Historic document – Content may not reflect current scientific research, policies or practices.
As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States -- now and in the future.

Cover photos - clockwise from upper left -

Children's fishing pond at the Patuxent Naval Air Station, Maryland.

South Dakota Cooperative Fishery Unit graduate student, Wayne Kruckenber, counting phytoplankton.

Virginia Cooperative Fishery Unit students, V. Douglass and J. Kaufman, harvesting channel catfish as a part of their cage culture study.

A nice rainbow trout caught from a managed pond at Buckley Air Force Base, Colorado.
Dr. Willis King (arrow) and co-workers. Dr. King was Chief of the Division of Fishery Services from 1957 when the Division was established until early in 1972 when he was promoted to Assistant Director.

Left to right -
Middle - Summers, Kinney, Graham, Chapman, Rasmussen, Hester, Anderson, McConnell, King, Vincent and Barnhart.
Front - Leedy, Kramer, McCann, Hatch, Eipper, Smitherman, Butler and Garlick.
The Division goal is:

To fulfill the Bureau's responsibilities for technical assistance to other Federal agencies, the States and Indian tribes to meet the Nation's needs for recreational and related commercial fishing.

The Division's role in fishery management is chiefly of a cooperative nature. Authority to regulate and manage sport and commercial fisheries is vested in the various States, with the exception of Indian reservations and a few areas of exclusive Federal jurisdiction. The beneficial impact the Division exerts in developing and maintaining productive fisheries is the result of inter-agency cooperation. One of the Division's chief assets is its mobility - unrestricted by jurisdictional boundaries. We must use it in a manner to benefit fishery resources as the need dictates.

In fulfilling its goal responsibilities the Division concentrates its efforts toward achieving the following objectives:

- to manage sport fisheries on Bureau lands for optimum recreational benefits;
- to provide technical assistance to and participate in the management of fisheries on other Federal lands;
- to assist Indian tribes in the development of fishery management plans and programs for resident and migratory species;
- to develop management requirements for scheduling production of fish from national fish hatcheries;
- to evaluate the relative success of fish stocked from national fish hatcheries;
- to monitor and report pesticide, heavy metal and other contaminant residues in tissues of aquatic organisms;
- to control the sea lamprey in the Great Lakes;
- to preserve and manage designated endangered fishes;
- to evaluate the effects of surface mining on fish and related aquatic systems;
- to coordinate fishery studies and projects of an interstate, interagency or international nature; and
- to provide advanced training to fishery scientists at the graduate and continuing education levels.
Children's fishing program at Buckley Air Force Base, Colorado.

Opening day of the trout season on the South Fork of the Roanoke River, Jefferson National Forest, Virginia.
A Branch of Fishery Management Services was established in 1957 to coordinate and evaluate fish stocking and provide technical assistance in sport fishery management on Federal areas and Indian reservations. Prior to 1957, some phases of the program were carried out under a Section of Fisheries Management in the Branch of Game-fish and Hatcheries. Divisional status was obtained in 1965, and in 1965, the name was changed to the Division of Fishery Services.

The Division of Fishery Services has three Branches.

The Branch of Fishery Management is concerned with:

a. Technical assistance to Federal areas and Indian reservations.

b. Programming and evaluation of fish produced at National Fish Hatcheries.

c. Investigations involving Indian off-reservation fishing.

d. Federal-State cooperative fishery projects.

The Branch of Cooperative Fishery Units is concerned with:

a. Operation of 25 cooperative fishery units at universities.

b. Sea lamprey control in the Great Lakes.

c. Rare and endangered fishes of the United States.

The Branch of Environmental Improvement is concerned with:

a. Monitoring fishes for pesticides and heavy metals.

b. Field appraisals on the effects of pesticide applications on aquatic life.

Regional office and field station personnel are generally not assigned to any particular branch. Their work encompasses a wide range of Division activities and generally includes those of all three branches. National surveys and extension activities, are examples of duties performed by all branches.

The Division of Fishery Services has 170 highly qualified fishery biologists and supporting aquatic scientists. Its program is coordinated from the Washington office. All field activities are supervised from the regional offices.
LOCATIONS OF REGIONAL OFFICES AND FISHERY SERVICES' FIELD STATIONS

REGIONAL OFFICE

Field Station
In 1972, the primary activity of the Branch of Fishery Management was providing technical assistance to 237 military and other Federal areas and 71 Indian reservations. Over 7.9 million man-days of fishing were provided on over 540 thousand acres of impoundments and natural lakes and 14,5 thousand miles of streams managed for fishing. An additional 0.9 million angler-days were provided on 118 projects involving cooperative programs with State agencies and work on other public and private waters (Table 1).

**Department of Defense**

Over 1.5 million angler-days of recreation were experienced on Department of Defense areas during 1972. Fishery management assistance was provided to nearly 30,000 acres of lakes and impoundments and 650 stream miles. A majority of the fishing pressure on military areas (60 percent) was exerted in the southeast. The remaining 40 percent was about equally divided throughout the rest of the country.

Cooperative sport fishery management programs on military lands are an important Division function in the southeast. This program is enhanced by full-time fish and wildlife coordinators at many installations. After enactment of the Sikes Act (P. L. 86-797), in 1960, cooperative agreements were established on all military areas having fish and, or, wildlife potential. These agreements are signed by representatives of the military reservation, the State fish and game agency and this Bureau. Technical assistance in the management of fisheries resources is provided to an average of 140 areas each year. Recently established Division priorities indicate reduction of active participation with established programs on some areas and concentration of effort on those installations having potential and need for further improvement.

**National Forests**

Fishery management programs are established on 14 National Forests. Twelve of these forests are located in the eastern United States. National Forests lands are important to the anglers. Over 30 percent of the total fisherman days provided by Division activities were produced on these areas (Table 1).

The primary management effort on National Forest waters is directed toward establishment of catchable trout fisheries. Since 12 of the forests are located near the heavily populated east coast, and contain a large percentage of available public lands, management direction has been concentrated on efficient use of hatchery fish. In Alaska, Division biologists are assisting in evaluating the effects of log-rafting on estuarine tidal flats.

**National Parks**

Technical assistance in fishery management is provided on 12 National Parks in accordance with Park Service policies. Our program is concerned with collection of biological data for all park waters, collection of creel census data, distribution of hatchery fish where necessary, and reintroduction of native species to areas where past activities may have caused their disappearance.

Nearly 84 percent of the recorded fishing pressure for 12 National Parks is exerted on the Yellowstone (41.7 percent), Great Smokey Mountains (27.0 percent) and Olympic (14.7 percent) National Parks.
View of the Yellowstone River, a popular fishing stream at Yellowstone National Park.

Youth group from Tennessee assisting in stocking Little River, Great Smoky Mountain National Park.

Yearling Atlantic salmon from the White River, White Mountain National Forest, New Hampshire.

Division biologist Al Johnson conducting water chemistry tests on the White River, New Hampshire.
Popularity of these exceptionally beautiful areas coupled with extensive and productive water areas resulted in over 700,000 angler-days in 1972. This heavy concentration of anglers poses problems to the management philosophy of the National Park Service, and has resulted in more restrictive regulations. The regulations are designed to reduce overall harvest while providing larger fish. In essence it is an attempt to provide quality sport fishing. If successful, one benefit could be increased predation on unwanted exotic fishes by the larger game. If the angler can be convinced that one large fish provides more sport than additional numbers of smaller fish, the problem should succeed.

**National Wildlife Refuges**

During 1972, technical assistance in fishery management was provided to 196,000 acres of impoundments and 394 miles of streams on 48 National Wildlife Refuges. This represents technical assistance programs on less than 15 percent of the total refuge system and only four percent of the total water area.

**Veterans Administration**

A small program to provide recreational fisheries for 21 Veterans Administration hospitals resulted in over 33 thousand angler-days in 1972. These programs combining recreation and rehabilitation are highly recommended by hospital officials. One major barrier to expansion of this program is a lack of suitable associated water areas.

**Miscellaneous Federal Areas**

Technical assistance is provided on a variety of small installations including the Department of Justice Federal prisons, Federal youth centers, Job Corp areas, and the Department of Commerce, HEW and NASA areas. Sixteen such areas provided over 31,000 angler-days in 1972 on some 1,000 acres of impoundments.

**Indian Reservations**

Fishery management direction was given to 71 Indian reservations in 1972. Region 1 (Portland, Oregon), and Region 2 (Albuquerque, New Mexico), accounted for over 75 percent of this effort.

Fish and wildlife recreation is an important part of the total natural resource program on Indian reservations. Bureau of Sport Fisheries and Wildlife biologists participate with Indian tribes, the Bureau of Indian Affairs, and other Federal agencies in developing comprehensive resource management plans on Indian reservations. This program provides technical assistance in development, design, implementation, and maintenance of sound fish and wildlife resource management programs with an end product of additional employment and economic benefits for the Indian people.

There are over 182,000 acres of impounded water and 4,400 miles of streams managed for sport fishing on Indian lands. These waters, providing over 1.6 million man-days of fishing in the past year, are only a small percentage of the waters that can be developed and managed on Indian reservations.

One principle obstacle to the development of additional fishing waters is the lack of trained Indian personnel. A training program was initiated to develop Indian expertise in fish and wildlife management. Presently, two Indian trainees at the Division's field headquarters at Lander, Wyoming, are receiving instruction in fishery management techniques and training necessary to successfully manage fishery resources.
Biological technician Tom Burchman applying rotenone to Fosberg Pond, Arrowhead National Wildlife Refuge, North Dakota.

Dead carp and bullheads killed by the rotenone. The pond was later stocked with largemouth bass and bluegill.

Zuni boys with their trout catches from Pescado Lake, Zuni Pueblo, New Mexico.

Indian Ranger Tony Gutierrez checking a fisherman at a managed pond on the Santa Clara Pueblo, New Mexico.
These management tools will be bolstered by formal training at University level to develop tribal members capable of providing management expertise to reservation waters. Guidelines for this type of training were developed at a workshop where Tribal members, Indian educators, Bureau of Indian Affairs trainees and Bureau of Sport Fisheries and Wildlife personnel participated.

The objective of such a program is to train and educate Indians to become self sufficient.

Until recently, the major problems existing in the Division of Fishery Services' program on Indian lands dealt with the amount of resource base and the increasing utilization by non-Indians; however, civilization is rapidly encroaching on what has been some of the finest remaining inland sport fishing areas. Strip-mining for coal—mainly an eastern problem—has moved westward. Significant mining near Indian lands in Montana—with mining options within reservation boundaries, and coal mining of lands near the "four corners" power complex in the southwest, will require Division of Fishery Services' expertise on coal strip-mining problems and reclamation of mined lands. Hopefully, our efforts will assist in prevention of another Appalachian region.

Off Reservation Fishing

There is a long history of conflict regarding the off-reservation fishing rights granted Indian tribes by treaties with the U.S. Government. Since 1968, the Division of Fishery Services has assisted in the Solicitor's Office and the Bureau of Indian Affairs by providing information and data related to fishing activities in northwestern United States.

Technical assistance to Indian tribes experiencing treaty difficulties greatly expanded during 1972, with the transfer of some Bureau of Indian Affairs funds to the Bureau of Sport Fisheries and Wildlife. Major activities include:

1. Preparation of a joint biological statement with the State of Washington describing the fishery resources, their management and harvest;

2. Provision of assistance to Indian groups in negotiations with State and international regulatory bodies regarding fishing regulations;

3. Conducting a fish hatchery feasibility study in the Southern Puget Sound area;

4. Completion of spawning, rearing, and migration flow requirement studies for use by an Indian tribe in their intervention in the issuance of a Federal Power Commission license.

Increased funding for this activity, establishment of a project headquarters for off-reservation fishing activities, and an increase in the number of Bureau fishery biologists assigned to this program will provide better response to requests for assistance by Indian groups in the Pacific Northwest.

Federal/State Cooperative Areas

On 18 joint cooperative programs with State Fish and Game agencies in 1972, over 850,000 angler-days of recreation were provided. This 43 percent reduction from the 1971 program resulted from complete State involvement on some projects worked cooperatively in prior years.
Division biologists measuring the flow of the White River, Washington, as a part of the Indian off-reservation fishery investigations.

Contractors for Fishery Services measuring flows of the White River in the Muckleshoot Indian Reservation, Washington.

Capturing juvenile American shad in the Connecticut River anadromous fish study, Massachusetts.

Collecting adult American shad at the Holyoke Canal on the Connecticut River, Massachusetts.
It should be understood that not all cooperative projects can be judged by number of fisherman-days provided. The Division is involved in coordinating fishery management activities on three large interstate river systems, (Connecticut, Delaware and Upper Mississippi) where man-days of fishing are not related to the effort expended.

Projects such as the restoration of Atlantic salmon in New England Streams, American shad to the Delaware River, coordinating the formulation of policy, plans and programs for carrying out cooperative programs on 900 miles of the Mississippi River, or determining the effects of an atomic power plant on the lower Hudson River, deal with problems affecting fish populations and do not provide immediate angler benefit. If successful, these programs will result in many thousands of angler hours.

Conditions affecting the well-being of anadromous fish populations have received widespread publicity in recent years. There have been drastic reductions in Atlantic salmon stocks attributed to commercial fishing on their ocean feeding areas. There are problems regarding Indian treaty rights to fish in their usual and accustomed off-reservation sites for Pacific salmon and steelhead trout in the northwest. Successful introduction of salmon into the Great Lakes has brought increasing publicity to fish requiring fresh-water streams and rivers to complete their life cycle.

Under cooperative agreements with the States bordering the Connecticut River, the problems to be solved include fish passage facilities at seven major impoundments, restoration of Atlantic salmon populations absent since before 1900, effects of river flow reversal by a pumped storage power generating system, and the effects of existing and proposed nuclear powered generating plants. Delaware River problems relate to the movement of American shad populations through a pollution block that coincides with the upstream movement of adults attempting to reach spawning areas and the out-migration of young fish later in the year. Additional problems requiring solutions involved a proposed main stream impoundment that will require fish passage facilities, arranging for water releases from headwater water supply reservoirs, and solving water withdrawal issues related to pumped storage power generation. It is in these areas that solutions will benefit the future fisheries for unknown numbers of anglers. It is also in these areas that present program evaluation using man-days of fishing is invalid.

In the southeast, a Division program to restore striped bass to its former range in northwest Florida is producing some return. Fishing pressure for striped bass has increased yearly to nearly 37,000 man-days since the initial stocking of this species in 1968. This is a cooperative project with the Florida Department of Natural Resources, Northwest Florida Development Council, Walton County Commission, Chamber of Commerce, and the National Marine Fisheries Service.

Anadromous fish programs elsewhere in the country deal with Pacific salmon and steelhead trout, both in the Great Lakes and in the Pacific Northwest. In both areas the projects relate directly with establishment or enhancement of fisheries for Indians.

**Fish Stocking Programming and Evaluation**

A primary tool in the management of recreational fisheries and in fish restoration programs, is the product of our National Fish Hatchery system.

Division biologists work closely with the Division of Fish Hatcheries in developing stocking schedules designed to provide maximum sport fishing opportunities and efficient use of hatchery production. Annual meetings are held with State fish and game departments and various Federal agencies to discuss need, allocation and distribution of fish from National Fish Hatcheries.
Military personnel at Fort Stewart, Georgia, assisting in stocking reservation ponds.
Evaluation of the use of hatchery fish has generally been accomplished by measuring percent harvest of total stocking, or catch per man-hour against an arbitrarily assigned acceptable level—generally in the 0.5 to 1.0 fish per hour range. California established a method of assessing their catchable trout fishery that is applicable elsewhere with little or no adjustment. Division biologists are using this system—particularly in the northeast to establish management criteria for program stocking rates and interval. Periodic rechecks are necessary to provide information on fishing pressures. Any drastic change in exploitation exerts an immediate effect on stocking rates. Managed fisheries, other than for catchable fish, are evaluated by investigation of fish populations. This evaluation is established on a routine recheck basis, usually annually, by Division biologists.

Distribution schedules were established for over 22.1 million pounds of hatchery fish stocked in 426 areas in 1972. The magnitude of this accomplishment is better appreciated when one realizes that fish are requested by species, by size range, by time period, and in some cases from particular hatcheries. Close coordination is necessary to insure program success.

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Cooperative Fishery Units

The Cooperative Fishery Unit program began in 1960 with the enactment of Public Law 86-686 (74 Stat. 733). The stated purpose 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."

The first unit was established in 1961, at Utah State University. In 1972, the Tennessee Cooperative Fishery Unit was established at the Tennessee Technological University, bringing the total number of fishery units to 25 (Figure 2).

Each fishery unit is a cooperative undertaking of the Bureau of Sport Fisheries and Wildlife, a university and a State fish and game agency. A coordinating committee, composed of representatives from each cooperating agency, provides general direction and guidance to each unit. This committee meets formally, at least once a year, and has frequent informal communication on unit business.

Each unit is staffed by two Bureau biologists designated as the leader and assistant leader who receive courtesy faculty positions at their respective universities. The university provides secretarial services and office, laboratory, and storage space. The State fish and game agency contributes funds for some unit equipment and support of graduate students. The units serve a multi-purpose. They train students who perform fishery research in the course of obtaining their advanced degrees. Research topics are selected by the students and their graduate committees with the concurrence of the coordinating committees. Their thesis work then serves the multiple role of training them to conduct research and aiding in the research needs of the three cooperating agencies. In addition, the leader and assistant leader conduct staff research and participate in extension activities of concern to the cooperators. Close liaison exists in the Division of Fishery Services between the units and the field management stations. One of the greatest strengths of the units is their ability and flexibility to work closely with all fishery interests.

During the 1971-1972 school year, Bureau staff members supervised 562 fishery students and taught 54 formal courses. Unit graduates in 1972 entered fisheries employment in State, Federal and foreign government agencies, educational institutions and private industry.

The Unit program is described in detail in Bureau of Sport Fisheries and Wildlife Resource Publication Number 112, which is available from the Division of Fishery Services.
Inside stream aquarium at the Idaho Cooperative Fishery Unit.

Maine Cooperative Unit student Barbara Fell examining salmon olfactory apparatus at the Craig Brook National Fish Hatchery.
Hawaii Cooperative Fishery Unit
students collecting aquatic
invertebrates from Aimakapaa,
Honokohav.

Hawaiian students inventorying
aquatic biota of shoreline ponds
along the Kona Coast.

Hawaiian student with a collection
of awa, amaama, uouoa, and oopu
akupa from Kaloka, an ancient
Hawaiian pond.

Hawaiian students studying the
effects of urbanization on the
channelized Palolo Stream.
Bureau of Sport Fisheries & Wildlife
GREAT LAKES FISHERY FACILITIES
★ Fishery Services Station
● Fishery Research Laboratory
☆ National Fish Hatchery
□ River Basin Studies Office
Sea Lamprey Control in the Great Lakes

An adult sea lamprey is a jawless fish that feeds on host fishes by attaching to them with its oral sucking disc that surrounds rows of sharp, rasping teeth. Lampreys feed on the blood, other body fluids, and pieces of tissue of the host. Laboratory experiments indicate that an individual lamprey, during its adult stage of 12 to 20 months, may destroy from 35 to 40 pounds of fish.

The anadromous sea lamprey, *Petromyzon marinus*, is found in the North Atlantic Ocean where it ranges as far south as Florida in North America and Portugal in western Europe. Lampreys spawn in certain cool, freshwater coastal streams. The larval forms, which are nonparasitic, live in burrows on the stream bottom for several years and gradually migrate to the sea where they become parasitic adults.

Assessment of damage by sea lampreys in the Atlantic Ocean has not been determined. They are known to have attacked cod, eels, hake, haddock, herring, mackerel, salmon, sharks, sturgeon, and swordfish.

Lake Ontario, the easternmost of the Great Lakes, is connected to the sea by the St. Lawrence River. It is not known how long sea lampreys have been in Lake Ontario, but they were found in 1875, in Cayuga Lake, a New York Fingerlake which drains into Lake Ontario. Lampreys are landlocked in Lake Ontario. The adults live in the lake and spawn in tributary streams.

The amount of lamprey damage to Lake Ontario fish is also unknown, but there are indications that it is large. Based on chemical and physical characteristics, Lake Ontario should be able to support a major lake trout fishery. However, the annual commercial catch of lake trout during the period from 1867 to 1940, averaged about 360 thousand pounds. The trout catch declined rapidly since 1940 and is now less than 500 pounds per year. Recent attempts by New York State to establish coho and chinook salmon runs in Lake Ontario have not been successful. The few adult salmon which have returned to streams had a high incidence of lamprey scarring.

The 167-feet high Niagara Falls, located on the Niagara River between Lake Ontario and Lake Erie, acted as a lamprey barrier until after 1829 when the Welland Ship Canal was opened. The first sea lamprey was reported from Lake Erie in 1921. Lampreys have never become abundant in Lake Erie as most tributary streams do not provide suitable spawning habitat. In 1934, sea lampreys were observed in a tributary of Lake St. Clair which lies between Lakes Erie and Huron. Lampreys were found in Lakes Huron and Michigan in 1936, and in Lake Superior in 1946.

Prior to the appearance of sea lampreys in the upper Great Lakes (Huron, Michigan and Superior), the annual commercial catch of lake trout was about 15 million pounds. Lake trout production began to decline in the early 1940's and by 1961, the annual catch was reduced to 0.3 million pounds. A similar decline occurred in other fisheries. Populations of burbot, rainbow trout (steelhead) and whitefish declined abruptly. Sea lamprey wounds were found on most species of fishes in the upper lakes.

In 1946, the Congress of the United States directed the Fish and Wildlife Service to develop measures to control the sea lamprey. That same year, a Great Lakes Sea Lamprey Committee was formed and included representatives of the Fish and Wildlife Service, the Lake States, and the Province of Ontario. Studies were initiated on the life history of the sea lamprey and on the effects of lamprey predation. In 1950, a search was begun for methods to control lampreys. The Committee was replaced in 1955 by the Great Lakes Fishery Commission, an international agency representing Canada and the U.S. In 1956, when two Bureaus were established in the Fish and Wildlife Service, primary responsibility for the sea lamprey control program was assigned to the
Bioassay trailer where concentrations of lampricides are determined before stream treatment.

Water quality analysis trailer where water is tested during survey and treatment activities.

Biological technician Lyle Mavis sorting and identifying larval lampreys taken during Lake Michigan stream surveys.
Bureau of Commercial Fisheries. Until 1971, the role of the Bureau of Sport Fisheries and Wildlife was concerned primarily with hatchery production of lake trout. When, in 1971, the Bureau of Commercial Fisheries became the National Marine Fisheries Service in the U.S. Department of Commerce, their lamprey control and research programs were transferred to the Bureau of Sport Fisheries and Wildlife.

The Bureau of Sport Fisheries and Wildlife, acting as the United States Agent for the Great Lakes Fishery Commission, carries out a program of research, fish stocking and sea lamprey control in the Great Lakes (Figure 3). The Division of Fishery Services is responsible for the lamprey control phase of the program.

The purpose of the control program is to reduce the populations of parasitic sea lampreys to levels which will permit the establishment of high quality fisheries.

The control program is headquartered at Marquette, Michigan, with a sub-station at Ludington, Michigan. About 45 permanent and 25 seasonal employees carry out the program.

The following activities are included in the sea lamprey control program:

1. Chemical treatment of lamprey producing streams with selective toxicants to kill lamprey larvae.
2. Stream surveys including -
   a. General surveys to determine the presence and abundance of lampreys.
   b. Pre-treatment surveys.
   c. Post-treatment surveys.
   d. Reestablishment surveys.
   e. Spawning surveys.
3. Population assessment of adult lampreys by -
   a. Comparing annual catches at eight weirs on Lake Superior tributaries and one weir on the Ocqueoc River, a tributary to Lake Huron.
   b. Collection of lampreys from commercial fisheries on all lakes except Lake Ontario.
4. Life history studies of larval lampreys including age and growth studies.
5. Lamprey barrier and potential barrier site surveys.
6. Preparation of semi-annual and special reports.

During 1972, 73 streams were treated and 238 stream surveys were conducted. One of the highlights was extension of the program to include Lake Ontario where 20 streams were treated for the first time. The 1972 catch of lampreys at eight Lake Superior weirs was 9,696 adults, an increase of 83 over 1971 (Figure 4). The catch at the Ocqueoc River weir on Lake Huron was 2,847 adults, a decrease of 150 from 1971. Division personnel participated in a U.S. Task Force survey of barrier sites. A preliminary survey, completed in 1972, found that 69 streams had 105 dams that acted as
Apparatus used to apply lampricide to the East Branch of the Chocolay River, Marquette County, Michigan.

A commercial fisherman with a lamprey scarred lake trout.

A lamprey scarred lake trout taken from Lake Superior.

Lamprey assessment barrier on the Iron River, Michigan, near Lake Superior.
lamprey barriers. They examined feasible barrier sites on 189 streams and reported that suitable sites were not found on 80 streams.

At the June 1972 Annual Meeting of the Great Lakes Fishery Commission, it was generally concluded that the lamprey control program was progressing very well. Bureau of Sport Fisheries and Wildlife biologists estimated that the 1972 level of abundance of lake trout in the Michigan waters of Lake Superior to be over 2.5 times the 1929-1943 average. The Michigan sport fishermen catch for 1971 in their portion of the upper lakes was determined to be over 1.2 million brown, lake and steelhead trout, and chinook and coho salmon. A greater catch was forecast for 1972. Bureau, State and Canadian biologists are waiting to see if similar success is obtained in Lake Ontario.

Annual assessment barrier catches of adult sea lampreys at eight weirs along the south shore of Lake Superior.
Fishery Services and National Park Service biologists conducting a census of the endangered Devils Hole pupfish at the Nevada adjunct of Death Valley National Monument.

Fishery Services and State biologists evaluating the survival of Lahontan cutthroat trout eggs in the Truckee River above Pyramid Lake, Nevada.
Rare and Endangered Fishes

The purpose of our rare and endangered fishes program is to insure the perpetuation of those species or subspecies which are threatened with extinction.

Various phases of the program are:

1. Determining the status of various species.
2. Finding out the reasons they are threatened.
3. Developing plans to insure survival.
4. Implementing the necessary conservation measures.

Our progress or lack of progress in these efforts is measured by the net gains or losses of individuals or populations and the degree of assurance that the species are safe and secure.

Although the program sounds simple, in reality it is highly complex.

Most of the Division's activities are concerned with resident rare and endangered fishes in the United States. Coordination and cooperation involves the various States, Federal landowner agencies, Indian tribes, universities, conservation groups, and other interested citizens. Our work with the desert pupfish involves cooperation with representatives of 10 colleges and universities, 7 Federal agencies, The Congress, 3 State agencies, 5 conservation groups, 1 aquarium and 2 private groups.

Many of the species are not sport fishes and little is known about them. It is difficult to establish monetary values for small populations of fishes which have no sport or commercial value. During the past 35 years, 7 species and 3 subspecies have become extinct in the U.S.

Passage of the Endangered Species Preservation Act of 1966 (P. L. 89-669; 80 Stat. 926) marked the first concerted attempt to protect and preserve all native fish and wildlife. The primary purpose of the Act is "To provide for the conservation, protection, and propagation of native species of fish and wildlife...that are threatened with extinction;..." The Endangered Species Act of 1969 (P. L. 91-135; 83 Stat. 275) added a requirement for international cooperation in the protection of species threatened with worldwide extinction and combined provisions of previous similar acts (16 U.S.C. 668aa-668ee).

During 1972, Fishery Services' biologists were involved in numerous investigational and developmental activities associated with the Bureau's endangered species program.

Staff members prepared data sheets on fishes for a new edition of the "Redbook" titled "Threatened Wildlife of the United States" (published in March 1973).

Biologists at the Alabama Cooperative Fishery Unit undertook a pilot study of fish importations for the month of October 1971. This involved the examination of records involving the importation of nearly 8 million fish representing 582 species from 41 different countries. Data are being collected on about 100 million live fish imported during 1972, from 50 countries. About 1,000 species are involved.
Also at the Alabama Unit, staff and students are culturing various species of bass (*Micropterus*) including the Suwannee bass.

At the Colorado Cooperative Fishery Unit, the Assistant Unit Leader and students are working on systematic studies of western trouts. One of the major problems in dealing with many of these species and subspecies is identifying them. Widespread stocking of exogenous fishes has resulted in various degrees of hybridization. Consequently, it is often very difficult to determine if we are dealing with true species.

In 1971, a suboffice was established at Las Vegas, Nevada. Personnel are primarily concerned with the preservation of threatened desert fishes of the Death Valley System of California and Nevada. Activities include monitoring of habitats and populations and transplanting stock to other waters. Spawning populations of Devil's Hole pupfish and Pahrums killifish were established at two transplant sites.

Other activities include a study of the Okaloosa darter in Florida, the management of Arizona (Apache) trout on the Fort Apache Indian Reservation, and a new transplant of greenback cutthroat trout in Utah.
Collecting fishes on the Ohio River near Metropolis, Illinois, as part of the National Pesticide Monitoring Program.

Collecting fishes with a back-pack electroshocker for analyses of heavy metals and pesticides.

Preparation of fish samples for shipment to laboratories for analyses.
Fish collection sites where polychlorinated biphenyls (PCB's) and mercury residues exceeded the Food and Drug Administration action levels of 5.0 ppm PCB's and 0.5 ppm of mercury in at least one species of fish.
Division and cooperating State biologists participated in the National Pesticide Monitoring Program by collecting over 400 composite fish samples at 100 major river and lake sites. For the fifth consecutive year whole fish were analyzed for organochlorine pesticides, lipid content, polychlorinated biphenyls (PCB's), phthalates and five heavy metals. Selenium, a trace metal was added in the 1972 collections. Results will be published in the Pesticide Monitoring Journal.

The 1970-71 results shows evidence of a decline in total DDT and some other chlorinated hydrocarbons in fish. Decreased use and/or shifting use patterns are attributed to this apparent decline. Continued monitoring hopefully, will confirm these preliminary indices and provide base line information relating to future trends of the continued use of DDT by foreign countries.

PCB's and mercury residues were still in the limelight in 1972. Concentrations of PCB's exceeding the Food and Drug Administration (FDA) action levels (5.0 part per million) occurred in at least one fish species at 16 collecting points, primarily in the Ohio River Basin and northeastern United States river systems (Figure 5). Overall, these levels are slightly higher than those of the previous year.

Mercury concentrations in whole fish exceeded FDA limits (0.5 part per million) at 17 stations but followed an erratic geographical pattern (Figure 5). Levels for the previous year were comparable.

Toxaphene, chlordane, dieldrin and phthalates associated with plasticizers are examples of contaminants showing up in fish sampled from agriculture or industrial drainage systems. The presence of these contaminants is attributed in large portion to shifting use-patterns after the banning of DDT. Monitoring will be continued with emphasis on identifying these biologically active contaminants and their possible interaction with pesticide problems.

Arsenic, lead, cadmium and selenium residue levels in whole fish were found to be below the FDA action levels at most collecting points.

Regional pesticide specialists cooperated with other Federal and State agencies on several chemical appraisal projects in their search for less harmful management tools.

Last year’s Bureau of Sport Fisheries and Wildlife field appraisal of Dylox on aquatic organisms in the USDA Forest Service gypsy moth control program contributed significantly toward the planned use of Dylox in 1973. It will replace carbaryl, which is more toxic to aquatic insects and honey bees.

Information relating to pesticides and their effects on fish and wildlife was furnished to private, State and other Federal agencies. Review of proposed pesticide programs by other Government Agencies was accomplished and a cooperative pesticide monitoring program has been initiated with U.S. Geological Survey and the Environmental Protection Agency to assist in the collection of water samples in FY-1974.

Division biologists spend a great deal of time and effort in extension activities. Hundreds of letters are written in reply to inquiries concerning sport fishery management problems and procedures. Articles are prepared for the use and information of scientists and the general public. Personnel participate in television and radio programs and present talks to all types of audiences. They also conduct and participate in various workshops, demonstrations, short course training programs and scientific meetings.

During the past several years the Division has been involved in developing urban fishing programs in various metropolitan areas. In 1972, programs were carried out in Boston, Newark, St. Louis, and Washington, D.C. These programs are cooperative and usually involve other Federal agencies, State and local agencies, and volunteer groups. The programs are quite popular and have been very successful.

Urban fishermen enjoying a day in the country and a change from the routine helter-skelter of metropolitan living.
Display at the Division's Central States Fishery Station, Gibson County, Indiana. The display was prepared for the open house held on September 23, 1972, in celebration of "National Hunting and Fishing Day."
As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of this department of natural resources.

The Department works to assure the wisest choice in managing all our resources so that each shall make its full contribution to a better United States now and in the future.