HUTTON NAMED NMFS ASSOCIATE DIRECTOR

Dr. Robert F. Hutton, Executive Secretary of the American Fisheries Society for the past 6 years, has been named Associate Director for Resource Management in NMFS. He assumes his post in early January 1972.

Dr. Hutton will work on all aspects of fishery resource management. His jurisdiction includes programs to accelerate the State-Federal Fisheries Management System; enforcement of international fishery regulations applicable to U.S. citizens; Federal financial assistance to certain fishery programs of States and other interests on a cost-sharing basis; fishery extension service; water-resources programs to protect estuaries; and enforcement and surveillance to protect U.S. fisheries from foreign encroachment. He will be responsible for the Pribilof Island Program and Columbia River Development Program. He will have overall responsibility for about 385 employes.

Dr. Hutton's Background

Dr. Hutton, 50, is known internationally as a scientist and fishery administrator. He earned his bachelor's and master's degrees in marine biology from the University of Miami, Coral Gables, Fla.; his Ph.D. in marine biology at the University of London in 1954 while a Fulbright scholar. He has written many scientific articles on marine subjects.

From 1955-1962, Dr. Hutton was Biologist in Charge at the Florida State Marine Laboratory, St. Petersburg, Fla.; from 1963 to 1965, Chief of Marine Biology, Massachusetts Department of Natural Resources.

SLAVIN CONFIRMED AS NMFS ASSOCIATE DIRECTOR

Joseph W. Slavin, 44, NMFS Acting Associate Director for Resource Utilization, has been named Associate Director.

His responsibilities embrace: economic and marketing research on fishery products, including projections of demand and supply; foreign-trade analysis; fishery statistics and market news; financial aid to fishing industry through loans, mortgage and loan insurance, and subsidies; microbiological, chemical, and technological research to improve the quality and use of fishery resources; a voluntary national program of inspection and certification of fishery products; and programs to improve marketing practices and to lessen the effects of supply-demand imbalances. Nearly 600 employes carry out these services.

Started With BCF

In 1954, Mr. Slavin joined the old Bureau of Commercial Fisheries at its technological laboratory in East Boston, Mass. After lab was moved to Gloucester, Mass., he functioned as its director from 1961 to 1966. He then came to Washington.

Background & Affiliations

Mr. Slavin was born in Boston. He was graduated from the Merchant Marine Academy, Kings Point, N.Y., in 1948, with a B.S. in engineering. He is a member of The American Society of Heating, Refrigeration and Air Conditioning Engineers, and The International Institute of Refrigeration. He is a scientific advisor to the Refrigeration Research Foundation.

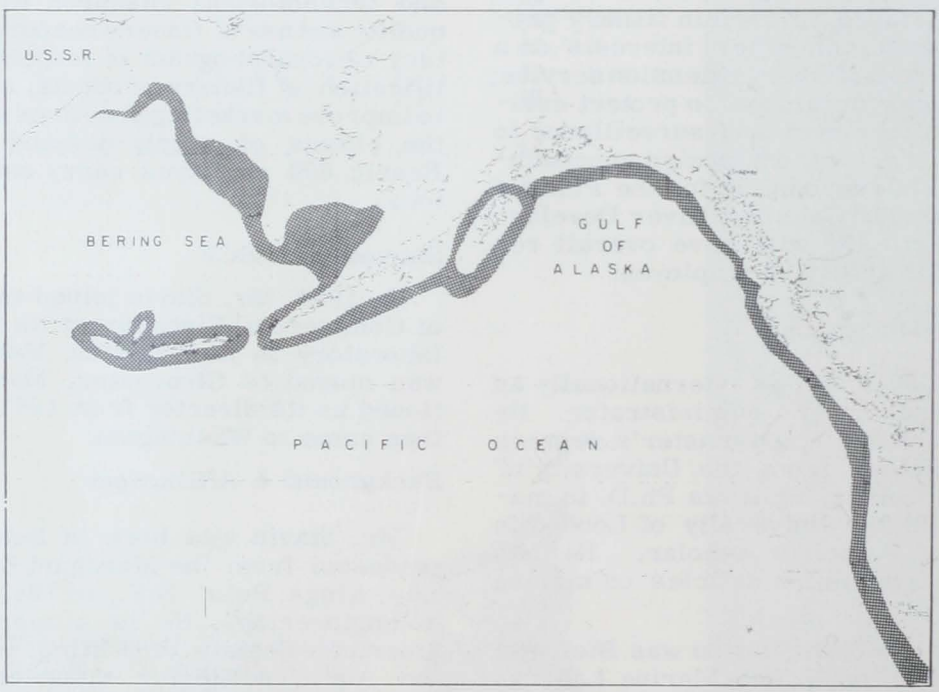
U.S.-SOVIET SCIENTISTS DISCUSS NORTH PACIFIC FISHERIES

Fishery scientists of the United States and the Soviet Union met in Seattle, Wash., Nov. 15-19, 1971, at the Northwest Fisheries Center (NFC) of the National Marine Fisheries Service (NMFS) to discuss the status of fishery resources in the northeast Pacific Ocean that concerned both sides. Working meetings followed on Nov. 22-23 to summarize details for reports. The meeting was a continuation of annual scientific meetings begun in Moscow in 1966 to exchange catch statistics and biological data.

During the 5-day formal meeting, the scientists exchanged views on the status of Pacific hake, Pacific ocean perch, Gulf of Alaska shrimp, and stocks of two important groundfish species in Bering Sea--yellowfin sole and walleye pollock. They discussed distribution and abundance of Pacific saury off California, Oregon, and Washington; also, the general biological features of flounder populations inhabiting the coastal waters of California, Oregon, Washington, and British Columbia.

Pacific Hake

Although recruitment of Pacific hake has been at relatively low level, the Soviets reported the second largest catch on record (167,200 metric tons) in 1970, and an increase in catch per unit effort. The U.S. and Soviets agreed that hake stocks in 1970 were similar in size to 1968-69 stocks, and that restrictive measures are not necessary at present fishing level.



Fishery resources (shaded area) of the Continental Shelf in the eastern North Pacific Ocean from northern California to the Bering Sea were discussed in U.S.-Soviet meeting.

Rockfish & Ocean Perch

Based on trawl and acoustic surveys, the scientists agreed, the rockfish populations from northern California to Alaska were about the same in 1970 as in 1969 (about 350,000 metric tons). The size of Pacific ocean perch stocks off Oregon, Washington, and British Columbia remains relatively unchanged, about 40,000 metric tons; current protective measures must be continued.

Shrimp

The U.S.-USSR 1970 shrimp catch was 30,000 metric tons and may reach 45,000 metric tons in 1971. The USSR catch was about 4,700 metric tons in both years. The two sides expressed concern that Gulf of Alaska shrimp stocks may not be capable of sustaining present harvest levels; they agreed on the need for continuing stock-assessment studies.

Walleye Pollack Fishery Grows

The scientists noted the growing fishery for walleye pollock in the Bering Sea and North Pacific Ocean: it now takes one of the largest catches of a single species in the world. The total catch is close to 2 million metric tons; in Bering Sea alone, over 1.5 million metric tons. A large share is taken in eastern Bering Sea and along Aleutian Islands. Despite intensive fishery, no evidence was presented that stocks were being damaged. Soviets reported general increase of this species during past decade throughout northeast Pacific Ocean.

Some improvement was reported for yellowfin sole fishery in eastern Bering Sea, but production is still far below peak years of 1960-62; then, nearly 500,000 metric tons were taken annually.

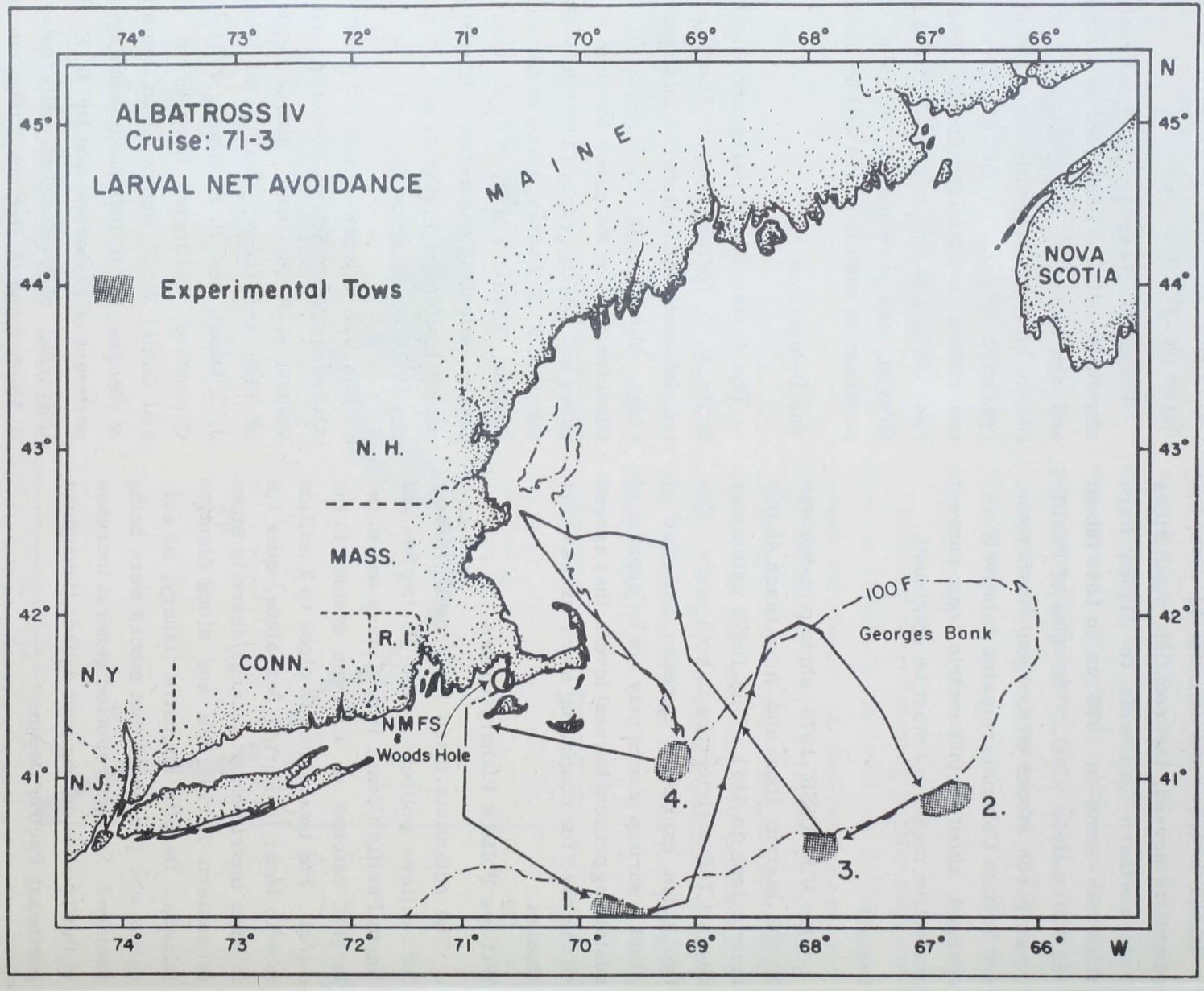
Agree on 1972 Research

The scientists agreed that cooperative research in 1972 be conducted on distribution and abundance of ichthyoplankton off California, biology of juvenile hake, and that cooperative acoustic and trawl surveys be undertaken to estimate stocks of hake and rockfish adults and recruits off California, Oregon, and Washington. A joint tagging program on sablefish also will be conducted.

The Delegations

The 4-man Soviet delegation was headed by Dr. V. G. Lafitsky, Deputy Director, Central Information Institute of Ministry of Fisheries, Moscow; Dr. B. N. Ayushin, Deputy Director, Pacific Research Institute of Fisheries and Oceanography (TINRO), Vladivostok; Dr. N. S. Fadeev, Chief of Biostatistics Section, TINRO; and Dr. YU. B. Ryazantsev, Senior Scientific Associate, All-Union Research Institute of Fisheries and Oceanography (VNIRO), Moscow.

The U.S. delegation was led by Dr. D. L. Alverson, NFC Acting Director, with advisors; J. A. McCrary, Alaska Department of Fish and Game; Drs. F. M. Fukuhara, J. C. Quast, and P. E. Smith, NMFS; E. C. Greenhood, California Department of Fish and Game; W. F. Hublou, Fish Commission of Oregon; G. B. DiDonato, Washington Department of Fisheries; and Dr. D. E. Bevan, University of Washington. Alternates were J. Meehan and R. Demory, Fish Commission of Oregon; J. Reeves and D. G. Gunderson, Washington Department of Fisheries; and Dr. J. C. Olsen, NMFS.


ALBATROSS IV
Cruise: 71-3
LARVAL NET AVOIDANCE
Experimental Tows
MAINE
NOVA SCOTIA
N. H.
MASS.
R. I.
CONN.
N.Y
N.J.
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NMFS TESTS PLANKTON-COLLECTING GEAR

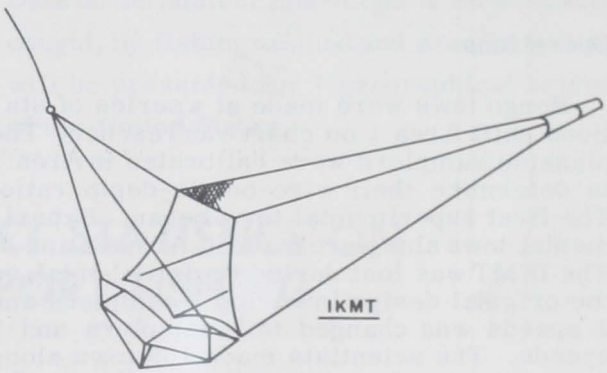
The NMFS "Albatross IV" tested 3 types of plankton-collecting devices in August 1971. The purpose was to study the effect of mouth area, speed of tow, and time of day on avoidance of the gear by fish larvae.

The periodic sampling of fish eggs and larvae constitutes an ichthyo-plankton survey. The collections are counted and the results extended to provide estimates of the size of adult fish populations. These estimates become the basis for the proper use and management of fishery resources.

Such surveys are important parts of the NMFS Marine Resources Monitoring, Assessment and Prediction Program (MARMAP). One MARMAP purpose is to develop techniques for predicting changes in the distribution and abundance of commercially valuable marine animals.

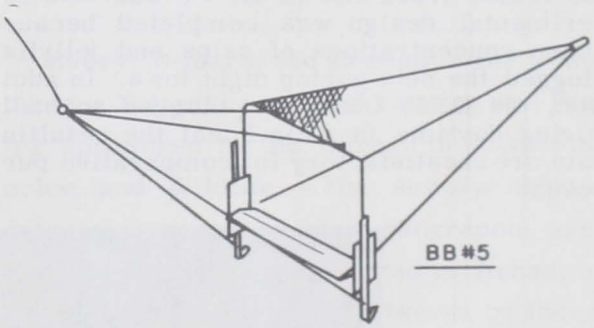
Isaacs Kidd Midwater Trawl (IKMT)

This trawl is spread open by a diving plane at the bottom, and by a horizontal bar at the top. It was designed as a medium-speed device to collect large planktonic animals and small fishes. The original IKMT was a 10-foot-wide (lateral dimension) diving plane; it was called a "10-foot IKMT." The trawl acquired for these trials is a scaled-downed version: it has only a 6-foot diving plane. The mouth opening of the 5-sided bag of the 6-foot IKMT are about: top panel, 4.71 feet (1.44 meters); side panels, 5.50 feet (1.68 m.). the two bottom panels, 2.87 feet (0.88 m.) each.



No. 5 Boothbay Harbor Depressor Trawl (BB#5)

The mouth of BB#5 is held open by a rigid, 1-inch steel pipe framework (dimensions: 4.76 feet (1.45 m.) horizontal, 3.28 feet (1.0 m.) vertical). A horizontal, articulated diving plane is used to attain depth for near-bottom operation; this plane is linked to rounded "feet" to cause trawl to lift if firm contact is made with sea bottom. This trawl is designed for use in near-bottom and mid-water operation.



Bongo Plankton Net

The Bongo is a dual-cylinder-and-cone plankton net of conventional design. It is modified by paired collar and net arrangement so the mouth of the two nets tow ahead of the towing line. This arrangement was devised to

eliminate disruption of water-flow patterns preceding the net openings--and possible avoidance reaction by large plankton forms. Leading-edge collars of the Bongo are fiberglass and resin cylinders 2 feet (0.61 m.) in diameter. A "V-Fin" depressor is attached below the collar-net assembly.

IKMT and BB35

Towing bridles of IKMT and BB#5 are arranged to effect a minimum disturbance of water flow in the space ahead of the net openings.

Area of Investigation

Southern New England and Georges Bank (see chart).

Operations

Bongo tows were made at a series of stations until Area 1 on chart was reached. The plankton samplers were calibrated in Area 1 to determine their wire-out-to-depth ratio. The first experimental tows began. Experimental tows also were made in Areas 3 and 4. The IKMT was lost during its initial trial, so the original design involving 3 samplers and 2 speeds was changed to 2 samplers and 3 speeds. The scientists made 109 tows along the cruise track and in the 4 areas. No experimental design was completed because dense concentrations of salps and jellyfish clogged the nets during night tows. In addition, the BB#5 trawl was clogged so badly during daytime in Area 1 that the resulting data are unsatisfactory for comparative purposes.

Results

Although analysis by the preplanned statistical design is not possible, the catches in Area 4 should provide comparisons between the Bongo and BB#5 towed at 3 speeds each during daytime. The data from the other areas and along cruise track should provide an idea of how the gear fished. Such information will be available after the samples have been sorted and the larvae indentified.

The depths attained during calibration trials varied considerably from the scientists' predicted depths, but these variations occurred mainly near the southern edge of Georges Bank. They may be related to currents rather than to the action of the depressors attached to the gear. In two instances, the bottom shoaled during tows so that the Boothbay depressor trawl was towing on bottom. Because the trawl is designed to be towed on bottom as well as in midwater, the gear was not damaged; numerous bottom forms were added to the collections of those organisms captured in midwater.

The cruise results suggest that modifications should be made to the gear that would permit sampling at night despite large contrations of salps and jellyfishes.

For more information, contact Center Director, North Atlantic Fisheries Research Center, U.S. National Marine Fisheries Service, Woods Hole, Massachusetts; or, Dr. Joseph J. Graham, Biological Laboratory, NMFS, West Boothbay Harbor, Maine.

The 'Albatross IV'

SALTWATER ANGLERS INCREASE

In 1970, there were 9.7 million saltwater anglers in the United States, according to preliminary results of the 1970 Saltwater Angling Survey. The survey was conducted for the National Marine Fisheries Service by the Bureau of the Census as a supplement to the Bureau of Sport Fisheries and Wildlife's 1970 National Survey of Fishing and Hunting.

The 1970 number was about 1½ million more than in 1965, when a similar survey showed 8.3 million anglers fishing in U.S. marine waters. The number increased on all coasts from 1965 to 1970, although the greatest increase (22%) was on the Atlantic Coast. In 1970, 5.1 million anglers fished Atlantic Coast waters; Gulf and Pacific Coast anglers each totaled 2.3 million.

Spend 52% More

The 9.7 million anglers spent $1.4 billion during 114 million recreation days. This compares with $800 million for about 96 million recreation days in 1965. Each saltwater angler spent an average of $146 in 1970, compared to $96 in 1965--a 52% increase.

Complete results for the 1970 Saltwater Angling Survey will be available in mid-1972. Data on the number and weight of each species caught, by fishing method and area of fishing, will be presented for 7 geographical regions of the United States.

NMFS WILL COLLECT STATISTICS ON SALTWATER SPORT FISHING

A major new responsibility of the National Marine Fisheries Service (NMFS) is the conservation of saltwater sport fishes. Formerly the Bureau of Commercial Fisheries, NMFS long has been responsible for commercial marine species. Collecting catch statistics is vital to a successful conservation program.

Although the commercial catch involves thousands of fishing craft, there are relatively few landing locations. So collecting statistics is fairly easy. The sport fishing record is harder to get. There are millions of saltwater anglers spread over the entire coastline from Maine around to Washington State, and including Alaska and Hawaii.

Census Bureau Survey

Every 5 years, the Bureau of the Census takes a National Survey of Hunting and Fishing sponsored by the Bureau of Sport Fisheries and Wildlife. The survey helps to determine broad trends: geographic areas that are more heavily hunted or fished, and the concentration of sportsmen by income levels. However, the techniques used do not obtain the detailed and accurate figures needed for fishery conservation.

NMFS is working to develop a technique to fill this need. It expects to have one by 1973.

VIMS EXPECTS ABUNDANCE OF BLUE CRABS

Blue-crab catches in the Chesapeake Bay are expected to be over 75 million pounds a year in 1972 and 1973, according to scientists of the Virginia Institute of Marine Science (VIMS). Large hatches in the summers of 1970 and 1971 and good survival of young account for the high abundance.

Virginia and Maryland landings since September 1967 have been between 47 and 67 million pounds per year. These were far below the 1960-70 average of 75 million pounds. The forecast for an increase in catch for September 1971 through August 1972 was made in October 1970 after observations of better-than-average numbers of young crabs hatched in 1970. The 1971 hatch seems as successful as 1970's.

1972 and 1973 Catches

The catches in 1972 and 1973 may not follow the usual seasonal pattern. The fall and winter catch of big crabs, 5 inches wide and larger, has not been unusually high. However, the rivers and bay waters contain countless numbers of 3-4-inch crabs. These are expected to make up a superabundant crop of large-sized peelers and soft crabs in spring 1972, and then produce a very large hard-crab catch in summer 1972.

The 1971 Story

Crabs hatched in lower Chesapeake Bay in 1971 were very late in migrating into the rivers. Normally, the migration of $\frac{1}{3}$-$\frac{1}{2}$-inch-wide crabs occurs in early September. But small crabs were not seen in the York and Rappahannock rivers until late October and early November. It is possible that an early normal hatch in June and July 1971 was killed by adverse environmental conditions, such as the low oxygen supplies in the Bay from July through early August, and that the crabs seen in early Dec. 1971 were from a later batch. Crabs smaller than two inches wide were very abundant in the York and Rappahannock river in early Dec. 1971, but almost nonexistent in the James. It is possible, but not likely, that the scientists missed the crop in their James survey. What this means for the 1972-73 James catch is unknown.

MENHADEN CATCH IS GREATEST SINCE 1962

During Jan.-July 1971, the U.S. catch of menhaden was the highest since 1962: 1.3 billion pounds that produced 163,600 tons of fish meal.

Menhaden is the principal species caught by Atlantic and Gulf fishermen. Gulf landings rose substantially.

U.S. production of fish oil also was high during January-July 1971--about 149.6 million pounds, 39% above 1970.

Imports Drop

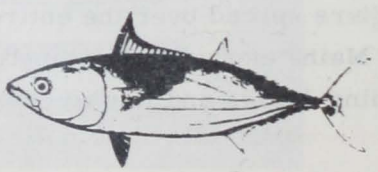
In that period, imports of fish meal dropped 28% from 1970. In the past 5 years, fish meal import averages have been about 314,000 tons in January-July. Reduced imports caused available U.S. supplies to fall considerably despite the high 1971 U.S. catches.

Prices for menhaden meal fell during first-half 1971 from high of about $186 per ton in January to a low of $150 in June, then rose to about $160 in September.

HAWAIIAN FISH LANDINGS ROSE IN 1970

In 1970, Hawaiian fishermen landed 11.1 million pounds of fish worth $3.9 million to them. It was an increase of 1.6 million pounds over 1969, due partly to greater landings of skipjack tuna.

There were 333 commercial fishermen working on 82 vessels of 5 or more gross tons; 1,103 commercial fishermen worked on smaller boats or from shore.



NMFS AND ALASKA SEEK TO ENHANCE SALMON RUN

A cooperative study of the suitability--biologic and economic--of increasing pink-salmon runs by mass introduction of fry into Alaskan steams is being conducted by the NMFS Auke Bay Laboratory and Alaska's Department of Fish and Game. Preparation of the site began in July 1971, and it received the first eggs for incubation in November.

The study will continue through at least 3 reproductive cycles. It seeks to increase significantly adult escapements in Auke Creek from the present annual level of 2,200 spawners.

The researchers deliberately limited the number of eggs to be incubated in 1971 to permit natural reproduction to continue during initial evaluation phase of incubators and water supply. If all system components operate dependably, are nontoxic, and capable of producing healthy fry, then the researchers will try to produce one million fry (or more) and marks will be used to evaluate ocean survival.

Eggs in Incubator Boxes

Four incubator boxes, each with about a cubic meter of gravel, were seeded with about 215,000 eyed pink salmon eggs from Auke Creek and 111,000 from Sashin Creek, Little Port Walter. An additional 16,000 eyed eggs from Sashin Creek will be incubated in a screened tray used in fish hatcheries.

The 215,000 Auke Creek eggs are survivors of about 15.5% of the potential egg deposition of the 1971 adult escapement. The remaining 84.5% were spawned naturally in Auke Creek. The researchers will compare fry that emerge from the gravel incubators and fry from the incubator tray with creek fry that migrate seaward from Auke Creek in spring 1972. They will compare size, stage of development, time of emergence, and lipid or energy reserve.

Only the Auke Creek fry will be allowed to migrate to sea. The Sashin Creek fry, which originated from a surplus of spawners in a study at Little Port Walter, will be destroyed to avoid genetic contamination of the Auke Creek pink salmon.

PRECOCIOUS COHO SALMON 'HOME' TO NORTHWEST FISHERIES CENTER

Fourteen marked jack (precocious male) coho salmon of 20,000 yearlings released in spring 1971 "homed" from the sea in fall 1971 to a holding flume at the NMFS Northwest Fisheries Center on the shores of Portage Bay in Washington State. The Center scientists call this return noteworthy for two reasons: (1) The fish had to locate the mouth of an 18-inch pipe emptying into the lake, and to swim 30 feet in darkness; this included a right-angle bend to enter the flume. (2) Six months before, some of the fish had been transported 30 miles from a hatchery. They had been held in the flume as little as 4 hours before release.

Released in Experiments

The marked cohos had been released to determine the effects of transporting juvenile salmon, and the effects of handling, intervals of holding, and release procedures on their homing. The experimental fish were from one of several groups of yearling coho salmon transported early in spring 1971 from a Washington State hatchery. The fish were held at the Center from 4 hours to 7 days before release.

Adults in Fall 1972

The scientists expect the remainder of these fish to return in fall 1972 as full-term adults. They expect the first returns from 100,000 chinook salmon similarly transported, held, and released. Information from the experiments will apply to studies now underway of salmon transportation. It will help establish procedures to operate proposed homing stations for relocated salmon stocks.

Coho or
Silver Salmon

SEEK CHANGE IN JUVENILE CHINOOK'S MIGRATION TIME

Juvenile chinook salmon in Idaho's Snake River migrate downstream in spring. Many of these juveniles do not reach the sea. They die from high concentrations of dissolved nitrogen gas in the rivers caused by heavy spilling at dams.

During the past 2 years, the Idaho Department of Fish and Game has been attempting to increase survival of yearling juvenile chinook by altering hatchery procedures and release time of fish. Biologists of NMFS Northwest Fisheries Center are cooperating in the fish marking. They are assessing by recovery programs the progress of migration.

Fish Size May Be Key

The biologists suspect that the size of fish at release may be a triggering mechanism for their migration. They hope that fish reared to 140 mm and larger by September would migrate in the fall and winter months before high nitrogen concentrations appear in rivers. In 1971, 90,000 juveniles larger than 140 mm were marked and released. At the same time, 60,000 of 95-100 mm (normal size of spring migrants) were treated the same way.

More Work Needed

Experiments have not progressed enough to make valid conclusions, but there is some indication that migration timing of larger fish might be altered. Of the larger marked fish, 700 have been recovered in barge traps on lower Salmon River, 150 miles below release areas; 36 were recovered in traps in turbine intake gatewells at Ice Harbor Dam, 400 miles below release area. No smaller fish have been recovered.

NMFS will continue to monitor migrations of young chinook salmon passing Ice Harbor Dam until normal migration period ends in June 1972. This will help to assess experiments.

NOAA PUBLISHES 3-D AIR PHOTOS OF U.S. COASTAL AREAS

NOAA has produced a 99-page book with 45 color photos in stereoscopic pairs of U.S. Coastal areas. It includes New York, Washington, Miami Beach, San Juan, and Honolulu.

Its title is "Color Aerial Stereograms of Selected Coastal Areas of the United States." The Stereoscopic photos, called stereograms, can be examined closely with a simple stereoscope; a foldout cardboard one is included. Shoreline locations, underwater features--channels, sandbars, and submerged rocks--water pollution effluents, geographical and geological features, bridges, and the damaging and corrosive effects of storms and other natural disasters (earthquakes and Hurricanes) can be viewed three-dimensionally.

Each photo has a description, technical data, and a map showing area covered. The book contains an explanatory text and a glossary of technical terms.

Communities Covered

Other communities included are: Salem, Mass.; Harrisburg-Steelton-New Cumberland, Pa.; Beach Haven, N.J.; Ocean City, Md.; Portsmouth, Va.; Georgetown, S.C.; Apalachicola, Fla.; Gulfport, Miss.; Corpus Christi, Tex.; Sausalito, Calif. (including the Golden Gate Bridge); Fort Bragg, Calif.; Aberdeen, Wash.; Turagain Heights, Anchorage, Alaska (including view of 1964 earthquake damage); Wrangell, Alaska; Waikiki Beach, Honolulu; San Juan (old city), Puerto Rico.

How to Order Book

The 9- x 11-inch book can be obtained for $4.75 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NMFS SURVEYS AMCHITKA AFTER NUCLEAR EXPLOSION

On Nov. 6, 1971, the U.S. detonated a 5-megaton nuclear device on Amchitka Island. Three days later, NMFS biologists-divers from the Auke Bay Center arrived on the island to see what happened. Although bad weather hampered boating and diving operations, they managed to sample the 4 planned stations. Other locations were spotchecked for possible test-related changes. When rough weather prevented diving, the scientists helped in the general inspection of beaches and in collection of dead and injured marine mammals, birds, fish, and invertebrates.

What They Found

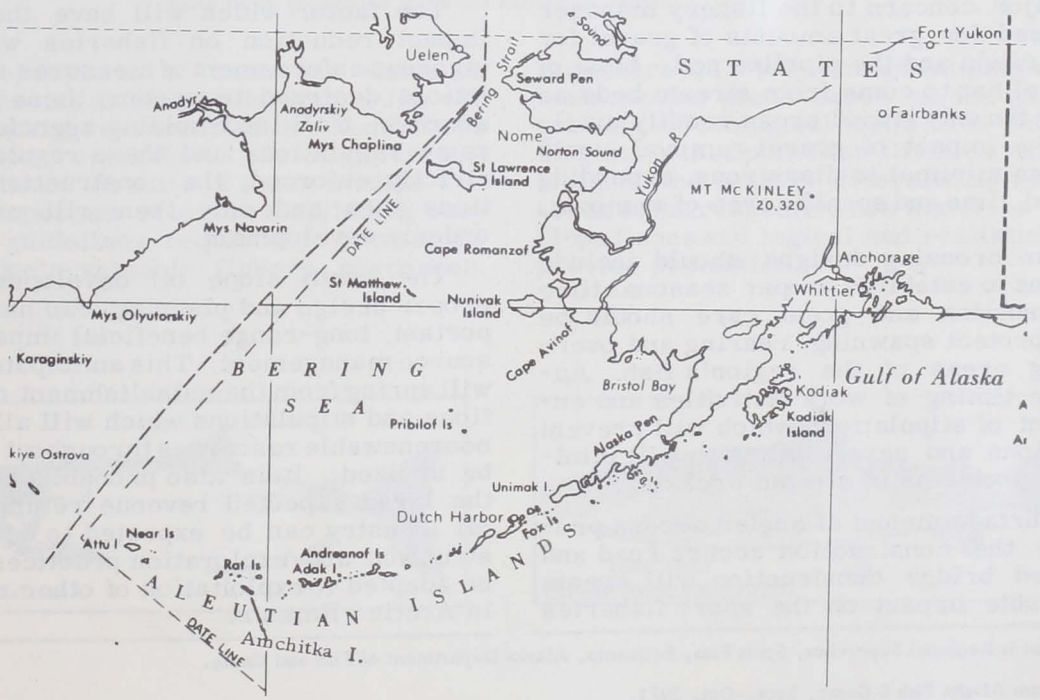
They observed few effects on the benthic (bottom) environment. No changes were apparent in density or size composition of sea-urchin populations. They saw no dead or injured animals. The only change was at a Bering Sea sampling site, about 2 kilometers from Cannikin ground zero. There, small pieces had been broken from edges of large patches of live corraline algae.

Disruption of Bottom Substrate

The scientists spotchecked other areas on the Bering Sea side of ground zero. They found slight-to-moderate disruption of the bottom substrate. The most extensive change was in about 8 meters of water--apparently on or near an active fault line. Blocks of rocks up to 3 meters or more in diameter had been broken off bedrock outcrop and been tumbled. The freshly fractured surfaces of rocks were exposed. Still-living algae (haminaria sp. and others) were on the undersides of some large rock fragments. Apparently some large blocks were broken off and tossed into inverted positions. So algae that had been growing on upper surface were now on shaded lower surface.

Limited Sampling Program

The scientists concluded: "The results of the underwater surveys do not indicate any catastrophic changes resulting from Cannikin, but we should consider this in light of the limited nature of the sampling program. Because of the poor underwater visibility and the difficulty the divers experienced in moving about, they were able to inspect only a few very small areas carefully. More extensive underwater surveys may disclose additional areas of substrate disruption and possible biological damage."



ALASKA's NORTH SLOPE

A New Factor In Fisheries Management

George L. VanWyhe

Alaska's North Slope and Interior contain enormous fishery resources which must be considered in any plans for developing the oil of the Arctic area.

Fishery resources which may be affected by the oil development and pipeline construction are of tremendous economic and recreational value and there are also subsistence fisheries of significant importance to Alaska's native population.

Chum salmon, lake trout, grayling, Arctic char and all five species of whitefish are of importance as sport, commercial or subsistence species on the North Slope.

While it is recognized that oil development may have considerable influence on North Slope fisheries, the total impact will not be known until construction methods are identified for each ecological area involved. There are, however, important ecological aspects to consider in the preliminary design and planning of construction.

Of major concern to the fishery manager is the need for great amounts of gravel for building roads and the pipeline pad. Most of this gravel has to come from stream beds as these are the only gravel areas readily available. The impact of gravel removal could vary from minimal to disastrous, depending on method, time and specific area of removal.

Stream crossing designs should include provisions to establish proper seasonal time of construction and great care should be taken to protect spawning, rearing and overwintering areas of the region's fish. Appropriate timing of work activities and enforcement of stipulations which will prevent obstructions and severe siltation will minimize the problems of stream crossing.

New surface means of angler access provided by the construction access road and associated bridge construction will create considerable impact on the sport fisheries north of the Yukon River. If the public is allowed to utilize the access construction road and some means of crossing the Yukon River is available, angling pressure in the northern area could increase by as much as 50,000 angler days per year. Already angler use and harvest has increased several thousand per cent since oil discovery in some waters.

The use of tracked vehicles causes long-lasting effects on the tundra which are a major concern to biologists and conservationists alike.

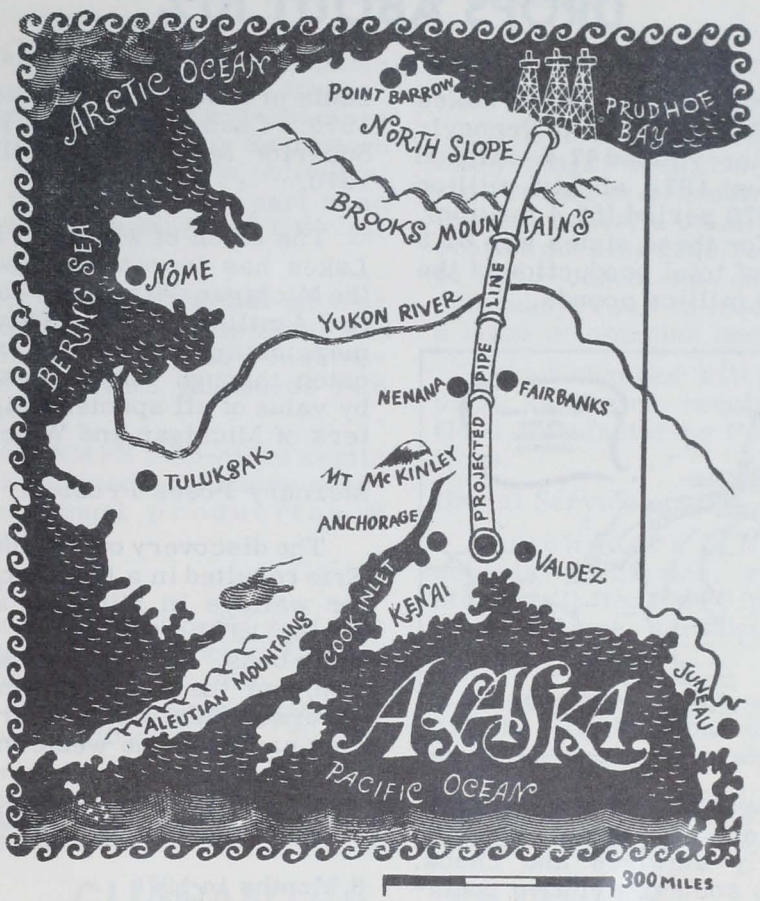
The effect of destroying the vegetative cover on the tundra is well documented on the North Slope. One extreme example is the draining of entire lakes when thawing and slumping of old vehicle trails creates a drainage ditch. Strict enforcement of regulations pertaining to the use of cross-country vehicles is required if the water drainages of the north country are to remain as suitable fish habitat.

The factor which will have the greatest impact reduction on fisheries will be the vigorous enforcement of measures and stipulations designed to protect these living resources. If all land-holding agencies use the same regulations and these regulations are strictly enforced, the construction stipulations then and only then will provide for orderly development.

The north slope oil development, with proper design and planning, can have an important, long-range beneficial impact on resource management. This anticipated benefit will spring from the establishment of regulations and stipulations which will allow other nonrenewable resources throughout Alaska to be utilized. It is also probable, because of the large expected revenue return, that the oil industry can be expected to devise construction and exploration practices that can be adapted to exploitation of other resources in Arctic climates.

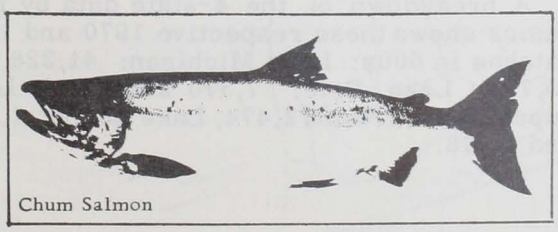
Mr. VanWyhe is Regional Supervisor, Sport Fish, Fairbanks, Alaska Department of Fish and Game.

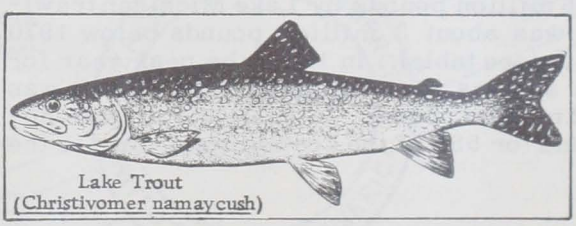
Reprinted from Alaska Fish & Game, Sept.-Oct. 1971.



THE NORTH SLOPE--and the proposed 800-mile pipeline that would carry its oil (estimated 50 billion barrels) to Valdez.

The Department of Fish and Game is making special studies to determine the extent of fishery resources of the North Slope and the impact which the oil development will have on them. Results of these studies will play an important role in establishing construction guidelines required to protect the North Slope's valuable fishery resources. Engineers can only design minimum impact construction plans based on the quality and quantity of biological input. The fishery biologists of the Sport Fish Division have ahead of them the task of determining the fragile areas in the respective life histories of North Slope fishes and logical and realistic ways to provide protection.


Chum Salmon


Lake Trout
(Christivomer namaycush)

U.S. GREAT LAKES COMMERCIAL CATCH DROPS ABOUT 10%

Commercial fishing in the Great Lakes waters of 4 states--Michigan, Ohio, Pennsylvania, and Wisconsin--yielded 47.4 million pounds through August 1971, about 5 million pounds below the 1970 period (52.4 million). In 1970, the catch for these states was 67.8 million pounds, 96% of total production of the 8 lakes states--70.4 million pounds.

The 1971 decrease in U.S. landings results primarily from declines in several major species, particularly alewives and chubs. Another factor was some restrictive measures in Lake Erie waters following mercury contamination. According to monthly catch statistics of the National Marine Fisheries Service for these states, the alewife harvest

State	1970	1971
Michigan	14,790.5	11,633.6
Ohio	6,530.2	6,870.6
Pennsylvania	419.9	210.9
Wisconsin	30,723.0	28,722.9
Total	52,463.6	47,438.0

of 26 million pounds by Lake Michigan trawlers was about 3 million pounds below 1970 figure (see table). In 1967, the peak year for this species, the figure through August was 33.2 million pounds. In 1971, the alewife accounts for 55% of the 4-state total; this is the same proportion as for the first 8 months in 1970. Chub landings for lakes Michigan and Superior fell 35%, 2.4 million pounds, from 1970.

The catch of whitefish in the upper Great Lakes has increased about 58% from 1970; the Michigan-Wisconsin catch rose from 1.5 to 2.4 million pounds. This species has commercial importance: the landed value of 1971 catch through August was $1.2 million, 40% by value of all species caught in the lake waters of Michigan and Wisconsin.

Mercury Poses Problem

The discovery of mercury in western Lake Erie resulted in a ban on commercial fishing for walleye in Michigan and Ohio waters in spring 1970. On May 8, 1971, Ohio banned white bass. Restrictions are limited to these fish, but the publicity reportedly has had an adverse effect on the market for other species caught at the western end of Lake Erie. Lake St. Clair, where mercury contamination was first discovered, is closed to commercial fishing in U.S. waters.

8 Months in 1970

Here are summaries of the commercial catch through August 1970 and 1971 in thousands of pounds:

Species	1970	1971
Alewives	29,045.7	26,072.1
Chubs	6,822.9	4,409.7
Carp	5,520.4	5,619.6
Yellow perch	2,511.4	2,415.5
Whitefish	1,536.8	2,428.4

A breakdown of the 4-state data by lake basins shows these respective 1970 and 1971 catches in 000s: Lake Michigan: 41,226 and 35,733; Lake Erie: 7,370 and 7,254; Lake Superior: 2,116 and 2,474; Lake Huron: 1,751 and 1,976.

NMFS FISHERY INSPECTION IS ADAPTABLE TO A PLANT'S NEEDS

New regulations in Commerce Department's Voluntary Fishery Products Inspection Program make it possible for inspectors of the National Marine Fisheries Service to inspect a plant according to its individual needs. A plant that needs only part of an inspector's day or 2-3 inspectors will get what it needs.

The program provides impartial inspection and certification of processing plants and products. It is based on sanitary requirements for plants and U.S. standards for products.

During 1970, 60 NMFS inspectors certified about 335 million pounds of fishery products--27% of total annual production of processed fishery items.

Reasons for Changes

NMFS Director Philip M. Roedel said that primary changes in the regulations are based on technological advances. The changes avoid duplication of effort in plants that have developed effective quality control. Before the rule changes, a fishery products inspector was assigned full time to a single plant.

"The inspection needs of a plant depend on many things--size, complexity of operation, the product or products being manufactured. In many cases, a small plant or a simple operation does not require a full-time inspector. In other cases, the one plant-one inspector rule many result in inadequate inspection for a large or complex operation," he noted.

Other changes will bring closer together plant sanitation requirements with FDA's Good Manufacturing Practice (GMP) regulations.

Useful Service

Purchasers of fishery products for schools, cafeterias, restaurants, or chain stores will find NMFS inspection a convenient method to make sure that a product meets bid specifications.

Firms that use the inspection service can use the official Department of Commerce inspection marks on brand labels.

INSPECTION and CERTIFICATION GUARANTEE QUALITY

The Slimier It Is, The Faster It Swims

The slime of barracudas, halibut, and other fast fish contributes appreciably to their speed, a Navy scientist has found. The skin slime of the Pacific barracuda can cut water friction as much as two-thirds (65.9%). This research on marine and freshwater fish was conducted by Moe W. Rosen and his assistant, Neri E. Cornford, U.S. Naval Underseas Research and Development Center, Pasadena, Calif. The Navy long has been concerned with the subject of what speeds aquatic animals through water.

Porpoises as Background

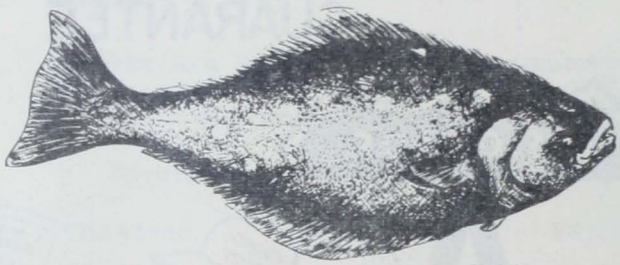
Researchers used to think that porpoises swam faster than their body shape and muscle strength should allow. They suspected that the porpoise's skin was resilient and flaby enough to cut the water's turbulence and so cut the drag. Some researchers even talked of equipping the hulls of submarines with a flabby covering.

However, research in recent years has indicated that porpoises are strong enough--without any special skin characteristics--to propel themselves through the water at the speeds researchers recorded them.

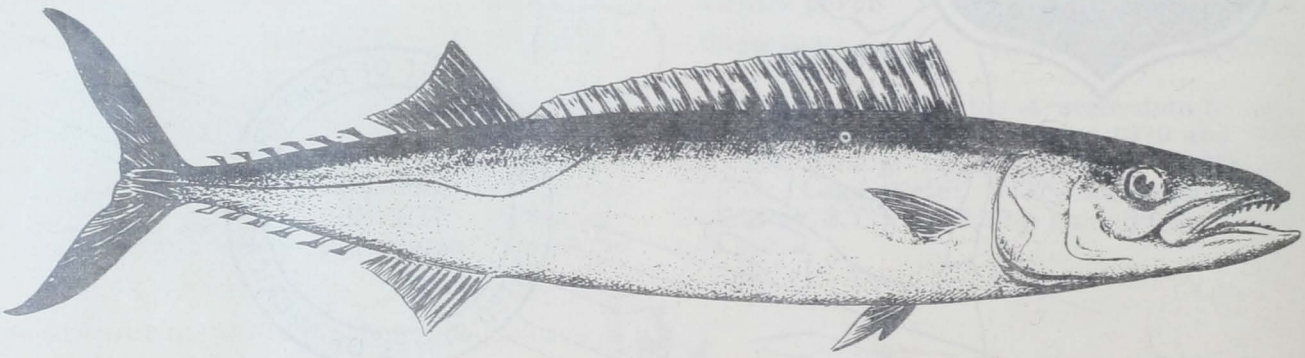
The Navy Study

The Rosen-Cornford research indicates that the slime on many (but not all) fish reduces turbulence at high speeds. Barracudas have been clocked at 28.3 miles an hour. Rosen calls this "very fast for an aquatic animal."

The slime's efficiency in cutting turbulence seems related directly to a species' need for speed to survive. The barracuda is streamlined predator. The halibut's slime is nearly as efficient as the barracuda's; the halibut catches fish "by means of long, swift lunges".



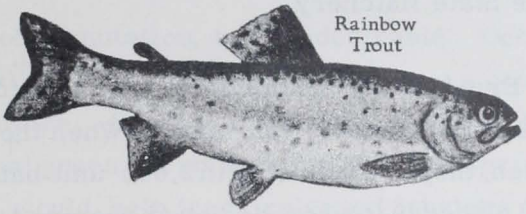
Halibut



Barracuda

Freshwater Species

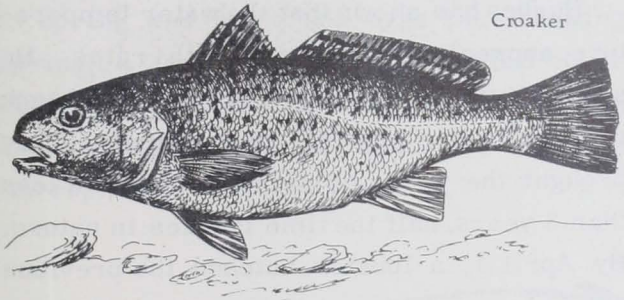
Of the freshwater species studied, the slime of the smallmouth bass was very effective. A little less efficient was the slime of rainbow and brown trout, white crappie, and bluegill.



Rainbow Trout

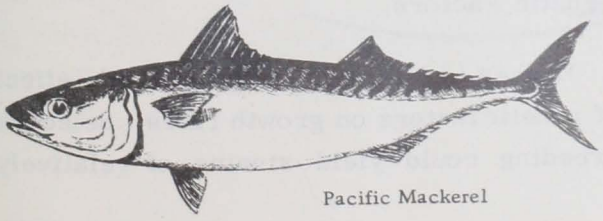
Exceptions to Rule

There were significant exceptions to all this: the slime of fish that do not need speed contributed little to reducing friction. In this category were the white croaker, an eater of slow-sealife, and the hagfish, an eellike scavenger.



Croaker

Other exceptions are the mackerel and the California bonito. These swift fish ooze a slime that helps little in cutting friction.



Pacific Mackerel

The nut-brown cowrie, a mollusk, has a friction-reducing slime. Researchers presume this lubricates the soft body's movement within the shell.

Functions of Fish Slime

Fish slime is believed to have other important functions: it guards against bacterial infection and lubricates scales as body flexes.

Rosen uses the word "reluctance" to describe the special characteristic of the slime on those fish that need it for speed. This property is the reluctance of slime to dissolve in water until "agitated by turbulence." As the fish wanders about at moderate speed, the slime remains intact. But when it attacks--or is itself being chased--the resulting water turbulence along its body starts to dissolve the slime. This cuts friction--and the turbulence.

Barracuda Slime Very Effective

With barracudas 26 to 31 inches long, the slime was very effective. A concentration of under 1% cut friction 44%. However, when heavily concentrated, slime efficiency falls.

Small-Fish Behavior

About a dozen years ago, Rosen found that several small fishes, when swimming, use the turbulence they produce to propel themselves. The fish's swimming action "generates a whirling vortex within the concave part of its flexing body." Then the fish pushes against this vortex to propel itself forward. Rosen suspects that large fish that do not have friction-reducing slime may propel themselves similarly; the bonito is an example.

LOBSTERS CAN BE RAISED IN HATCHERIES, EXPERT SAYS

The supply of lobsters may never catch up with demand. A possible solution is to raise lobsters commercially. This was the belief expressed by John Hughes to the New England Marine Resources Information Program. Hughes, a leading authority, is Director of the Massachusetts State Lobster Hatchery and Research Station at Oak Bluffs.

Not only can this be done, he says, but the very nature of the lobster may make this the only practical method of ensuring supply.

The Oak Bluffs hatchery opened in 1951. Since then, he and a colleague, J. J. Sullivan, have raised and released millions of young lobsters. Hughes says: "Considering the lobster's life history, it's amazing as many of them make it to the dinner table as do." Only within 48 hours of the female's molt do lobsters mate. Adults shed their shells "perhaps only every 2 years." Also, certain size limitations affect successful mating.

In the Beginning

The female produces as many as 60,000 eggs. It takes 18 months from copulation to release the eggs as baby lobsters. One-third-inch long, they resemble the larvae of mosquitoes more than lobsters. They float on the surface during their first 3 larval stages. They are helpless prey for fish, other lobsters, and birds. Of the 60,000, possibly 60 survive the first 3 weeks to reach fourth stage. Sexual maturity and one pound in weight are 5 to 7 years away.

So the primary aims in lobster culture are to speed growth and to increase the survival rate of baby lobsters. Hughes has done both.

The State Hatchery

Egg-bearing females are put in hatching tanks with running sea water. When the fry hatch, they are collected in 3,000-unit batches and placed in Hughes-designed rearing tanks. These tanks reduce 2 activities: the infant lobsters' cannibalistic tendencies; their diet of finely ground clams or brine shrimp. Lobsters, not scavengers, prefer fresh food. They reach the fourth molting stage and readiness to be released. Using mass-culture techniques, Hughes has increased survival rate from $\frac{1}{10}$ of 1% up to 40%.

Hughes has shown that the water temperature appreciably affects growth rates. He and Sullivan built a temperature-control tank to keep water at 70° year round. They brought the young to one-pound size in less than 3 years, half the time it takes in nature. By April 1, a lobster hatched the previous November and reared in heated water was 6 times as large as sibling reared elsewhere. Also, female eggs kept in heated water hatched 3 months early.

Genetic Factors

Hughes is interested in the possible effect of genetic factors on growth rates. Selective breeding could yield strains of relatively

rapid-growing lobsters. He has experimented with selective breeding of other desirable traits. Sometimes, lobsters have outsize claws or 2 crusher claws instead of one crusher and one ripper. The crusher has more meat than the others. Hughes would like to rear a 2-crusher strain.

Color mutation, too, is desirable. Occasionally, albino, red, and blue lobsters occur in nature. Hughes has bred a red with a normal green and obtained 50% red offspring. This would help track released lobsters for future population studies. Because lobsters molt regularly, it is virtually impossible to tag them permanently.

Reproductive Habits

Hughes was probably the first researcher to measure the gestation period. He discovered that a female who molts and mates in spring will hatch her eggs the following spring; a female who mates in fall holds them 18 months. In 1965, he produced a successful mating in the laboratory--and the fry reproduced in captivity.

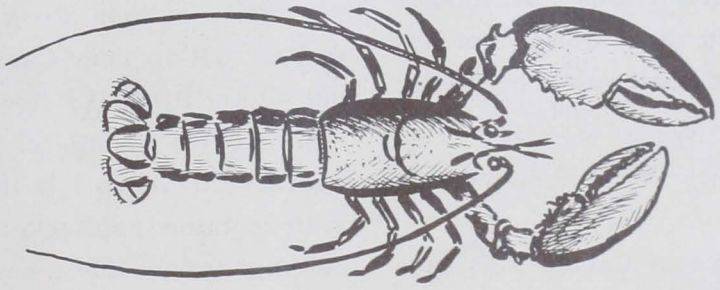
Mating

Hughes found that while the male "approaches the first female to whom he is presented with exemplary ardor, he is considerably less enthusiastic if presented to a second lady the same day and downright indifferent to a third."

He documented size limitations in mating. Invariably, a large male fails to mate with a much smaller female; but a small male can mate successfully with a much larger female. Some researchers say mating can occur as late as 12 days after the female molts. In Hughes' experience, 48 hours is more accurate for the female, although males can mate successfully up to 5 days after molting.

The Future

Hughes believes that there is a good chance of lobster farming becoming a reality in the years ahead. "I expect we'll know an awful lot more about it next year than we do now."

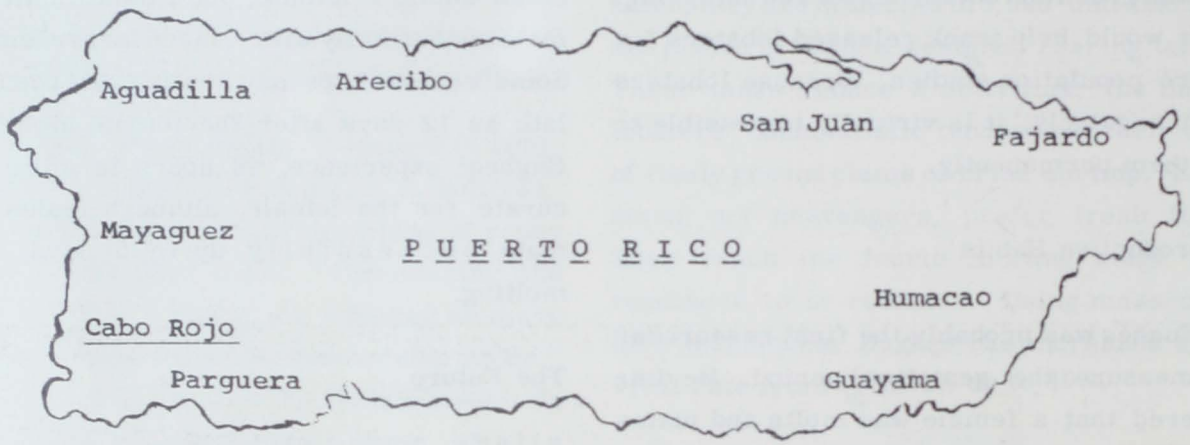


PUERTO RICO TO HAVE UNDERSEA LAB IN 1972

Puerto Rico will have an international undersea laboratory in September 1972, Gov. Luis A. Ferre has announced. This marine research and development project--the Puerto Rico International Undersea Laboratory (PRINUL)--will consist of a habitat and a research program in coastal-zone management and environmental protection. PRINUL is an extension of the Tektite I and II programs of 1969 and 1970.

habitat for marine investigations. It will be available to scientists and engineers from government, industry, and universities in the U.S. and abroad.

The lab will provide accommodations for off-island concerns interested in testing and evaluating equipment and systems. It is expected to attract to Puerto Rico industries that can use these facilities. Also, PRINUL will be involved in projects dealing with oil



Gov. Ferre hopes that "the laboratory will attract to Puerto Rico technical projects from all over the United States and other countries, as well as industrialists and scientists specializing in related fields. This project is the initial step in establishing Puerto Rico as a world leader in the development and utilization of one of its most valuable assets: its marine resources."

What PRINUL Is

PRINUL will explore the Caribbean's submerged platforms for potential resources that can be developed for Puerto Rico's benefit. It will train scientists in using a contamination, operating techniques, construction, and surveys--and with underwater physiological and psychological problems.

Scheduled for Sept. 1972

A 38-acre tract along the southwest coast of Puerto Rico, near Cabo Rojo, is the physical site of PRINUL. However, the lab is designed to be completely mobile and able to operate anywhere. It is centered around a self-contained habitat designed to function in 100 feet and provide a base for excursions to 300 feet. It can be relocated in less than an hour. The habitat is two 20' X 8' horizontal cylinders built within a barge.

OREGON STATE UNIVERSITY AIDS AMERICAN SAMOA

A 4-man Oregon State University (OSU) Sea Grant team is helping the natives of American Samoa to build hydraulically equipped dories and to use them for fishing.

The 3-month project is financed by a grant from the Office of Economic Opportunity. R. Barry Fisher, project head, said: "At the end of the project in Spring 1972, we hope to leave behind 5 native-built and equipped dories, nucleus of a fishing industry, plus a boat-building capability, an engine installation and repair capability, a fishing gear development program and a Sea Grant proposal to set up an extension program to help the fisherman and the consumer."

Fisher is associate professor of fisheries, OSU Department of Fisheries and Wildlife, and a former East Coast commercial fishing captain. He is gear development technician for the project. Other members are: Ted Howe, Newport, OSU's master fisherman; Cliff Roop, commercial fisherman and marine engine mechanic, Salem, and Tom Duncan, master fisherman, Newport.

American Samoa has been an American protectorate since 1911. It has 28,000 residents, 5,000 of them in Pago Pago, the capital, one of the Pacific's finest natural harbors. Tuitila is the main island.

The Project

The team will build 5 prototype Pacific City (Oregon) dories in a converted government building in Pago Pago. It will teach Samoans boat building and hydraulic and gear installation, then train them to use the equipment. It will cooperate with the Samoan Department of Marine Resources to develop fishing gear.

Fisher added: "Among the spin-offs, we hope, will be the fact that Samoans go into business building boats.

"We would like to see every interested village be able to catch fish for two basic reasons: Provide a source of high quality protein for the villagers and make possible the sale of fish in the open market as cash income."

Fish is a favorite food of Samoans. Species include skipjack tuna, yellowtail tuna,

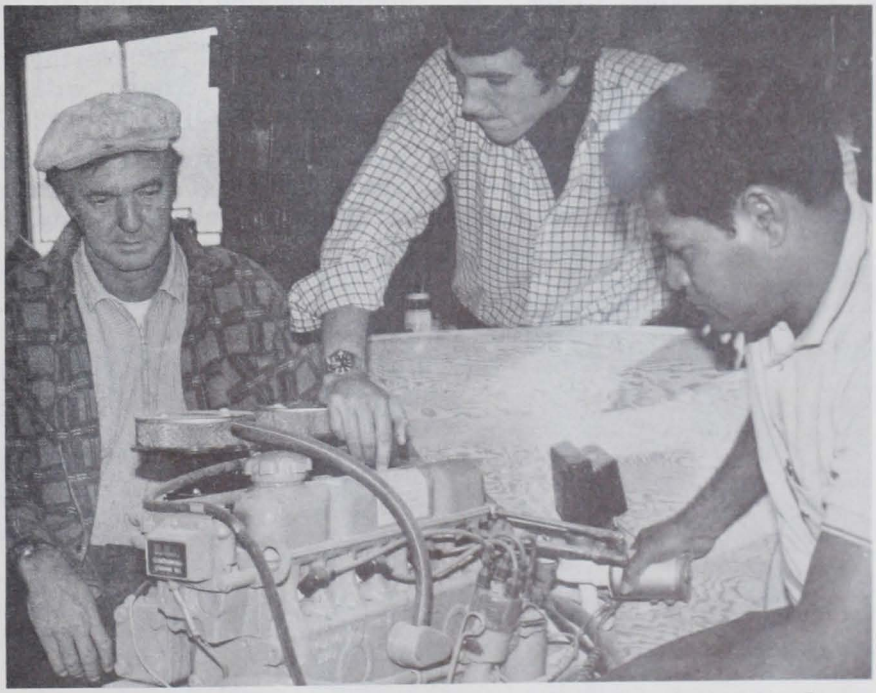


Fig. 1 - Three leaders in Oregon State University Sea Grant project for American Samoa look over a 130-horsepower engine installed in a new Pacific City dory in Oregon. From left: R. Barry Fisher, project leader; Steve Ritterbush, Pago Pago, assistant to head of Department of Marine Resources in American Samoa; Sam Puletasi, vocational adviser, Department of Education of American Samoa.

bottom fish, snapper, rockfish, perch, cravelle jacks, and parrot-fish. Periodically, pelagic fish like dolphin, wahoo, mackerel, and marlin are available.

Fisher added: "Historically, fishing was an important part of activities in Samoa. But it dwindled in importance as the society became Americanized and today the islands are no longer self-sufficient in fish."

It is hard to determine how much fish is imported, but every grocery sells canned salmon, salt mackerel, and frozen bottom fish from New Zealand and Australia.

Taiwanese and Korean fleets carry fish to American Samoa canneries owned by U.S. companies. These are the only significant private employers of Samoans.

Fisher emphasized: "Key to the whole Sea Grant project is the concept of a low cost boat with high speed and productivity through developing some gear and hydraulic pulling power to harvest the resources."

PACIFIC CITY DORY

He chose the Pacific City dory because of its stability, speed, and ruggedness. It is widely used on the U.S. West Coast. In Samoa, two keels will be added to the flat bottom to give it more bite in the ocean and to protect it against reefs. The fishbox will be insulated to carry ice for fish preservation.

An awning will be added to protect crew from rain and sun. Each 2-man crew will help build and equip their boat so they will know how to take care of it. The boats, worth about $4,500, will be owned by villagers or private fishing associations.

The crews will be trained in Pacific Northwest-style tuna trolling; Tahitian pole-and-line fishing for tuna; hand lining for bottom fish, using various gear including Portuguese long lines; Norwegian jigging gear, and bait fishing and gill nets for spiny lobsters, bottom fish, and schooling pelagic fish.

Each dory will be built from a master jig with a $\frac{3}{4}$-inch laminated plywood bottom. It will have $\frac{1}{2}$-inch plywood sides, a small foredeck, and a console fishbox. A South Pacific wood, dakua, will be used for framing. It will be fastened with epoxy glues, galvanized bolts, and silicone bronze ring nails and screws.

At Pacific City, a boat is turned out from a master jig without deviation. It takes 2 men 5 days to finish a boat. In American Samoa, it will take 10 days because of training in each step.

The dories will be powered with Volvo-Penta Model 270 130-horsepower inboard-outboard engines. They will be equipped with VHF telephones for communication and as a homing device to illustrate the idea of cooperative fishing of several boats. The dory's hydraulics will be Northwest Pacific-style tuna pullers. These will be used to pull pelagic fish caught trolling.

Complete studies and earnings records will be kept to assist Samoan fishermen in obtaining private financing.

Fig. 2 - The Pacific City Dory.