

PACIFIC NORTHWEST REGION

BUREAU OF
COMMERCIAL
FISHERIES





UNITED STATES DEPARTMENT OF THE INTERIOR

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DESIGNED AND COMPILED
by Don Ingalls



**THE PACIFIC NORTHWEST
REGION OF THE BUREAU
OF COMMERCIAL FISHERIES**

SAMUEL J. HUTCHINSON
Regional Director
Seattle, Washington

WASHINGTON, D. C.
April, 1965
(Revision of Circular 108)

Let us begin . . .

“The seas offer a wealth of nutritional resources. They already are a principal source of protein. They can provide many times the current food supply if we learn how to garner and husband this self-renewing larder. To meet the vast needs of an expanding population, the bounty of the sea must be made more available. Within two decades, our own nation will require over a million more tons of sea-food than we now harvest.”

JOHN F. KENNEDY

35th President of the United States



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ORGANIZATION CHART

BUREAU OF COMMERCIAL FISHERIES • PACIFIC NORTHWEST REGION

DIRECTOR

Washington, D. C.

PACIFIC NORTHWEST REGION	Gulf and South Atlantic Region	North Atlantic Region	Great Lakes and Central Region	Alaska Region	Pacific Southwest Region	Hawaii Area Office
1	2	3	4	5	6	

	ADMINISTRATION
	BIOLOGICAL RESEARCH
	TECHNOLOGICAL RESEARCH
	FISH-PASSAGE RESEARCH
	EXPLORATORY FISHING AND GEAR RESEARCH
	MARINE MAMMAL RESEARCH AND MANAGEMENT
	COLUMBIA FISHERIES PROGRAM OFFICE
	MARKET NEWS AND STATISTICS
	MARKETING
	ENFORCEMENT
	LOANS AND GRANTS



PACIFIC NORTHWEST REGION I



PRINCIPAL DAMS BUILT OR UNDER CONSTRUCTION IN THE COLUMBIA RIVER BASIN.

- | | |
|------------------------------|---|
| Seattle, Washington | PACIFIC NORTHWEST REGIONAL OFFICE
(SEE PAGE 1) |
| North Bonneville, Washington | LABORATORY SUBSTATION |
| Astoria, Oregon | ENFORCEMENT OFFICE |
| Bellingham, Washington | ENFORCEMENT OFFICE |
| Portland, Oregon | COLUMBIA FISHERIES PROGRAM OFFICE |
| Eugene, Oregon | PROGRAM OFFICE FIELD STATION |
| Boise, Idaho | PROGRAM OFFICE FIELD STATION |
| Weiser, Idaho | FIELD OFFICE AND LABORATORY SUBSTATION |
| St Paul, Alaska | FUR SEAL PROGRAM FIELD OFFICE |
| St George, Alaska | FUR SEAL PROGRAM FIELD OFFICE |

AREA OF THE PACIFIC NORTHWEST REGION AND PRINCIPAL OFFICES.



Seattle's metropolitan area fronts on a deep, protected harbor which provides superb anchorage for ships. The bulk of Seattle's fishing industry is located along the waterfront. (Courtesy Port of Seattle).

The Pacific Northwest Region of the Bureau of Commercial Fisheries

Puget Sound was a fishing center in the Pacific Northwest long before white men stepped ashore at Alki Point in West Seattle. Fish were the important food for the Indians living on the shores of this vast natural waterway. As the white settlement grew, fisheries became one of the prosperous industries. The methods of fishing were varied and included a combination of methods adopted from East Coast fishermen and the local Indians. Salting was the principal early technique used to preserve the fish. As time progressed, newer and larger boats with more efficient gear led to a greater harvest from the sea, and the preservation techniques were improved manyfold. The fishermen soon learned, however, that fishery stocks were not inexhaustible and felt the need for fishery research.

During the late 1920's, many foresighted men visualized the future importance of Seattle as a fishery center. One of these was the U. S. Commissioner of Fisheries, Henry O'Malley. He selected Seattle as the site for a Federal fishery research laboratory. Thus, Seattle became a center for fishery research and was the logical site for the office of the Pacific Northwest Region when the Bureau of Commercial Fisheries was established under the U. S. Fish and Wildlife Act of 1956.

The activities of the Bureau range from basic research on the populations of fish and the many factors influencing their abundance, to the finished product on the consumer's table. Between these extremes, the Bureau's work involves various types of problems in many fields of science and technology. The Bureau's program is financed from two major sources: (1) an annual appropriation by Congress and (2) Saltonstall-Kennedy funds, which represent a percentage of the duties paid on imported fishery products.

Many pressing fishery problems in the Pacific Northwest concern the Western States. Through persistent research by the fishery agencies of these States and the Bureau of Commercial Fisheries, such problems are being solved. Important to this effort is the supply of fishery scientists, educated in the colleges and universities throughout the world.

With Federal-State cooperation and with dedicated people in the employ of the various agencies, we are confident the great fish resources will always be productive and contribute to the economy and well-being of our Nation.



Food science and the study of food preservation: Examination of the condition of commercially-raised trout as part of our studies on preservation by freezing.

Fishery students at the University of Washington sampling shore fishes by beach seine as part of their intensive study of the life history and ecology of fishes.

(Courtesy of Paul V. Thomas).





▲ This new 65,000-square-foot laboratory addition was completed in December 1964. It and the original laboratory are the home of the Biological and Technological Laboratories, Exploratory Fishing and Gear Research Base, Marketing Office, and the Branch of Reports.



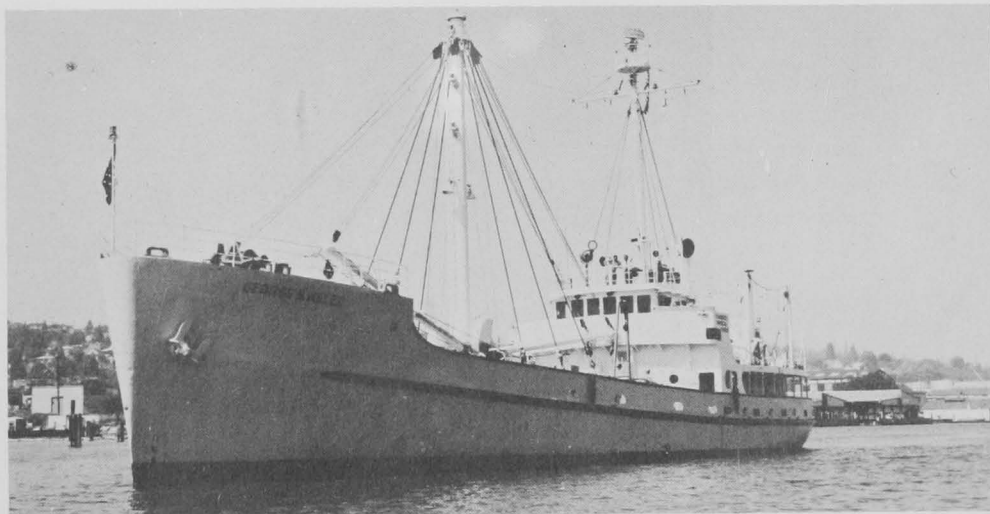
▲ The original "Montlake Laboratory" is now an integral part of the Bureau's research complex. Built in 1931, it housed all the Bureau's research activities until recent years. This now historic building has been the scene of many international commission meetings, where decisions of importance to world fisheries have been made.



Biological Laboratory

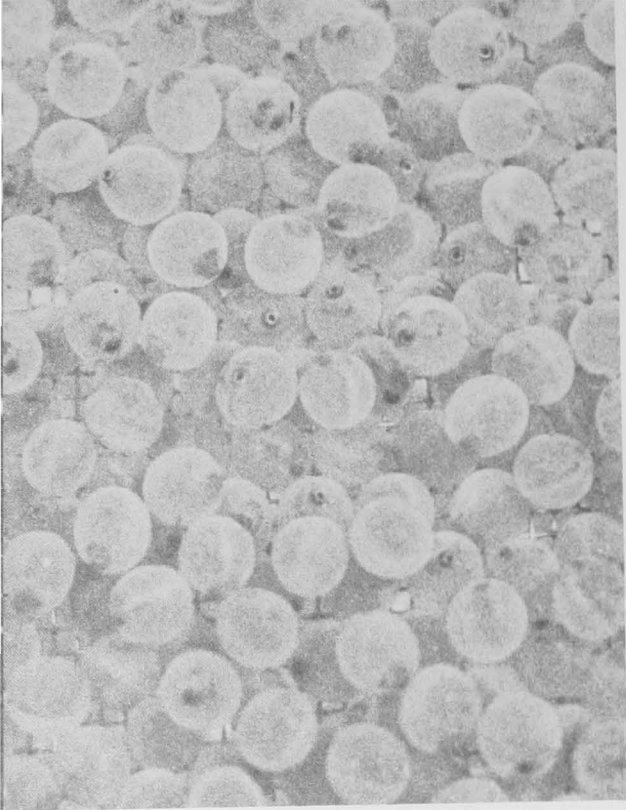
The principal function of the Bureau's Biological Laboratory, Seattle, Wash., is to conduct research on the coastal and high seas fishes in the Pacific Northwest Region. Research on salmon behavior patterns and survival and the influences of environment provides an understanding of the fluctuations in abundance of coastal stocks. Considerable research is directed toward providing safe passage for migratory fishes at water-use projects, such as hydroelectric and flood-control dams, and irrigation systems.

In the critical international North Pacific fishery, unique research tools have been developed to distinguish Asiatic from North American stocks of salmon and determine their distribution.

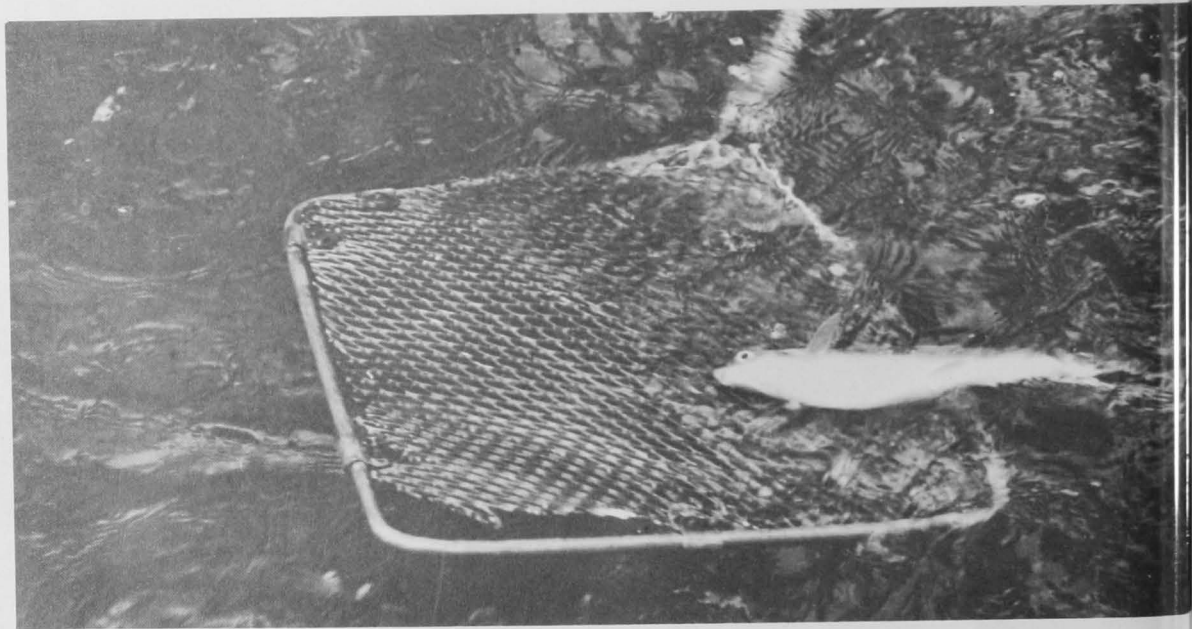


The **George B. Kelez**, a converted military vessel, is the Biological Laboratory's first high seas research vessel. She was commissioned in July 1962. This 176-foot vessel is engaged in salmon gill netting and longline fishing and oceanographic work.

Scales are removed from salmon and magnified, and the growth rings studied to determine the age and origin of the individual fish.

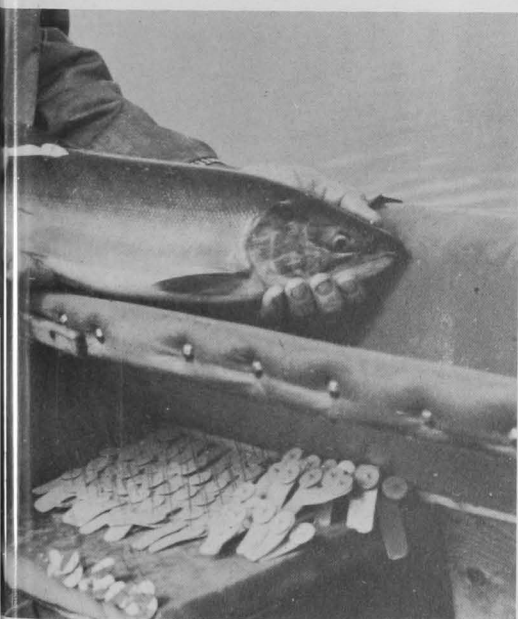


Planting salmon eggs in gravel of a man-made stream where optimum conditions are provided for incubation.



Fish attracted to anode of specialized electro-fishing gear that enables biologists to sample predatory stream fishes in salmon survival studies.

Surgical and physiological techniques are often necessary in fishery research. On a dead fish from which the gill cover has been removed, the technique of direct injections into the blood stream is illustrated. Serological studies have provided valuable means of investigating genetic differences among fish populations, and serology has proven to be a sensitive method of detecting maturity.



Salmon being tagged on the high seas to obtain information on growth rates, mortality, and migration during periods of ocean life — especially to measure the effects of high seas salmon fisheries.

The oceanographic program investigates the fertility and biological production of the ocean as one of its many facets of research. Here a chemist uses an atomic spectrophotometer to measure minute quantities of the dissolved nutrient metals present in sea water.

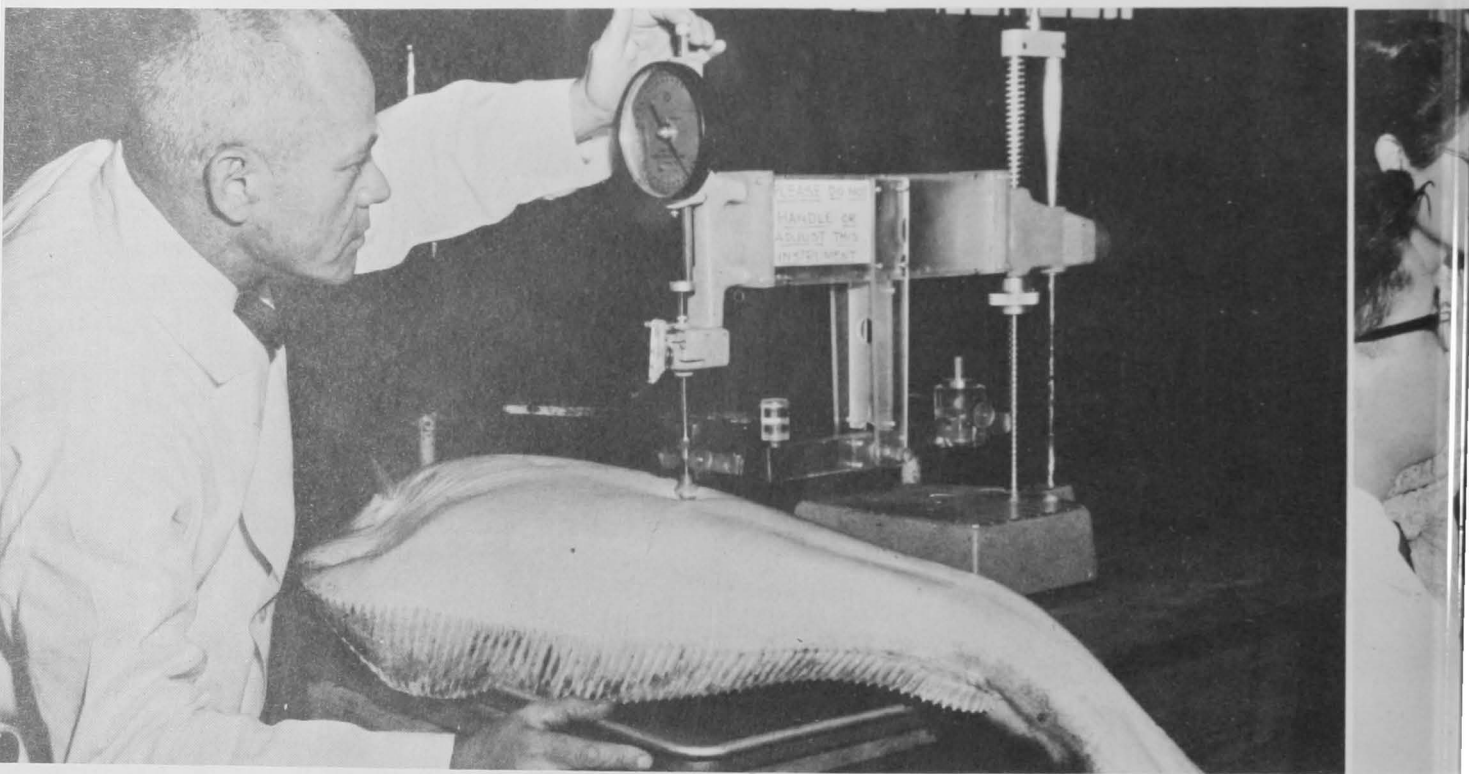


Technological Laboratory

The Bureau's Technological Laboratory in Seattle conducts research that will provide knowledge necessary to use our fishery resources more effectively. The laboratory maintains liaison with industry so that the commercial fisheries may be kept abreast of research progress and may obtain information on problem areas.

The laboratory has two principal units of research. The Chemical Research Unit is concerned largely with basic changes in the chemical, biochemical, or physical components of fish. The Preservation and Processing Research Unit deals with the microbiology of fresh and processed fish, and the physical and chemical changes occurring in the processing of fish.

Currently, three large research programs are underway. The first aims at improving and expanding the market for fish oils, including studies on their properties and chemical reactions, and on the preparation of new products from fish oils. The second involves irradiation pasteurization of several fish products as a means of extending their storage or shelf life. The third deals with developing standards for quality that will assure the customer of high-quality fresh and frozen fish.

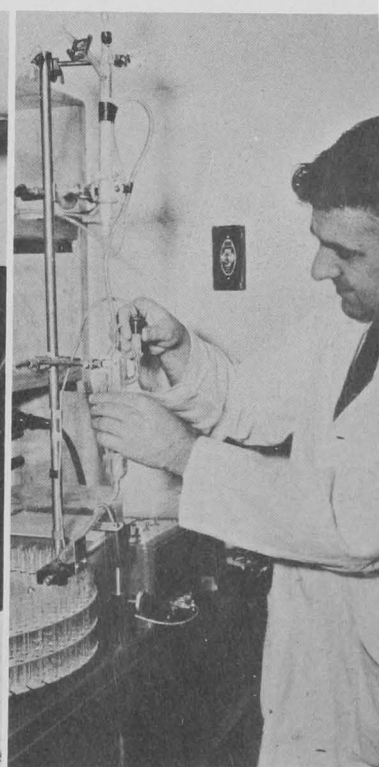


Measuring relative firmness of fresh halibut in a study of the quality changes in iced dressed fish. The Bureau's Technological Laboratory at Seattle developed this instrument.



Organic and analytical chemists perform a molecular distillation of phosphorus derivatives of fatty acids. Fish oil is an ingredient in fire-retardant paints and lubricant additives.

Nitrogenous compounds that indicate freshness or spoilage are extracted and separated from fresh fish as part of the study on radiation preservation of chilled fish fillets.

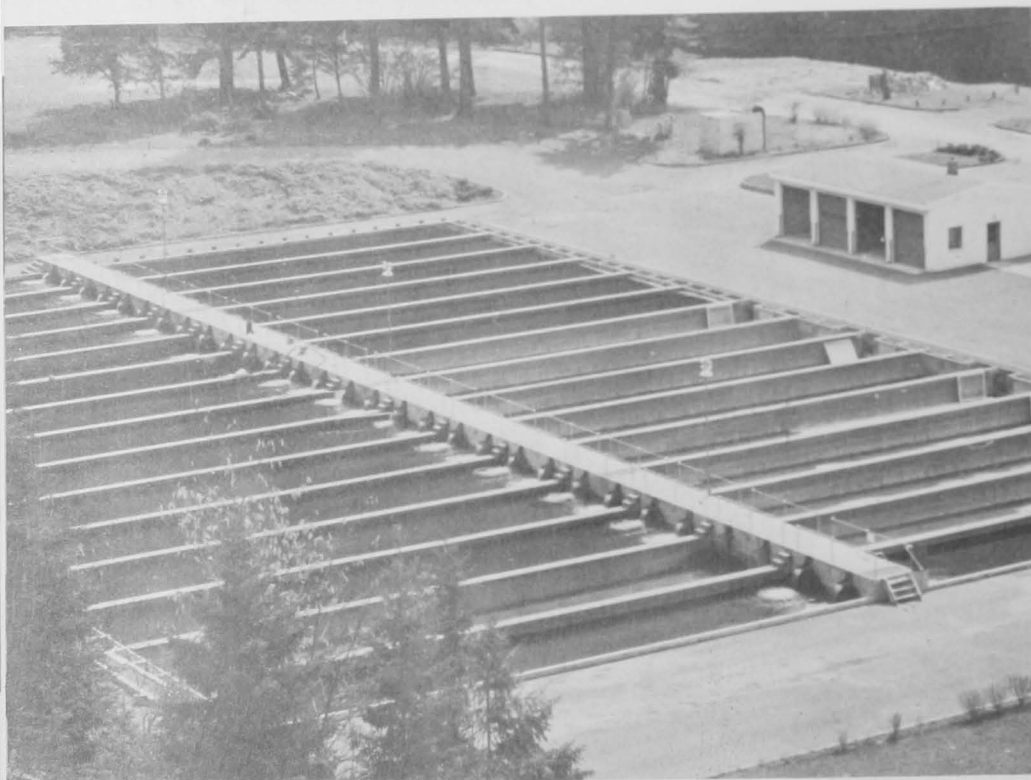


A chemist examines a thin-layer chromatographic plate used in the analysis of fish oil derivatives.

A microbiologist examines a culture of anaerobic bacteria found in the marine environment. Information from such studies leads to improvement of methods for extending the storage life of fresh fish.

Columbia Fisheries Program Office

In 1949 the Congress authorized Federal funds to initiate a program to rehabilitate the salmon runs in the lower Columbia River; however, since 1938 the Federal Government has been engaged in fishery development work in this area. The present program is based on the recognized loss of fish and fish habitat at Federal water-use projects. The objective is the maximum development of the salmon and steelhead runs in the tributaries of the Columbia River. To supervise this work, the Columbia Fisheries Program Office is ideally located in Portland, Oreg., on the Columbia and Willamette Rivers. In addition to grant-in-aid functions, the Program Office is staffed to review water-development projects affecting anadromous fish resources and develop functional designs for a wide variety of fish facilities.



A part of the Columbia River Fishery Development Program has been the construction or reconstruction of 21 salmon and steelhead hatcheries in Oregon and Washington.

Biologists examining sport-caught adult fall chinook for scars where fins were clipped off. Missing fins indicate Program hatchery origin. First marked fish from this enormous hatchery evaluation program returned in 1964.

ALASKA 10



BRITISH COLUMBIA 1998



WASHINGTON 1598

COLUMBIA RIVER 10

OREGON 589



CALIFORNIA 10

In an evaluation of the hatcheries of the Columbia River, 22,000,000 fall chinook salmon fingerlings have been marked by removing fins. An additional 8,000,000 will be marked in 1965. The location and number of fish recovered as of August 8, 1964, are indicated in the chart to the left. This evaluation will continue for several years.



Adult chinook salmon collected in the fishery, with the adipose fin missing, came from a hatchery.

The safe passage of downstream migrating salmon and steelhead fingerlings is an important feature of many water development projects. Shown here is the right bay of a huge louver facility at Mayfield Dam on the Cowlitz River, Wash. The facility diverts downstream migrants into a bypass around the turbines. The functional design was developed at the Columbia Fisheries Program Office.



Dams and natural obstructions often completely block the upstream migration of salmon and steelhead. The efficient fishway at Rocky Reach Dam on Columbia River was designed with the aid of engineers in the Columbia Fisheries Program.

The use of natural and artificial impoundments for rearing salmon and steelhead is one of the more recent developments in fishery management. Regular hatchery production is supplemented by utilizing ponds such as this one created by highway construction along the Columbia River.

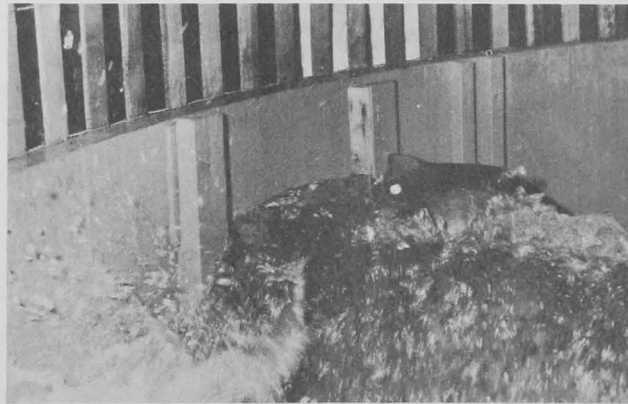
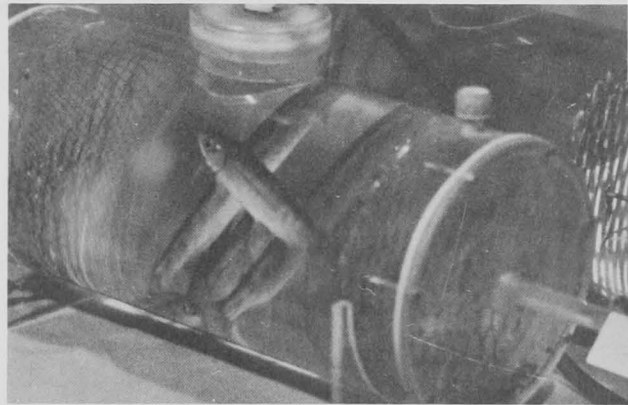


Fish-Passage Research



A large-scale program of research directed toward the solution of major fish-passage problems is being performed in cooperation with fishery agencies of the States of Washington, Oregon, and Idaho. The studies include research on the effect of impoundments created by dams on fish migration, methods of collecting (and guiding) downstream migrants from streams and rivers, passage of migrant fish at dams, and adaptability of salmon to new environments created by dams.

Testing of salmon and steelhead passage in full-scale models of the Ice Harbor Dam fishway weirs.



Behavior and response (1) Salmon fingerlings in a "respiratory chamber" yield information on daily oxygen use. (2) An adult chinook salmon swims over a weir in a Seattle laboratory after a long truck ride from Bonneville Dam. (3) Biologists stuff cotton in nasal cavity of adult salmon to determine importance of sense of smell for locating home stream (spawning grounds).

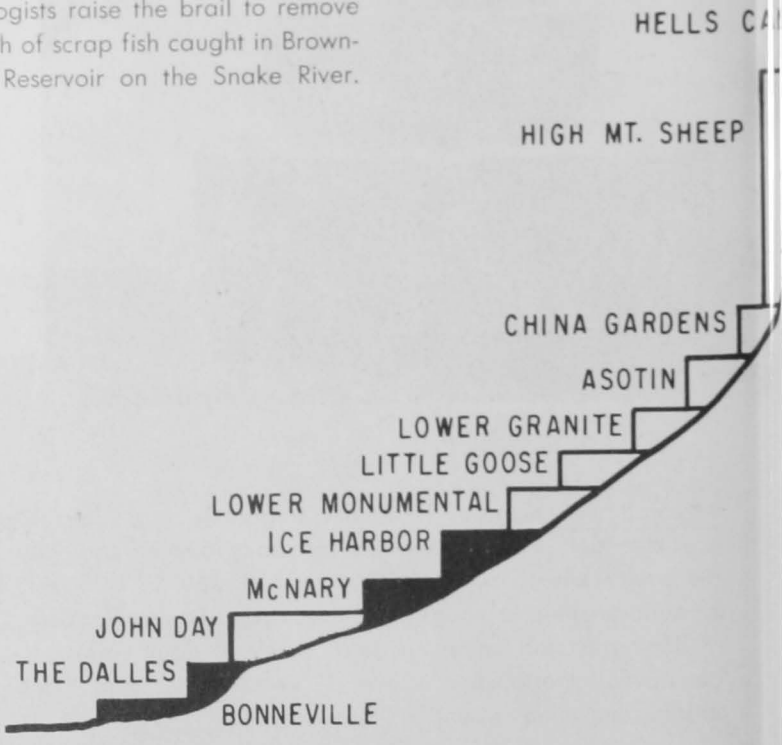




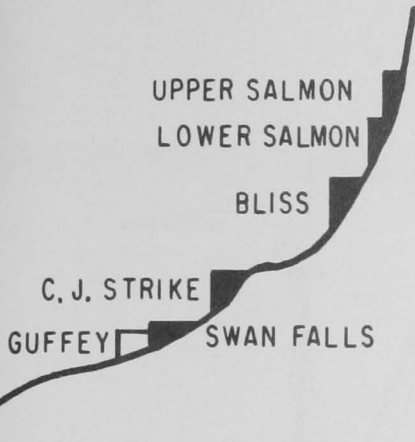
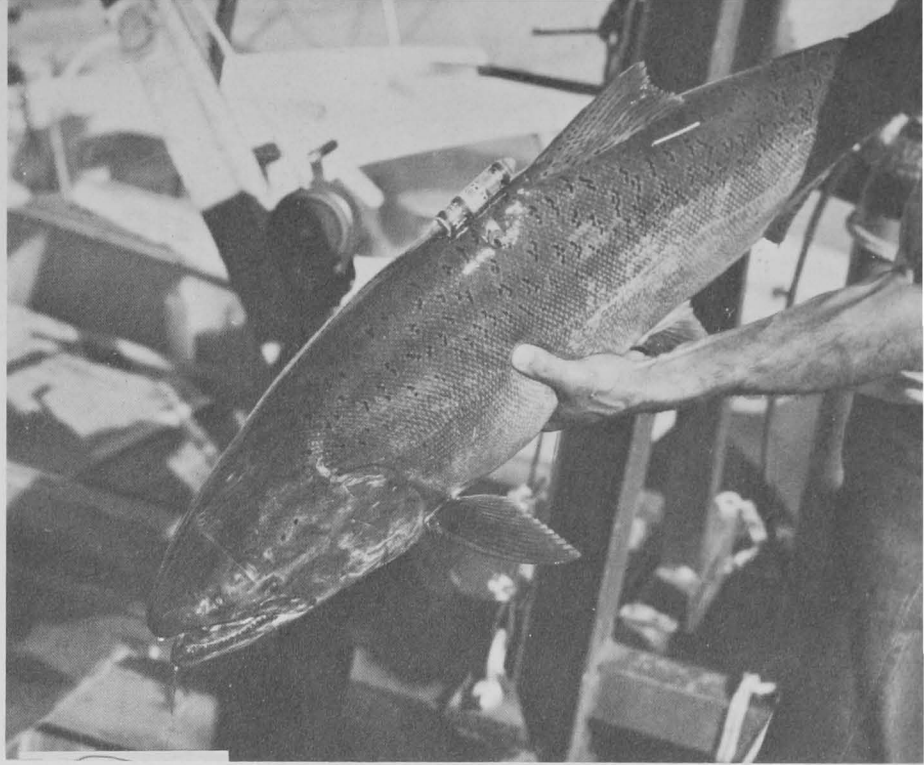
A giant net is lowered behind turbine to determine extent of damage to fingerling passing through. Insert shows sample of fish damaged by turbine.



Biologists raise the brail to remove catch of scrap fish caught in Brownlee Reservoir on the Snake River.



Large chinook salmon wears a sonic tag (miniature sonar pinger). The tagged fish can be followed by biologists in a boat specially equipped to detect the sonic pings.

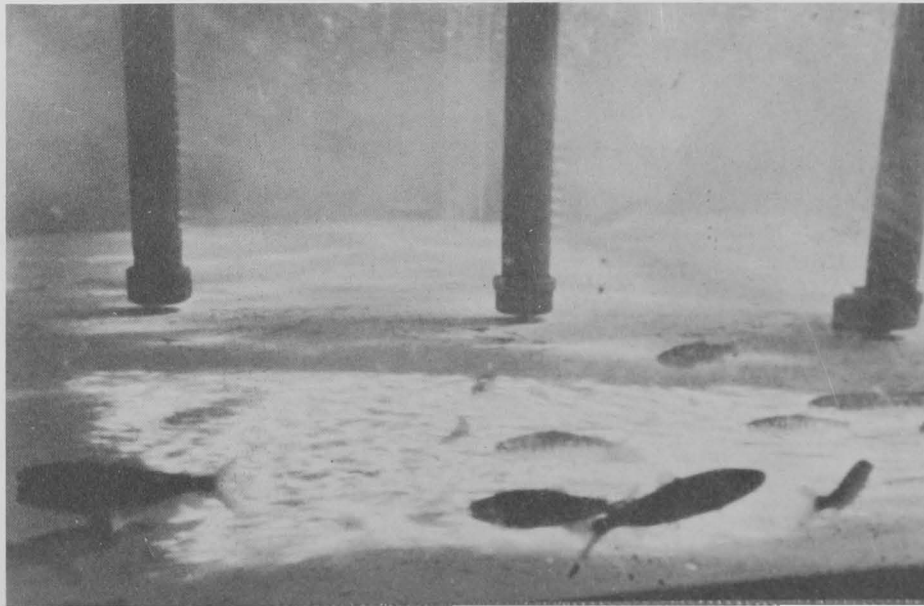


Little free-running river will be left when present and proposed dams create a series of pools and reservoirs in the Columbia and Snake Rivers.

EXISTING

PROPOSED

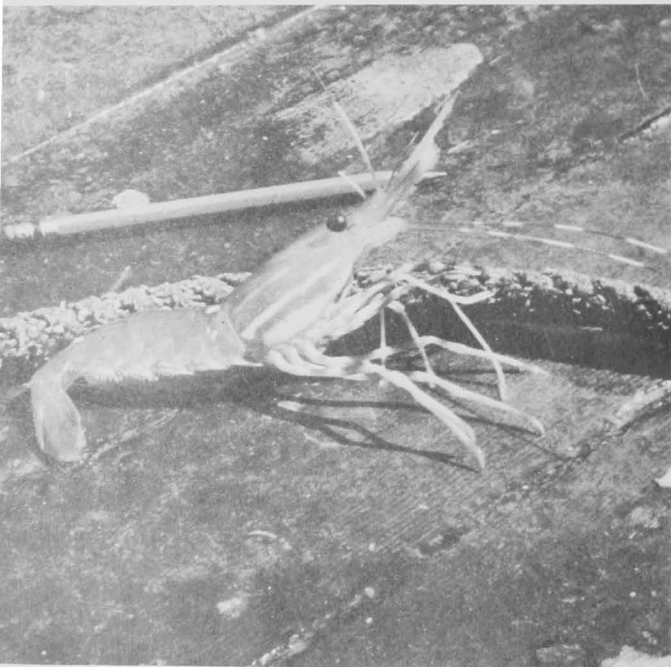
In studies of ways to screen dangerous entryways, young salmon dart away as water is jetted from pipes.



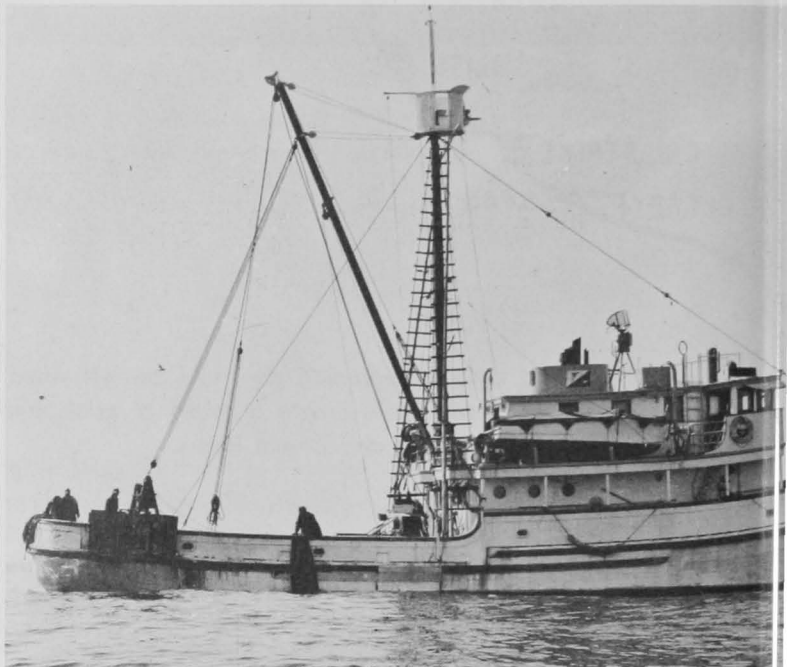
Exploratory Fishing and Gear Research



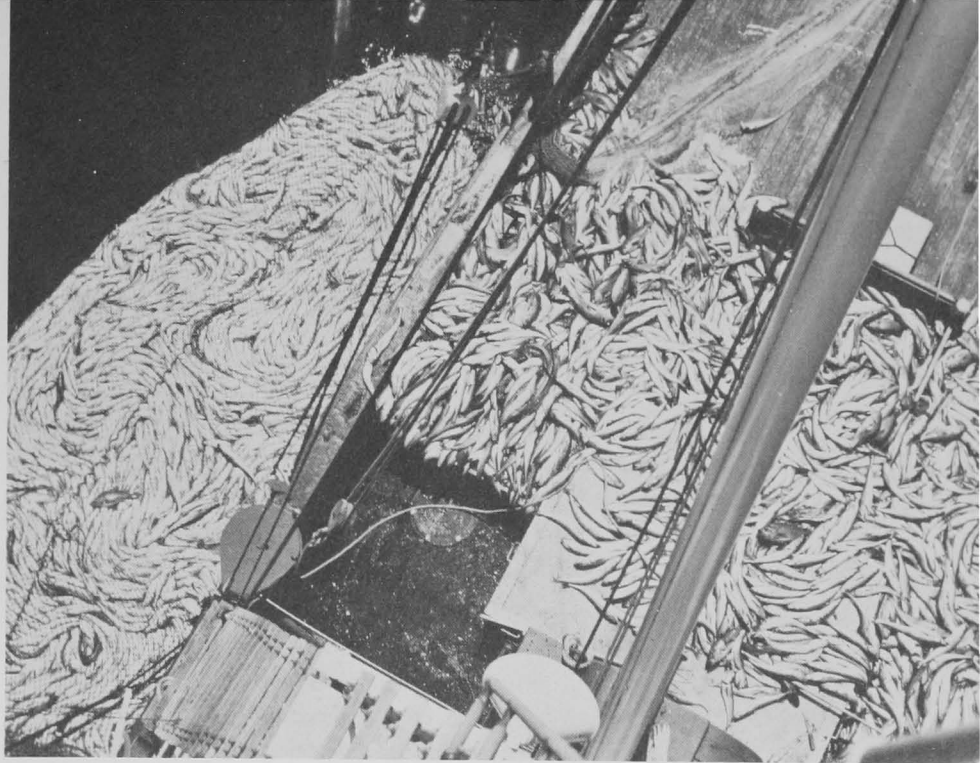
Exploratory fishing aids the growth of our commercial fisheries by expanding present fishing grounds, diversifying effort on present grounds, and discovering new fisheries. By developing better gear and improving fishing methods, research can help the domestic industry compete with foreign imports.



Large populations of shrimp have been located off the coasts of Oregon and Washington and in the waters of Central and Southeast Alaska. These discoveries have aided the expansion of the commercial shrimp industries of the Pacific Northwest.

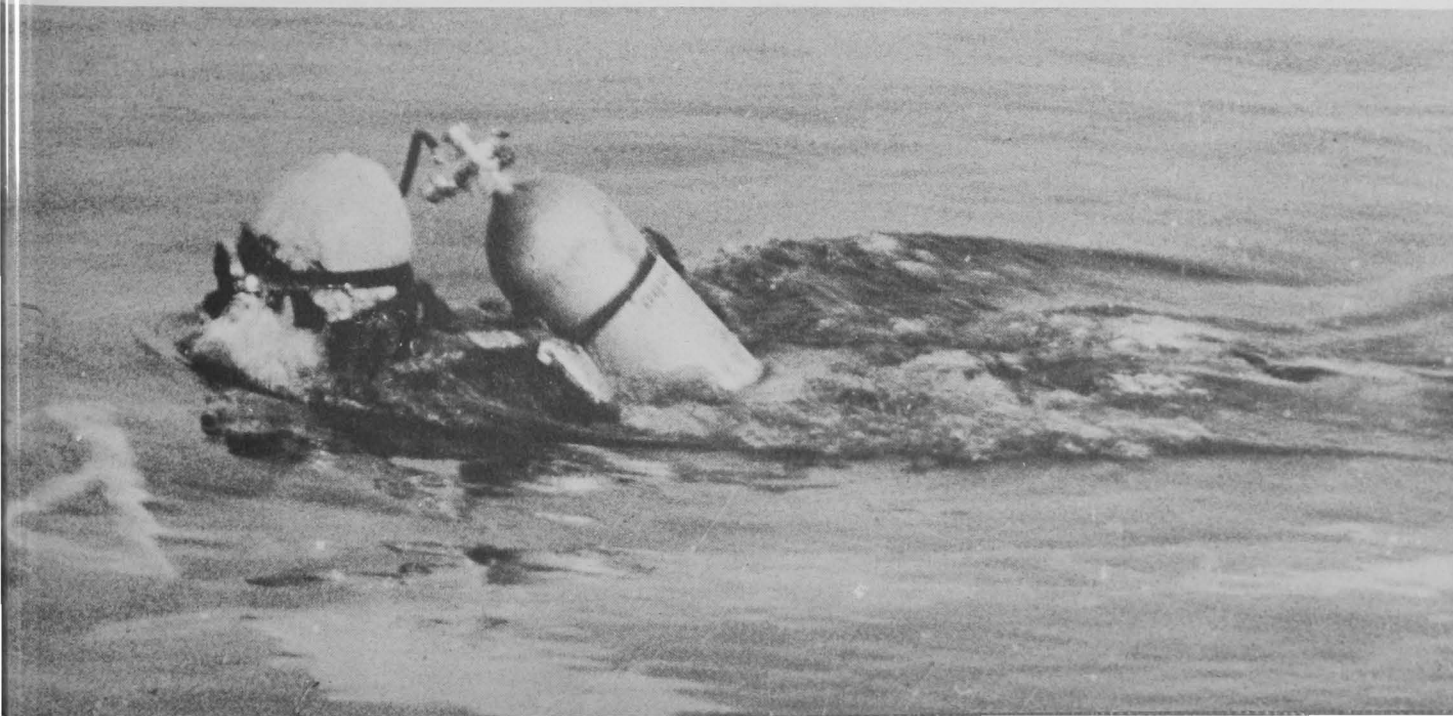


The **John N. Cobb** is engaged in a wide variety of exploratory fishing and gear research programs. This 93-foot vessel carries eight crew members and normally two to four scientists.



Exploratory surveys have produced up to 60,000 pounds of hake per one-half hour of fishing time. This catch off the Washington coast was taken with a newly-developed midwater trawl and electronic telemetering gear to monitor the fishing depth of the net. Surveys suggest that hake comprise one of the largest unexploited fishery resources available in Pacific Northwest waters.

SCUBA diver preparing to descend aboard sea sled to observe midwater trawl in action. These observations provide a better understanding of gear design and operation.



Marine Mammal Research and Management

Once nearly exterminated by fur hunters, the fur seal herds of the Pribilof Islands are now approaching their peak abundance under the research and management of the Bureau of Commercial Fisheries, whose success with the seals is an outstanding example of conservation in action. The Bureau also has a small research program on whales.

The United States has netted about \$1,500,000 annually from its share of the seal pelts during the last 15 years. Japan and Canada receive shares of the seal pelts taken by the United States under the provisions of the Interim Convention on Conservation of North Pacific Fur Seals. The Soviet Union is also a participating nation under this Convention. The Bureau, in its Pribilof Islands Program, provides for the health, education, and welfare of about 600 Aleut resident natives.



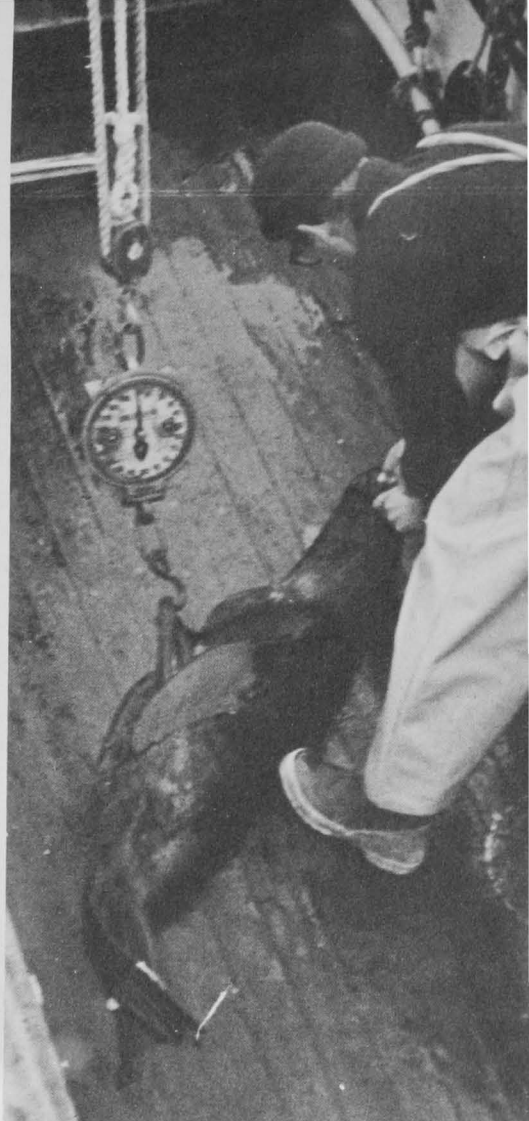
▲
Biologists and Pribilof Islanders marking a fur seal pup by shearing hair patches. Marking provides valuable information on the abundance of the annual seal crop



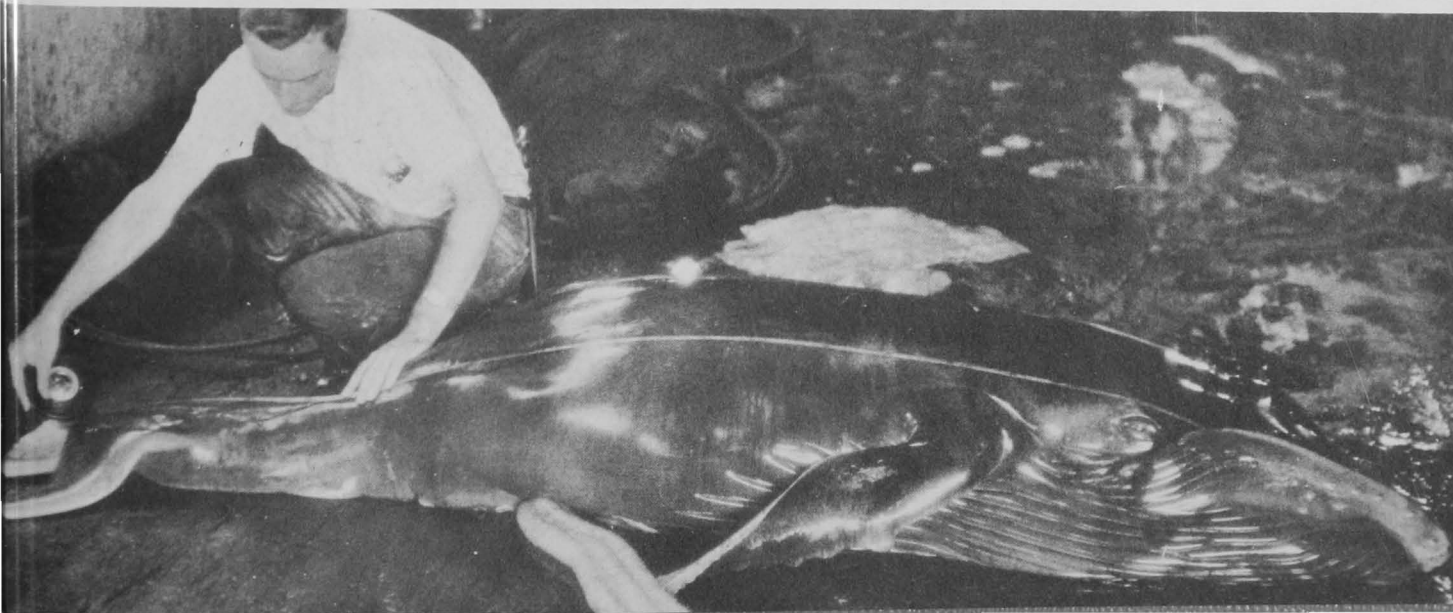


▲ Bull and females on fur seal rookery (Little Polovina) on St. Paul Island, Alaska. A bull may have as many as 100 females in a harem.

Measuring and weighing seals taken during pelagic fur seal research conducted in the Bering Sea. ▶



▼ Biologists obtain information about the whales taken by the two land stations located at Richmond, Calif., on San Francisco Bay. The fetus of the hump-back whale shown is nearly eight feet long. At birth it would be about 15 feet long. An international management plan for whales of the North Pacific is a conservation need.



Marketing

The basic aims of the Branch of Marketing are (1) to promote the free flow of domestically produced fishery products, (2) to develop and expand markets for fishery products of domestic origin, and (3) to promote the improvement of marketing practices. These aims are achieved through a broad range of educational, market development, and promotional activities designed to reach all segments from the producing fisherman to the consumer.



▲
A marketing specialist discusses merchandising with a fresh-fish retailer.

Educational exhibits are provided by the Bureau to promote the use of fishery products. Exhibiting at meetings and conventions also provides a point of contact to discuss marketing and use of fishery products with industry and food service personnel.

The housewife learns fish cookery through television demonstrations. Bureau Home Economists appear frequently on TV and radio. Other fish cookery demonstrations are given to institutions, restaurants, and other consumer groups, and, in cooperation with the Department of Agriculture, for the National School Lunch Program.

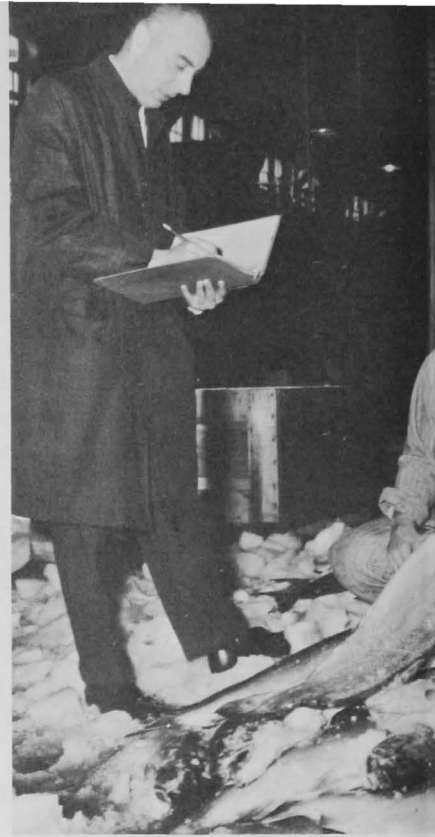


The educational program includes clinics for retailers, distributors, and institutional handlers of seafoods. A Bureau Marketing Specialist demonstrates the filleting technique.

Market News and Statistics

The Seattle Market News Service office is one of seven such offices strategically located throughout the United States. Through the daily publication of the landings, receipts, stocks, prices, and market conditions, this Service encourages the orderly marketing of fishery products and byproducts. In addition to the daily "Fishery Products Reports," many other types of reports of importance to the fishing industry are issued, including monthly and annual summaries. The Seattle office reports are mailed to nearly every State, and many foreign countries.

One of the 35 field offices of the Branch of Statistics is in Region 1, at Seattle, Wash. It is responsible for assembling data for Washington and Oregon on the number of fishermen, fishing craft, and quantity of gear engaged in taking fish and shellfish in these States; and volume and value of the catch; the production of manufactured fishery commodities; and related information. The data are compiled from the records of the State fishery departments or by surveys of fishermen, fishery wholesale dealers, and manufacturers. Statistical information on the fisheries is released in monthly and annual bulletins in the Current Fishery Statistics series and in the Bureau's annual digest, "Fishery Statistics of the United States."

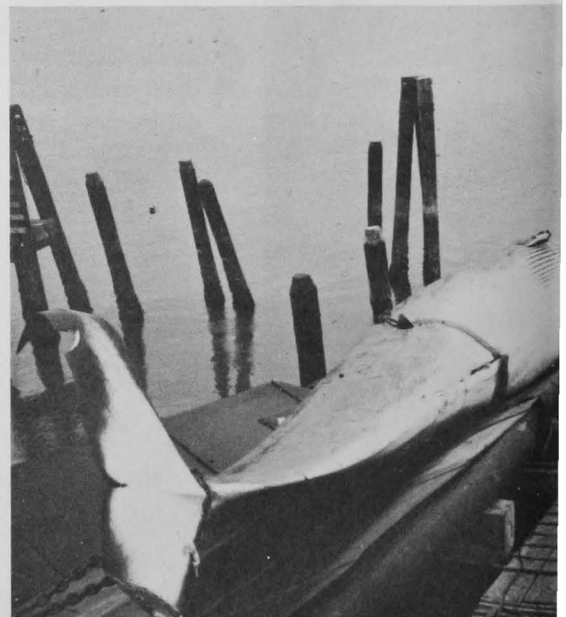


▲
Market News reporter talks daily with industry personnel to obtain information for reports.

Enforcement

The Bureau of Commercial Fisheries, Branch of Enforcement, is responsible for enforcing international treaties, acts, and regulations for protection of the fisheries and marine mammals in our coastal waters. In cooperation with the U. S. Coast Guard and Washington State Department of Fisheries, aerial and surface patrols are made of international and territorial waters, to curtail infractions of the various acts, treaties, and regulations that were imposed to protect fishes and marine mammals.

▲
A 65-foot fin whale being landed at a whaling station for processing. Regulations governing the time, size, and species of whales that may be taken are enforced by the governments of the countries participating in the whale fishery.




Loans and Grants

The Branch of Loans and Grants administers a fisheries loan program in the states of Washington and Oregon for financing and refinancing operations, maintenance, replacement, and repair of commercial fishing vessels damaged by explosion, fire, sinking, or collision. Loans valued at 3 million have been awarded to vessel owners in this Region. The Branch also conducts a mortgage and loan insurance program and a differential subsidy program for the construction of fishing vessels.



Vessels damaged by 1964 Alaska quake. The Bureau furnished loans to replace and rebuild lost and damaged vessels.





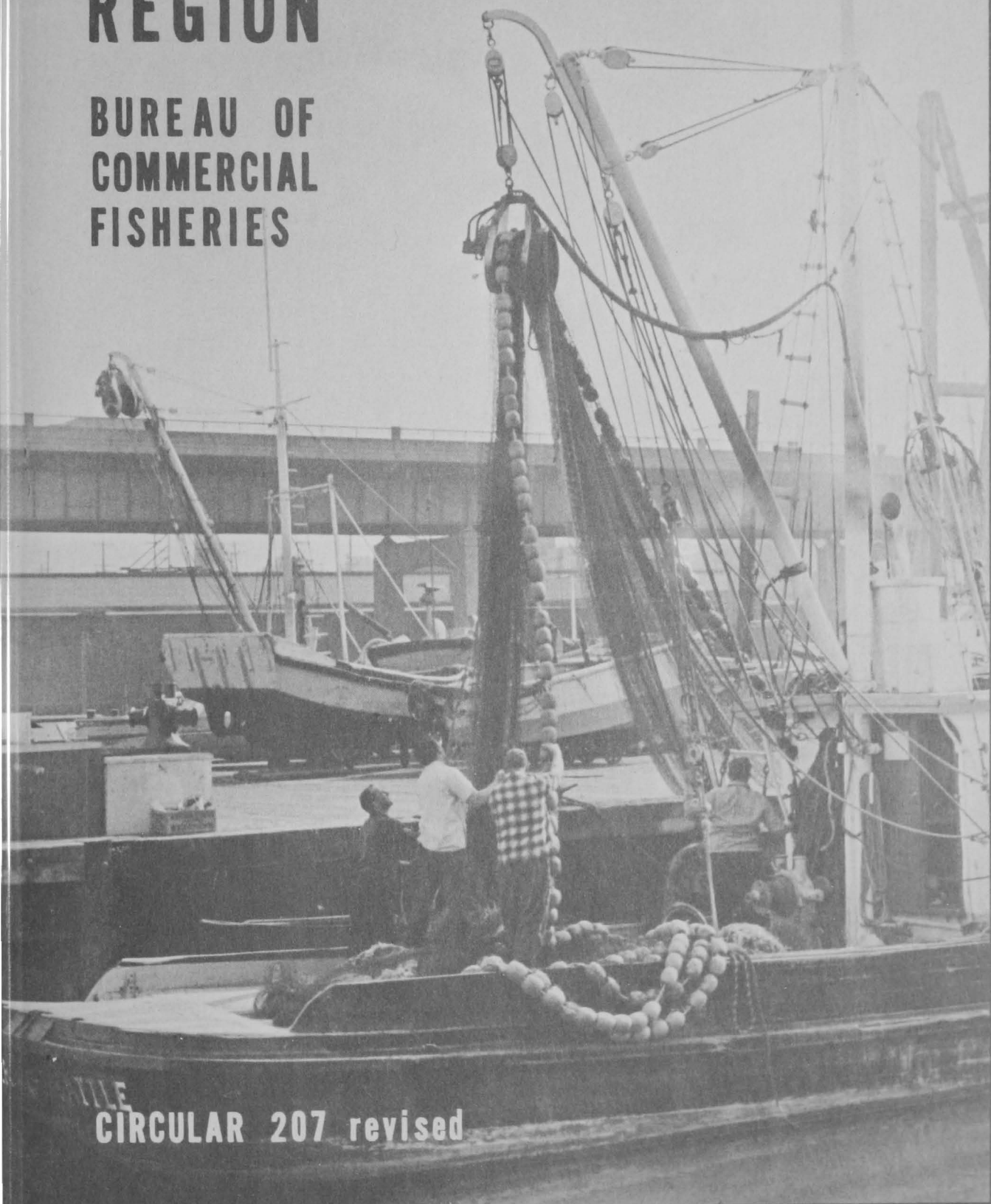
Created in 1849, the Department of the Interior—a department of conservation—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation'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.

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PACIFIC NORTHWEST REGION

BUREAU OF
COMMERCIAL
FISHERIES



CIRCULAR 207 revised



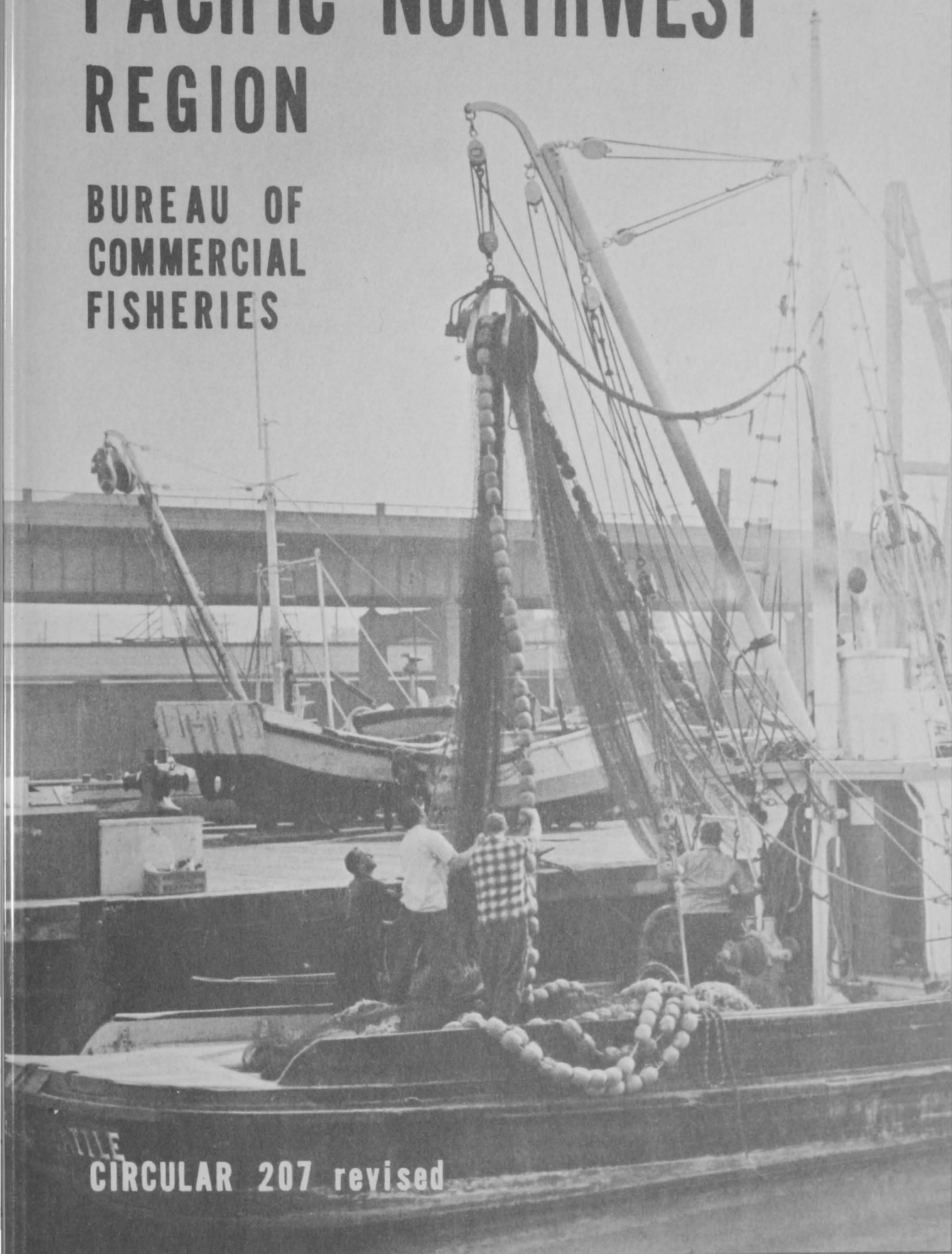
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CIRCULAR 207 revised

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UNITED STATES DEPARTMENT OF THE INTERIOR
Walter J. Hickel, *Secretary*
Russell E. Train, *Under Secretary*
Leslie L. Glasgow, *Assistant Secretary*
for Fish and Wildlife, Parks, and Marine Resources
Charles H. Meacham, *Commissioner, U.S. FISH AND WILDLIFE SERVICE*
H. E. Crowther, *Director, BUREAU OF COMMERCIAL FISHERIES*



THE PACIFIC NORTHWEST REGION OF THE BUREAU OF COMMERCIAL FISHERIES

DONALD R. JOHNSON
Regional Director
Seattle, Washington

September 1969

FOCUS
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Seattle's metropolitan area fronts on a deep, protected harbor which provides superb anchorage for ships. The bulk of Seattle's fishing industry is located along the waterfront. (Courtesy Port of Seattle).

The Pacific Northwest Region of the Bureau of Commercial Fisheries

Puget Sound was a fishing center in the Pacific Northwest long before white men stepped ashore at Alki Point in West Seattle. Fish were the important food for the Indians living on the shores of this vast natural waterway. As the white settlement grew, fisheries became one of the prosperous industries. The methods of fishing were varied and included a combination of methods adopted from East Coast fishermen and the local Indians. Salting was the principal early technique used to preserve the fish. As time progressed, newer and larger boats with more efficient gear led to a greater harvest from the sea, and the preservation techniques were improved manyfold. The fishermen soon learned, however, that fishery stocks were not inexhaustible and felt the need for fishery research.

During the late 1920's, many foresighted men visualized the future importance of Seattle as a fishery center. One of these was the U.S. Commissioner of Fisheries, Henry O'Malley. He selected Seattle as the site for a Federal fishery research laboratory. Thus, Seattle became a center for fishery research and was the logical site for the office of the Pacific Northwest Region when the Bureau of Commercial Fisheries was established under the U.S. Fish and Wildlife Act of 1956.

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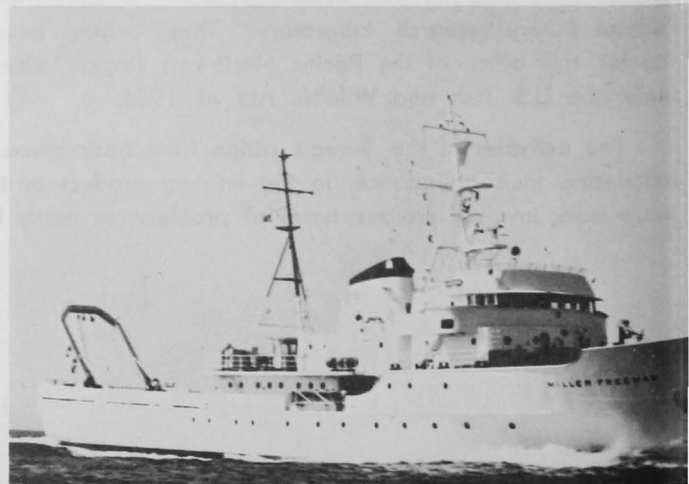
Biological Laboratory

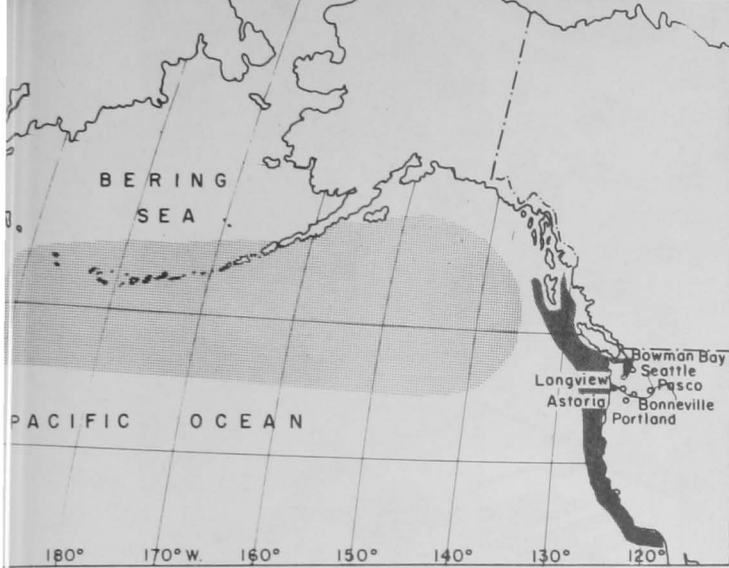
The Biological Laboratory at Seattle, with some 80 scientists, is the largest research organization in the Bureau. The scientists conduct intensive research on salmon and groundfish on the high seas, in coastal areas, and in the environs of the mighty Columbia and Snake Rivers.

The Laboratory's three main subdivisions are the Biometrics Institute, Freshwater-Estuarine Research, and Marine-Coastal Research. Personnel at six field stations are directed from their headquarters in Seattle. The Laboratory maintains close associations with representatives of the fishing industry, government officials, educators, engineers, and scientists — locally, nationally, and internationally.



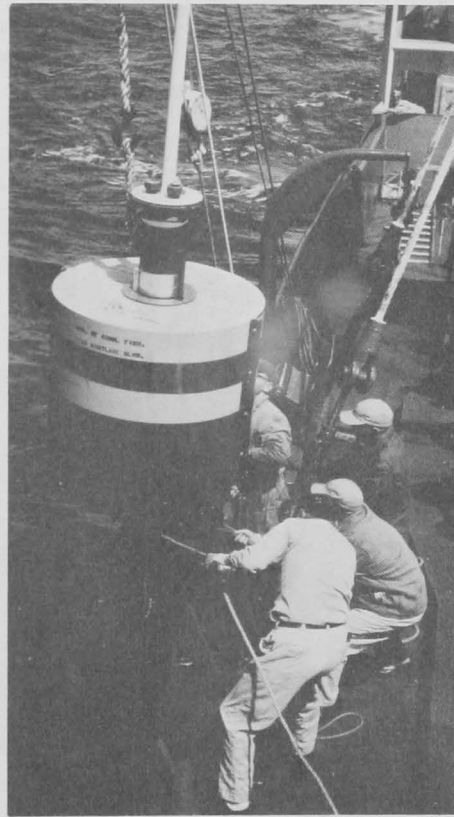
The research complex (center) of the Bureau of Commercial Fisheries nestles between Lake Washington (upper right) and Lake Union (lower left), south of the University of Washington. The complex houses the Biological Laboratory, Exploratory Fishing and Gear Research Base, Food Science Laboratory, Marketing Office, and Technology Laboratory.





Research at the Biological Laboratory covers a vast area of the North Pacific Ocean (shaded). Salmon are studied in the northern waters and groundfish along the Continental Shelf. Field stations in Washington and Oregon are shown at lower right.

One of the Laboratory's telemetry buoys being lowered in midocean. The buoys can transmit information on location, salinity, and temperature to vessels at sea, to land stations, or even satellites.



Biologists removing gonads of freshly caught salmon for weighing aboard ship. Condition of the gonads shows whether the fish is maturing and in its spawning migration.

Bureau's newest research vessel, the 100-foot **Miller Freeman**, was launched in 1967. She carries 9 scientists and a crew of 28. Her cruising speed is 15 knots with maximum range of 16,000 miles. A year-round cruise schedule is maintained by the Laboratory's biologists and oceanographers on the **Miller Freeman** and the **George B. Kelez**.



↑

Oceanographer examining data from an automatic STD (salinity-temperature at depth) sensor (left), lowered from a ship. Data are collected on a recorder (right) or may be processed immediately with a shipboard computer.



↑

Oceanographer measuring trace element content of sea water by atomic absorption spectrometry. Trace elements may help identify water masses which may influence movements of salmon.

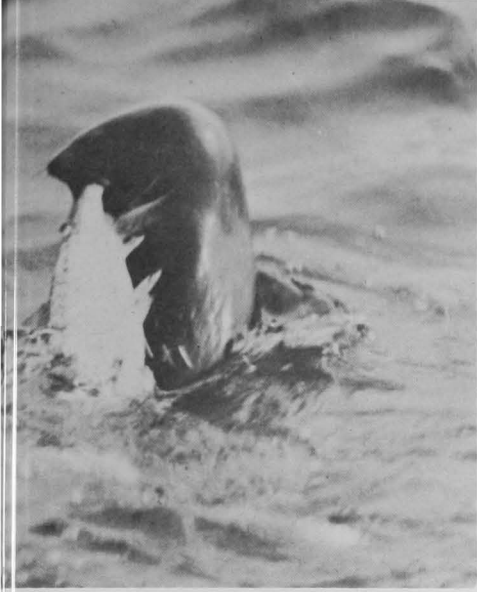
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Sockeye salmon caught in gill net, a gear used extensively in the Laboratory's research. The twine constricts the fish behind the gill covers and they cannot escape.



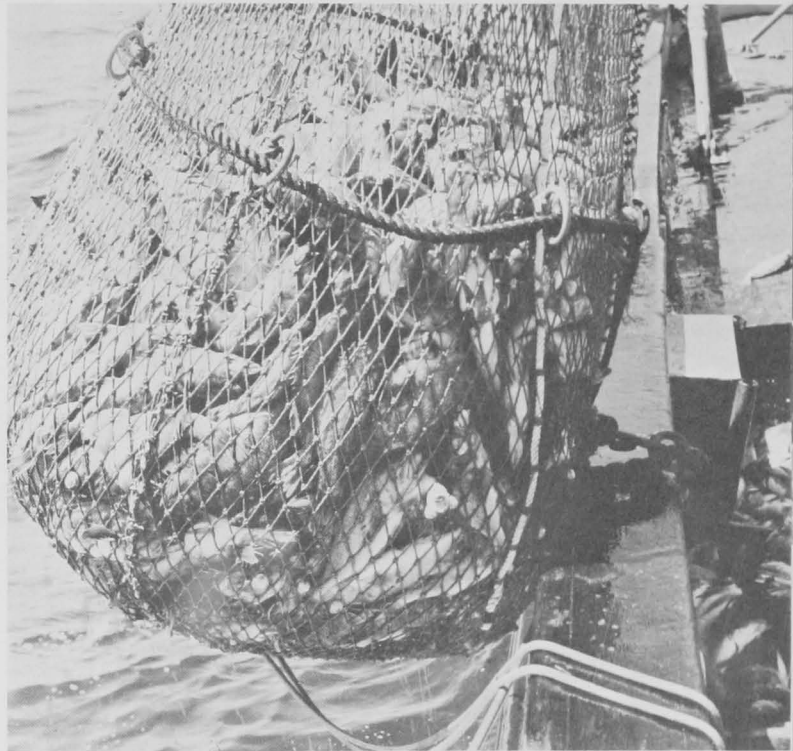
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Technician preparing density gradients for ultracentrifugation to isolate enzymes. Biochemical techniques show promise in finding genetic markers for races of fish.



A fur seal finds a ready-made banquet of a salmon taken from an experimental gill net. Experiments show that sea lions, seals, sharks, and birds could cause problems in gill net fisheries.

Catch of Pacific ocean perch aboard U.S. trawler. Samples for biological studies are taken from these catches.



Biologists collecting young salmon with beach seine.

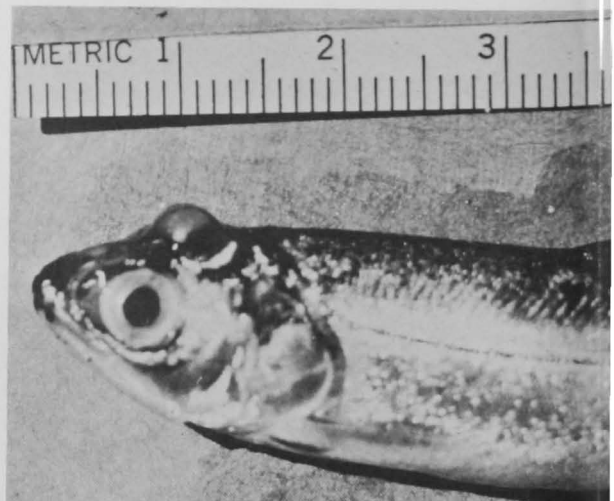


Scale of a sockeye salmon from Bristol Bay, Alaska. Arrows indicate winters of life: narrow arrows, winters in fresh water; broad arrows, winters in the sea.

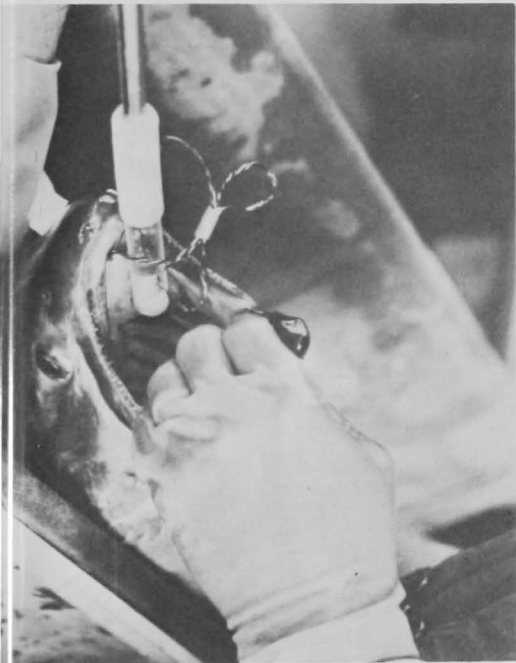


Semi-automatic machine for reading fish scales being operated experimentally. Image of scale under microscope (right) is fed to computer (center). The computer analyzes the light and dark areas of the scale and results are printed on teletype (left). The machine will "read" scales about 60 times faster than humans.

Gas bubble in eye tissue of coho salmon caused by excessive amounts of dissolved nitrogen. Supersaturation of nitrogen occurs in turbulent water below spillways or where river water warms rapidly without adequate circulation.



Sonic tags are used extensively to trace movements of fish. Here, a shore monitor records date, hour, and direction of passage. Monitor is completely automatic; units need servicing only once every 7 to 10 days.



A recently developed sonic tag is being inserted through the mouth and esophagus into the stomach of a chinook salmon. The procedure does not harm the salmon and protects the tag.

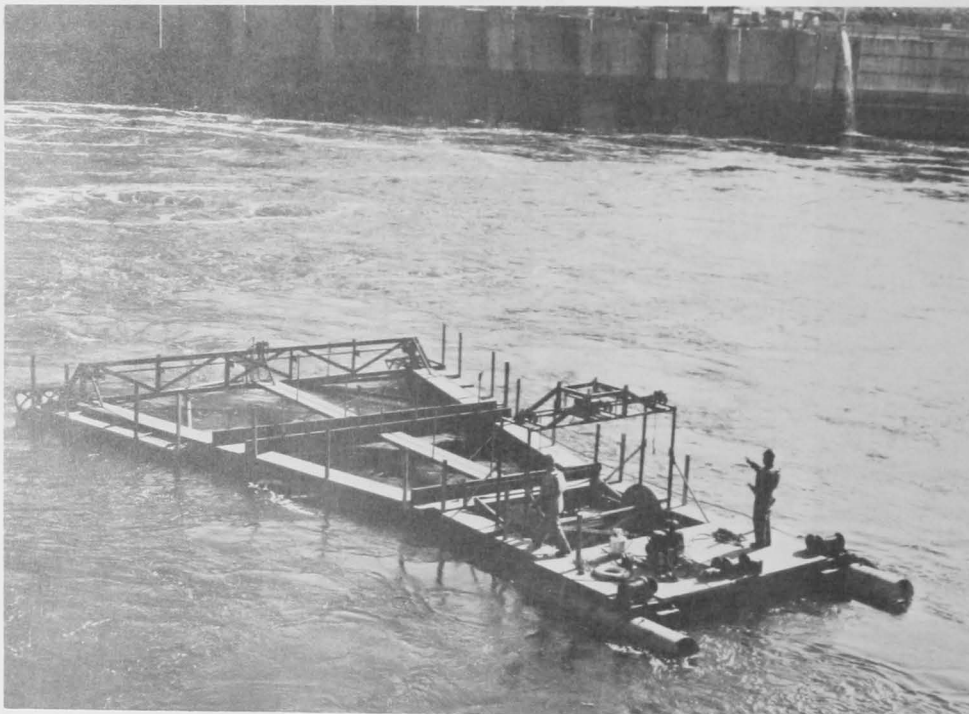
Otolith (ear bone) from Pacific hake magnified about 5 times (age 8 years). Otoliths are better than scales for determining ages of hake in groundfish research.



Blade of Kaplan turbine at Bonneville Dam. The blade has thick edges, but fish are injured where there is minimal clearance. About half of the young salmon and trout migrating down the Columbia River find relatively safe passage over the spillways of dams. The other half pass through the turbines, where 10 percent or more are injured or killed by the turbine blades.



Scoop (floating dipper) trap in operation to recover fish from predator-laden slack water below a dam.



Artist's concept of the traveling screen (Model VII) as it might appear with river or canal. The screen moves a stream to guide fish into a by around a dam or danger point.



Lummi Indian trainees examining trays of chinook salmon fry on board the **Brown Bear**, an ocean-going vessel converted into a barge. The trainees had spawned adult chinook salmon and raised the fertilized eggs to young fry.

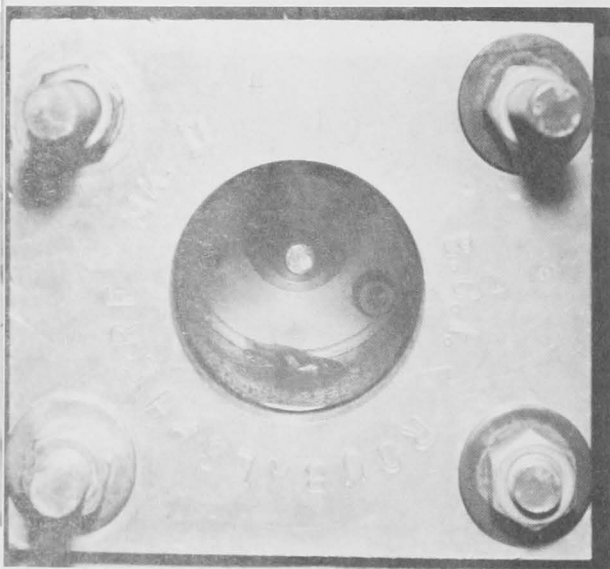
The Laboratory's new bathysphere, or diving bell, is about 8 feet high and weighs nearly 8,500 pounds (including 2,500 pounds of ballast). Two observers can descend as deep as 675 feet to observe the marine environment and the behavior of commercially important fish and shellfish.



Food Science Laboratory

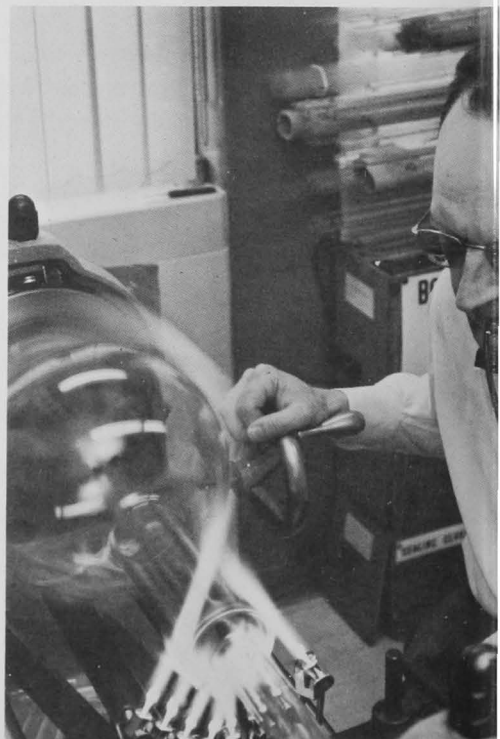
The scientists at this small laboratory carry out long-term research to obtain basic information needed before important problems concerned with utilization of fish for food can be solved. Currently much of the effort is going into a determination of the chemical mechanism by which fish oils oxidize. Such oxidation can result in loss of normal pleasing flavors in fish, development of unpleasant flavors, in discoloration and even in loss of nutritive value. Fish oils being polyunsaturated are highly prone to oxidation. Yet we know less about their oxidation and how to stop it than about oxidation of any of the other food oils or fats.

The laboratory also carries out research concerned with nutritional and functional properties of fish oils. This work is related both to the function of the oil in living fish and to its nutritional properties when consumed.



← A special pressure chamber was constructed to determine effects of high pressure on the lipids in fish.

Projects of the laboratory often require original or unusual glass apparatus. A chemist who is also a scientific glass-blower is making equipment on the glass lathe.



Sophisticated equipment, electron paramagnetic resonance (EPR), is used to measure small changes from lipids in dried fishery products such as fish protein concentrate. These changes play a role in chain reactions that occur during oxidation of the products.



Radioactive compounds are given to fish and are used to trace metabolic activity in the fish. The radioactive material is isolated and tells us how the fish have utilized the compounds.

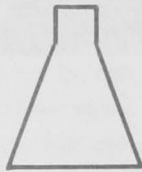
Technological Laboratory

The Bureau's Technology Laboratory in Seattle conducts research that will provide knowledge necessary for more effective use of our fishery resources. The laboratory maintains close contact with industry so that commercial fisheries may keep abreast of research progress and may obtain information on problem areas.

The technology research program is directed toward the expansion of Pacific fisheries, particularly the trawl fishery; development of new and improved products to utilize the available marine resources; and new and improved handling and processing methods aboard the vessel and in the plant.

Current activities of this laboratory include research on: (1) development of new food products from underutilized species, (2) improved techniques for preserving fish and shellfish in refrigerated sea water, (3) new methods for separation of crab meat from the shell, (4) the recovery and utilization of high-quality fish oils for improved animal feeds and industrial applications, (5) an aqueous process for manufacture of fish protein concentrates and purified proteins from whole fish, and (6) microbiological and chemical problems that are important to the safety and wholesomeness of fishery products.

Increasing the Use of Fishery Resources Through



LABORATORY RESEARCH

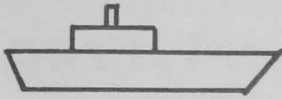


Studying improved methods for extracting high-quality fish oil

Determining the freshness of the fat in fish as a measure of its quality

Determining pesticide residues in fishery products

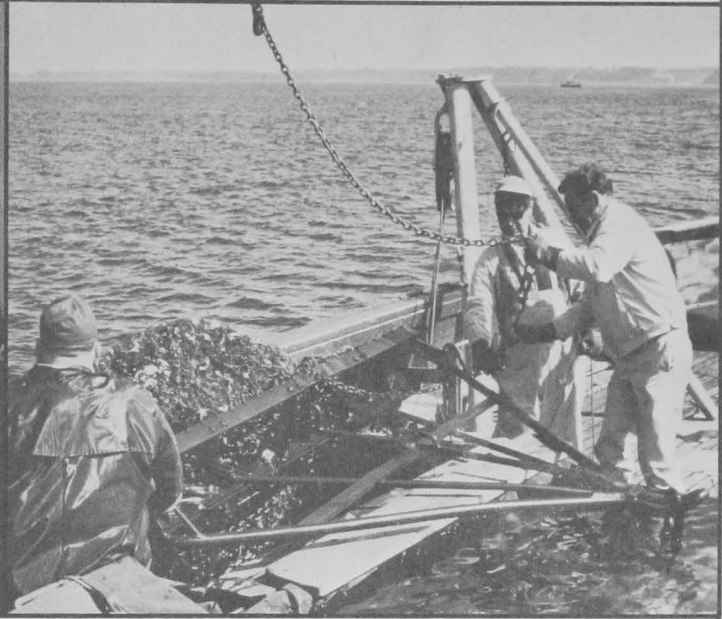
A microbiologist demonstrates bacterial culture techniques to student trainees



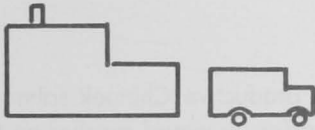
STUDIES AT SEA AND IN THE PLANT



Studying quality changes in fresh halibut aboard the fishing vessel



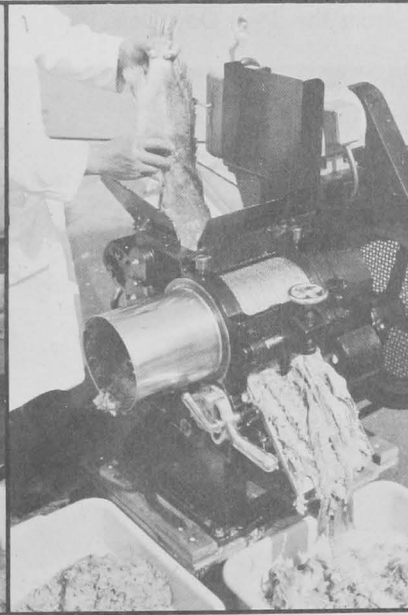
Obtaining scallops aboard a vessel in Puget Sound for processing tests



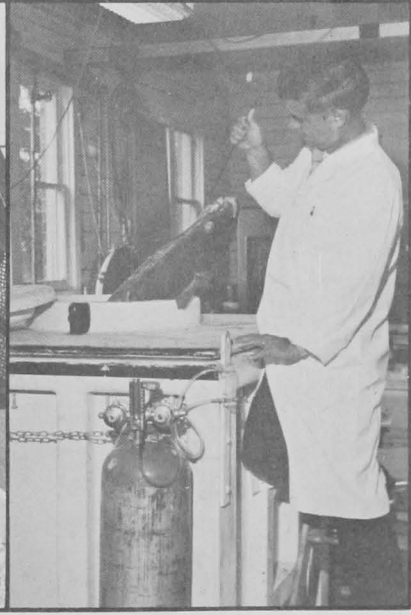
INDUSTRIAL APPLICATION



Demonstrating the separation of crab meat from shell in a horizontal centrifuge



Using a fish-meat separator to recover edible meat for new product studies



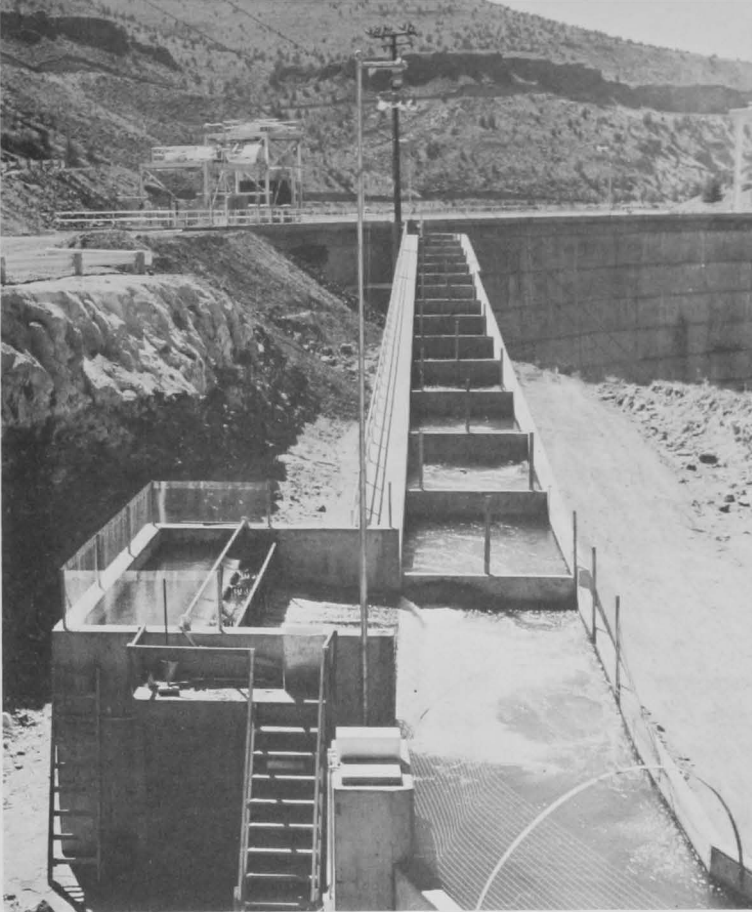
Examining a fresh halibut preserved in a modified refrigerated sea-water system

Columbia Fisheries Development Program

In 1949 the Congress authorized Federal funds to initiate a program to rehabilitate the salmon runs in the lower Columbia River; however, the Federal Government has been engaged in fishery development work in this area since 1938. The present program is based on the recognized loss of fish and fish habitat at Federal water-use projects. The objective is the maximum development of the salmon and steelhead runs in the tributaries of the Columbia River. To supervise this work, the Columbia Fisheries Program Office is ideally located in Portland, Oreg., on the Columbia and Willamette Rivers. The Program Office is also staffed to review water-development projects affecting anadromous fish resources and develop functional designs for a wide variety of fish facilities.

The Spring Creek National Fish Hatchery, one of more productive Chinook salmon units in the Columbia River system, will be further developed for increased production to offset losses resulting from the John Day Dam.



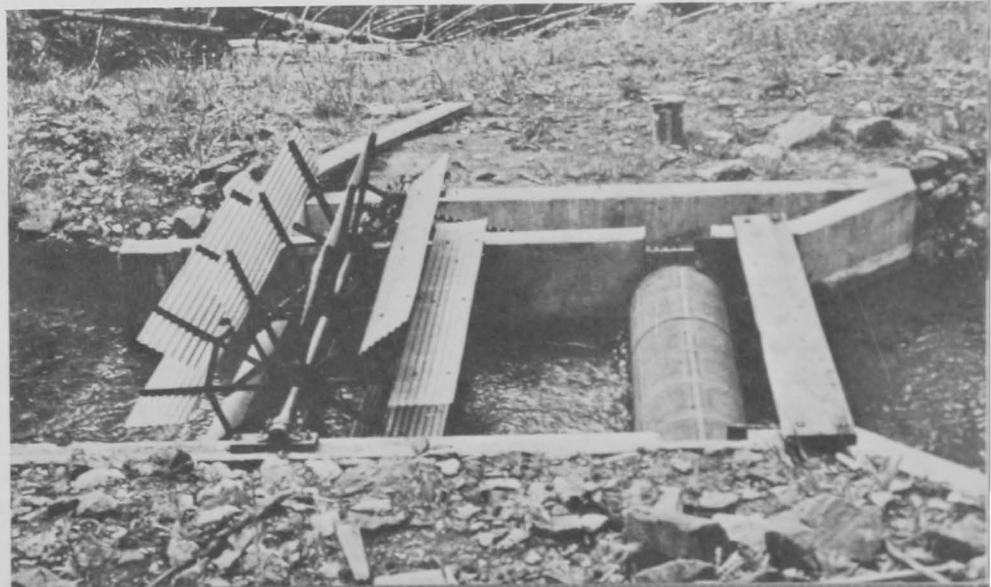


Fish ladders provide passage for adult salmon and steelhead over dams.



Adult chinook salmon collected in the fishery, with the adipose fin missing, came from a hatchery.

This fish screen is typical of downstream migrant protective facilities installed in the John Day River system. Over 400 screens have now been installed in this watershed.

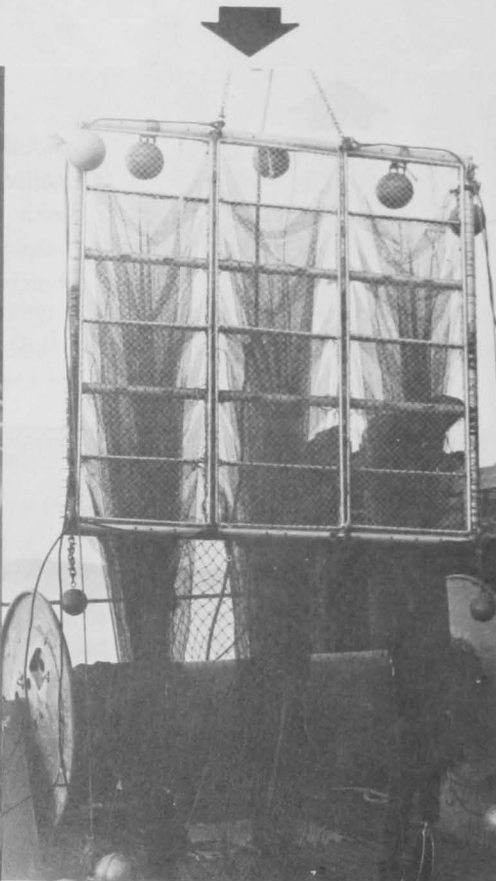


Exploratory Fishing and Gear Research

Exploratory fishing is the systematic examination of aquatic resources in waters of interest to the United States' fisheries. Exploratory fishing aids the growth of our commercial fisheries by expanding present fishing grounds, diversifying effort on present grounds, and discovering and assessing the potential of new fisheries. By developing more efficient harvesting gear and improving present fishing methods, research can help the domestic industry compete with foreign imports.

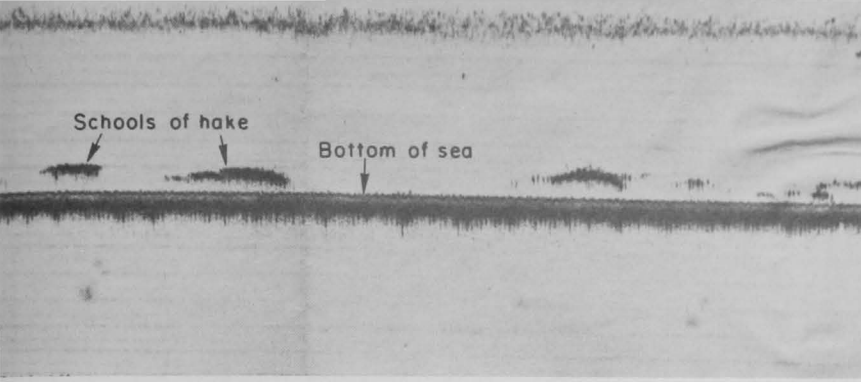
The 93-foot research vessel, John N. Cobb, is used to conduct a diverse program of exploratory fishing and gear research. This vessel is of the Pacific Northwest all-purpose commercial vessel type, carries a crew of seven plus two or three scientists, and is equipped with a variety of electronic gear. The John N. Cobb has engaged in fishery research work in the eastern Pacific Ocean from the Chukchi Sea to Baja California, Mexico.

This is a variable depth sampler for shrimp. Each rectangular opening has a separate retaining net. When towed through areas where shrimp are available, it can be determined by examining catches in the retaining nets, how far from the sea bottom shrimp are most available. This information can be incorporated into design of new trawls or modification of existing gear.

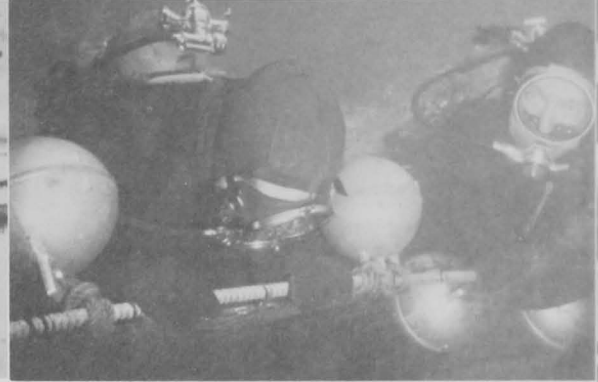


Electronic equipment is being tested aboard the John N. Cobb before leaving on a cruise.

Commercial shrimp fishermen are plagued with so fish, bottom-dwelling invertebrates, and debris from catches of shrimp. The gear research unit has developed a trawl which separates bottom dwelling organisms from shrimp while fishing. This shows a clean catch of shrimp being emptied onto a sorting table aboard a commercial vessel.



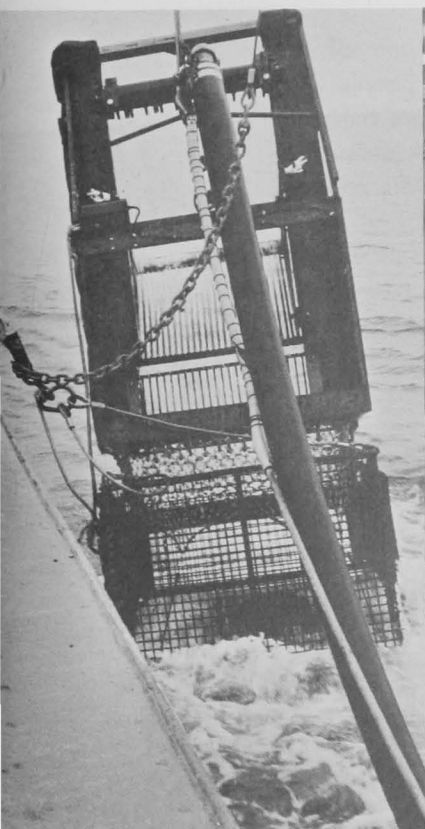
Who tracing from a depth sounder shows schools of Pacific hake, the depth at which the schools are located. Through a depth telemetry developed by the Exploratory Fishing and Gear Research Base, a trawl can be lowered and fished at the precise depth of fish located on the depth sounder.



SCUBA divers riding on top of a trawl. Underwater observation of fishing gear is an excellent way to evaluate gear performance and net configuration.

A dredge being lowered over the side of a vessel. Strong water jets aid in loosening the substrata as the dredge is towed along the sea bottom.

New methods of harvesting fish are constantly being tried. In this experiment king crab pots have been converted to fish traps, and one is shown being lifted aboard with a catch of sablefish.



Underwater observation is important to the success of exploratory fishing and gear research programs. Underwater television is one method of monitoring fish behavior to fishing gear and gear performance.



"Idle Bull" seals on Zolstoi Sands, St. Paul Island. St. Paul Village in the background. Approximately 475 Aleuts reside on St. Paul Island and 125 on St. George. The United States Coast Guard operates a Loran station, the U.S. Weather Bureau a weather station, and the Department of Health, Education and Welfare a hospital. Elementary schools are maintained by the Alaska State Department of Education under contract to the Bureau.



Canvas-covered baidars are still one of the most effective craft for landing people and supplies on the Pribilof Islands where the piers are in shallow water filled with boulders. The flexible frame and resilient covering are capable of withstanding twists and shocks that would damage a boat constructed in the usual way. The Bureau's vessel *M/V Pribilof* is anchored offshore. Since there is no harbor the vessel is sometimes forced to wait days or weeks for favorable landing conditions.

A study of adult male fur seals showed that they usually do not have a territory and a harem until they are 10 years old. Over one-third are replaced each year. Few males older than 13 remain on the rookeries.



Marine Mammal Research and Management

The Northern fur seal herds on the Pribilof Islands were once nearly exterminated by indiscriminate hunting. By 1911, prior to complete Federal management, the population declined to less than 200,000 animals and has since grown to a sustained population level of approximately 1,500,000 animals. The research and management by the Bureau of Commercial Fisheries have made the fur seals on the Pribilof Islands one of the world's most intensively and successfully managed wild animal populations.

The United States harvests about 60,000 pelts annually. Japan and Canada receive shares of the seal pelts taken by the United States under provisions of the Interim Convention on Conservation of North Pacific Fur Seals. The Soviet Union is also a participating nation under this Convention. The State of Alaska receives a share of the net proceeds from sale of the pelts. The Bureau in its Pribilof Islands Program, is charged with certain responsibilities for the health, education, and welfare of about 600 Aleut resident natives; and is currently assisting the St. Paul community with the development of self-government. The Bureau also conducts a small research program on whales which contributes to the work of the International Whaling Commission.

is applied to 1-year-old and 2-year-old seals in the autumn supplement
marks put on pups and make possible an estimate of the number of seals
die between birth and 1 and 2 years of age. Sand on the Pribilof Islands
mark in color because it is derived mostly from basalt.

A thick layer of blubber is removed from the fur seal skin preparatory to salting and barreling for shipment to the processor. Seasonal laborers are recruited throughout Alaska and the Pacific Northwest for this arduous work.



Marketing

The basic aims of the Seattle Marketing Office are (1) to promote the free flow of domestically produced fishery products, (2) to develop and expand markets for fishery products of domestic origin, and (3) to promote the improvement of marketing practices. These aims are achieved through a broad range of educational, market development, and promotional activities designed to reach all segments from the producing fisherman to the consumer.



↑ Educational programs including fish cookery demonstrations are given to institutional and restaurant personnel and other consumer groups, and, in cooperation with the Department of Agriculture, for the National School Lunch Program.

The housewife learns about selection, handling and preparation of seafoods through television. Bureau marketing specialists and home economists appear frequently on both radio and television.





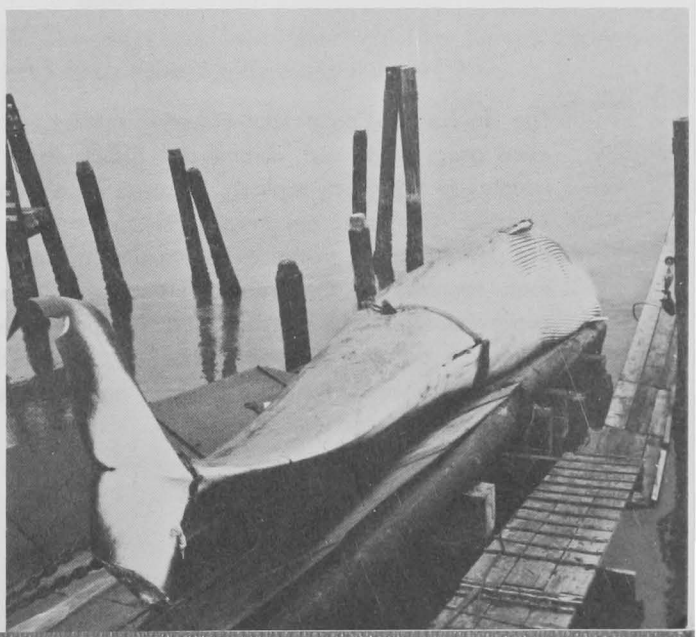
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A marketing specialist discusses merchandising with a fresh-fish retailer.

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Food photographs and recipes are provided for national distribution to newspaper and magazine food editors.

Enforcement and Surveillance

A 65-foot fin whale being landed at a whaling station for processing. Regulations governing the time, size, and species of whales that may be taken are enforced by the governments of the countries participating in the whale fishery.

↓
The Bureau of Commercial Fisheries shares joint responsibility with the U.S. Coast Guard for enforcing international treaties, acts, and regulations for protection of the fisheries and marine mammals in our coastal waters. In cooperation with the U.S. Coast Guard and Washington State Department of Fisheries, aerial and surface patrols are made off the Oregon and Washington coast to appraise activities of foreign fishing fleets and to curtail infractions of the various acts, treaties, and regulations that were imposed to protect fishes and marine mammals.



Statistics and Market News

The Seattle Market News Service office is one of seven such offices strategically located throughout the United States. Through the daily publication of the landings, receipts, stocks, prices, and market conditions, this Service encourages the orderly marketing of fishery products and byproducts. In addition to the daily "Fishery Products Reports," many other types of reports of importance to the fishery industry are issued, including monthly and annual summaries. The Seattle office reports are mailed to nearly every State, and many foreign countries.

This office is also responsible for assembling data for Washington and Oregon on the number of fishermen, fishing craft, and quantity of gear engaged in taking fish and shellfish in these States; and volume and value of the catch; the production of manufactured fishery commodities; and related information. The data are compiled from the records of the State fishery departments or by surveys of fishermen, fishery wholesale dealers, and manufacturers. Statistical information on the fisheries is released in monthly and annual bulletins in the Current Fishery Statistics series and in the Bureau's annual digest, "Fishery Statistics of the United States."

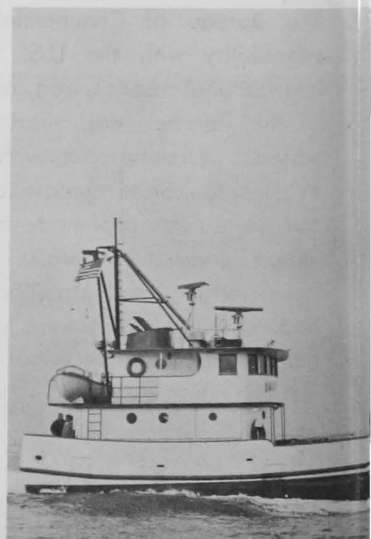


Market News reporter talks with industry personnel to obtain information for reports.

Financial Assistance

The Bureau of Commercial Fisheries administers a financial assistance program to aid commercial fishermen in obtaining capital needed to construct, replace, improve, repair and maintain fishing vessels. This program entails (1) direct loans under conditions not permitting the vessel owner to obtain funds from conventional loan sources; (2) Government insurance of loans obtained from commercial lending sources; and (3) payments of a subsidy to cover the difference between costs of constructing fishing vessels in U.S. shipyards, required by law, and the costs of similar construction in foreign countries.

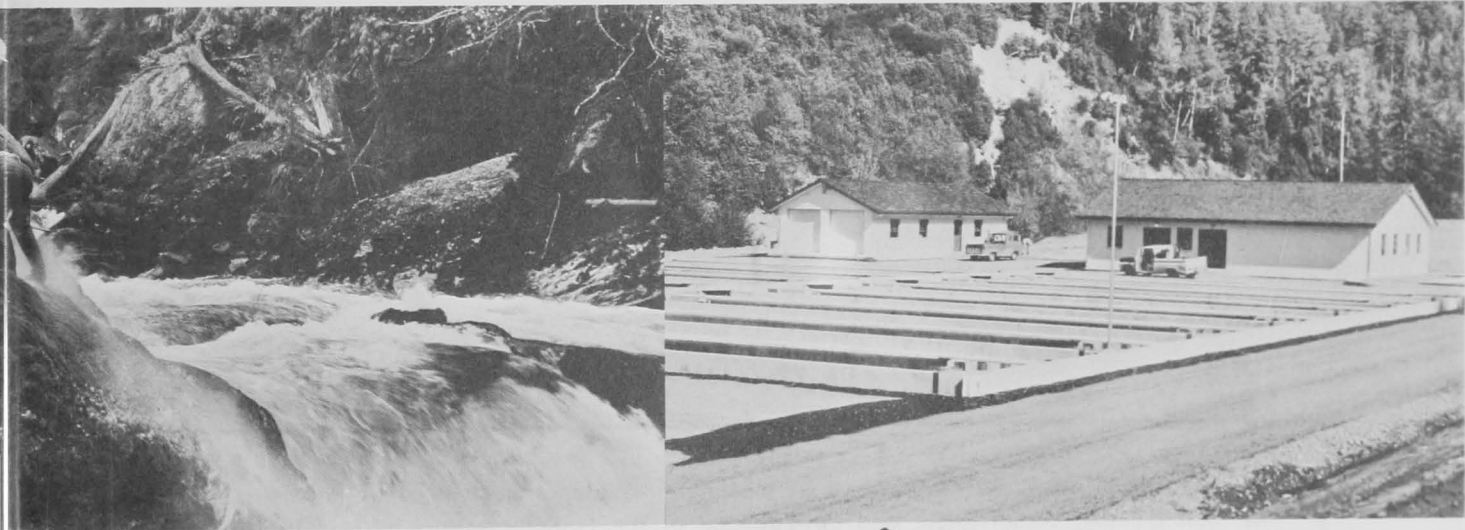
One of several modern K vessels constructed through the program of Financial Assistance.



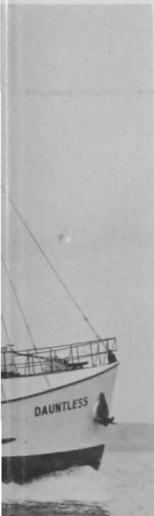
Federal Grants-in-Aid

Federal Aid activities in the Pacific Northwest region are concerned with the administration of two Acts: The Commercial Research and Development Act of 1964 (P.L. 88-309), and the Anadromous Fish Act of 1965 (P.L. 89-304). Each of these Acts provides for a cost sharing program in which the Federal Government cooperates with the States and other non-Federal interests in the support of research, development, and other projects for the conservation and enhancement of commercial and anadromous fisheries. Each of the five States in the region is fully utilizing all Federal Aid funds available under the two Acts, and significant advancements in commercial fisheries are being noted.

removal of natural barriers, financed by Federal Grants-in-Aid administered by the Bureau of Commercial Fisheries, is opening many miles of salmon spawning streams in Oregon and Washington.



The Elk River Hatchery in southwestern Oregon was recently completed under the Anadromous Fisheries Program.



Department of the Interior

Created in 1849, the Department of the Interior—a department of conservation—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation'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.

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