Fish Department

1. Farm Pond Investigations (FA: F-1-R).

Information from this project will be applicable to at least 30,000 ponds. Twenty-nine ponds are being used for these investigations and they have been stocked with the following species: largemouth bass, redear sunfish, bluegill, white and black crappie, fathead minnows, and channel catfish. All ponds will be open to public fishing and record of catch made. The main objectives of the project are to determine the most desirable species combinations for stocking farm ponds, to better understand pond limnology, age, growth and food habits of individual species.

Vicinity of Atoka, Okla.; 3 years; \$9,646.

Address correspondence to: C. M. Kramer, Project Leader, Box 203, Atoka, Okla.

2. Lake Hefner Project.

This study is mainly concerned with the fish populations and related biology of the Lake. Some time is also devoted to the propagation of fishes at the Hefner culture ponds and the management of small ponds on the reservation. Age, growth and creel census data are expected to reveal the value of intensive non-game fish removal.

Oklahoma City municipal reservoir; 4 years; \$5,000.

Address correspondence to: Roland H. Brown, Fishery Biologist, 608 N. W. 33rd., Oklahoma City, Okla.

3. Status of the Walleye, Stizostedion vitreum vitreum, in Canton Reservoir.

Since the walleye is a new fish in Oklahoma waters, the main objectives of this project are to determine (1) the rate of growth, (2) if they will spawn in Oklahoma waters, (3) what part will they have in the creel, (4) should additional plantings be made in other lakes, and (5) what effect it has on the overall population density of Canton Reservoir.

Blaine County; indefinite.

Address correspondence to: John King, Fishery Biologist, Regional Office, State Game and Fish Dept., Fairview, Okla.

OKLAHOMA (Cont.)

4. Stream and Pre-impoundment Survey.

Pre-impoundment surveys were conducted on Ft. Gibson Reservoir on the Grand River and on Tenkiller Reservoir on the Illinois River. Information was especially sought on species composition, population density, and age and growth. During the summer of 1952 investigations were begun on the Illinois River and some of its tributary streams. The most important objective of this work was to gain information which could be used in the proper utilization of the smallmouth bass populations.

Wagoner, Cherokee, and Sequoyah Counties; 1 year; \$6,000.

Address correspondence to: Dr. E. M. Leonard, Dir. Fishery Research Lab., Box 14, University of Oklahoma, Norman, Okla.

Oklahoma Agricultural & Mechanical College

1. Causes of Stunting of Crappie (Pomoxis annularis and Pomoxis nigromaculatus) in Oklahoma Lakes.

The project undertakes to study the age, growth rates, food habits, and population concentrations of crappie for the purpose of determining, if possible, the reason for the development of stunted populations which are common in many of our lakes. Lakes having stunted populations were selected and at least one lake chosen which seemed to have a nonstunted population, so that conditions could be compared.

Payne County; Okla. Coop. Wildlife Res. Unit cooperating; began February 1952, to close August 1953; \$2,250; Henri D. Crawley, Project Leader; reported quarterly through Unit reports.

Address correspondence to: Dr. W. H. Irwin, Dir., Wildlife Conservation, Zoology Dept., Okla. A & M College, Stillwater, Okla.

2. The Age, Growth and Food Habits of Crappie (Pomoxis annularis and Pomoxis nigro-maculatus) in Oklahoma Lakes.

To study the age, growth rates, and food habits of crappie for the purpose of determining the average rate of growth in the lakes of the State. Samples were taken from as many of the lakes as possible over a wide area and with different populations represented. The work is being done to establish a basis for comparing the productiveness of individual lakes with a state standard.

Lakes throughout the State of Oklahoma, with headquarters at Stillwater; Okla. Coop. Wildlife Res. Unit cooperating; began September 1950, expected to close in September 1953; \$2,700; William C. Burris, Project Leader.

Address correspondence to: Dr. W. H. Irwin, Dir., Wildlife Conservation, Dept. of Zoology, A & M College, Stillwater, Okla.

3. Production of a Bulletin, "The Commercial Production of Bait Minnows in the Southwest,"

Information from personal experience, from minnow growers in the southwest and from literature will be compiled to provide the public with a bulletin describing the hazards as well as the possibilities of raising bait minnows commercially.

OKLAHOMA (Cont.)

Information will be used to present in layman's language facts concerning minnow culture which will include the following major topics: The needs of a water supply, construction of usable ponds, needed facilities, stocking, fertilization, feeding, disease control, harvesting, and transportation.

Okla. A & M College, Stillwater; publication in 1954; \$500; W. H. Irwin and Ralph W. Altman, Project Leaders.

Address correspondence to: Dr. W. H. Irwin, Dr. , Wildlife Conservation, Dept. of Zoology, Okla. A & M College, Stillwater, Okla.

4. Fish Population Development in Heyburn Reservoir.

The study is made to learn what fish population develops, how well the individual fish grows, the harvest attained and the management practices that can be used to facilitate better and continued use of the new flood control reservoir.

Hdqtrs.: Stillwater; began August 1952, to close June 1954; \$3,750; Orty Orr, Project Leader.

Address correspondence to: Dr. W. H. Irwin, Dir., Wildlife Conservation, Dept. of Zoology, Okla. A & M College, Stillwater, Okla.

5. Population, Growth Rate and Harvest Studies of the Fishes of Canton Reservoir.

The project is designed to study the population development, rate of growth, harvest and harvest effects in a new impoundment that has a fluctuating water level. Samples of all species were taken and studied for growth rates, longevity, and numbers. The winter harvest from a concentration area was studied. Also, the effects upon the growth rates following heavy harvest were examined to learn the effects upon the population.

Canton Reservoir; began August 1951, expected to close June 1953; \$4,060; Hunter M. Hancock, Project Leader.

Address correspondence to: Dr. W. H. Irwin, Dir., Wildlife Conservation, Dept. of Zoology, Okla. A & M College, Stillwater, Okla.

State Department of Health

1. Tolerance of Aquatic Life to Oil Field Wastes (Brines).

The principal objectives of this study are to find the tolerance level of several species of aquatic life to brine wastes and to compare these values with those of sodium chloride. Further laboratory experiments are being attempted to check the degree of acclimation of certain fish to brine wastes. It is hoped that the information gleaned will be valuable in pollution abatement in streams receiving brines since there is no known way of removing brine from water.

Univ. of Ark. cooperating; began July 1, 1952, planned for 1 year; \$3,000; reports submitted to the Oklahoma Public Health Dept.

Address correspondence to: Howard P. Clemens, Project Leader, Dept. of Zoology, Univ. of Okla., Norman, Okla.

OKLAHOMA (Cont.)

Fish and Wildlife Service, Branch of Game-fish and Hatcheries.

1. Channel Catfish (*Ictalurus lacustris*) Culture.

Successful utilization of the channel catfish in the stocking program in the southwest has prompted increased production of this species. Experiments are being conducted to learn more about feeds and feeding, methods of rearing, and disease and parasite prevention and control.

U. S. Fish Culture Station, Tishamingo, and other stations in Okla. and Texas; began in 1950, continuing; C. E. Cozart, Supt.; progress reports available.

Address correspondence to: Regional Director, U. S. Fish and Wildlife Service, P. O. Box 1306, Albuquerque, N. M.

OREGON

State Game Commission

1. Resource Inventories, Summer Steelhead.

Annual inventories are taken of the catch of summer steelhead on the Deschutes River in order to have a record of the value of the fishery and its extent for management purposes.

The Deschutes River from the vicinity of Madras to the Columbia River; continuous. Address correspondence to: Monty Montgomery, Fishery Biologist, 1340 Federal St., Bend, Ore.

2. Resource Inventories, Winter Steelhead.

Annual inventories of winter steelhead are taken on several Oregon coast streams for purposes of management of the resources.

Oregon coast streams from Astoria to Brookings; continuous; field agents of the State Game Commission in charge.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

3. Population Studies, Trout.

Periodic samplings are taken of fish populations in lakes, reservoirs and streams by means of gill nets, chemicals, examination of anglers' catches, and through electrofishing for the purpose of determining the influence of stocking policies, the environment upon the fish, and to obtain a measure of the status of the individual populations.

Statewide; continuous; Field agents of the State Game Commission in charge.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

OREGON (Cont.)

4. Marking Programs.

Yearling chinook, silver salmon, rainbow trout, cutthroat, brown trout, and steel-head reared in Oregon hatcheries are marked to determine their value in the fisheries harvests and to assess the need for hatchery-raised fishes.

Statewide and in off-shore, coastwise waters; began 1950, continuous; field agents of the State Game Commission in charge.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

5. Creel Census.

Annual inventories are taken of the anglers' trout catch on the McKenzie River, Oregon coast streams, and numerous lakes throughout the State for the purpose of determining the return to the angler of hatchery fish, the efficiency of management programs, and to have a yearly measure of the pulse of the trout fishery.

Continuous; field agents of the State Game Commission in charge.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

6. Resource Inventories, Counting Stations.

Anadromous fishes passing Winchester Dam on the North Umpqua and Gold Ray Dam on the Rogue River are enumerated for the purpose of following population trends and correlating those trends with river improvement work, changes in regulations and other environmental alterations. Runs of chinook and silver Pacific salmon, summer and winter steelhead, searun cutthroats and other trout are counted.

Continuous; William E. Pitney (Umpqua River) and Cole M. Rivers (Rogue River), Fishery Biologists.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

7. Resource Inventories, Spawning Ground Counts, Pacific Salmon.

An enumeration of spawning anadromous fishes is taken at yearly intervals for purposes of detecting changes in numbers of fish using the waters, so that management practices may be inaugurated for the improvement of the runs.

Sixteen tributaries of the Lower Umpqua River, Metolius River, and Squaw Creek, a tributary of the Deschutes River; continuous; William E. Pitney and Monty L. Montgomery, fishery biologists.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

OREGON (Cont.)

8. Resource Inventories, Spring Chinook Creel Census.

Annual inventories of sport catch of spring chinooks on the Willamette, Umpqua, and Rogue Rivers are undertaken in order to include them as a part of the enumeration of the total runs of fish in the three streams.

In the Willamette below Oregon City Falls and throughout the Umpqua and Rogue Rivers; continuous; John Dimick, William E. Pitney, Cole M. Rivers, and Henry E. Mastin, Fishery Biologists.

Address correspondence to: H. J. Rayner, Chief of Operations, Div. of Fisheries, Ore. State Game Commission, 1634 S. W. Alder St., Portland 8, Ore.

Cooperative Wildlife Research Unit, Oregon State College

1. The Relationship Between Logging and Fish Production in Streams.

An observational study together with extensive temperature and stream flow measurements. Particular attention is being devoted to sources of siltation.

Lookout Creek drainage, Lane County; Pacific Northwest Forest and Range Experiment Station cooperating; indefinite; \$2,000.

Address correspondence to: Arthur S. Einarsen, Leader, Ore. Coop. Wildlife Res. Unit, 210 Agricultural Engineering Bldg., Corvallis, Ore.

2. Post Planting Mortality of Hatchery Fish Following Transportation.

Present work includes controlled duplication of transportation procedures together with careful chemical water analysis. The objectives are to learn the causes of and to determine a remedy for the delayed losses of hatchery trout following transportation and release in wild and hatchery waters.

Statewide; indefinite; \$3,500.

Address correspondence to: Arthur S. Einarsen, Leader, Ore. Coop. Wildlife Res. Unit, 210 Agricultural Engineering Bldg., Corvallis, Ore.

Fish Commission

1. Coastal Salmon Studies.

A stream inventory and watershed improvement program is being carried out. Also, efforts are being made to determine what portion of coastal salmon runs are taken by river fisheries, the effects of rainfall upon abundance of salmon in coastal streams, and the relationship between number of spawners and the resulting progeny.

Hdqtrs.: Bay City; planned for 1 to 5 years; \$32,000.

Address correspondence to: Kenneth Henry, Aquatic Biologist, Box 226, Bay City, Ore.

OREGON (Cont.)

2. Hatchery Biology.

A project to determine best methods of development of suitable hatchery food, holding requirements of spring salmon, and the relationship between time and size of release of hatchery fish and survival.

Sandy; planned for 1 to 4 years; \$24,000.

Address correspondence to: Thomas B. McKee, Aquatic Biologist, Route 1, Box 263B, Sandy, Ore.

3. Columbia River Studies.

Studies are being conducted on the life histories of sturgeon and shad, the effects of fishing upon smelt, and the rate of migration and fishing pressure on Columbia River salmon.

Hdqtrs.: Clackamas; planned for 1 to 3 years; \$40,000.

Address correspondence to: Robert W. Schoning, Aquatic Biologist, Route 1, Box 31A, Clackamas, Ore.

4. Marine Fisheries.

This is an extensive project involving both sport and commercial fish species. A study of the life histories of the English, petrale, and Dover soles and the rose fish is being made. Migration and mortality of salmon due to fishing in the ocean is being investigated. The catch per unit of effort in otter trawl fishery will be determined, and the racial characteristics of the albacore will be recorded.

Astoria; 6 months to indefinite; \$35,000.

Address correspondence to: George Y. Harry, Asst. Dir. of Research, Route 3, Box 3, Astoria, Ore.

5. Lower Columbia River Rehabilitation Program.

A project aimed at locating hatchery sites, locating obstructions to be removed from the river, and assessment of results of stream improvement.

Clackamas; planned to run until 1965; \$35,000.

Address correspondence to: Chester R. Mattson, Aquatic Biologist, Route 1, Box 31A, Clackamas, Ore.

6. Planning Time of Arrival and Numbers of Fish Appearing at Various Damsites in the Columbia River Watershed (Proj. #DA-35-026-eng-20053).

Plans are made in cooperation with the U. S. Army Engineers to have adequate fish facilities available during dam construction and to have work scheduled in such a way as to leave passage ways open when needed.

Clackamas; 4 months; \$8,000.

Address correspondence to: Theodore R. Merrell, Aquatic Biologist, Route 1, Box 31A, Clackamas, Ore.

Oregon State College

1. The Willamette River Fishes and Fish Food Organisms as Biological Indicators of Pollution.

The seasonal distribution of the fishes of the Willamette and three major tributaries is being studied in relation to fish food organisms present at 12 separate collecting stations, with the view of using fishes and their stomach contents as indicators of pollution. There is good indication that absence or presence of certain species of fishes can be used as biological indicators of pollution or non-pollution, and that the stomach contents are fairly indicative of the aquatic insect groups important in bioindices evaluations.

Willamette River, including three tributaries--the Clackamas, McKenzie and S. F. of the Santiam River; Ore. State Sanitary Authority, Portland, cooperating; began July 1951, to be completed in June 1953; \$6,000; limited number reports at the Ore. State Sanitary Authority, Portland, and at Ore. State College.

Address correspondence to: R. E. Dimick, Dept. of Fish and Game Mgt., Ore. State College Corvallis, Ore.

Oregon State Sanitary Authority

1. The Biological Measurement of Recovery from Pollution in the Lower Willamette and Columbia.

This is a study of the bottom fauna and plankton in relation to pollution in the Lower Willamette River and in the Columbia River. A major objective of the project is to measure the recovery and rehabilitation of the stream from the biological standpoint. Fish population studies are being undertaken and correlated with continuing results of bottom fauna and plankton determinations. Physical and chemical results are provided by the City of Portland, Department of Public Works.

Lower Willamette River from above Portland to the Columbia River and in the Columbia River from above Vancouver, Wash., to a point about a mile below the mouth of the Willamette River; began August 1951, indefinite; J. N. Wilson, Project Leader; interim report covering period from Fall 1951 through March 1952 has been prepared.

Address correspondence to: Mr. C. M. Everts, Jr., Secretary and Chief Engineer, Ore. State Sanitary Authority, State Office Bldg., Portland 1, Ore.

U. S. Forest Service

1. Sedimentation Studies.

Twenty stations were established in Oregon and Washington to study the amount of sedimentation in such streams as the Methow, Burnt River, Wallowa, Rogue River, Umpqua, etc. The work was done by rangers and the water analyzed for sediment content. Some rather startling figures were obtained. As an example, road construction increased the sediment content of the waters of the Umpqua River in 1949 to five times what it had been in 1945 and 1946.

OREGON (Cont.)

Pacific Northwest Region; began October 1950, completed in 1952; \$2,400; Martin E. Baudendistel, Project Leader; reports available.
Address correspondence to: A. M. Piper, U. S. Geological Survey, Portland, Ore.

PENNSYLVANIA

Fish Commission

1. Selective Breeding Program for Trout.

Preliminary studies on brook trout to develop, by individual selection, an improved strain for artificial propagation and for angling. Selected trout have been individually marked and their ability to transmit desirable characters through heredity will be tested. Reciprocal crosses have been made between brook, brown and rainbow trout to test for hatchability and hybrid vigor. Egg and sperm viability after storage in several media over varying periods of time was tested. Studies are being conducted on methods of transporting milt and unfertilized eggs.

Fisheries Research Lab., Bellefonte; began October 1952, continuing; \$2,500.
Address correspondence to: Keen Buss, Fishery Biologist, Pa. Fish Commission, Fisheries Research Lab., Bellefonte, Pa.

2. Biological Survey of Streams.

Biological and physical surveys are conducted on streams to formulate proper stocking policies.

Statewide; began in 1932, continuing; \$10,000; Individual stream surveys available.
Address correspondence to: C. R. Buller, Chief Fish Culturist, Fisheries Res. Lab., Pa. Fish Commission, Bellefonte, Pa.

3. General Lake Survey.

The project aims to determine factors limiting the satisfactory production and harvest of lake fish populations, and to provide practical recommendations for the improvement of adverse conditions affecting such harvest. Analysis is accomplished through the ordinary techniques applied to such surveys and includes the evaluation of lake quality, age and growth of fishes, and the ecological relationships of fish populations. Findings to date indicate that when poor lake fishing is found the underlying cause is usually unbalanced fish populations. Although liberalization of the regulations on pan-forage species may be desirable, perhaps greater size restrictions on pikeperch, northern pike, pickerel, muskellunge, and bass are necessary for the purpose of increased predatory function and improved reproduction.

Statewide; began June 1949, continuing; \$15,000; DeWayne E. Campbell, Project Leader.
Address correspondence to: Gordon L. Trembley, Chief Aquatic Biologist, Fisheries Res. Lab., Pa. Fish Commission, Bellefonte, Pa.

PENNSYLVANIA (Cont.)

4. Studies on Establishing Rainbow Trout Runs in Pennsylvania Tributaries of Lake Erie.

Experiments are under way to determine whether a significant run of rainbow trout can be established into tributaries of Lake Erie through plantings of fingerlings. One tributary has been closed as a nursery water and stocked with marked rainbow fingerlings. Seining is being conducted at intervals in the test stream and records will be kept of individuals returning to spawn.

Tributaries of Lake Erie; began August 1952, planned for 5 years; \$200; Alfred Larsen, Project Leader.

Address correspondence to: Gordon L. Trembley, Chief Aquatic Biologist, Fisheries Research Lab., Pa. Fish Commission, Bellefonte, Pa.

5. Results of Experimental Trout Plantings in Lakes Holding Warm-water Fish Species.

The project is set up to determine survival and catchability of various sizes of brook, brown, and rainbow trout when planted in lakes containing warm-water fish species. Investigations showed several lakes suitable for trout but which held limited populations of bass, bluegills, yellow perch and other warm-water species. Legal-size trout up to 20 inches were planted in spring and fall. Plantings of fingerling trout will be tried. A complete creel census is being conducted on one such lake. Test netting is being used on all of these lakes twice per year.

Five lakes in northern Pennsylvania; began March 1952, to be completed November 1954; \$2,000 (except fish).

Address correspondence to: Gordon L. Trembley, Chief Aquatic Biologist, Fisheries Research Lab., Pa. Fish Commission, Bellefonte, Pa.

6. Marking Trout by Branding.

A method of marking trout which is permanent and allows identification of the individual fish is being tried in conjunction with selective breeding experiments to positively identify brood stock. Wood-burning irons were used on several body areas. Best results were obtained when branding was applied to dorsal surface of head. Scar tissue formed is highly pigmented and characters are easily legible.

Fisheries Research Lab., Pa. Fish Commission, Bellefonte; began June 1951, planned for 5 years; \$100.

Address correspondence to: Keen Buss, Fishery Biologist, Fisheries Research Lab., Pa. Fish Commission, Bellefonte, Pa.

Industrial Wastes Division, Department of Health

1. Bio-assay Studies of Industrial Wastes.

To evaluate the lethality of industrial wastes, their components and other water pollutants to fish. The evaluation, as determined by bio-assay procedures, offers a reasonable judgment tool in administering effective stream pollution abatement.

Fisheries Research Lab, Bellefonte; affiliated with the Industrial Wastes Lab., Harrisburg; in cooperation with the Pa. Fish Commission; began in November 1949, indefinite; Dr. C. S. Meyers and Thomas Iezzi, Project Leaders, mimeographed reports available.

Address correspondence to: Dr. C. S. Myers, Dept. of Health, Bureau of Sanitary Engineering, Harrisburg, Pa.

PENNSYLVANIA (Cont.)

U. S. Fish and Wildlife Service, Branch of Fishery Biology

1. Biology of the Shad (Proj. 87).

(See same title under North Carolina)

RHODE ISLAND

Division of Fish and Game

1. Pond and Lake Survey (FA: F-2-R).

This project is a comprehensive survey of the fishing waters of the State, including: Physical, chemical and biological studies; fish population studies; and fish harvest studies. Spawning area surveys are also being carried out.

Statewide; began June 1, 1952, planned for 3 years; \$15,000.

Address correspondence to: Chester T. Whaley, Project Leader, Vets. Memorial Bldg., 93 Park St., Providence, R. I.

2. Test-water Study of Trout Fishery (FA: F-1-R).

By stocking marked hatchery trout in selected trout ponds and streams, information is being gathered on percentage of recovery, percentage of holdovers, time of recovery, and losses and movements of said fish. This data, together with knowledge of fishing intensity, will be used as a guide to future stocking procedures.

Meadow Brook, Austin Farm Pond, Washington County; began April 1952, planned for 3 years; \$2,700.

Address correspondence to: Chester T. Whaley, Project Leader, Vets. Memorial Bldg., 83 Park St., Providence, R. I.

SOUTH CAROLINA

Wildlife Resources Department, Department of Game

1. Investigation of Fish Populations in Reservoirs (FA: F-1-R).

The investigation will cover fish populations and creel census studies, causes of fish mortality, determinations of the feasibility of constructing new public fishing lakes and sub-impoundments, and a life history survey of the striped bass in the Santee-Cooper Reservoirs.

Statewide; began December 1, 1951, planned for 3 years; \$20,295.

Address correspondence to: W. A. Garth, Fishery Biologist, South Carolina Wildlife Resources Dept., P. O. Box 360, Columbia, S. C.

SOUTH DAKOTA

Department of Game, Fish and Parks

1. Statewide Fisheries Investigations (FA: F-1-R).

Management plans are being developed through surveys of South Dakota waters and biological investigations of fish populations.

Statewide; began November 1, 1951, continuing; \$25,000; William D. Clothier, Project Leader.

Address correspondence to: Bernard A. Nelson, Dept. of Game, Fish and Parks, Pierre, S. D.

Yankton College

1. Age and Growth of Pan Fishes in Beaver Lake, South Dakota.

This is a study to determine the extent of stunting of the pan-fishes taken by anglers. Recommendations for the proper management of the fish populations will be based upon the growth data obtained.

Beaver Lake, Yankton County; began July 1952, indefinite; \$20.

Address correspondence to: Dr. Frank W. Jobes, Dept. of Biology, Yankton College, Yankton, S. D.

TENNESSEE

State Game and Fish Commission

1. Investigations of Waters Below Storage Reservoirs (FA: F-1-R).

The investigation consists of a detailed study of the environmental conditions and the methods of fish management in waters which are released below the dams in storage reservoirs. Determinations are being made of fish populations, bottom organisms, plankton, and aquatic plants. Chemical and physical conditions are investigated and studies are made on the amount of natural reproduction and growth of trout. Plantings of fingerling trout are being made to determine the most suitable species for planting and the relative survival rates that can be expected.

Various tailwaters in East Tennessee; began June 1951, planned for 3 years; \$9,721; quarterly progress reports available.

Address correspondence to: Donald Pfitzer, Project Leader, Univ. of Tenn. Farm, Knoxville, Tenn.

2. Creel Census and Population Studies (FA: F-2-R).

The object of this study is to obtain basic information for the management of large bodies of water in Tennessee. Creel census, population studies, and growth data are being collected on Dale Hollow and Center Hill Reservoirs and on Reelfoot Lake. Population estimates are made annually. Chemical and physical data are being collected on the lakes concerned. Gill nets and trap nets are being used in cold weather periods for fish population estimates.

TENNESSEE (Cont.)

Tennessee Valley Authority cooperating; began in June 1951, planned for 3 years; \$27,300; quarterly progress reports available.
Address correspondence to: Carlos Fetterolf, Project Leader, 626 North Washington Ave., Cookeville, Tenn.

3. A Statewide Survey and Evaluation of Streams (FA: F-3-R).

The objectives of this project are three-fold: First, to determine the spawning success and survival of young of the principal stream species; second, to survey stream habitats to determine species present, population and growth conditions and environmental factors involved; third, to gain information on the relationship between commercial harvest of minnows and the sport fish populations.

Statewide; began January 1952, to be completed in December 1954; \$18,000; quarterly progress reports available.
Address correspondence to: C. E. Ruhr, Project Leader, 166 - 8th Ave., North; Nashville 3, Tenn.

4. Life History and Management of the Muskellunge.

Life history studies are being made on the muskellunge on several streams of the Cumberland Plateau. Growth rate, migration, and survival rates are being determined. Hoop nets are being used to capture the fish. Coal mine pollution has destroyed about 112 miles of muskie habitat, and methods are being studied to avert this problem.

Cumberland Plateau; began 1951, continuing; \$1,000.
Address correspondence to: John Parsons, Dist. Fish Biologist, Route 2, Crossville, Tenn.

5. Life History and Management of the Coosa Bass.

The habitat of the Coosa bass in Tennessee has been found to be waters that are intermediate between trout streams and smallmouth bass streams. Studies are being carried out to determine if this bass can be propagated in the hatchery, and to develop feasible management practices. Some Coosa bass have been stocked experimentally.

Southeastern Tenn.; began in 1950, continuing; \$1,000; Journ. Tenn. Acad. Sci., No. 2, 1951.
Address correspondence to: John Parsons, Dist. Fish Biologist, Route 2, Crossville, Tenn.

6. Fish Rescue and Tagging Project (FA: F-4-D).

This project is designed to rescue stranded fish in certain sections of Cherokee and Norris Reservoirs. When water levels are lowered in winter, isolated sections of the lake become cut off and large populations of fish become stranded. Seines are used to collect the fish. Game fish are restored to permanent waters of these reservoirs or used in other approved ways. Some are tagged to provide information on creel census and population studies.

Northeast Tenn.; began in June 1951, continuing; \$8,000; quarterly reports available.
Address correspondence to: L. Price Wilkins, Dist. Fish Biologist, Univ. of Tenn., Farm, Knoxville, Tenn.

7. Planting of Adult Trout.

Studies are being continued to determine the return of legal-sized hatchery trout stocked in East Tennessee streams. A creel census is conducted on specific management areas in Cherokee National Forest. Some studies are being made to determine the migration of hatchery fish following planting. The program is also being carried out in a few streams in Middle Tennessee. Studies are being made on the amount of natural reproduction that can be expected in marginal trout streams.

East and Middle Tenn.; began in 1949, continuing; stream survey reports available. Address correspondence to: Dr. Glenn Gentry, Chief, Fish Mgt. Section, State Game and Fish Commission, 166 Eighth Ave., No., Nashville, Tenn.

8. Operation of State Game and Fish Lakes.

The State has presently six state-owned lakes under management. Three more are near completion. A complete creel census is conducted on each lake, and the lakes are fertilized as conditions warrant. Some studies are being made on the fish population by netting and by rotenoning. Knowledge of the limnology and of the fish population of each lake is being collected. New management practices will be introduced as they appear necessary.

Statewide; continuing.

Address correspondence to: Dr. Glenn Gentry, State Game and Fish Commission, 166 Eighth Ave., No., Nashville, Tenn.

9. Farm Pond Management.

Farm pond management includes eradication of undesirable species, draining, partial poisoning, algae control, and fertilization. District biologists recommend the number and species of fish to be planted in new ponds. Corrective stocking is planned. Management practices are suggested to the pond owner when the pond is out of balance.

Statewide; continuing; Bulletin on Pond Management available.

Address correspondence to: Dr. Glenn Gentry, State Game and Fish Commission, 166 Eighth Ave., No., Nashville, Tenn.

Tennessee Valley Authority, Fish and Game Branch

1. Spring Creel Census on TVA Reservoirs and Tailwaters.

The census is designed to determine qualitative and quantitative trends in catch, residence of fisherman, and fishing methods during a limited season, April, May, and June on certain reservoirs and tailwaters. Census is taken daily at particular stations but no attempt is made to census entire reservoir.

Cherokee, Norris, and Wheeler Reservoirs; Watts Bar and Guntersville Dam Tailwaters; began in 1945, continuing; L. F. Miller, TVA, Decatur, Ala. (Guntersville Tailwater and Wheeler Reservoir census); C. J. Chance, TVA, Norris, Tenn. (Cherokee and Norris Reservoirs and Watts Bar Tailwater census) Leaders.

Address correspondence to: Dr. A. H. Wiebe, Chief, Fish and Game Branch, Div. of Forestry Relations, TVA, Norris, Tenn.

TENNESSEE (Cont.)

2. Annual Fall Fish Population Inventory of TVA Reservoirs.

Information is collected on the success of reproduction and survival of young, growth and size distribution of different species, available food for game fish, trends in relative abundance of species, and the presence or absence of certain species. Small areas, 1 to 5 acres, are treated with rotenone and all fish from the area are removed, separated to species, counted, weighed and measured, and scale samples taken.

Reservoirs in the Tenn. Valley; Hdqtrs. at Decatur, Ala., and Norris, Tenn.; began: Decatur - 1945; Norris - 1949, continuing; L. F. Miller, TVA, Decatur; C. J. Chance, Norris.

Address correspondence to: Dr. A. H. Wiebe, Chief, TVA Fish and Game Branch, Norris, Tenn.

3. Fish Harvesting on TVA Reservoirs.

Fish are netted, caught by hook and line or removed from sinkholes and tagged with monel metal jaw tags to indicate extent of harvest, movement of species and to gain an idea of changes in population. These investigations are carried out on both storage and mainstream reservoirs, but not on all reservoirs simultaneously.

Storage reservoirs: Norris, Cherokee, Hiwassee, Nottely, Watauga, and South Holston. Mainstream reservoirs: Fort Loudon, Guntersville, and Wheeler; began in 1945, continuing; Storage reservoirs: C. J. Chance, TVA, Norris, Tenn.; Mainstream reservoirs: L. F. Miller, TVA, Decatur, Ala., Leaders; published reports available.

Address correspondence to: Dr. A. H. Wiebe, Chief, TVA Fish and Game Branch, Norris, Tenn.

TEXAS

U. S. Fish and Wildlife Service, Branch of Game-fish and Hatcheries

1. Glass "V" Trap Experiments.

A fry and fingerling trap was developed at the San Marcos, Texas, Station. This trap uses "V"-shaped openings of glass instead of wire cloth. The object of experiments conducted in 1952 was to evaluate the trap's utility in harvesting fish crops from hatchery ponds and collecting forage species for feeding adult bass. Of the ponds in which traps were used, over 50 percent of the total production was removed by trapping.

Began in 1951, planned for 3 years; F. C. Richan, Supt.; reports available.

Address correspondence to: Regional Dir., U. S. Fish and Wildlife Service, P. O. Box 1306, Albuquerque, N. M.

TEXAS (Cont.)

2. Experimental Stocking of Walleye in a Texas Impoundment.

Devils Lake near Del Rio, Texas, has been examined and findings indicate a good possibility for survival, and possibly reproduction of walleye. It is intended to stock this lake with one-half million walleye fry in 1953.

Began September 1952, indefinite; \$150; Regional Fishery Mgt. Biologists; progress reports available.

Address correspondence to: Regional Dir., U. S. Fish and Wildlife Service, P. O. Box 1306, Albuquerque, N. M.

U. S. Fish and Wildlife Service, Branch of Fishery Biology

1. Biochemistry of the Gulf of Mexico (Proj. 67).

As a means of delimiting potentially productive fishing areas, an effort is being made to establish the distributions and concentrations of nutrients and the relation between these nutrients and the distributions and concentrations of fishes.

Hdqtrs.: Fort Crockett, Galveston; began 1950, continuing.

Address correspondence to: Albert W. Collier, Jr., Project Leader.

Chief, Gulf Fishery Investigations, Fort Crockett, Galveston, Texas.

2. Biological Inventory of the Gulf of Mexico (Proj. 68).

The objective of this project is to define the identity, abundance, distribution, and interrelation, of the various plankton forms and the relation between the variations within these to the distribution, availability and fluctuation of the fishes.

Hdqtrs.: Fort Crockett, Galveston; began 1950, continuing; Edgar L. Arnold, Jr., and Isaac Ginsburg, Project Leaders.

Address correspondence to: Albert W. Collier, Jr., Chief, Gulf Fishery Investigations, Fort Crockett, Galveston, Texas.

3. Red Tide Investigation (Proj. 70).

This is a study to determine the cause or causes that bring about over-growths of plankton in general, and of potential sources of Red Tide, especially of Gymnodinium brevis, in particular.

Hdqtrs.: Fort Crockett, Galveston; began in 1948, continuing; William B. Wilson, Project Leader.

Address correspondence to: Albert W. Collier, Jr., Chief, Gulf Fishery Investigations, Fort Crockett, Galveston, Texas.

UTAH

Department of Fish and Game

1. A Survey of the Economics of Utah's Fishery Resources (FA: F-1-R).

The project proposes to determine fishing pressure, to obtain economic and biological data on Bear Lake, and to summarize and evaluate such information. It also provides for a study of water temperatures, turbidities, chemicals, water levels and fluctuations, bottom composition etc., and their effects on fish productivity. Further investigations include determination of species of fish present in the lake and their relative abundance.

Bear Lake, Rich County; began December 1, 1952, planned for 1 year; \$12,000;
William McConnell, Project Leader.
Address correspondence to: J. Perry Egan, Dir., Fish and Game Dept., 1596 W.
North Temple, Salt Lake City, Utah.

2. Bear Lake Fisheries.

The project includes a life history study of the economically important species, creel census to determine the catch per unit of effort, the effectiveness and cost of the stocking program. The limnology and general ecology of the lake will be studied, including the dynamics of the plankton-nekton populations.

Bear Lake, Idaho and Utah; Utah State Agricultural College cooperating; began June 1, 1951, planned for 10 years; \$15,000.
Address correspondence to: W. J. McConnell, Utah State Agricultural College,
Logan, Utah.

Utah State Agricultural College, Utah Cooperative Wildlife Research Unit

1. The Life History and Population Dynamics of the Fish and Their Food in Logan River.

Work under way includes: Life history studies of all species above the dam at the mouth of Logan Canyon; determination of the creel composition, fishermen success per unit of effort, and the success of the stocking program; study of the population dynamics with the aid of experimental gill nets and electric shocking machines; investigations dealing with the limnology and general ecology of Logan River.

Northern Utah and Southern Idaho; began September 1947, planned for 10 years;
\$1,500.
Address correspondence to: Dr. William F. Sigler, Cooperative Wildlife Res. Unit,
State Agricultural College, Logan, Utah.

2. The Life History and Economic Status of the Carp in Utah.

The project undertakes to study intensively the age and rate of growth of the carp in one locality in Utah, and support this study with other extensive data from several areas; to determine the food and feeding habits of the carp in the same locality; to make both intensive and extensive observations on general carp ecology; to study carp reproduction; to continue to investigate annual and standing carp crop in small ponds or impoundments.

UTAH (Cont.)

Utah; Agricultural Experiment Station cooperating; began July 1949, planned for 6 years; \$1,000; The Agricultural Experiment Station annual reports and Utah Cooperative Wildlife Research Unit quarterly reports available.
Address correspondence to: Dr. William F. Sigler, Utah State Agricultural College, Logan, Utah.

3. The Ecology of the Warm-Water Ponds in Utah.

The project is designed to study the life history of the fish present in the small natural warm water ponds, study of the limnology of these ponds, and to determine what fish will reproduce naturally and produce a fishable population of game fish.

Northern Utah; began June 1948, planned for 10 years; \$500; Utah Cooperative Wildlife Res. Unit quarterly report available.
Address correspondence to: Dr. William F. Sigler, Utah State Agricultural College, Logan, Utah.

U. S. Forest Service

1. Experimental Forests and Ranges (Watershed Improvement).

The project aims to test effectiveness of several watershed improvement measures including: (1) Control of livestock grazing, (2) reseeding, and (3) contour trenching for preventing the recurrence of violent mud rock floods during high intensity summer rains. The study involves several watersheds and subwatersheds totalling about 28,000 acres, some of which were intensively treated and others given only protection from grazing. A network of recording rain gauges provides a record for evaluating the depth-area-intensity relations of summer rains. Streamflow records and observations of discharges are checked against the climatic record and the treatment on specific subwatersheds. Since the improvement measures were installed, channels have become more stable and streamflow more regular.

Davis County Experimental Watershed, near Farmington, Utah; began in 1933, continuing; \$15,000; R. B. Marston, Project Leader; See USDA Misc. Pub. 639.
Address correspondence to: Dir., Intermountain Forest and Range Experiment Station, Forest Service Bldg., Ogden, Utah.

2. Study of Water Level of Fish Lake, Utah.

Information is being secured to aid in the stabilizing of the water level of Fish Lake to possibly aid in improving fish production and to determine the relation of inflow to total losses. This is a 4,200-acre extremely productive and popular trout lake.

Sevier County, south central Utah; began in 1936, continuing; \$300 to \$500; W. L. Nicholls, Project Leader.

Address correspondence to: Regional Forester, U. S. Forest Service, Forest Service Bldg., Ogden, Utah.

VERMONT

Fish and Game Service

1. Lake Champlain Fisheries Investigation (FA: F-1-R).

An ice-fishing and a summer fishing census are being conducted to determine the composition of the take by species, size and relative abundance, and to measure the intensity and quality of the fishing and its trends from year to year. A study of the growth rate of the more important species, including the collection of scales, weight and length data is being made. The habits and survival of walleyed pike will be studied by means of marking of specimens for future identification. This will be carried out mainly through tagging adult specimens seined or trapped near spawning grounds.

Lake Champlain (Vermont portion); began December 1951, planned for 2 years; \$8,426.09; mimeographed progress reports are available upon request. Address correspondence to: Leonard Halnon, Project Leader, Bristol, Vt.

2. Connecticut River Watershed Fisheries Investigation (FA: F-2-R).

Extensive stream surveys are under way including population estimates, selection of tributaries for test stream studies on utilization, evaluation of stream environment. A D. C. electric shocker is being used extensively to determine range and relative abundance of brook, brown and rainbow trout with especial reference to the stocking history of the streams in question. Evaluation of stream environment includes temperature extremes, flow information, pollution problems and physical characteristics of the watershed as a whole, and of specific waters.

Connecticut River Watershed; began April 15, 1952, planned for 2 years; \$9,981.40; mimeographed reports will be available. Address correspondence to: James M. MacMartin, Project Leader, Vt. Fish and Game Service, Montpelier, Vt.

VIRGINIA

Commission of Game and Inland Fisheries

1. Game Fish Survey of the Impounded Public Fishing Waters of Virginia (FA: F-1-R).

A survey designed to yield information which will aid the formulation of management policies for the impounded waters of the State. Fish population studies involving the use of rotenone and conventional netting gear, and harvest studies are receiving preferred treatment in the execution of the project. Large reservoirs, State and municipally-owned reservoirs, are receiving most of the attention.

Statewide; began July 1, 1951, planned for 3 years; \$30,000; Robert G. Martin, Project Leader; mimeographed quarterly reports available. Address correspondence to: G. W. Buller, Chief, Div. of Fish, Commission of Game and Inland Fisheries, P. O. Box 1642, Richmond, Va.

WASHINGTON

Department of Game

1. Production of Storm and Flowing Lakes Since Rehabilitation.

Storm and Flowing Lakes lie adjacent to each other. Prior to rehabilitation in 1948, a random check of 29 fishermen at Flowing showed a catch of 126 fish of which 104 were perch. Storm Lake random check showed 40 fishermen with 105 fish including 50 perch. Sample checks on Flowing since rehabilitation show in 1952, 2,086 fishermen took 14,925 rainbow, with the average catch per man 7.2 fish; on Storm Lake, 2,122 fishermen caught 10,844 rainbow, average 5.1 fish. The lakes were reopened in 1950 and fishing has increased yearly since that time.

Snohomish County, Western Washington; began October 1, 1948; \$4,554.

Address correspondence to: Clarence F. Pautzke, Wash. State Game Dept., 509 Fairview Ave. No., Seattle, Wash.

2. Public Fishing Areas.

To date, 160 acres have been acquired, of which 108 have been developed. Development includes providing adequate parking space and such grading and filling as necessary in order to launch boats. The boundaries are fenced so as to prevent intrusion on neighboring property. Sanitary facilities including toilets and garbage pits are provided. The majority of the areas to date have been donated to the Department. They are extremely popular and heavily used.

Statewide; \$240,000 in 1951 and 1952; Oliver Edwards and James Lyons, Project Leaders.

Address correspondence to: Clarence F. Pautzke, Wash. State Game Dept., 509 Fairview No., Seattle, Wash.

3. Returns of Hatchery Reared Steelhead.

Twelve-months-old steelhead fingerlings were marked by fin clipping prior to release. One group of 8,000 averaging 5.5 per pound were released in March 1951 and a second group of 8,000 averaging 4.4 per pound were released in May of the same year. The stream into which the fish were released is closed to all fishing, a good check of returning adults is made near tide water where traps are located at the top of two fish ladders over a low dam. During certain water conditions some steelhead pass over the dam without passing through the ladders. To date, 579 steelhead have been checked from the first group and 814 steelhead have been checked from the second group.

South Tacoma Hatchery and Chamber Creek; began May 1951, planned for 3 years; Tom Inions, Project Leader.

Address correspondence to: Clarence F. Pautzke, Wash. State Game Dept., 509 Fairview No., Seattle, Wash.

4. Production of Twin Lakes.

Big Twin Lake, covering 79 acres, contained a heavy population of shiners prior to rehabilitation in 1949. Following reclamation, 2,030 fishermen were checked in 1952, with 18,136 rainbow running from 8" to 24" in length, and averaging 12" Average catch per man--9.0 fish.

WASHINGTON (Cont.)

Okanogan County in Eastern Wash. ; began June 1949; \$2,126 for material; Roy Strickland, Project Leader.

Address correspondence to: Clarence F. Pautzke, Wash. State Game Dept. , 509 Fairview Ave. No. , Seattle, Wash.

State Department of Fisheries

1. Tolerance Limits of Toxic Industrial Waste Constituents on Salmon and Other Marine Organisms.

The various types of salmon, silver smelt, herring, and typical fish food organisms are subjected to varying concentrations of industrial waste constituents in flowing and stagnant water aquaria and the effects as to mortalities or damage noted. Tests are made in salt and fresh water or combinations thereof. The object is to determine the concentration which may cause damage in each case and to apply the results to the pollution control program. Calcium- and magnesium-base liquor from the sulphite pulping process, condensates and bleach liquors from kraft process, chlorine, cyanides, metal ions, soaps, detergents, arsenic, and oil will be used in the program as presently planned.

Bowman Bay Marine Res. Station, Anacortes; Washington Pollution Control Commission and the Pacific Marine Fisheries Commission cooperating; began April 1950, indefinite; \$75,000 to date; a report is being printed.

Address correspondence to: Don Johnson, Supvr. , Div. of Research, State Fisheries Dept. , 1308 Smith Tower, Seattle 4, Wash.

2. Saltwater Sport Fishery Investigation.

This program encompasses the collection of salmon sport fishery statistics in Puget Sound. Through a system of reports and actual field checks accurate estimations of the intensity of the fishery and the resulting catch is tabulated. In addition to the statistical compilation, field data is collected on the age and size composition of the recreational salmon catch. A study of the efficiency of various lures is also being conducted in this investigation.

Puget Sound and Strait of Juan De Fuca; began March 1948, continuing; \$13,730; James Fitzgerald, Project Leader; printed report will be available June 1953.

Address correspondence to: D. R. Johnson, State Fisheries Lab. , Fisheries Center, Univ. of Wash. , Seattle 5, Wash.

3. Elwha River Dam Study.

The objectives of this study are to determine the mortalities that occur when young migrating salmon are passed through the power turbines or over high dams. Several species of salmon and different size groups are being used for these tests. After passing through the turbines or over the dam, the fish are recovered by fyke nets for examination.

Elwha River; began May 1952, indefinite; \$40,000; Dale Schoeneman, Project Leader; typewritten reports, 1952 Dept. of Fisheries Annual Bulletin.

Address correspondence to: H. T. Heg, Dept. of Fisheries, 1308 Smith Tower, Seattle 4, Wash.

4. Salmon Fresh Water Environmental Study.

This is a study of stream environmental conditions that affect the survival and resultant downstream migration of salmonoid fishes. The production of fish food organisms in natural stream beds is being compared with adjacent areas that have been disturbed by road construction, dredging, channeling, etc. It is hoped that answers obtained in this study will give this agency a basis of assessing the detrimental effects to fish life that occur when projects of this nature are proposed or undertaken.

Little Bear Creek, King County; began July 1952, planned for 1 year; \$1,750; William A. Smoker, Project Leader; mimeographed progress reports available. Address correspondence to: D. R. Johnson, State Fisheries Lab., Fisheries Center, Univ. of Wash., Seattle 5, Wash.

5. Minter Creek Migration Studies.

Weirs have been installed to enumerate both upstream and downstream migrating trout and salmon. The survival of various ages and sizes of hatchery planted salmon is being studied. The natural seeding and the resulting survival of young is being compared with hatchery plantings. An attempt is being made to determine the approximate numbers of adult salmon that will produce an optimum yield of migrants and returning adults.

Minter Creek, south Puget Sound; began in 1937, indefinite; \$18,000; Ernest Salo, Project Leader; reports in Dept. of Fisheries Annual Bulletins. Address correspondence to: D. R. Johnson, State Fisheries Lab., Fisheries Center, Univ. of Wash., Seattle 5, Wash.

6. Pollution Studies.

The objective of this study is to determine the effect of various pollutants on fish and fish food organisms. Salmon and steelhead trout are the principal test animals that are being subjected to tests involving varied exposures to pollutants of different concentrations. The effluents of pulp mills (sulphite and sulphate liquors) are being given special consideration in this study.

Deception Pass Marine Research Station; began June 1950, indefinite; Gilbert Holland, Project Leader; reports will be available by September 1953. Address correspondence to: D. R. Johnson, State Fisheries Lab., Fisheries Center, Univ. of Wash., Seattle 5, Wash.

(Closely related to Project 1, page 114.)

U. S. Forest Service

Sedimentation studies - see Oregon.

WASHINGTON (Cont.)

Fish and Wildlife Service, Branch of Fishery Biology

1. The Vitamin Requirement of Chinook Salmon (Proj. 41).

A study to determine the quantitative vitamin requirements of chinook salmon.

Hdqtrs.: Univ. of Wash., Seattle; began Sept. 1951, continuing; Robert R. Rucker and John E. Halver, leaders.

Address correspondence to: John E. Halver, Chief, Salmon Nutrition Lab., Univ. of Wash., Seattle, Wash.

2. Gill Disease Studies (Proj. 43a).

The objective of this project is to describe the pathology of the gill disease caused by a nutritional deficiency so that this disease can be recognized more definitely when encountered among fish populations.

Hdqtrs.: Univ. of Wash., Seattle; began in the spring 1951, to be completed in 1955. Address correspondence to: Robert R. Rucker, Chief, Western Fish Disease Lab., Univ. of Wash., Seattle, Wash.

3. Virus Research (Proj. 43b).

Studies indicate that a virus is the major etiologic agent responsible for several serious outbreaks of disease. This investigation proposes to study the virus disease of fish, their effect on the fish, how infection is transmitted, determine source of infection, develop sera for identification and development of control measures.

Hdqtrs.: Univ. of Wash., Seattle; began September 1952, continuing.

Address correspondence to: Robert R. Rucker, Chief, Western Fish Disease Lab., Univ. of Wash., Seattle, Wash.

4. Development of Better Practical Diets (Proj. 51).

A survey to explore growth potential and nutritional adequacy of potential fish food products and to develop practical diets for salmon.

Hdqtrs.: Salmon-Cultural Lab., Entiat, Wash.; began 1948, continuing.

Address correspondence to: R. E. Burrows, Chief, Salmon-Cultural Lab., Entiat, Wash.

5. Development of Hatchery Equipment (Proj. 52).

The objective is to determine environmental factors affecting development of salmon reared under artificial conditions and to develop rearing ponds which will satisfy requirements for optimum environmental conditions and efficient operation. Model studies of raceway, Foster-Lucas, and circular ponds and correlation of pond characteristics with hydraulic conditions to be first phase of investigation.

Hdqtrs.: Salmon-Cultural Lab., Entiat, Wash.; began 1948, continuing.

Address correspondence to: Roger E. Burrows, Chief, Salmon-Cultural Lab., Entiat, Wash.

WASHINGTON (Cont.)

6. Migration and Mortality of Fingerlings at Bonneville Dam (Proj. 88).

The objectives are to determine species, origin (hatchery or natural propagation) size, age and time of seaward migration of salmon and steelhead fingerlings. The effect of turbines and spillways at the dam upon small downstream migrants will be evaluated.

Hdqtrs.: Seattle; began March 1945, planned for completion in 1957; \$13,500; K. G. Weber, Project Leader.

Address correspondence to: Clinton E. Atkinson, Chief, Pacific Salmon Investigations, 2725 Montlake Blvd., Seattle, Wash.

7. Temperature Regimen of the Columbia River System (Proj. 89).

The original objective was to obtain picture of water temperatures of Columbia River and its tributaries prior to construction of the dams. With many more reservoirs being created, the resulting temperature changes and their effect upon migrating fish are being studied.

Hdqtrs.: Seattle; began in 1945, continuing; \$1,000; K. G. Weber, Project Leader.

Address correspondence to: Clinton E. Atkinson, Chief, Pacific Salmon Investigations, 2725 Montlake Blvd., Seattle, Wash.

8. Guiding of Salmonoid Fishes (Projects 90 and 91).

The objectives of these projects are to determine the most effective electrical conditions for controlling the movements of salmon fingerlings with pulsating direct current, the principles of orientation involved and the degree to which this method can be used to protect the fingerlings on their downstream migration. The efficiency of sonic vibrations, light waves and magnetism in guiding salmon into safe channels of migrations will be studied.

Hdqtrs.: Seattle; began in 1945, continuing; \$20,300; K. G. Weber and G. B. Collins, Project Leaders.

Address correspondence to: Clinton E. Atkinson, Chief, Pacific Salmon Investigations, 2725 Montlake Blvd., Seattle, Wash.

9. Efficiency of Types of Fishways (Proj. 95).

This is a comparative study of the "Denil" fish ladder and the standard pool-type fish ladder in attracting salmon and assisting them over streambarriers. Advantages and disadvantages of the new "Denil" fishway are noted.

Hdqtrs.: Seattle; began in June 1948, completed in 1953; \$1,000; C. J. Burner, Leader. Address correspondence to: Clinton E. Atkinson, Chief, Pacific Salmon Investigations, 2725 Montlake Blvd., Seattle, Wash.

WEST VIRGINIA

Conservation Commission

1. National Forests Fishery Management Program.

A fishery biologist is employed to: (1) Map and study the production of the native brook trout waters; (2) experiment with trout stream improvement; (3) establish trout stocking methods to assure higher angler success; (4) to maintain suitable intra-agency cooperation on mutual fish management activities; and (5) locate and supervise a lake-building program.

George Washington and Monongahela National Forests; began in 1952, continuing; Jack D. Larmoyeux, Project Leader; occasional bulletins available.

Address correspondence to: E. A. Seaman, Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

2. Development and Management of Public Fishing Areas.

The Conservation Commission has encouraged lake building projects in both our trout and warm-water territories. The latter is being given special attention for those areas near heavily populated centers of the State. Creel census and an annual check of the fish population will be made. A fertilization program including both the surrounding land and water will be carried on. Several public fishing areas have already been established and are proving very popular to anglers.

Statewide; began in 1949, continuing.

Address correspondence to: E. A. Seaman, Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

3. Selective Creel Census.

A number of qualified anglers are selected each year on the basis of considerable skill and keen fishing interest to keep personal data of their trips. Some 50 members are provided with a special creel booklet in which they record information concerning number and size of fish caught, location of fishing water, date, catch effort, weather and stream conditions, et cetera, per each and every trip. These records are promptly mailed in so that we may keep up on the progress of the fishing results throughout the year. The results of our Selective Creel Census clearly shows that angling is an art and that the success of these anglers is considerably greater than that of the general public.

Statewide; began January 1949, continuing; \$100; reports available.

Address correspondence to: Harry Van Meter, Asst. Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

4. Aerial Census Project.

Flying at tree-top level in a small single-engine plane, a fishery biologist conducts an aerial census covering the major waters of the State during the opening weeks of the trout and bass seasons each year. A count is made on the number of cars and anglers frequenting these areas. These data are later compared with the creel census conducted by ground patrolmen in order to ascertain the concentration of fishing pressure and an estimated total harvest from that body of water. Such information is then useful the following season for either stocking purposes or for encouraging the anglers to fish less concentrated areas where their success should prove even greater.

WEST VIRGINIA (Cont.)

Statewide; began April 1952, continuing; E. A. Seaman and Jack Larmoyeux, Project Leaders; reports available.

Address correspondence to: E. A. Seaman, Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

5. Elk River Investigational Project.

Elk River, a popular bass fishing stream, is being investigated as a result of numerous reports indicating a continuous decline in fishing success over the past few years. The river has been divided into six areas totaling 128 miles, each undergoing separate and detailed studies. This includes creel census, tagging and marking studies of the native fish population, limited stocking of marked hatchery fish, the extent of pollution, periodic floodings and drought conditions, and a thorough check into the stream habitat itself.

Covers three counties; began June 1952, to be completed December 1956; Paul L. Hooper, Project Leader.

Address correspondence to: E. A. Seaman, Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

6. Age and Growth Studies of West Virginia Fishes.

A study has been set up for determining a standard growth rate pattern for various fishes found in our State waters. Plastic impressions of scales collected during annual surveys are being made and studied. Several waters throughout the State are being selected as the basis for establishing an average growth rate pattern.

Statewide; began January 1953, continuing; reports available.

Address correspondence to: Harry Van Meter, Asst. Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

7. Population Manipulation and Creel Census of Two West Virginia Smallmouth Bass Streams (FA: F-1-R).

This project involves investigation into the fundamental biological problems involved in increasing the numbers and pounds of bass in Lost River. Attempts are being made to manipulate the population to ascertain what effects such techniques will have. The dominant fishes of the stream by weight ratios are suckers and fall fish. These species are being reduced to determine the effects on game fishes. Electrical shockers are being employed, as well as other population study techniques. An intensive creel census is conducted to determine the angler harvest.

Hardy County; began May 1952, planned for 3 years; \$27,000; George D. Holton, Project Leader; progress reports available.

E. A. Seaman, Chief, Div. of Fish Mgt., Conservation Commission, Charleston, W. Va.

8. Fishing Areas Investigation for Development (FA: F-2-R).

The State of West Virginia needs more fishing waters. This project concerns (1) Mapping new lake sites; (2) mapping and testing suitability of strip mines and beaver ponds; (3) mapping and exploring the fish populations of large river lock-and-dam backwater areas, as well as inaccessible trout and bass waters now not

WEST VIRGINIA (Cont.)

frequented by anglers. The project is designed to aid the angler in two ways: (1) Add more fishing waters to the State and (2) make more readily available the least exploitable waters.

Statewide, Hdqtrs.: Elkins; began October 1952, planned for 2 years; \$10,000;
Donald Peterson, Project Leader.

Address correspondence to: E. A. Seaman, Chief, Div. of Fish Mgt., Conservation
Commission of West Va., Charleston, W. Va.

West Virginia University

1. The Limnology of Cheat Lake.

The objective of this project is to determine the quality of the water on a year-around basis; determine the plankton population and bottom organisms on the same basis. This Lake is a 27-year-old impoundment which is polluted by acid mine waste.

Began October 1952, continuing; \$2,000.

Address correspondence to: Bertil G. Anderson, Dept. of Biology, West Virginia
Univ., Morgantown, W. Va.

2. Bioassay Methods for Using Daphnia Magna to Evaluate the Acute Toxicity of Industrial Wastes.

As title indicates.

Began 1941, continuing.

Address correspondence to: Bertil G. Anderson, Dept. of Biology, W. Va. Univ.,
Morgantown, W. Va.

Fish and Wildlife Service, Branch of Fishery Biology

1. Etiology of Gill Diseases (Proj. 48).

A study to determine which of the gill diseases are caused by pathogens and which have nutritional origin. Isolation and determination of the eventual pathogens is involved.

Hdqtrs.: Leetown, W. Va.; began 1947, continuing; S. F. Snieszko and P. J. Griffin,
Leaders.

Address correspondence to: S. F. Snieszko, Dir., Microbiological Lab., Leetown,
Kearneysville, W. Va.

2. Study of the Effect of Pollution on the Bottom Fauna and Fish Population in the Shenandoah River (Proj. 49).

A study to keep constant watch on the effect of industrial pollution on the fish population in the Shenandoah River.

Hdqtrs.: Leetown, W. Va.; began 1947, continuing.

Address correspondence to: S. F. Snieszko, Dir., Microbiological Lab., Leetown,
Kearneysville, W. Va.

WEST VIRGINIA (Cont.)

3. Study of the Toxicity of Various Chemical Compounds, Insecticides, and Herbicides on Warm- and Cold-Water Fresh Water Fishes (Proj. 50).

The objectives are to screen the chemicals toxic to fish, determine the mechanism of action of the most toxic substances, and make practical application of the results.

Hdqtrs.: Microbiological Lab., Kearneysville, W. Va.; continuing, E. M. Wood, Leader.

Address correspondence to: S. F. Snieszko, Dir., Microbiological Lab., Leetown, Kearneysville, W. Va.

WISCONSIN

Conservation Department

1. Watershed Management (FA: F-1-D in part).

The concept that improvement of the aquatic environment for fish is co-existent with proper land use by the farmer is the basis for this project. Because of the varied benefits to be derived from this program, cooperative projects between individual landowners and public agencies have received emphasis. Also, separate demonstration areas are being developed by public agencies.

Statewide; began July 1951, indefinite; \$175,000; progress reports are available. Address correspondence to: D. John O'Donnell, Nevin State Fish Hatchery, Madison, Wisc.

2. Evaluation of Lake Trout Stocking in Lake Superior.

Eggs of lake trout are taken from adult spawners in Lake Superior. These are hatched and reared to fingerling and yearling sizes. Various lots are being fin-clipped and planted in Lake Superior to evaluate returns from plantings of this type.

Bayfield Fish Hatchery and Western Lake Superior; began in 1949, indefinite; \$25,000. Address correspondence to: Russell I. Daly, Bayfield, Wisc.

3. Rough Fish Control.

Removal of carp and sheepshead is effected by state-operated fishing crews and by commercial fishermen operating under contract and supervision. Fish are sold commercially and the proceeds help to defray removal costs.

Southern Wisconsin; began 1935, continuing; \$250,000.

Address communications to: Nicholas J. Miller, Nevin State Fish Hatchery, Madison, Wisc.

4. Muskellunge Fingerling Stocking.

This program is an attempt to maintain adequate populations of muskellunge in the face of competition from northern pike and heavy angling pressure. In selected chains of lakes, liberal regulations for northern pike have been coupled with muskellunge stocking to promote an increase in stocks.

WISCONSIN (Cont.)

Selected Lakes in Northern Wisc.; began 1948, continuing; \$50,000.

Address correspondence to: Clarence A. Wistrom, Fish Mgt. Div., Spooner, Wisc.
and L. E. Morehouse, Fish Mgt. Div., Woodruff, Wisc.

University of Wisconsin, Department of Zoology

1. Fertilization of Low Nutrient Lakes.

The role of alkalization in reducing brown color of bog lakes has been studied. Bog lake soils are analyzed to determine availability of nutrients. Isotopes are used in laboratory phases of the study.

Northern Wisconsin and Univ. of Wisconsin, Madison; planned for 3 years; \$4,000;

A. D. Hasler, K. Berger, and E. Zicker, Leaders.

Address correspondence to: Dr. A. D. Hasler, Dept. of Zoology, Birge Hall, Univ. of Wisc., Madison 6, Wisc

2. Production of Fish in Northern Wisconsin Bog Lakes.

The project is designed to study production, standing crop, carrying capacity and mortality of trout in a mono-species community, and of bass in competition with pan fish. The lakes are of the bog type.

Chippewa County and Vilas Counties; continuing for 5 years; \$7,000; A. D. Hasler, W. R. Schmitz, and W. E. Johnson, Leaders.

Address correspondence to: Dr. A. D. Hasler, Dept. of Zoology, Birge Hall, Univ. of Wisc., Madison 6, Wisc.

3. Olfactory Sense of Fishes and Its Relation to Homing.

The study is of the basic type involving the physiology of the sense of smell in fishes. Field studies on sensory abilities of migrating salmon have been carried out.

Univ. of Wisc.; planned for 5 years; \$5,000; A. D. Hasler and W. J. Wisby, Project Leaders; some published reports available.

Address correspondence to: Dr. A. D. Hasler, Dept. of Zoology, Birge Hall, Univ. of Wisc., Madison 6, Wisc.

The Institute of Paper Chemistry

1. The Effect of Pulp and Paper Mill Wastes on Aquatic Environments.

The project is organized to determine the total effect of these wastes on the habitat, behavior, propagation, and survival of game and forage fish.

Work is done at Appleton, and on other rivers where pulp mills have been built; began July 1, 1942, continuing; some reports available.

Address correspondence to: Willis M. Van Horn, The Institute of Paper Chemistry, Appleton, Wisc.

WISCONSIN (Cont.)

Fish and Wildlife Service, Branch of Fishery Biology

1. Fluctuations, Interrelationships and Movements of Fish Populations (Projects 17 and 18).

The objective of this project is to follow the fluctuations in the age, growth, size, and abundance of the different species, commercial and non-commercial; and to ascertain through marking experiments and morphological studies whether local races and stocks exist, and the extent of movements and intermingling of different segments of the populations.

Lakes Huron, Superior, and Michigan; Hdqtrs.: Sturgeon Bay, Wisc.; began 1947, continuing; Leonard S. Joeris, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Wash. St., Ann Arbor, Mich.

2. Limnology of Green Bay (Proj. 19).

The objective of this project is to make a limnological reconnaissance with special reference to physical conditions--seiches, temperatures currents--in the hydrographically complex control region in relation to the distribution and movements of fish.

Hdqtrs.: Sturgeon Bay, Wisc.; began May 1950, continuing; Leonard S. Joeris, Leader.

Address correspondence to: James W. Moffett, Chief, Great Lakes Fisheries Investigations, 1220 E. Wash., St., Ann Arbor, Mich.

WYOMING

Game and Fish Commission

1. The Survival of Hatchery Reared and Wild Fish Before and After the Installation of Stream Improvement Devices (FA: F-1-R in part).

Physical and biological conditions have been determined for several trout streams in their natural state. The fish population has been sampled by means of electrical shocking apparatus to determine relative abundance and species composition. A number of stream improvement devices are being placed in experimental sections of the streams. To be considered are the changes these structures induce upon the stream bottom, their resistance to high water, and their effects on the resident fish population.

Trout Creek, Sweetwater County, and Granite Creek, Teton County; began August 1, 1952, to be completed December 31, 1954; \$9,000; Grant. O. Hagen, Project Leader. Address correspondence to: Floyd M. Blunt, Coordinator, Wyoming Game and Fish Commission, Cheyenne, Wyo.

WYOMING (Cont.)

2. Natural Reproduction, Age, Growth, and Catch of Brown, Rainbow and Brook Trout (FA: F-1-R in part).

The project aims to determine the approximate total catch and the catch per unit of effort, and to establish the age, growth and natural reproduction of the game fish in the experimental section of Clear Creek. This information will be determined initially under the present rate of stocking and finally under no stocking of hatchery fish. The study will concentrate mainly on the fish populations which can be sampled by means of electrical fish shocking apparatus, seines and creel census.

Clear Creek, Johnson County; began August 1, 1952, to be completed December 31, 1954; \$11,000; Fred Eiserman, Project Leader.

Address correspondence to: Floyd M. Blunt, Coordinator, Wyo. Game and Fish Commission, Cheyenne, Wyo.

3. The Survival of Hatchery Reared Fish in the Big Laramie River (FA: F-1-R in part).

The study is aimed at the determination of the approximate percentage survival, to the fisherman's creel, of hatchery reared fish of various sizes, as well as an estimate of the mortality in the stream of these same fish during stipulated time periods. In addition, a comparison will be made of the census techniques presently employed as a method of evaluating stocks of fish present in such a stream as the Big Laramie River.

3. Big Laramie River, Albany County; began August 1, 1952, to be completed December 31, 1954; \$12,000; Jack Kanaly, Project Leader.

Address correspondence to: Floyd M. Blunt, Coordinator, Wyo. Game and Fish Commission, Cheyenne, Wyo.

4. Lake and Stream Surveys and Inventories (Proj. 1-FR-6).

Because there is a shortage of good fishing lakes and streams in the State, potential lakes and reservoirs are being surveyed and classified as to possibilities of developing them into good recreational areas.

Statewide; began January 1, 1951, continuing; \$2,000.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyo. Game and Fish Commission, Cheyenne, Wyo.

5. Lake Rehabilitation Projects (3-FD-6).

The objective of this program has been to eradicate all fish species in certain lakes and reservoirs so as to develop a more desirable game fisheries. Twenty-six lakes, comprising 678 acres, have been treated, and, in addition, partial effort has been made to control coarse fish on three lakes.

Statewide; began July 1950, continuing; \$1,000.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyo. Game and Fish Commission, Cheyenne, Wyo.

WYOMING (Cont.)

6. Fish Salvage and Transplanting (Proj. 4-FD-6).

This is a program designed to salvage desirable fish species which would otherwise be eliminated because of extreme changes in their habitat; such salvaged species are transferred to suitable habitat. Transfer of game and/or forage fish from an established population to under-populated waters is also being carried out.

Statewide; began January 1, 1951, continuing as required; \$500.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

7. Investigations and Development of Farm Ponds, Reservoirs and Small Lowland Lakes (5-FD-6).

The objectives of this project are to develop and increase facilities for fishing in the State and to provide fishing in areas previously lacking this resource. This program also entails the stocking of game and/or forage species and the carrying out of necessary follow-up surveys to evaluate and improve the stocking program.

Statewide; began in 1950, indefinite; \$5,000.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyo. Game and Fish Commission, Cheyenne, Wyo.

8. Spawning Site Investigations and Developments (Proj. 6-FD-6).

This project was established to locate, develop and maintain spawning sites for purposes of preserving or increasing the native fish species of the State and to make possible the most economical source of supply.

Statewide; began January 1, 1950, continuing; \$5,000.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

9. Pollution Control and Abatement Projects (7-FD-6).

Polluted waters are studied as to the effect of the contamination on fish life. Fish populations in streams are checked by means of the electric shocker. After chemical analysis of the polluted waters is made, the necessary remedial action is taken or recommended.

Statewide; began December 1950, continuing; \$500.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

10. Stream Improvement Project (8-FD-6).

The objective of this program was to test the permanency of stream improvement devices and to provide a more suitable habitat for game fish species and thereby improve the quality and quantity of available fishing.

Statewide; began July 1950, closed January 1953; \$500.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

WYOMING (Cont.)

11. Fish Tagging and Marking Programs (13-FR-6).

Using several different species of fish retained under identical conditions the comparative merits of various types of tags and other methods of marking fish are being determined. Ten thousand, four hundred and ninety fish were tagged in 1952 and placed where follow-up observations could be made.

Statewide; began January 1, 1951, continuing.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyoming.

12. Beaver-Trout Relationship Studies (27-FR-6).

This program was established to determine beaver-trout relationships at various times of the year. Water depths, temperatures, ice and snow depths are recorded along with the chemical, physical and biological conditions of the ponds. Availability of fish foods, species present, and abundance are also recorded. Utilization of various habitats is noted.

Pole Creek, Johnson County; began November 14, 1950, to close in 1953; \$700.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

13. Lake DeSmet Investigations (29-FRD-2).

The objectives of this project are to determine fish production and activity; to discover the effects of the limnological and environmental factors on the fish populations in the lake; and to improve conditions in the lake which will in turn make for improved fish and fishing conditions.

Johnson County; began in the winter of 1950, to close March 31, 1955; \$2,000; Louis S. Pechacek, Fisheries Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

14. Chugwater Creek Investigations (30-FRD-3).

The determination of annual trends in abundance of brown trout by population estimates on a 1-mile section of stream is being made. The life history of the trout in a stream of low gradient, meandering type is being recorded. Facts of age, growth and survival as determined from marked, wild fish will be secured and the value of various stream improvements devices used will be established.

Platte County; began Nov. 1950, planned for 4 years; \$6,000; Jack J. Kanaly, Fisheries Mgt. Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

15. Bruner Creek Project (31-FRD-1).

The primary objective of this project is to obtain records of survival of hatchery-reared and wild trout under controlled conditions. The preliminary experiment was initiated primarily to observe operational procedures which may be applied in future small stream investigations and fisheries management procedures.

Lincoln County; began August 1952, to close September 1953; \$250; Grant O. Hagen, Fisheries Mgt. Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

16. Experimental Study of the Artificial Propagation of the Burbot, Lota lota maculosa (Proj. 32-FR-1).

To determine by experimentation the possibility and practicality of hatching and rearing burbot (ling) under hatchery conditions.

Cokeville, Lincoln County; began January 1952, to close July 1953; \$500; Grant O. Hagen, Fisheries Mgt. Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

17. Sand Creek Trout Population Studies (33-FR-2).

This project was set up to make a relative, quantitative census of fish populations on a portion of Sand Creek in order to determine trout planting needs. Scale samples for supplemental growth data on brown trout have been collected. A cross section of trout were tagged for migration studies. Data collected will be analyzed for subsequent management use.

Crook County; began July 1950, closed January 1953; \$300; Fred. M. Eiserman, Fisheries Mgt. Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

18. A Preliminary Ecological Study of Clear Creek, Johnson County (34-FR-2).

The production and carrying capacity of Clear Creek for trout, the condition of the stream environment and its effect on the trout were determined in order to establish a stocking policy that will yield a maximum catch for the anglers.

Began January 1, 1951, closed March 30, 1953; \$1,025; John W. Mueller, Fisheries Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

19. Life History and Management Study of Rocky Mountain Whitefish in Wyoming (35-FR-6).

This project looks toward the establishment of a management program for the whitefish in Wyoming, based upon the relationship of this species to the fisheries of the State. In conjunction with this, determinations will be made as to the competition

WYOMING (Cont.)

between whitefish and trout, the seasonal movements of whitefish, and life history studies of the species as pertains to their habitat in Wyoming.

Sheridan, Lincoln, and Teton Counties; began January 1952, planned for 2 years; \$1,150.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

20. Experimental Hybridization of Brook and Mackinaw Trout (36-FR-1).

The objectives of this project are: To cross the two species (male mackinaw x female brook and female mackinaw x male brook); to propagate the hybrids for taxonomic studies; to experimentally breed the hybrids by artificial reproduction; to stock them in a virgin lake to study their survival and practical management values; and to determine their value as compared to the mackinaw trout.

Dome Lake, Sheridan County, and State Fish Hatchery, Story; began October 18, 1952, indefinite; \$50; Charles L. Sowards, Fisheries Biologist.

Address correspondence to: A. F. C. Greene, State Fish Warden, Wyoming Game and Fish Commission, Cheyenne, Wyo.

Fish and Wildlife Service, Branch of Fishery Biology

1 Vital Statistics of the Yellowstone Lake Fishery (Proj. 27).

The objective is to determine the numbers of fish and the sizes of fish to be expected at Yellowstone Lake at different levels of fishing pressure and hatchery activity.

Began June 1950, planned for 5 years; Oliver B. Cope, Leader.

Address correspondence to: Oliver B. Cope, Chief, Rocky Mountain Fishery Investigations, Utah State Agricultural College, Logan, Utah.

ALASKA

Alaska Water Pollution Control Board

1. Ward Cove Survey.

The objective was a chemical, biological, and hydrological survey of Ward Cove and adjacent Tongass Narrows waters to determine water characteristics before discharge of wastes to these waters from operation of the Ketchikan Pulp Mill now being constructed at Ward Cove. This survey is to form a basis for evaluating future effects of Magnesia - base sulfite pulp wastes on fish and other marine life in adjacent receiving waters. The project included the collection of samples at various depths at 9 selected sampling stations at various tide levels throughout the year. Observations were made of the effects on adjacent waters of pollution from the fish reduction plant which operated at Ward Cove during the month of August 1952.

Ward Cove and adjacent coastal waters of Tongass Narrows approximately 5 miles northwest of Ketchikan; began October 1951, planned for 1 year; \$15,000; William L. Porter, Project Leader; limited supply of project reports available about Sept. 1953. Address correspondence to: Amos J. Alter, Administrator, Water Pollution Control Board, Box 1931, Alaska Dept. of Health, Juneau, Alaska.

ALASKA (Cont.)

Alaska Game Commission

1. Game Fish Investigations of Alaska (FA: F-1-R).

Reconnaissance surveys of sport fishing pressure in the areas of Ketchikan, Anchorage, and Fairbanks are being conducted. Records are being obtained on the number of sport fishermen using salt and fresh water, lakes and streams, and the species of fish preferred. Information on the relationship between fishing pressure and accessibility is also being recorded. General surveys as to species present, adequacy of spawning areas, pools, cover, and foods are being conducted in order that adequate development activities may be planned for the future.

Began November 1, 1951, planned for 3 years; \$58,907; Roger Allin, Anchorage, and Robert Baade, Ketchikan, Fishery Mgt. Biologists.

Address correspondence to: Urban C. Nelson, Proj. Leader, U. S. Fish and Wildlife Service, Juneau, Alaska.

HAWAII

Division of Fish and Game

1. Bluegill and Bass Stocking Program (FA: F-2-D).

Largemouth bass and bluegills are being stocked in ponds on the Islands of Oahu, Maui, and Hawaii. Fish are stocked at rates varying from 30 to 75 bass and 50 to 100 bluegill per individual reservoir, most of which range in size from 1 to 4 acres.

Began August 1, 1951, planned for 2 years; \$2,921.11; Yoshio Yamaguchi, Leader.

Address correspondence to: Vernon E. Brock, Dir., Div. of Fish and Game, Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

2. Fresh Water Game Fish Management Research (FA: F-4-R).

At present, work on this project centers around (1) the life history study of the Goby and (2) experimental introduction of game fishes. As a part of the Goby study, efforts are being made to trap and mark the young for migration studies. The fins of the young are clipped; mature fish are tagged. Species being studied for introduction are smallmouth bass, channel and blue catfish, black crappie, and peacock eye cichlid.

Began November 1, 1951, planned for 3 years; \$12,000; Yoshio Yamaguchi, Leader.

Address correspondence to: Vernon E. Brock, Dir., Div. of Fish and Game, Board of Commissioners of Agriculture and Forestry, Honolulu 1, T. H.

3. Reef and Inshore Game Fish Management Research (FA: F-5-R).

This is a study of the ecology of reef fishes of interest to anglers, the fishing pressure and catch on selected fishing grounds. Objectives are being accomplished by means of creel census, interviews of shorecasters and reef fishermen, and an underwater survey of selected fishing areas, fish tagging, collecting, etc.

HAWAII (Cont.)

Began January 1, 1952, planned for 3 years; \$11,000; Yoshio Yamaguchi, Project Leader.

Address correspondence to: Vernon E. Brock, Dir., Div. of Fish and Game, Board of Commissioners of Agriculture and Forestry, Honolulu 1, T. H.

University of Hawaii

1. The Biology of the Aholehole (Kuhlia sandvicensis).

The immediate object is to determine the feasibility of rearing aholehole in ponds as a baitfish for the livebait tuna fishery. Determinations include the rate of growth in length and weight for fish in the natural habitat and in ponds and tanks; the food and feeding habits; spawning areas, habits and season; description of the eggs and larvae; the range of temperature, salinity and oxygen concentration in the natural environment and the range of tolerance to these factors.

Oahu; in cooperation with the Industrial Research Advisory Council; began January 1952, to be completed in April 1953; \$7,000; results to be published by Industrial Research Advisory Council.

Address correspondence to: Dr. A. L. Tester, Univ. of Hawaii, Honolulu, T. H.

2. Reaction of Tuna to Chemical Stimuli.

The objectives of the project are: To investigate further certain extracts of tuna and other fish flesh and viscera, which had previously been found to attract tuna held in captivity; to identify the attractive compound(s) in the extracts; to screen various chemical substances in an attempt to discover an attractant; to discover methods of preparation and preservation of the tuna extract which would serve to provide large quantities for sea tests on "wild" tuna.

Hawaii Marine Laboratory, Coconut Island, Oahu, T. H.; Fish and Wildlife Service, Pacific Oceanic Fishery Investigations, cooperating; began June 1952, to be completed in May 1953; \$8,000.

Address correspondence to: Dr. A. L. Tester, Univ. of Hawaii, Dept. of Zoology and Entomology, Honolulu, T. H.

U. S. Fish and Wildlife Service, Branch of Fishery Biology

1. Investigation of Tunas about the Hawaiian Islands (Proj. 82).

A project to investigate the tuna resources in the vicinity of the Hawaiian Islands with the view of determining their magnitude; how to extend the season and area of fishing; and the extent of the bait resources in the leeward islands of the Hawaiian group.

Hdqtrs.: Honolulu; began in 1950, continuing; D. Yamashita, J. E. King, T. Cromwell, Investigators.

Address correspondence to: O. E. Sette, Dir., Pacific Oceanic Fishery Investigations, Honolulu, T. H.

HAWAII (Cont.)

2. Life History and Biology of Tunas (Proj. 83).

In order to better understand the occurrence, distribution and abundance of tunas of various sizes, this is a study of the spawning, maturation, early life history, and age and growth of the tunas found in the equatorial Pacific.

Hdqtrs.: Honolulu; began in 1948, continuing; D. J. McKernan, Leader.

Address correspondence to: O. E. Sette, Dir., Pacific Oceanic Fishery Investigations, Honolulu, T. H.

3. Tuna Reaction Studies (Proj. 84).

The objective of this project is to learn what will attract tunas with special regard to finding a substitute for live bait and to study the effects of various types of electrical and other stimuli on tuna and bait fishes.

Hdqtrs.: Honolulu; began in 1950, continuing; A. Tester, Project Leader.

Address correspondence to: O. E. Sette, Dir., Pacific Oceanic Fishery Investigations, Honolulu, T. H.

PUERTO RICO

Division of Fisheries and Wildlife

1. Puerto Rico Fish Surveys and Investigations (FA: F-1-R).

The objective of this project is to obtain information on Puerto Rico's streams and artificial lakes considered suitable for producing fish of value to the recreation and food supply of the people. Periodic samples of fish will be taken, creel censuses conducted on important reservoirs, data on food preferences will be recorded. Plans for the control of excessive aquatic vegetation are being drawn.

Began October 1952, continuing; \$12,000; Luis Costas Grana, Project Leader.

Address correspondence to: Felix Inigo, Div. of Fisheries and Wildlife, Agricultural Experiment Station, Rio Pridras, Puerto Rico.

VIRGIN ISLANDS

Government of the Virgin Islands

1. Investigation of Sport Fishing Potential (FA: F-1-R).

The fresh water resources as well as the marine fishery are being investigated. Small inland impoundments on St. Croix, constructed by other agencies, are being stocked and placed under a management program by the project. Exploratory marine fishing is being carried out to learn the recreational possibilities of the fishery resource about the Islands.

Began August 1952, continuing; \$10,000.

Address correspondence to: William Miller, Project Leader, Govt. House, Charlotte Amalie, St. Thomas, V. I.

SUBJECT INDEX

Numbers given under subject headings indicate pages on which projects involving the particular subject appear. The State or Territory in which the work is being done is also given as an aid to those who may be interested in work in a limited part of the country. The heterogeneous nature of many projects did not permit complete cross indexing. The number of subjects was kept at a minimum, with the result that certain categories contain material which might be regarded as being more appropriately placed under a different subject. Subjects were chosen largely on the basis of the frequency with which they appeared in the project descriptions.

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