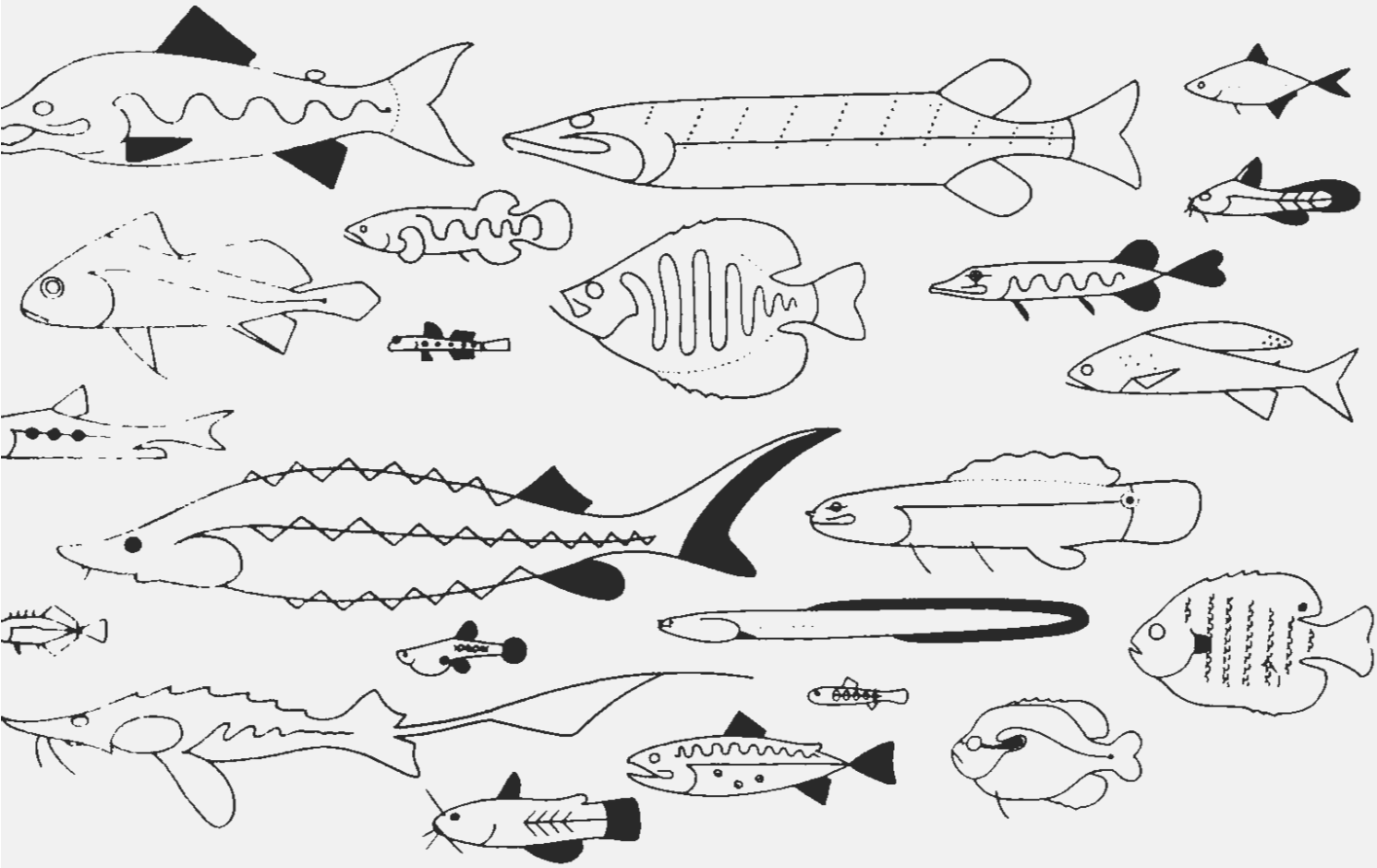
U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

DIVISION OF FISHERY SERVICES

ANNUAL REPORT FOR 1966,

With a Summary of Accomplishments for the Period 1957 – 1966



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

RESOURCE PUBLICATION 40

The Department of the Interior, created in 1849, is concerned with management, conservation, and development of water, wildlife, fish, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As America's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States, now and in the future.

Cover -- Drawing by Craig Phillips, National Fisheries Center and Aquarium, Washington, D.C.

UNITED STATES DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY
Stanley A. Cain, Assistant Secretary for Fish and Wildlife and Parks
Fish and Wildlife Service, Clarence F. Pautzke, Commissioner
Bureau of Sport Fisheries and Wildlife, John S. Gottschalk, Director

DIVISION OF FISHERY SERVICES

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With a Summary of Accomplishments for the Period 1957—1966

Willis King, Chief

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RESOURCE PUBLICATION 40

Washington, D.C. June 1967

TABLE OF CONTENTS

TABLES AND FIGURE

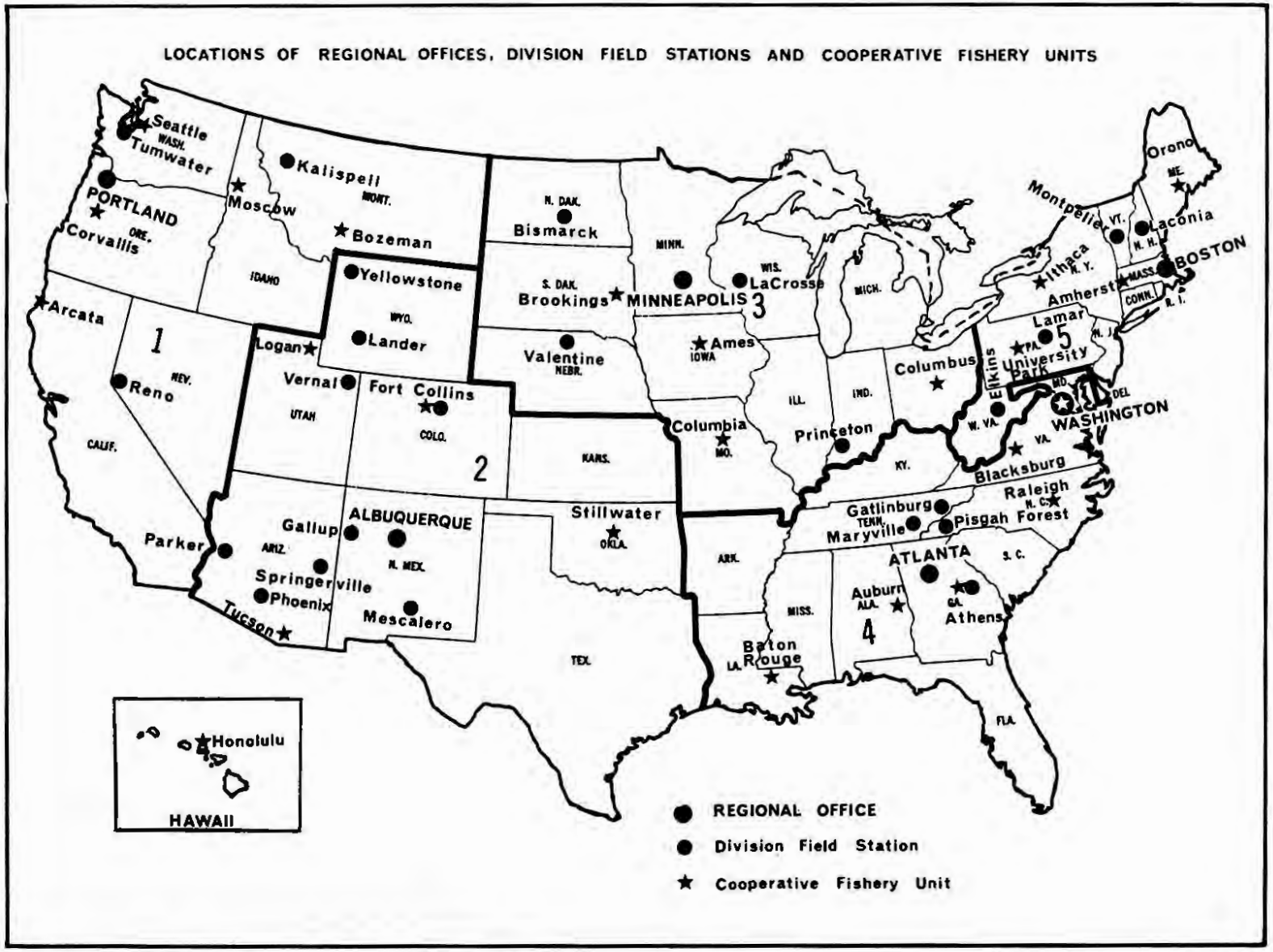


Figure 1. -- Locations of Regional Offices, Division Field Stations and Cooperative Fishery Units.

DIVISION OF FISHERY SERVICES ANNUAL REPORT FOR 1966, WITH A SUMMARY OF ACCOMPLISHMENTS FOR THE PERIOD 1957-1966

The primary objective of the Division of Fishery Services is to provide better sport fishing for the present and future by applying the techniques learned from research and experience.

This is accomplished in the following ways:

1. By providing guidance to other Federal landowner agencies and Indian tribes in the development and execution of fishery management programs so as to make the maximum fishing available without undue interference with the primary objectives of the areas.

2. By assuring that the fish produced at national fish hatcheries are stocked in such a manner as to provide maximum fishing to the angler; and to provide information which will help gear hatchery production to stocking requirements.

3. By providing means of cooperation with, and assistance to, the States in their fishery management programs where there are mutual State-Federal interests. Duplication of effort is avoided and accomplishments are greater when both agencies work together.

4. By participation in programs of training and studies at colleges and universities by the establishment of Cooperative Fishery Units.

5. By providing information to the public on fishery management through extension-type activities and printed materials.

Director Gottchalk speaking at the ground breaking ceremonies for the Fishery Services Field Headquarters near Princeton, Indiana, September 17, 1966.

An Artist's Sketch of the new Fishery Service Field Headquarters near Princeton, Indiana.

Brief History of the Division of Fishery Services

During the early 1950's, trained fishery biologists were added to the Section of Fisheries Management, Branch of Game-fish and Hatcheries, to undertake studies of stocking success resulting from plants of fish produced at national fish hatcheries. Limited fishery management technical services were provided on a few Federal areas and Indian reservations.

The program was expanded in 1957 by the establishment of a Branch of Fishery Management Services. The Branch obtained divisional status in 1963. The name of the Division was changed in 1965 when it became the "Division of Fishery Services."

At the start, the Branch included 17 fishery biologists, 11 of whom are still with the Division while 5 are with other Bureau divisions which work closely with Fishery Services. One is in a higher administrative position associated with the Division.

During 1957, fishery biologists visited 137 Federal areas and prepared 172 reports. Cooperative projects included participation with the Upper Mississippi River Conservation Committee and the Steering Committee for Roanoke River Studies in North Carolina and Virginia. Cooperative agreements were established with several States regarding the stocking of fish from national fish hatcheries. Other projects included an investigation of the effects of strip mining on aquatic life, the establishment of a farm pond demonstration program, and participation in the trout management program in the Black Hills of South Dakota.

During 1958, assistance was provided to 225 Federal areas and Indian reservations, and most cooperative projects were continued. Other activities included a cooperative study of fishes in a portion of the Coosa River system in Alabama and the Little Missouri and Spring Rivers in Arkansas. Cooperation was extended to State fishery personnel in connection with the distribution of fish from national fish hatcheries. Training and extension activities included providing assistance to several colleges and universities in their conservation programs. A pesticide field appraisal was made of a fire ant control project in Georgia.

Additional activities in 1959 included a survey of 1,000 farm ponds conducted in cooperation with fish hatchery personnel. The survey was made on ponds stocked by the Bureau and pointed out the

significant contribution which fish from national fish hatcheries are making in the United States. During 1960, studies were made of the Colorado River trout fishery in the Southwest and assistance was provided in the development of fishery management programs on several Missouri River reservoirs in Montana.

The year 1960 was an important one in the life of Fishery Management Services. The "Cooperative Fish and Wildlife Unit Act" (P.L. 86-686, 74 Stat. 733) was enacted in September 1960. The Act authorized the establishment of cooperative fishery units at colleges and universities for the purposes of research, training and extension in sport fisheries. The first unit was activated in January 1962, and the second unit was added in November 1962. Nine units were established during 1963, two in 1964, and one during 1965. Six became operative during 1966, bringing the total to 20 units. By the end of 1966, three additional units had been authorized.

Another significant legislative action in September 1960 was the "Sikes Act" (P.L. 86-797, 74 Stat. 1052). This Act promotes effective planning, development, maintenance and coordination of fish and wildlife conservation and rehabilitation on military reservations.

Near the close of 1960, the Bureau contracted with the Outdoor Recreation Resources Review Commission to prepare a report on the present and future role of recreational fishing in the United States. Fishery Services personnel played an important role in collecting data and preparing the report. The report was published in 1962 as ORRRC Study Report 7, "Sport Fishing - Today and Tomorrow." The report has become a valuable guideline for present and future sport fishery planning and development.

During 1961, activities of the Branch of Fishery Management Services continued to emphasize the objective of more and better fishing in waters on Federal lands and Indian reservations. During the year, 198 areas received assistance and 239 management reports were prepared.

By 1962, services were being provided to 284 Federal areas and Indian reservations. Major increases occurred in work on Indian reservations as a result of a specific appropriation of funds for this activity. The Branch undertook work at Yellowstone National Park using funds provided by the National Park Service.

The impact of the requirements for fishery management under the Sikes Act was not substantially felt until 1963 when 313 visits were made to Department of Defense areas. Special studies undertaken during 1963 included acid mine pollution investigations in West Virginia, a nationwide survey of the effects of acid mine pollution on fish and wildlife, a survey of potential trout waters in Kentucky, and fishery surveys on the Colorado, Delaware, and Mississippi Rivers.

During 1964, the program of pesticide field appraisal was expanded on Federal lands, and a special study of the effects of herbicides on aquatic life, as a part of the Corps of U.S. Army Engineers' "Expanded Project on Aquatic Plant Control," was begun in North Carolina. Other activities included a survey of flood damages in Montana, an investigation of damage from oil pollution along the Pacific Coast off the Quinault Indian Reservation in Washington, and the preparation of materials on rare and endangered fishes in the United States. A field office was established at park headquarters at the Great Smoky Mountains National Park to facilitate studies of park waters.

The pesticide field appraisal program was expanded during 1965 when observations were made on 19 areas involving 318,000 acres. Also, during 1965, a cooperative trout management project was established in eastern Tennessee. Acid mine pollution studies included pre-abatement surveys at the Randolph County, West Virginia demonstration project and participation in a nationwide study of the effects of strip and surface mining. Assistance was provided to the Department of Health, Education, and Welfare in a survey of the lower Mississippi River and to the Department of the Interior in a cooperative Federal-State study of the Potomac River Basin.

Highly erodable manganese spoil piles in Virginia support sparse vegetation after 25 years of abandonment and contribute silt and sediment to downstream areas.

The U.S. Forest Service demonstrated that manganese spoil areas can be revegetated as shown above.

Summary of 1966 Activities

During 1966, biologists of the Division of Fishery Services made 367 visits to Federal areas and Indian reservations and prepared 255 technical reports on fishery investigations and management recommendations. The acreage of lakes, ponds and reservoirs under management increased from 445,500 acres in 1965 to 711,700 acres in 1966. The mileage of streams under management remained about the same. During 1966, technical assistance was provided on 1,621 acres of newly created waters. Of these, 513 acres were on military areas and 801 acres on Indian reservations. Man-days of fishing on managed waters increased by almost 420,000 over 1965 and totaled 5,363,000 days. Major increases in fishing occurred on Indian reservations, totaling 158,000 days over 1965 and on National Forests where the increase over the previous year was 110,000 days.

Beginning in 1965, the Division cooperated with other governmental agencies in a study of strip and surface mining in Appalachia, with findings issued as an Interim Report by the Secretary of Interior to the Appalachian Regional Commission, dated June 30, 1966. Also in 1966, the major surface mining areas throughout the country were visited by biologists who served as members of Interior's Field Appraisal Team. Additional data were gathered through a questionnaire and an interagency random sampling program. The information is being completed, analyzed and prepared for publication as a part of Interior's Report to the President and the Congress on surface mining in the United States.

Cooperative fishery units were established during 1966 in Hawaii, Iowa, Ohio, Oklahoma, Oregon, and Virginia bringing the total number to 20. Thirty courses in fishery science were taught by unit personnel with 370 students enrolled. Special supervision was given to 132 graduate students. Advanced degrees were awarded to 34 graduates of the unit program, 6 received the Doctor of Philosophy degree and 28 were awarded the Master of Science or Master of Arts degree.

Division biologists participated in the following additional cooperative projects:

1. Pesticide field appraisals were made on 11 projects involving portions of 660,000 acres of Federal lands and Indian reservations which were treated with chemicals. Follow-up studies were made on 4 areas on which 134,000 acres were treated in 1965.

2. Studies of the effects of herbicides used in the Corps of U.S. Army Engineers' Expanded Project on Aquatic Plant Control were continued.

3. Fish population studies were made in the lower Mississippi River as part of the pollution investigations of the Federal Water Pollution Control Administration.

4. Coordination of fishery activities of the Upper Mississippi River Conservation Committee was continued.

5. Trout management studies in eastern Tennessee were expanded to include Dale Hollow Reservoir.

6. Assistance was provided in fishery studies of southwestern water development projects including Central Arizona, Central Utah, Navajo Irrigation in New Mexico, Colorado River Channelization in Arizona, and the Colorado River Storage Project.

7. Assistance was provided in the conservation of two endangered species, the Arizona (Apache) trout and the greenback cutthroat trout of Colorado.

8. A national survey of needs for hatchery fish was initiated. Division biologists participated in the design, data collection, and data processing of a national survey to determine present and future needs for hatchery fish. The survey included an inventory of fish-supporting waters of the United States.

Table 1.--Number of areas served, 1966

	Region					Totals
	1	2	3	4	5	
Department of Defense	28	17	16	68	29	158
Air Force	10	5	4	13	9	41
Army	8	11	11	34	13	77
Navy and Marine Corps	10	1	1	21	7	40
Other Federal Areas						
Veterans Administration	-	2	8	2	5	17
National Forests	1	-	1	5	5	12
National Parks	3	2	-	5	-	10
Wildlife Refuges	8	4	25	17	1	55
Miscellaneous	1	3	1	3	2	10
Indian Reservations	15	24	10	3	-	52
Totals	56	52	61	103	42	314

Members of the Pueblo Army Depot, Colorado Sportsmens' Club assist handicapped children with their tackle during their Fishing Derby. U.S. Army Photograph.

Fishery Management Programs on Department of Defense Areas

Fishery management activities on military installations are carried out under cooperative agreements and plans under Public Law 86-797, the Sikes Act (74 Stat. 1052) and a Memorandum of Understanding, dated July 11, 1960, between the Department of Defense and the Department of the Interior. These cooperative agreements are signed by the installation commander, the regional director of the Bureau of Sport Fisheries and Wildlife, and usually the director of the State fish and game department. Activities are coordinated with other Federal and State agencies involved in land and water conservation programs. Following the enactment of the Sikes Act on September 15, 1960, agreements have been signed with 183 Department of Defense areas where the Division pursues active fishery management programs. Agreements were also signed with the Department of Defense Command in Alaska and with the Army Commanders in Hawaii covering 39 units of the Fort Shafter and Schofield Barracks areas.

During 1966, Fishery Services' biologists made 184 visits to 158 military installations. These areas had 25,115 acres of lakes ponds and reservoirs and 179 miles of streams under fishery management and provided almost a million man-days of fishing. Over 500 acres of newly constructed fishing lakes and ponds were placed under fishery management during the year.

Clover Creek, stocked periodically with catchable size rainbow trout, is a popular fishing area on McChord Air Force Base, Washington. U.S. Air Force Photograph.

Opening day of the fishing season at Childrens trout pond, Fort Lewis, Washington. U.S. Army Photograph.

Buck Rodgers and friend with bass catch at Cheatham Annex, Williamsburg, Virginia. Photograph courtesy, the Mariners Museum, Newport News, Va.

Fishery Management Programs on Veterans Administration Areas

Sport fishing is a popular activity for many patients of Veterans Administration hospitals. The program of providing technical fishery management assistance to Veterans Administration areas began in 1951 under the former Branch of Game-fish and Hatcheries and was transferred to the newly created Branch of Fishery Management Services in July 1957.

Fishing facilities are rather limited on most areas and usually consist of one or two ponds which are intensively utilized. During 1966, assistance was furnished to 17 hospitals having 65 acres of ponds and 6 miles of streams. These provided 24,200 man-days of fishing. At some hospitals which lack fishing waters, arrangements are made for fishing in nearby public and private waters. Both the States and sportsmens' clubs cooperate with the Bureau and the Veterans Administration in the fishery management programs at many of these areas.

Patients from Lenwood Veterans Hospital fishing at Leitner Pond, Fort Gordon, Ga. U.S. Army Photograph.

West Virginia trout stream damaged by private logging operations.

These inexpensive stream improvement devices were designed by Fishery Service on Williams River, Monongahela National Forest, West Virginia.

Fishery Management Programs on National Forests

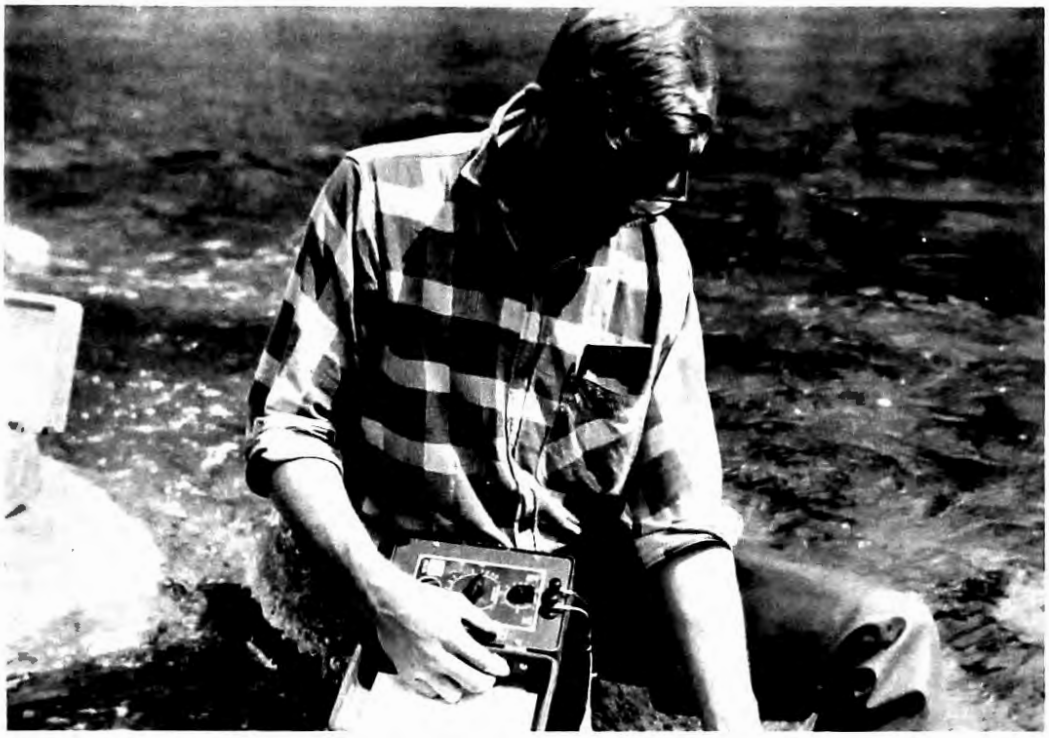
Fishery services are provided on some National Forests in accordance with a Memorandum of Understanding, dated October 19, 1960, between the U.S. Fish and Wildlife Service and the U.S. Forest Service, and in cooperation with the State fish and game departments.

During 1966, services were provided to 12 national forests, 10 of which are in the eastern United States. Extensive management assistance activities were carried out on the following forests: Allegheny, Pennsylvania; Daniel Boone (formerly Cumberland), Kentucky; Green Mountain, Vermont; Jefferson, Virginia; Monongahela, West Virginia; George Washington, Virginia and West Virginia; and White Mountain, New Hampshire and Maine.

The principal effort by fishery management biologists on most of the forests consisted of trout management. Other work included fishery surveys on lakes and streams, collecting creel census data, controlling non-game fish, and improving streams.

The 25,731 acres of lakes, ponds and reservoirs and 3,598 miles of streams under cooperative management on the 12 forests provided nearly 2 million man-days of fishing.

Fishery Services and U.S. Forest Service personnel electrofishing during a watershed study on the White Mountain National Forest, New Hampshire.



Biologist checks conductivity of water in a Yellowstone National Park stream.

Collecting water chemistry data during a back country stream survey, Yellowstone Park.

Fishery Management Programs on National Parks

Technical assistance and services in fishery management are provided the National Park Service in accordance with a Memorandum of Understanding approved by the Assistant Secretary of the Interior for Fish and Wildlife and Parks on August 5, 1966. The current Memorandum superseded the previous Memorandum of June 15, 1960.

Technical assistance was provided on 112,323 acres of lakes and ponds and 1,540 miles of streams on 10 national parks. These waters provided 813,100 man-days of fishing during the year.

Comprehensive investigations were continued at Yellowstone and Great Smoky Mountains National Parks.

This was the fifth year that Fishery Services biologists worked at Yellowstone National Park. In addition to continuing the work on 88,000-acre Yellowstone Lake, surveys were carried out on 15 other lakes and 9 streams during 1966.

Creel census on Yellowstone Lake indicated a catch of 299,253 cutthroat trout in 202,265 man-days of fishing with an average catch per angler-hour of 0.63 fish. During the past 17 years the catch per hour's fishing has been fairly constant and ranged from 0.6 to 0.8 trout.

The annual spring program of trapping spawning runs in tributaries of Yellowstone Lake was continued. A new record of 52,331 trout were trapped.

New studies initiated during the year included fishery ecology of the Lower Yellowstone River between the Lake and Upper Falls, migration of trout fry and fingerlings entering the lake from Clear Creek and investigations of mortalities of juvenile trout entering the Lake from tributary streams.

The findings of physical, chemical and biological investigations of 24 other lakes and streams were described in a 102-page, illustrated report. No fish were found in some of the lakes while others ranged from moderately to highly productive.

Over 6 million persons visited the Great Smoky Mountains National Park in Tennessee and North Carolina during 1966. About 38,000 anglers were counted, an increase of 44 percent over the 1965 counts. The fishing season was increased by 45 days and additional waters were opened to fishing.

Another excellent season was enjoyed by anglers in park waters. The average catch per fishing trip was 12.6 fish with an average catch rate of 3.9 fish per hour's fishing.

Biologists check the fish population under ice using a gill net at Watts Lake, Valentine National Wildlife Refuge, Nebraska.

Fish population sampling in the Allegheny Reservoir, Pa. by Fishery Services and Pennsylvania State University. Photo-Pa. Fish Commission.

"Before" and "after" views of Upper Peverly Pond, Pease Air Force Base, New Hampshire showing effects of herbicide treatment on aquatic vegetation. U.S. Air Force Photographs.

Fishery Management Programs on National Wildlife Refuges

Managed fishing waters on 120 of the 300 National Wildlife Refuges offer splendid opportunities for the public enjoyment of recreational fishing. During 1966, refuge waters provided 3.8 million man-days of sport fishing, an increase of 275,000 days over 1965.

A study of the population dynamics of fishes in Lake Mattamuskeet continued under the leadership of the North Carolina Cooperative Fishery Unit. Work on Lacassine and Sabine National Wildlife Refuges, conducted by students of the Louisiana State University Cooperative Unit, included research on the distribution and abundance of fishes and food habits of the bowfin.

An intensive vegetation control program was carried out with herbicides on Wichita Mountains Wildlife Refuge, Oklahoma. Approximately 318 surface acres of water were reclaimed for recreational use as a result of the treatments. Fishery Services and Refuge personnel cooperated in these operations.

Surveys were made of water areas on Slade National Wildlife Refuge, North Dakota to determine the fishery management potential. Water quality studies were completed on Lower Souris National Wildlife Refuge, North Dakota to provide a better understanding of management problems of this area.

Fishery Services' biologists visited 60 refuges during 1966. The refuges visited provided 450,000 man-days of fishing during the year.

Fishery Management Programs on Other Federal Areas

Other Federal areas which received assistance during the year included Bureau of Prisons facilities in Colorado, Kansas, Pennsylvania, and Washington; Fort Logan National Cemetery, Colorado; Public Health Service Hospital at Carville, Louisiana; Goddard Space Flight Center and National Institutes of Health Research Farm in Maryland; and NASA Test Operations Center in Mississippi. These areas have 453 acres of lakes and ponds which provided 11,600 man-days of fishing during the season.

Tribal member boring hole through the ice in order to check dissolved oxygen content of Goose Lake, Blackfeet Indian Reservation, Montana.

Catch of brook trout made through the ice on Goose Lake by tribal member.

The fishing and marketing of salmon from the Quinault Indian Reservation streams is a major activity at the villages of Taholah and Queets, Washington.

Fishery Management Programs on Indian Reservations

Among the more successful fishery programs is the work with Indian tribes and the Bureau of Indian Affairs. During the year, 67 visits were made to 52 Indian reservations (table 2) having provided 1,068,900 man-days of fishing. About 1,060 acres of lakes were reclaimed or improved, and 801 acres of new fishing waters were completed.

The tourist industry, associated with the development of sport fishing on many Indian reservations, has become a major source of income. High quality fishing coupled with outstanding scenery is becoming increasingly popular with the American sportsman.

Fishery management assistance has been provided to Indian tribes over the past 15 years. The program progressed rather slowly until 1962 when a specific appropriation was provided by Congress. The growth of the program during the 1957-1966 period is shown in tables 20 through 25.

Table 2.--Number of Indian reservations served during 1966

State	Number	State	Number	State	Number
Arizona	9	Minnesota	2	North Dakota	3
California	1	Montana	4	Oregon	2
Colorado	2	Nebraska	1	South Dakota	4
Florida	1	Nevada	2	Utah	1
Idaho	2	New Mexico	10	Washington	5
Mississippi	1	North Carolina	1	Wyoming	1
				Grand Total	52

Navajo Tribal Rangers applying molasses to Round Rock Lake, Arizona for fertilization experiment. Photo-Jack Dean.

Indians in the village of Taholah depend on salmon runs into Quinault River and other reservation streams. Ownership of net sites, visible in the above photo, are hereditary.

Cooperative Fishery Units

The cooperative fishery unit program was initiated September 2, 1960 by the enactment of Public Law 86-686 (74 Stat. 733). The stated purpose of the act is "To facilitate cooperation between the Federal Government, colleges and universities, the States, and private organizations for cooperative unit programs of research and education relating to fish and wildlife and for other purposes".

Each fishery unit is a cooperative effort involving the Bureau of Sport Fisheries and Wildlife, a college or university, and (with one exception) a State game and fish department. A coordinating committee, representing the participating agencies, provides general guidance to each unit, including review of proposals for graduate studies and annual budgets. The Bureau provides two highly trained fishery biologists to serve as unit leader and assistant unit leader.

During 1966, six cooperative fishery units were established bringing the total number to 20 (table 3).

The first joint meeting of unit leaders and representatives of cooperating agencies was held in Kansas City, Missouri during September, 1966 following the conference of the American Fisheries Society. The meeting was considered highly informative and successful in advancing program objectives.

During the year, unit personnel taught 30 courses with an enrollment of 370 students. Advanced degrees were awarded 34 graduates of the unit program, 6 Doctors of Philosophy and 28 Masters of Science. Unit personnel, student researchers, and unit cooperators, prepared 66 manuscripts which were accepted for publication.

A detailed report on the unit program is presented in Resource Publication 41 which may be obtained from the Bureau of Sport Fisheries and Wildlife, U.S. Department of Interior, Washington, D.C. 20240.

Leroy Heaton extracting drug from fish tissue in a study at the Colorado Cooperative Fishery Unit.

Endangered greenback cutthroat trout are released into Hourglass Creek, a remote mountain stream in the Roosevelt National Forest, Colorado.

University of Georgia Cooperative Fishery Unit Leader Mel Huish and students sample a lake at Fort Gordon, Georgia. U.S. Army Photo.

Table 3.--Cooperative Fishery Units and locations

Unit	Location	Calendar Year Established
Arizona	University of Arizona, Tucson	1964
Colorado	Colorado State University, Fort Collins	1963
Georgia	University of Georgia, Athens	1963
Hawaii	University of Hawaii, Honolulu	1966
Idaho	University of Idaho, Moscow	1964
Iowa	Iowa State University, Ames	1966
Louisiana	Louisiana State University, Baton Rouge	1963
Maine	University of Maine, Orono	1962
Massachusetts	University of Massachusetts, Amherst	1963
Missouri	University of Missouri, Columbia	1963
Montana	Montana State University, Bozeman	1963
New York	Cornell University, Ithaca	1963
North Carolina	North Carolina State University, Raleigh	1963
Ohio	Ohio State University, Columbus	1966
Oklahoma	Oklahoma State University, Stillwater	1966
Oregon	Oregon State University, Corvallis	1966
Pennsylvania	Pennsylvania State University, University Park	1963
South Dakota	South Dakota State University, Brookings	1965
Utah	Utah State University, Logan	1962
Virginia	Virginia Polytechnic Institute, Blacksburg	1966

Units authorized but not staffed in 1966

Alabama	Auburn University, Auburn
California	Humbolt State College, Arcata
Washington	University of Washington, Seattle

Personnel of the Massachusetts Cooperative Fishery Unit prepare to dive in the Connecticut River to retrieve experimental siltation boxes.

Cooperation with the Division of Fish Hatcheries

One of the requirements for efficient fish hatchery operation is advance knowledge of the kinds and amounts of fishes required. Much of the information on future needs in management programs is provided the Division of Fish Hatcheries by the Division of Fishery Services. During 1966, about 34 million fish weighing about 2.7 million pounds were stocked from national fish hatcheries on managed waters associated with Fishery Services' activities. Federal areas and Indian reservations received over 12 million fish weighing over 1 million pounds, and Federal-State cooperative areas received 21.1 million fish weighing over 1.5 million pounds.

One of the early responsibilities assigned to Fishery Services was to evaluate the sport fishing success resulting from plants of hatchery fish. This is a major task which involves close cooperation with the Division of Fish Hatcheries. National fish hatchery facilities are usually utilized during the marking or tagging phase of this program. The marked fish are stocked by hatchery personnel at the right time in the right place. Cooperative creel census programs are carried out to determine the sizes and amounts of stocked fish which enter the fisherman's creel. Fish population studies are made to determine the composition of the fishery and the abundance of hatchery fish. Most of the studies carried out during the year indicated that hatchery fish made important contributions to the sport fisheries. There were a few instances where no traces of the stocked fish were found. These latter instances were usually in waters which contained an abundance of wild fishes. Most of the stocking evaluation studies are carried out on Federal areas and Indian reservations where assistance is provided by the cooperators. The evaluation of farm pond stocking is rather limited due to the large number (2 million) of ponds and their wide geographic distribution.

Aerial view of Edenton National Fish Hatchery, North Carolina. U.S. Marine Corps Photograph.

Other Cooperative Projects

Effects of Mineral Mining Operations on Fisheries

Division biologists continued to participate in the several programs concerned with the silt, acid and iron pollution which result from coal mining operations. These programs include the following:

a. Effects of strip mining in the Beaver Creek Basin in Kentucky. Portions of the study area are located on the Daniel Boone (Cumberland) National Forest.

b. Effects of mining and coal processing operations on the water quality of the Gauley River and Summerville Reservoir in West Virginia.

c. Effects of coal mining and reclamation on the water quality of Shavers Fork, a source of hatchery water supply at the Bowden National Fish Hatchery in West Virginia.

d. Pre-abatement studies of aquatic habitat at Acid Mine Drainage Pollution Control Demonstration projects in West Virginia and Pennsylvania. Surveys of other potential demonstration sites were made in Kentucky, Maryland and Pennsylvania.

e. Participation in the Advisory Work Group of the Monongahela River Mine Drainage Remedial Project of the Federal Water Pollution Control Administration.

f. National Survey and Study of Strip and Surface Mining in the United States.

The Chief of the Division of Fishery Services serves as representative of the Bureau of Sport Fisheries and Wildlife on the Inter-departmental Working Committee for this survey and study. Two members of the Division served on the Field Appraisal Team for the first phase of the study which included Appalachia. An interim report by the Secretary of the Interior titled, "Study of Strip and Surface Mining in Appalachia" was provided the Appalachian Regional Commission on June 30, 1966. It was found that approximately 800,000 acres of land have been disturbed

An open pit uranium mine in New Mexico. New water holes will be formed on these Indian lands when mining is completed which will increase the carring capacity of the surrounding lands for livestock and wildlife. Photo-Ron Ogden.

The mining of molybdenum in New Mexico is reshaping the mountains. This type mining reduces the usefulness of the land for both humans and wildlife and causes tremendous silt and sediment damage to streams. Photo-Willard Spaulding.

by strip mining for coal in Appalachia. The results have been acid and sediment pollution of streams, massive slides along outslopes, destruction of forests, damage to watersheds, wasted natural resources, health and safety hazards, and impaired aesthetic and economic values. It was estimated that the cost for basic reclamation would be about 251 million dollars. Basic reclamation was defined as water quality control - to the extent it can be achieved by establishing proper drainage, covering toxic materials, and vegetating pit and spoil areas. It does not mean, or imply, the restoration of the terrain to the original contour. Although the report is concerned primarily with strip coal mining in Appalachia, data are presented on surface mining of clay, sand, gravel, and stone.

The second phase of the survey and study included a nationwide inspection of surface mining of minerals and the collection of data by personal contact with the State conservation agencies. Data were obtained regarding the types and extent of damage to fish and wildlife habitat, the restoration measures required to improve the habitat, the types of fish and wildlife which would benefit from reclamation, the interest in reclamation and needs for assistance, and descriptions of recent studies and developments regarding fish and wildlife in areas disturbed by surface mining.

As of December 31, 1966, it was determined that there were 3.2 million acres of disturbed area due to surface mining in the United States. The amount of fish and wildlife habitat damaged by surface mining operations was 2.2 million acres including 12,900 miles of streams containing 136,000 acres, 281 natural lakes having 103,630 surface acres, 168 impoundments having 41,516 surface acres, and 1.7 million acres of wildlife habitat.

It was estimated that by carrying out basic reclamation measures on the 2.2 million acres of disturbed land fisherman and hunter use would increase 40 million man-days. If fish and wildlife development were specifically included in the reclamation program an estimated increase of 68 million man-days of fishing and hunting use would result.

A report on the entire study and survey will be provided by the Secretary of the Interior to the President and the Congress on or before July 1, 1967.

Croswell Henderson and Jack Becker check Fools Creek, Big Horn Mountains, Wyoming during pesticide field appraisal. Photos-William Melander.

Effects of an insecticide treatment at ten times the recommended dosage are shown above. Ponderosa Pond, Holmes County, Mississippi.

Taking a drift sample on Pryor Creek, Crow Indian Reservation, Montana, for field appraisal of Grasshopper Control Project

Pesticide Field Appraisal

Pesticide field appraisal, or pesticide surveillance, was continued during 1966. Field appraisal was carried out on 11 projects involving portions of 660,000 acres on Federal lands and Indian reservations (table 4). Limited follow-up studies were conducted on 4 areas included in the 1965 program. These were on the Bitterroot National Forest, Montana, the Bighorn National Forest, Wyoming, the Bureau of Land Management chickenbrush and sagebrush control project in Colorado, and the Teton National Forest, Wyoming.

Expanded Project on Aquatic Plant Control

The U.S. Corps of Engineers held an Aquatic Plant Control Conference in January, 1966 to plan and coordinate a program for the fiscal year 1967. Division of Fishery Services participated in this meeting.

Existing studies under this program were continued in two southeastern States. An experiment to determine the effect of Kuron (silvex) on midge larvae (Tendipedidae) was conducted in North Carolina. Concentrations of 0.1 to 10.0 ppm of Kuron had no detrimental effects on midge larvae populations in the test pools.

Kuron was also tested in the laboratory for its effect on the eggs and fry of bluegill sunfish, chain, and redfin pickerel. Preliminary results indicate that pickerel reproduction would be substantially reduced by concentrations of 1.0 ppm or more of Kuron. Concentrations up to 10 ppm did not influence hatching of bluegill eggs, although the fry did not survive at 5.0 ppm or above. The tolerance of bluegill fry was found to be between 1.0 and 5.0 ppm.

Fish population studies continued in the Turkey Creek and White's Canal areas in North Carolina.

Fish samples from the three Louisiana study areas were checked for silvex residues and reported by the Southeast Water Laboratory, Federal Water Pollution Control Administration, Athens, Georgia.

Table 4.-- Pesticide field appraisal, 1966

State	Area	Target Pest	Chemical	Acres Treated	Effects Observed on Aquatic Life
California	Yuma Indian Reservation	Aquatic plants	AQUALIN (Acrolein)	7	Partial fish kill (1)
Delaware	Bombay Hook National Wildlife Refuge	Mosquitoes	ABATE	450	None
Idaho	Salmon National Forest	Spruce budworm	ZECTRAN	(Report in preparation)	
Mississippi	Experimental test area	Mosquito larvae	DURSBAN	1	Variable (2)
Mississippi	Experimental test area	Mosquito larvae	DURSBAN	100	Variable (3)
Montana	Crow Indian Reservation	Grasshoppers	Malathion	562,000	None
New Mexico	Carson National Forest	Spruce budworm	Malathion	50,000	Some loss of insects
Oregon	Bureau of Land Management	Rodents	Endrin-coated fir seeds	5,200	None
Utah	Dixie National Forest	Grasshoppers	Malathion	4,300	Trout mortality (4)
Washington	U.S. Army Corps of Engineers	Aquatic plants	Xylene	21 miles of ditches	Inconclusive (5)
Wyoming	Wind River Indian Reservation	Grasshoppers	Malathion	37,440	None

(1) A partial fish kill resulted from an overdose of acrolein applied to a drainage ditch in California.

(2) Obaervations were made on field tests by the Dow Chemical Company of DURSBAN formulation No. M-2840, a mosquito larvicide. Two ponds in Mississippi were treated at the recommended rate of 0.025 pounds per surface acre, and one pond was treated with 10 times the recommended rate. A light kill of small bluegill occurred in the ponds receiving 0.025 pounds without apparently affecting the fishery. There was practically a complete kill of green sunfish, bluegill, and bullheads in the pond which received 0.25 pounds per acre.

(3) Additional field tests were conducted by the Dow Chemical Company and the Gulf Coast Mosquito Control District in parts of Bay St. Louis uaing 0.05 pounds of DURSBAN per acre. Fiddler crabs were virtually eliminated in the test area and shrimp and blue crabs suffered heavy losses. One month after treatment normal populations of shrimp and blue crabs inhabited the test area but fiddler crabs were still absent. There were no significant mortalities of fishes.

(4) A mortality of about 80 brook trout, ranging from 3 to 14 inches in length, occurred in the East Fork of Podunk Creek, Utah. The treatment involved aerial spraying of 8 ounces of malathion per acre. Spray card information and observations indicated that there was considerable overlapping of spray swaths in the vicinity of the fish kill. All mortality occurred in unconfined fish with no mortality of fishes held in live boxes. Apparently the unconfined fish fed on insects killed by the spray.

(5) Following a reported fish kill in the Columbia River, Washington, in the vicinity of the outlets of drainage ditches which had been treated with xylene modifications were made in the treatment methods. The concentration of chemical was reduced and the treated water was held for a couple of hours before being pumped into the river. No mortalities occurred among trout held in live boxes during July treatments. Some mortalities occurred during August but may have been ude to high water temperatures which reached 74 degrees. Additional studies are planned for this project.

Federal Water Pollution Control Administration

Cooperation with this agency continued in 1966 with the assignment of a Fishery Services biologist to the Lower Mississippi River Technical Assistance Project. The biologist directed fish population surveys at seven stations on the Lower Mississippi and Atchafalaya Rivers. A report on the data collected was submitted to the Federal Water Pollution Control Administration and the assignment was terminated on December 31, 1966.

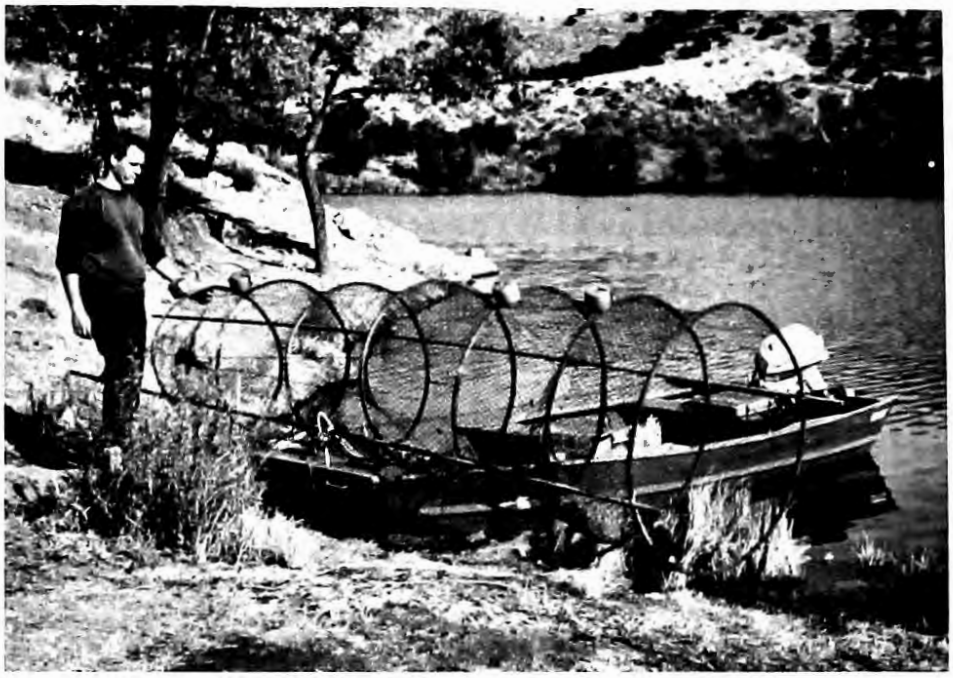
Cooperation with the Upper Mississippi River Conservation Committee

A Division biologist continued to serve as coordinator for activities of the Upper Mississippi River Conservation Committee. The Committee, which was formed in 1945, includes members from the conservation agencies of Illinois, Iowa, Missouri, Minnesota and Wisconsin. Cooperators include representatives of the Bureau of Commercial Fisheries, Bureau of Sport Fisheries and Wildlife, Bureau of Outdoor Recreation, U.S. Army Corps of Engineers, Federal Water Pollution Control Administration and the U.S. Soil Conservation Service. These agencies have united in a coordinated approach in the development of recreational programs associated with the River.

East Tennessee Fishery Management Project

A major cooperative effort was made by the Division of Fishery Services and the Tennessee Game and Fish Commission in planning and activating an investigation at Dale Hollow Reservoir, a 27,000-acre Corps of Engineers impoundment fed by the Wolf and Obey Rivers.

This is a study to determine the most efficient and economical ways of establishing and maintaining a trout fishery in a two-story reservoir. This will be accomplished by large-scale plants (approximately 1,000,000 annually) of trout of various sizes, stocked by different methods. Many of the stocked trout are marked by "fin clipping" in order that they may be identified as to size, date, and method of stocking. The stocking success of each marked group can thus be evaluated.



Richard Biggins prepares to set a hoop net at Pena Blanca Lake to catch specimens for food and predation studies. Arizona Fishery Cooperative Unit.

Bureau personnel fin-clipping rainbow trout for the Dale Hollow "Second-story" project. Photo-Hal Boles.

Dale Hollow Reservoir was first stocked in April, 1966 with 300,000 marked rainbow trout of the Wytheville strain. The Obey River, tributary to the reservoir, received 250,000 "eyed" eggs of Washington strain rainbow trout.

Limnological collections were limited to temperature and dissolved oxygen samples taken bi-weekly at ten stations on Dale Hollow Reservoir.

During October, 1966, a creel census program was initiated with three clerks working on the reservoir five days per week. This census is deisgned to obtain total angling pressure, total catch and other information which will be extremely valuable in managing the Reservoir's fishery.

Colorado River Storage Project

The Division of Fishery Services continued to perform staff functions in assisting the Bureau's Colorado River Storage Project Coordinator in connection with fishery investigations under Section 8 of the Colorado River Storage Project Act (P.L. 458, 84th Congress). The Project Leader of the Vernal Field Office is assigned duties as field inspector for such contracts on investigations being carried on at Navajo Reservoir, New Mexico; Lake Powell Reservoir, Utah and Arizona; Flaming Gorge Reservoir, Utah and Wyoming, and the Blue Mesa Reservoir, Colorado.

The Vernal office has also concluded fishery studies this year on waters of the Uintah and Ouray Indian Reservation that will be involved in the Bonneville Unit of the Central Utah Project.

Rare and Endangered Fishes

The Colorado Cooperative Fishery Unit conducted research on racial differences and distribution of trouts in the Rocky Mountain area. Included in these studies was the endangered greenback cutthroat trout, which is known to occur only in Blackhollow Creek, Cache la Poudre River Drainage and a few isolated streams in Boulder and Larimer Counties, Colorado.

Forty adult greenback cutthroat trout were introduced into Hourglass Creek, Roosevelt National Forest, Colorado in the first effort to establish this species in a suitable new habitat.

The endangered Little Colorado Spinedace was found to be more widely distributed than was previously thought. Recent investigations reveal this species to be present in significant numbers in at least 120 miles of streams that it was not known to occupy.

Division biologists transferred 100 Arizona (Apache) trout from Deep Creek to the newly constructed Sun Moon Lake on Fort Apache Indian Reservation, Arizona. This lake was built by the White Mountain Apache Tribe specifically for the preservation of this species. Christmas Tree Lake was also stocked with adult Arizona (Apache) trout from Deep Creek.

National Survey of Needs for Hatchery Fish

The purpose of the Bureau of Sport Fisheries and Wildlife's national survey of needs for hatchery fish was to collect information for estimating future nationwide sport fishing requirements for hatchery-reared fish. During the fall and winter of 1966, data were collected from Federal and State conservation agencies on the present and future: (1) amount of sport fish habitat; (2) amount of habitat stocked and to be stocked; (3) number and types of fishermen; (4) stocking requirements; and (5) hatchery fish production. Fishery Services biologists participated in designing the survey and in collecting the data. The Division was given the primary responsibility of processing the data.

Other Activities

Each year, hundreds of requests are received by the Division of Fishery Services for assistance on private ponds and lakes. Most work on private waters is in connection with the farm pond stocking program and is at the request of owners or the U.S. Soil Conservation Service. Over 200 visits were made to private ponds and streams to advise on fish management.

A program to ascertain the growth rates, survival, and the amount of fishing provided by fingerling trout stocked in private ponds from Maryland to South Carolina has begun to show results. Ponds drained this year indicated returns to the creel ranging from 5 to 65 per cent with some fish reaching 16 inches in length after two years without supplemental feeding. Farm pond management studies were carried out, in cooperation with the Soil Conservation Service, on 30 ponds in West Virginia. Aquatic weed control demonstrations were held on 2 military installations in the southeast.

Other Training

Division biologists participated in numerous training sessions for conservationists. These included a tour of the Fort Apache Indian Reservation in Arizona. Fort Apache has one of the most progressive sport fishery development and management programs in the United States. Tribal training sessions were held at the Blackfeet Indian Reservation, Montana; the Uintah and Ouray Indian Reservation, Utah; and the Pine Ridge Indian Reservation in South Dakota. A member of the Division serves on the Advisory Committee for the fishery technician course at Peninsula College, Port Angeles, Washington. Several Indian students from Washington coastal tribes are enrolled in the program. The Division continued to provide an instructor for the teacher's training course at the Lost River Conservation Camp in New Hampshire.

In addition to the student assistance programs of the Cooperative Fishery Units, limited numbers of college students are employed to assist field biologists in their summer work. The students gain knowledge and obtain valuable practical experience while providing much-needed help. During 1966, 20 students were employed in this program.

Table 5.--Summary of Fishery Services on Air Force Bases, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	5	5	4	16	9	39
Reports submitted	1	1	2	13	6	23
Waters under Management Acres of Lakes & Ponds	252	82	239	1,716	268	2,557
Miles of Streams	5	3	-	-	2	10
Acres of Fish Habitat Reclaimed or Improved	-	-	-	25	13	38
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	18	-	-	-	18
Man-Days of Fishing	23,700	29,600	29,300	193,400	22,400	298,400
Pounds of Hatchery Fish	11,394	15,555	5,324	306	5,670	38,249
Number of Hatchery Fish	46,701	62,000	43,040	43,650	16,252	211,643

Table 6.--Summary of Fishery Services on Army Installations, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	10	12	5	48	12	87
Reports submitted	3	2	2	45	10	62
Waters under Management Acres of Lakes & Ponds	537	1,021	330	3,732	1,159	6,779
Miles of Streams	19	7	30	56	44	156
Acres of Fish Habitat Reclaimed or Improved	-	16	-	211	-	227
Miles of Stream Reclaimed or Improved	-	1	-	-	25	26
Acres of New Waters Developed	78	239	-	37	106	460
Man-Days of Fishing	60,000	78,400	47,100	344,700	64,500	594,700
Pounds of Hatchery Fish	22,153	15,900	9,144	11,234	6,639	65,070
Number of Hatchery Fish	99,365	63,600	56,950	381,605	285,269	886,789

Table 7.--Summary of Fishery Services on Navy and Marine Corps Bases, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	17	1	1	31	8	58
Reports submitted	6	-	-	28	8	42
Waters under Management Acres of Lakes & Ponds	12,289	800	832	1,776	82	15,779
Miles of Streams	-	-	-	12	1	13
Acres of Fish Habitat Reclaimed or Improved	9	-	-	25	-	34
Miles of Stream Reclaimed or Improved	-	-	-	1	-	1
Acres of New Waters Developed	20	-	-	15	-	35
Man-Days of Fishing	26,600	2,700	4,800	51,900	13,800	99,800
Pounds of Hatchery Fish	16,264	1,075	-	3,047	869	21,255
Number of Hatchery Fish	101,413	506,000	-	73,150	10,390	690,953

Table 8.--Summary of Fishery Services on Department of Defense Areas, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	32	18	10	95	29	184
Reports submitted	10	3	4	86	24	127
Waters under Management						
Acres of Lakes & Ponds	13,078	1,903	1,401	7,224	1,509	25,115
Miles of Streams	24	10	30	68	47	179
Acres of Fish Habitat Reclaimed or Improved	9	16	-	261	13	299
Miles of Stream Reclaimed or Improved	-	1	-	1	25	27
Acres of New Waters Developed	98	257	-	52	106	513
Man-Days of Fishing	110,300	110,600	81,200	590,100	100,700	992,900
Pounds of Hatchery Fish	49,811	32,530	14,468	14,587	13,178	124,574
Number of Hatchery Fish	247,479	631,600	99,990	498,405	311,911	1,789,385

Table 9.--Summary of Fishery Services on Veterans Administration Areas, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	-	3	4	2	6	15
Reports submitted	-	1	-	1	4	6
Waters under Management						
Acres of Lakes & Ponds	-	18	4	11	32	65
Miles of Streams	-	3	1	-	2	6
Acres of Fish Habitat Reclaimed or Improved	-	-	-	-	2	2
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	3	-	-	-	3
Man-Days of Fishing	-	8,300	5,700	3,300	6,900	24,200
Pounds of Hatchery Fish	-	1,587	1,660	-	1,147	4,394
Number of Hatchery Fish	-	6,000	4,700	-	5,000	15,700

Table 10--Summary of Fishery Services on National Forests, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	1	1	1	5	6	14
Reports submitted	3	1	-	7	13	24
Waters under Management Acres of Lakes & Ponds	15	-	2,036	1,249	2,431	5,731
Miles of Streams	-	-	168	1,963	1,467	3,598
Acres of Fish Habitat Reclaimed or Improved	-	-	-	1	172	173
Miles of Stream Reclaimed or Improved	-	-	-	-	3	3
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	3,300	-	260,000	1,106,800	603,500	1,973,600
Pounds of Hatchery Fish	500	-	44,340	126,475	128,410	299,725
Number of Hatchery Fish	5,000	-	444,400	505,900	525,556	1,480,856

Table 11.--Summary of Fishery Services on National Parks, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	3	2	-	5	-	10
Reports submitted	-	4	-	5	-	9
Waters under Management						
Acres of Lakes & Ponds	20,938	91,200	-	188	-	112,326
Miles of Streams	-	535	-	1,005	-	1,540
Acres of Fish Habitat Reclaimed or Improved	-	-	-	-	-	-
Miles of Stream Reclaimed or Improved	-	-	-	10	-	10
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	240,600	508,700	-	63,800	-	813,100
Pounds of Hatchery Fish	3,980	62	-	28,415	-	32,457
Number of Hatchery Fish	157,807	19,500	-	85,234	-	262,541

Table 12--Summary of Fishery Services on National Wildlife Refuges, 1966

	REGION					
	1	2	3	4	5	Total
Areas visited	7	6	11	30	6	60
Reports submitted	2	1	9	10	5	27
Waters under Management						
Acres of Lakes & Ponds	5,750	4,500	86,192	95,476	468	192,386
Miles of Streams	16	-	-	-	16	32
Acres of Fish Habitat Reclaimed or Improved	140	-	-	-	100	240
Miles of Stream Reclaimed or Improved	2	-	-	-	-	2
Acres of New Waters Developed	-	-	-	3	-	3
Man-Days of Fishing	23,700	154,900	81,800	183,400	6,000	449,800
Pounds of Hatchery Fish	5,472	1,158	690	1,661	521	9,502
Number of Hatchery Fish	22,802	550,000	313	1,080,250	2,600	1,655,965

Table 13--Summary of Fishery Services on Miscellaneous Federal Areas, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	4	3	3	5	2	17
Reports submitted	2	1	3	4	10	20
Waters under Management Acres of Lakes & Ponds	104	52	2,570	287	2,200	5,213
Miles of Streams	-	-	-	-	8	8
Acres of Fish Habitat Reclaimed or Improved	-	-	300	5	-	305
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	1	300	-	-	301
Man-Days of Fishing	1,800	3,300	20,000	7,500	7,800	40,400
Pounds of Hatchery Fish	2,268	1,948	457	1,210	2,296	8,179
Number of Hatchery Fish	3,907	7,158	168,020	12,165	827,320	1,018,570

Table 14--Summary of Fishery Services on Indian Reservations 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	33	24	7	3	-	67
Reports submitted	9	17	6	10	-	42
Waters under Management						
Acres of Lakes & Ponds	128,201	16,755	225,914	23	-	370,893
Miles of Streams	889	2,172	35	50	-	3,146
Acres of Fish Habitat Reclaimed or Improved	893	162	-	3	-	1,058
Miles of Stream Reclaimed or Improved	3	2	-	-	-	5
Acres of New Waters Developed	678	58	65	-	-	801
Man-Days of Fishing	354,000	642,700	26,500	45,700	-	1,068,900
Pounds of Hatchery Fish	141,356	392,443	3,070	43,698	-	580,567
Number of Hatchery Fish	2,113,985	3,143,145	431,030	178,529	-	5,866,689

Table 15--Summary of Fishery Services on Federal Areas and Indian Reservations, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	80	57	36	145	49	367
Reports submitted	26	28	22	123	56	255
Waters under Management Acres of Lakes & Ponds	168,086	114,428	318,117	104,458	6,640	711,729
Miles of Streams	929	2,720	234	3,086	1,540	8,509
Acres of Fish Habitat Reclaimed or Improved	1,042	178	300	270	287	2,077
Miles of Stream Reclaimed or Improved	5	3	-	11	28	47
Acres of New Waters Developed	776	319	365	55	106	1,621
Man-Days of Fishing	733,700	1,428,500	475,200	2,000,500	724,900	5,362,800
Pounds of Hatchery Fish	203,387	429,728	64,685	216,046	145,552	1,059,398
Number of Hatchery Fish	2,550,980	4,357,403	1,148,453	2,360,483	1,672,387	12,089,706

Table 16.--Summary of Fishery Services on Federal-State Cooperative Areas, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	-	6	1	2	18	27
Reports submitted	-	2	-	3	7	12
Waters under Management						
Acres of Lakes & Ponds	42,484	222,000	-	28,900	11,634	305,018
Miles of Streams	35	151	613	-	551	1,350
Acres of Fish Habitat Reclaimed or Improved	-	-	-	-	-	-
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	-	-	2,723	2,723
Man-Days of Fishing	-	1,551,000	1,500,000	32,900	170,500	3,254,400
Pounds of Hatchery Fish	849,162	282,967	-	1,788	408,152	1,542,069
Number of Hatchery Fish	11,261,161	6,210,600	-	350,000	3,309,326	21,131,087

Table 17.--Summary of Fishery Services on Other Public Areas, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	-	2	2	6	13	23
Reports submitted	-	3	-	1	4	8
Waters under Management						
Acres of Lakes & Ponds	-	21	-	10	75	106
Miles of Streams	-	-	-	7	28	35
Acres of Fish Habitat Reclaimed or Improved	-	-	100	-	-	100
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	-	22,300	1,000	3,500	2,500	29,300
Pounds of Hatchery Fish	-	21,731	-	8,134	-	29,865
Number of Hatchery Fish	-	250,000	-	24,400	-	274,400

Table 18--Summary of Fishery Services on Private Areas, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	1	6	2	100	42	151
Reports submitted	-	1	-	90	20	111
Waters under Management Acres of Lakes & Ponds	-	597	1	2,404	194	3,196
Miles of Streams	-	1	-	6	-	7
Acres of Fish Habitat Reclaimed or Improved	-	-	1	99	6	106
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	1	-	5	6
Man-Days of Fishing	1,600	53,800	100	3,500	4,800	63,800
Pounds of Hatchery Fish	1,565	13,128	-	7,495	4,396	26,584
Number of Hatchery Fish	3,204	91,900	-	275,900	75,123	446,127

Table 19--Summary of Fishery Services on All Areas Served, 1966.

	REGION					
	1	2	3	4	5	Total
Areas visited	81	71	41	253	122	568
Reports submitted	26	34	22	217	87	386
Waters under Management Acres of Lakes & Ponds	210,570	337,046	318,118	135,772	18,543	1,020,049
Miles of Streams	964	2,872	847	3,099	2,119	9,901
Acres of Fish Habitat Reclaimed or Improved	1,042	178	401	369	293	2,283
Miles of Stream Reclaimed or Improved	5	3	-	11	28	47
Acres of New Waters Developed	776	319	366	55	2,834	4,350
Man-Days of Fishing	735,300	3,055,600	1,976,300	2,040,500	902,700	8,710,400
Pounds of Hatchery Fish	1,054,114	747,554	64,685	233,463	558,100	2,657,916
Number of Hatchery Fish	13,815,345	10,909,903	1,148,453	3,010,783	5,056,836	33,941,320

Table 20.--Summary of visits and reports on Federal areas and Indian Reservations, 1957-1966.

Number of Visits	Department of Defense	Veterans Administration	National Forests	National Parks	National Wildlife Refuges	Misc. Federal Areas	Indian Reservations	Totals
1957	93	8	7	4	12	-	13	137
1958	124	16	12	5	38	-	30	225
1959	83	7	9	6	34	3	24	166
1960	93	12	9	8	34	9	26	191
1961	104	8	11	10	29	3	33	198
1962	157	12	20	12	41	18	34	294
1963	313	10	14	20	61	12	91	521
1964	244	17	15	25	66	26	113	506
1965	186	9	20	11	56	96	59	437
1966	184	15	14	10	60	17	67	367
Totals	1,581	114	131	111	431	184	490	3,042

Number of Reports								
1957	106	10	14	8	13	-	21	172
1958	147	15	37	7	39	-	28	273
1959	136	6	20	10	32	3	28	235
1960	122	11	14	5	26	10	14	202
1961	126	8	31	15	33	4	22	239
1962	139	8	27	6	42	10	34	266
1963	245	7	8	11	22	7	42	342
1964	193	12	29	28	34	9	68	373
1965	137	1	24	34	61	83	39	379
1966	127	6	24	9	27	20	42	255
Totals	1,478	84	228	133	329	146	338	2,736

Table 21.--Summary of waters under management on Federal areas and Indian Reservations, 1957-1966.

Acres of Lakes and Ponds	Department of Defense	Veterans Administration	National Forests	National Parks	National Wildlife Refuges	Misc. Federal Areas	Indian Reservations	Totals
1957	9,208	45	1,703	16,320	270,805	941	12,207	311,229
1958	8,587	48	1,930	16,332	311,325	874	14,449	353,545
1959	10,311	48	2,193	16,763	315,428	916	14,740	360,399
1960	11,052	90	3,630	16,813	318,038	820	16,365	366,808
1961	11,759	107	3,721	16,813	320,588	918	17,222	371,128
1962	11,937	151	2,041	20,113	366,648	635	128,511	530,036
1963	15,151	134	3,080	110,808	142,464	72	143,467	415,176
1964	23,839	143	7,011	131,678	171,655	2,487	186,915	523,728
1965	25,277	65	5,716	112,137	142,305	2,587	149,382	437,469
1966	25,115	65	5,731	112,326	192,386	5,213	370,893	711,729
Miles of Streams								
1957	108	--	819	37	662	71	1,788	3,485
1958	112	--	817	37	86	81	2,059	3,192
1959	107	--	892	66	86	90	2,070	3,311
1960	105	--	972	66	96	72	2,045	3,356
1961	108	--	1,181	66	96	91	2,064	3,606
1962	106	1	1,021	719	259	19	2,097	4,222
1963	164	5	1,288	483	155	--	3,261	5,356
1964	153	1	3,422	1,340	130	47	3,068	8,161
1965	178	6	3,528	1,705	82	8	3,120	8,627
1966	179	6	3,598	1,540	32	8	3,146	8,509

Table 22--Summary of amount of habitat reclaimed or improved on Federal areas and Indian Reservations, 1957-1966.

Acres of Lakes and Ponds	Department of Defense	Veterans Administration	National Forests	National Parks	National Wildlife Refuges	Misc. Federal Areas	Indian Reservations	Totals
1957	395	--	8	--	680	315	30	1,428
1958	912	--	69	--	4,308	293	190	5,772
1959	712	--	400	16	2,521	299	98	4,046
1960	822	4	213	--	2,551	--	455	4,045
1961	516	--	481	50	2,258	148	755	4,208
1962	2,724	2	125	12	863	24	1,465	5,215
1963	2,086	--	26	--	1,855	20	417	4,404
1964	1,664	2	6	--	3,008	91	1,141	5,912
1965	1,007	--	163	--	487	2	507	2,166
1966	299	2	173	--	240	305	1,058	2,077
Totals	11,137	10	1,664	78	18,771	1,497	6,116	39,273

Miles of Streams								
1957	--	--	16	--	--	19	--	35
1958	--	--	7	--	6	2	--	15
1959	1	--	22	--	12	--	--	35
1960	8	--	--	--	40	--	3	51
1961	--	--	6	2	43	1	70	122
1962	5	--	1	--	80	500	5	591
1963	4	--	36	--	6	--	68	114
1964	9	--	29	--	--	10	45	93
1965	29	--	34	10	--	1	19	93
1966	27	--	3	10	2	--	5	47
Totals	83	--	154	22	189	533	215	1,196

Table 23.--Summary of acres of new waters developed on Federal areas and Indian Reservations, 1957-1966.

Acres of New Waters	Department of Defense	Veterans Administration	National Forests	National Parks	National Wildlife Refuges	Misc. Federal Areas	Indian Reservations	Totals
1957	142	--	8	--	15	--	265	430
1958	130	4	--	--	300	--	200	634
1959	648	--	33	415	170	--	589	1,855
1960	137	--	--	50	--	70	--	257
1961	187	6	75	--	600	--	82	950
1962	106	--	32	--	150	22	2,534	2,844
1963	165	5	--	33	--	--	632	835
1964	139	--	22	--	1,531	75	674	2,441
1965	346	--	35	24	4	255	162	826
1966	513	3	--	--	3	301	801	1,621
Totals	2,513	18	205	522	2,773	723	5,939	12,693

Table 24.--Summary of man-days of fishing on Federal areas and Indian Reservations, 1957-1966.

1000's Man-days								
1957	148.7	18.5	387.5	17.5	574.5	13.4	184.1	1,344.2
1958	245.1	23.2	428.8	26.6	616.6	14.6	202.6	1,557.5
1959	342.4	27.1	368.0	60.1	548.7	14.1	355.2	1,715.6
1960	398.9	27.3	439.0	61.1	1,019.1	12.5	305.5	2,263.4
1961	377.4	22.7	695.6	39.4	1,071.8	16.9	335.2	2,559.0
1962	549.9	23.2	534.8	127.3	1,271.4	22.9	396.6	2,926.1
1963	717.3	18.8	578.3	593.2	942.4	9.1	501.1	3,360.2
1964	955.5	22.4	1,380.3	661.0	540.9	12.0	657.6	4,229.7
1965	969.8	18.9	1,863.4	734.6	424.3	20.4	911.3	4,942.7
1966	992.9	24.2	1,973.6	813.1	449.8	40.4	1,068.9	5,362.9
Totals	5,697.9	226.2	8,649.3	3,133.9	7,459.5	176.3	4,918.1	30,261.3

Table 25.--Summary of hatchery fish allotted to Federal areas and Indian Reservations, 1957-1966.

1000's Pounds	Department of Defense	Veterans Administration	National Forests	National Parks	National Wildlife Refuges	Misc. Federal Areas	Indian Reservations	Totals
1957	12.2	0.3	156.6	10.7	9.8	4.6	69.4	263.5
1958	26.6	0.2	149.6	20.8	5.4	4.6	76.7	283.9
1959	41.0	--	156.2	30.3	6.9	7.4	109.8	351.6
1960	62.9	0.4	180.5	18.9	11.3	5.2	149.4	428.6
1961	72.7	0.7	206.2	20.9	4.0	7.6	142.5	454.6
1962	89.2	6.6	264.2	14.1	6.6	4.2	175.3	560.2
1963	87.0	4.2	461.1	30.9	8.8	2.4	287.7	882.1
1964	80.3	4.8	421.9	41.1	8.1	4.9	372.6	933.7
1965	111.2	5.3	327.1	19.2	2.3	5.7	468.7	939.5
1966	124.6	4.4	299.7	32.5	9.5	8.2	580.6	1,059.5
Totals	707.7	26.9	2,623.0	239.4	72.7	54.8	2,432,7	6,157.2
Number (1000's)								
1957	945.2	4.6	483.1	720.7	2,569.5	166.9	548.8	5,438.8
1958	844.3	8.4	882.8	395.5	388.1	141.4	1,103.2	3,763.7
1959	1,374.1	--	1,573.8	441.0	1,019.6	139.3	1,359.6	5,907.4
1960	823.4	4.5	800.6	545.3	3,946.8	78.3	1,844.7	8,043.6
1961	1,082.3	9.2	823.6	628.7	496.1	123.8	2,640.9	5,804.6
1962	1,369.7	10.3	1,391.7	494.6	5,795.1	27.2	3,478.0	12,566.6
1963	981.6	13.6	2,187.2	301.5	5,428.2	10.5	2,904.3	11,826.9
1964	1,692.0	16.6	1,982.2	388.9	6,814.9	31.3	11,815.3	22,741.2
1965	1,396.7	14.5	1,491.4	325.2	7,464.8	177.2	4,249.2	15,119.0
1966	1,789.4	15.7	1,480.9	262.5	1,656.0	1,018.6	5,866.7	12,089.8
Totals	12,298.7	97.4	13,097.3	4,503.9	35,579.1	1,914.5	35,810.7	103,301.6