

Biologists measure fish aboard BCF vessel to assess fishing's effect on population. Thousands must be measured to determine growth and mortality rates. (R. K. Brigham)

FISH PRICES HIGHER IN 3RD QUARTER 1969 THAN YEAR EARLIER

Although some fish prices dipped seasonally in the third quarter of 1969, most prices were generally higher than in the same period of 1968. This had been predicted by BCF's Division of Current Economic Analysis.

Wholesale prices have been running about 11% higher than last year's, but fresh fish wholesale prices have risen an average of about 14%. Prices for several frozen products have been up about 10%. Wholesale prices for a limited number of canned products averaged fractionally lower.

Supplies

Supplies of most fishery products--had a notable exception--are expected to increase seasonally and be ample for the remainder of the summer.

As of July 1, inventories of frozen fish and fish were about 5% above a year earlier. Stocks of shrimp, crabs, and lobster tails were much larger. Fillets and steaks were up--but were offset by lower stocks of round and dressed fish. Stocks of fish sticks and portions were 18% above 1968; production was 25% in first quarter. Freshwater-fish stocks were about the same as in 1968.

Landings

Landings of the popular New England fish decreased about 8% this year. Haddock was a third less than the low level of 1968, but ocean perch was off 13%. But flounder and cod were up substantially.

California tuna landings, used primarily for canning, were up 45% due to the heavy catch of yellowfin in the tropical Pacific.

Fish Meal

Three factors are important in determining how much fish meal is used in the U.S.--the number of broilers hatched, fish meal prices, and prices of competing feed ingredients. Broilers hatched in January-May were 7% over last year. In June, menhaden meal was \$172 a ton f.o.b. East Coast ports; Peruvian meal was \$168.

Fish Meal vs. Competitive Products

Fish meal prices also were high in relation to competing products, such as soybean meal. If the high prices and price ratios continue through third quarter, the use of fish meal could fall considerably, as it did in 1965 and 1966 during periods of high prices. It was estimated that, at June prices, fewer than 250,000 tons of meal would be used in third quarter. This would be about one fourth below third-quarter 1968 consumption.

Fish Oil & Solubles

The U.S. consumed 11.2 million pounds of fish oil in first 4 months of 1969--up 5% from last year. Exports were 53.8 million pounds, nearly triple the amount exported in 1968. It was estimated that 8-12 million pounds of oil will be used in third-quarter 1968--slightly above last year. Exports were expected to be at least 21 million pounds.

Declining prices of fish solubles in first 5 months of 1969 indicated relatively weak U.S. demand. Prices of menhaden solubles fell from average \$51.25 per ton, f.o.b. East Coast ports, in January, to \$47.75 in May. In late May, prices began to increase and averaged \$49.75 per ton in June. This increase could indicate an increase in demand. In May 1969, consumption of fish solubles was about 11,100 tons--an increase of over 75% from May 1968.



UNITED STATES

Catfish Farming Grows in the South

A "new" agricultural industry--centuries old in Europe and a thousand years old in Asia--is on the rise in several southern States: catfish farming for sport fishing and commercial sales.

The main catfish-farming States today are Arkansas, Alabama, Mississippi, Louisiana, and Texas. There are more than 700 individual enterprises on over 30,000 acres of farm ponds. These produce about 39 million catchable or market-size catfish and over 50 million fingerlings. Current wholesale value of the "crop" is about \$10½ million. Income from bait minnows, also raised on fish farms, is \$8¼ million.

The most profitable arrangement, one encouraged by fish culturists, is a fish-rice-soybean rotation that makes fish farming part of agriculture.

Government Aid

The Bureau of Sport Fisheries and Wildlife and BCF work closely with the States to conduct basic research and to provide technical assistance. The U.S. Department of Agriculture provides financial and technical assistance to build and stock ponds. Investigations cover all of fish husbandry--rearing, feeding, stocking, and disease control.

Beginning of Fishery

Catfish culture was first considered seriously in the U.S. in 1917. Notes on rearing, growth, and food of channel catfish, in 'Transactions of the American Fisheries Society,' were based on research by the old U.S. Bureau of Fisheries. But it was not until the late 1940s that research at Auburn University, University of Oklahoma, and U.S. research at Marion, Ala., and Stuttgart, Ark., found catfish-rearing feasible. State hatcheries, especially in Arkansas, then helped. Later, private initiative and capital began to take over, and industry spread.

Recreational Use

Perhaps one-fifth of today's anglers in farm ponds. Many children and adults their first line and learned to catch a fish such waters. Anglers can fish only a minutes and miles from home or office. They can fish a couple of hours in the cool summer morning or evening, in the afternoon of warm winter days, or between April showers.

Good pond management can be carried by the owner in his spare time. Fertilization of water, or use of commercial feed, increases the pounds per pond; angling brings in extra cash; farmers simply harvest fish to sell on the market.

Good Future for Farming

The Bureau of Sport Fisheries and Wildlife sees a good future for fish farming. More people are accepting catfish for food and sport. The Bureau expects cost-per-pound to drop, production per man-year and production per acre to rise. The Bureau also expects current research to produce catfish that grow faster, are hardier in the winter, more resistant to disease.



Temperate Tuna Forecasting Is Expanded

Fishermen operating in Oregon-Washington waters this year are receiving additional radio advisory materials through a joint BCF-Oregon State University (OSU) cooperative project. OSU is operating an albacore information service from July 1 to October 1 and is emphasizing sea surface temperatures concentrating on microscale features along the Oregon coast out to 200 nautical miles.

Daily Messages

OSU transmits a daily message through the Astoria Marine Operator. The message

part of the normal weather broadcast at 1000 PDST and 2215 PDST. Each message is received twice; the new message will be the evening.

In addition to information from BCF's Fisheries-Oceanography Center at La Jolla, Calif., and the Weather Bureau, OSU receives reports from aircraft equipped with infrared thermometers, research vessels, and fishing boats (11 outfitted with bathythermographs).



San Pedro Wetfish Fleet In Poor Economic Condition

To BCF specialists, an economist and a fishery biologist, recently completed a study of the economics of the San Pedro, Calif., wetfish fleet. Wetfish include jack mackerel, Pacific mackerel, anchovy, and Pacific sardine.

Findings

They found the fleet in an unhealthy economic condition: low profits, unusual capital structure, low crew earnings, and decreasing employment. However, despite the overall depressed condition, a few boats have made reasonable profits in recent years. This fact, plus favorable cost analyses of existing vessel types, good estimates of some wetfish stocks off California -- may indicate that, with present market conditions, fleet expansion with surplus vessels from other fisheries would be economically feasible.

New Vessels Uneconomical

Present catch rates and prices, cost analyses show that new vessel construction would not be economically feasible, even with construction subsidies. If catch rates and efficiency were increased through technological research, the situation might change.



Pacific Halibut Landings Increase

Pacific halibut landings by the U.S. and Canadian fleet through July 31 were 35.3 million pounds (dressed weight). This is an increase of 3.3 million pounds, or 10%, over

the 1968 period. For the first time since 1966, quotas in most fishing areas were expected to be reached.

High Prices Stabilizing Factor

High prices should keep the vessels from shifting to other fisheries as they did last year, when prices were much lower. Prices have continued upward since the season opened. At the beginning, exvessel prices for medium halibut were 40.6 cents a pound in Seattle, Wash., and 41.6 cents at Prince Rupert, British Columbia. On July 31, prices for medium halibut had reached 45.3 cents at Seattle, and 44.2 cents a pound at Prince Rupert.



Lake Erie Fishermen Reject 30-40% of Catch

Biologists from BCF's Sandusky, Ohio, field station on Lake Erie are investigating the number and species of fish commercial fishermen land and then return to the lake. Working with beach seiners in Sandusky Bay, the biologists report about 40% of the fish are returned for lack of market demand. Most are sheepshead, goldfish, carp, and gizzard shad. A similar situation exists in the trap net fishery, where about 30%, usually the same species, are returned. This selective fishery may be contributing to the lake's undesirably high abundance of unmarketable fish.



Fish Oil May Be Marketed For Human Consumption

Representatives of BCF's Division of Food Science met recently with members of the fish industry to discuss the feasibility of bringing fish oil to the U.S. human food market.

BCF is cooperating with industry and other government agencies to reintroduce fish oil as human food.

Sardine Oil Used 1912-1952

Oil from California sardines was used in human foods in the U.S. from 1912 through

1952. Failure of the resource, and lack of information on using oil from other species, brought in vegetable oils to fill the market void. The menhaden industry particularly is interested in marketing fish oil for people. With the recent emphasis on good manufacturing practices, and esthetic considerations for all human food, present practices must be changed before oil can be used.



Biologist Tests Effects of Lunar Materials on Aquatic Species

James W. Warren, a fish biologist with the Bureau of Sport Fisheries and Wildlife, will test the effects of lunar materials on earth's aquatic species at Houston's lunar receiving laboratory.

Species Used

Warren will work for 2 months with species ranging from small protozoans to flat worms, oysters, shrimp, and fathead and mummichog minnows. The minnows, he says, are something like "guinea pigs of the fish world"--much is known about their normal condition and they are, in many ways, ideal as a laboratory test species.

The main objective of these experiments with moon dust is to detect any elements that may jeopardize life on earth.

Preliminary Tests

Warren emphasizes that his experiments will be only preliminary: to see if any hazards exist before the moon dust is sent to other scientists for more comprehensive studies. His tests will begin after a team of physicists and geologists has spent 3 weeks intensively examining the material for gross cosmic radiation or chemical hazards. These researchers then will distribute the dust to special test groups. Warren's 5-man aquatic research team is one of these groups.



BCF Studies Shrimp-Sorting Trawls in Pacific Northwest

BCF's Exploratory Fishing Base in Seattle, Wash., reports that 3 gear-development cruises involving studies of shrimp-sorting trawls were conducted between April 1 and June 30, 1969. Several trawls incorporating various sorting concepts were evaluated. Trawl performance studies involved observations by SCUBA-equipped personnel during shallow-water testing, and actual test fishing on commercial fishing grounds.

The Findings

Findings revealed that trawls equipped with a vertical sorting panel eliminated virtually all trash fish and invertebrates from the shrimp catch; some smelt and a few small rockfish were retained. The research model--a 3-panel shrimp trawl--was most effective in eliminating trash. Trawls with a headrope overhang retained fewer smelt than those having an overhang; this occurred without any apparent change in shrimp catch. Contamination of sorting trawl catches was always less than that found in commercial catches by nearby vessels.



BCF Tests Fresh Halibut Stored in Refrigerated Sea Water

A BCF technologist went to sea early in June to begin a study of halibut stored in carbon dioxide (CO₂) treated refrigerated sea water (RSW). He returned to Seattle, Wash. with freshly caught fish in an RSW unit. The unit was transferred to the laboratory without disturbing the fish in the holding tank. The halibut will be evaluated periodically to determine the effect of the CO₂ treatment on quality and storage life, compared to that of iced 'control fish.'

Bacterial Counts

The first examination was made on July 25 after the fish had been held 21 days. The halibut held in RSW-CO₂ were in excellent condition. Total bacterial counts had not risen above 100 organisms per square centimeter of skin. The bacterial load in the water itself was 100 organisms per milliliter.

By comparison, total bacterial counts on the ice control fish were in excess of 1,000,000 organisms per square centimeter of skin. Initial bacterial counts on the fish, prior to storage, were 10,000 organisms per square centimeter.

Seemary Tests

Organoleptic (sense organ) assessment of rainbow trout clearly indicated that the iced halibut were in very poor condition. Similar assessment of the CO₂-treated RSW halibut showed these fish to be in good condition.



U.S. & Japan Cooperate in Salmon Research

Scientists of Japan's Hokkaido University and BCF are working together to learn more about the early marine life of Alaska's Bristol Bay sockeye (red) salmon. They are interested also in the salmon's environment.

Biologists at BCF's Auke Bay (Alaska) Laboratory are trying to discover the seaward migration routes of Bristol Bay young sockeye salmon. Their study is part of a comprehensive investigation to improve the accuracy of salmon run forecasts.

Japanese Invitation

This year, Hokkaido officials invited BCF's Dr. Richard Straty to board the 'Oshoro Maru' during its Bristol Bay cruise. The vessel is used primarily to train graduate fishery students. BCF saw this as an excellent opportunity to coordinate its Bristol Bay efforts with those of the Japanese.

Under Straty's supervision, BCF and Hokkaido researchers established the present cooperative effort. The two groups thus will avoid costly duplication and collect much more scientific information.

See Marked Salmon

The main task of 2 research vessels will be to collect young sockeye salmon migrating seaward through the Bering Sea. Researchers hope to find some salmon bearing fluorescent marks. These will represent part of over 750,000 young salmon marked earlier this

summer on the Wood and Naknek Rivers, before starting their long ocean journey. Their recapture will give BCF biologists valuable information on migration routes. By using 2 research vessels, BCF and Hokkaido biologists will be able to gather data from a much wider area in Bristol Bay. Once the information is analyzed, the scientists will exchange findings.



BCF Conducts Tuna/Porpoise Survey in Eastern Equatorial Atlantic

A BCF Biological Technician is exploring the eastern equatorial Atlantic to gather information on the association of tuna with porpoise. His prime interest is sampling the virtually unfished porpoise populations of the Atlantic for comparison with data from the eastern Pacific. In the Pacific, tuna and porpoise frequently school together. The schools are located by sighting the jumping or "spinning" porpoise.

Porpoise caught in purse seines in attempts to catch tuna are released by fishermen.

The Operation

Traveling with a commercial tuna seiner, a transshipment vessel, and a scouting helicopter, the technician will observe and photograph their operations. He also will collect tuna length frequency data, tuna blood samples, stomach contents of tuna, size and sex data on the porpoise catch, and photograph and measure porpoises.



Financial Aid Provided for Fishing Vessels

The Federal Fisheries Loan Fund program, administered by BCF, began in 1956. Through June 30, 1969, BCF had received 2,259 applications for \$62,783,447. Of these, 1,187 (\$29,002,714) were approved; 685 (\$16,859,072) were declined or found ineligible; 349 (\$12,585,271) were withdrawn before processing; and 38 (\$1,904,505) were pending.

As 418 were approved for smaller amounts than applied for, the total was reduced by \$2,431,885.

Mortgage Insurance Program

BCF also administers the Fishing Vessel Mortgage Insurance Program. Since the program began on July 5, 1960, 240 applications for \$31,837,977 have been received. By June 30, 1969, 199 for \$24,198,828 had been approved, and 11 for \$4,262,401 were pending.

Fishing Vessel Construction Subsidies

The first applications for fishing-vessel construction subsidies under the expanded program were received in December 1964. By June 30, 1969, 119 applications for an estimated \$32,191,100 had been received. Sixty were approved for an estimated \$14,732,000. Thirty-two, for \$18,604,748.70, have been executed. Some provide for greater subsidies than were estimated.



U.S. and 9 States Discuss Control of Water Pollution

The first in a series of meetings between Federal and State officials to coordinate plans for water pollution control was held August 6 in the offices of Carl L. Klein, Interior Department's Assistant Secretary for Water Quality and Research.

Interior Secretary Hickel said: "We are going to do everything we can to clean up the Nation's waterways. In working towards this goal, we intend to establish a close coordination and correlation between State and Federal policy making on this vital issue."

National Problem

The first group of conferees included representatives from New Jersey, Pennsylvania, Illinois, New York, Colorado, Washington, South Carolina, Vermont, and Nebraska. No attempt is being made to arrange the meetings along regional lines. The problems being discussed concern the whole country and cover the future of water-pollution control. These include regulation of thermal pollution,

coastal waste disposal, deep well disposal, the "highest practicable treatment" of waste, and Federal-State problems generally.



Record Run of Spring Chinook in Columbia River

A record run of spring chinook was tallied over Bonneville Dam this year -- 174,143 fish. Although the run was quite strong, there were some difficulties. Some fish were killed, probably from the high nitrogen concentrations caused by spillway discharges at various dams on the Columbia. Because of the high nitrogen values, it was impossible to assess accurately the loss to either adults or seaward migrants. However, both juvenile and adults were noted in distress at various points along the river.

Lewiston Dam Escapement

Escapement of spring chinook over Lewiston Dam into the Clearwater River, Idaho, had exceeded 2,600 fish by June 30. This had passed through the 2 fishways rebuilt under the Columbia River Fisheries Development Program. The return was from eyed eggs planted in incubation channels in the Selway River; this was a cooperative effort of BCF and the Idaho Fish and Game Department.

Fall Creek Run

The spring chinook run was heavy in Fall Creek, a tributary of the Willamette River. By June 19, 4,001 adults had been trapped at Fall Creek Dam. In contrast, the total Fall Creek chinook count had been only 100 fish. Because of concern about saturation of spawning areas in tributaries above the reservoir, trapped chinook were being transported to Green Peter reservoir in the Santiam River.



Bonneville Hatchery To Be Enlarged

The U.S. Corps of Engineers will fund enlargement of Bonneville Hatchery to compensate for the flooding of spawning grounds by John Day Dam. The new hatchery, s

ponds, will have a complete reuse-water system capable of heating and chilling the water.

The Corps also has installed stoplogs in the draft tube unwatering slots at Lower Monumental Dam. This has alleviated the problem of fish entering the skeleton bays and becoming entrapped. Fish passage now is considered good.



Columbia River Water Temperatures Predicted

Exploratory temperature tests of the Columbia River have been completed by the Corps of Engineers Hydraulic Laboratory, Beville, Oregon. A physical model of the Lower Columbia was used to determine the typical characteristics of heated discharges from a proposed thermonuclear plant near the Kalama grain dock.

Methods & Results

The dispersion characteristics of the temperature plumes were measured and recorded with Rosemount temperature sensing and recording devices. The dye plumes were recorded visually. The temperature plumes were photographed with an infrared optical system. cursory examination of the data indicated that: (1) dye plume factors do not necessarily coincide with temperature plume lines, (2) heated water can become trapped in eddy areas, and (3) under all conditions, a temperature increase was recorded at Coffin Bay, 5 river miles downstream from Kalama, the site of another thermonuclear plant.

Tests with Fish

In other tests, juvenile salmonids were subjected to lethal temperature for a sublethal period. The treated fish were mixed with a number of untreated control fish and held in a large tank containing predators. The test was terminated after 2 hours. Twenty-eight of 60 treated fish had been eaten, compared with only 1 of the 60 untreated fish.



Seattle Gets Ready for FISH EXPO '69

One of the world's largest fishing shows, FISH EXPO '69, is scheduled to open in the Seattle, Wash., Coliseum on October 5. It will run 4 days. The show will feature marine exhibits, well-known speakers, panel discussions and seminars, 3 banquets, and sightseeing tours and activities.

Dr. Richard Van Cleve, University of Washington School of Fisheries and seminar program chairman, has announced this schedule:

Mon., Oct. 6, 1969

9:30-10:45 a.m. - The Electronic Detection of Fish--chaired by Dr. Murphy, director, Division of Marine Resources, U. Washington.

11:00 a.m.-12:30 p.m. - The Captains Speak Out--featuring representatives from South America, Europe, Canada, the U.S. West Coast, East Coast, and Gulf Coast.

Tues., Oct. 7

9:30-10:45 a.m. - Quality Control Ashore and Afloat--chaired by Dr. Pigott, U. of Washington.

11:00 a.m.-12:30 p.m. - The Lay System (share system in the boats)--chaired by Mr. Sig Jeager; will include representatives from each coast.

Wed., Oct. 8

9:30-10:45 a.m. - Transportation and Marketing of Fresh Fish and Shellfish--expansion of markets through air transportation, containerization of fish--chaired by Roy Stevens.

Tentative tours have been set:

Mon., Oct. 6--Open House about noon at Fishermen's Terminal aboard BCF's 'Miller Freeman.'

Tues., Oct. 7--New England Fish, Marco, and other industry points of interest in Seattle area. Morning and afternoon.

Wed., Oct. 8--U. of Washington School of Fisheries and BCF's Montlake Laboratory. Morning and afternoon.

Buses will shuttle from Center Coliseum to tour points.

FISH EXPO '69 is the third in a series. The previous 2 were held in Boston, Mass.



Fraser River Salmon Outlook Is Promising, Commission Believes

The outlook for the sockeye and pink salmon in the Fraser River system of British Columbia is promising, states the 1968 annual report of the International Pacific Salmon Fisheries Commission. The Commission was appointed under a Canada-U.S. Convention to protect and expand these resources. Its recommendations are important to Canadian and U.S. fishermen.

The Commission's study of the salmon fisheries of 2 other major river systems on the Pacific coast--California's Sacramento-San Joaquin River system and Washington State's Columbia and Snake Rivers--"leads to an optimistic forecast for the future of the Fraser River salmon fishery."

The Sacramento-San Joaquin River system, once a major producer of chinook salmon, lies in semi-arid, very valuable, farm land. The available river flow is being developed to full capacity, for irrigation primarily, but also for domestic and industrial water supplies. The fishery has suffered. The Fraser River watershed, in contrast, unfolds only a limited amount of farm land that needs extensive irrigation. In this respect, only a major diversion of the Fraser River to other areas would threaten the salmon fishery.

The Columbia River salmon, too, "has declined substantially." Decades ago, irrigation development "destroyed or permanently decimated" the salmon population of major tributaries. More recently, the main Columbia and Snake Rivers have been utilized for hydroelectric power. The salmon of the upper Columbia and Snake Rivers "are now declining in abundance and may eventually become of little commercial importance." Protecting the Fraser system is the policy of the British Columbia Government. It has opposed development of the Fraser's hydroelectric capacity until there are improvements in thermal generation of electric power. So the Commission concludes: "From this we gain confidence that the salmon industry of the Fraser River will not be affected by the disastrous forces which are impairing or have destroyed major salmon producing areas in the Columbia and Sacramento-San Joaquin Rivers." This policy is "all-important to the future of the fishery."

HISTORY OF FRASER SALMON

From 1911-1913, railroad construction produced an obstruction at Hell's Gate, north-east of Vancouver, B.C., which had a "devastating effect" on the annual upstream migration of Fraser River salmon. Annual sockeye production dropped 87% from an average 9.5 million sockeye for 1899-1913 to 1.2 million for 1921-24. Beginning in 1913, the extensive pink salmon escapements above Hell's Gate disappeared. The abundance index of this species declined 76%.

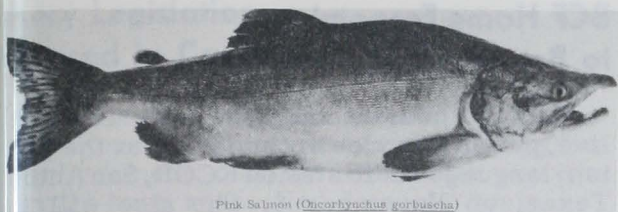


The serious effects of Hell's Gate obstruction led to the Sockeye Salmon Fisheries Convention ratified by Canada and the U.S. in 1937. The International Pacific Salmon Fisheries Commission was created "to protect, preserve and extend the fishery for this species." After 8 years of scientific study, the Commission took on regulatory responsibility. In 1945, the major Hell's Gate fishways were completed. The next year, new regulations became effective to adjust fishing "in the interest of conservation and division of the catch."

Production History -- Fraser River Sockeye			
Years	Average Annual Catch	Value to Fishermen	Processed Value
		1968 Prices	
1898-1913	9,494,000	\$22,008,500	\$39,115,000
1921-1924	1,213,000	2,812,000	4,997,500
1958-1961	4,770,000	11,058,000	19,653,000

The years 1958-1961 are used to show current production because bad environmental conditions during 1962-1966 reduced temporarily the production of sockeye and pink salmon. Since 1966, the Commission reports: "reproductive environment and survival rate appear to be regaining favorable levels, but a full quadrennial cycle has not been completed."

Fraser River pink salmon runs also declined seriously after the Hell's Gate slide "but have recently begun to return to the



Pink Salmon (*Oncorhynchus gorbuscha*)

former abundance." It has been estimated that the 1967 pink salmon catch, worth \$3,380,000 to fishermen and \$18,676,000 in processed value to Canada and U.S. at 1968 prices, eventually can be doubled and perhaps tripled. The escapement above Hell's Gate is increasing to large levels again and the potential production may be achieved "in a few cycle years of favorable survival rates."

When the values for sockeye and estimated minimum values for pink salmon (twice 1967 production) are combined, the original populations before the 1913 disaster were worth an estimated \$28,389,000 a year to fishermen--and \$57,791,000 after processing to Canada and U.S. based on 1968 prices. Immediately after the 1913 slide, the industry's value dropped to \$4,950,000 to fishermen and \$11,254,000 processed; it has recovered "due in a large part to the operations of the Commission." Now, annual value is \$14,248,000 to fishermen and \$28,991,000 after processing--an annual increase of \$9,298,000 and \$7,737,000 over the previous period.

Restoring Fraser's Original Wealth

Several factors will determine whether Fraser River will regain its original sockeye and pink salmon wealth. Some transplants may be necessary because, in some cases, the original racial structure of the populations was destroyed." A second factor is the change in the reproductive environment brought about by logging of the watershed." Only artificial aids can prevent some declines. The Commission has investigated artificial spawning channels, incubation channels, temperature control, and artificial rearing. "These artificial aids will act not only as substitutes for lost or damaged spawning grounds, but also as potential methods for extending the populations to levels greater than those possible under natural conditions."

The Commission believes that "the rehabilitation picture may change within the next 10 years." More data on returning adults

will justify the rapid expansion of artificial aids to sockeye and pink salmon reproduction.

SOCKEYE SALMON FISHERY

The 1968 run of Fraser River sockeye entering Convention waters was 2,559,301 sockeye: 1,805,962 caught commercially, an estimated 124,002 by Indians, and 629,337 recorded on spawning grounds. Another 355,000 fish were caught in Johnstone Strait. The commercial sockeye catch was much larger than the brood year catch in 1964 of 1,023,000.

Of the 1,805,692 sockeye, Canadian fishermen caught 920,092 and U.S. fishermen 885,870--about 51% and 49%. The catch in Convention waters was 77% above that of the brood year 1964. The average weight of 4-year-old sockeye was 5.81 pounds, slightly smaller than the cycle average of 6.04 pounds.

The Canadian fishery in Juan de Fuca Strait was closed during passage of the main 1968 sockeye run because the expected run was considered too small to permit a practical fishery.

The 1968 U.S. purse-seine and reef-net fleets were the smallest of any recent cycle year. So the sockeye catch by these gear was the smallest since 1964. The gill-net fleet, with more vessels, harvested about 40% of the catch; in 1964, 35%; in 1960, 21.12%.

Escapement

The net escapement of 629,337 sockeye was 24.6% of the 1968 run to Convention waters and 21.6% of the calculated total run. Most individual escapements were higher than those in the brood year. These increases were attained mostly because of favorable marine survival of all races.

The 1968 spawning escapement "was most satisfactory and spawning conditions were generally favorable."

REHABILITATION

From 1949-1962, the Commission experimented with eyed-egg transplants to barren streams that reportedly had sockeye runs in earlier years. It achieved minor successes in beginning sockeye runs that now are self-sustaining. "However," the Commission

states, "the degree of success of these transplants has not been of major commercial importance to date," although the investment was more than justified.

The Commission studied the reasons why previous sockeye hatchery operations failed to build up Fraser River runs. It found that "hatchery-produced fry are smaller and weaker than wild fry, develop sooner and thus enter their lacustrine (growing in lakes) life earlier than normal." For these reasons, enough hatchery-produced fry did not survive to increase the returning runs. "However, research by other organizations on coho and chinook salmon has shown that the adverse effects of hatchery incubation can be offset by artificial rearing of fry, with economic benefits gained in terms of adults produced."

The Commission has been forced to use artificial aids to maintain certain runs for 2 reasons: 1) increasing instability of several natural spawning grounds of pink and sockeye salmon caused by watershed logging, and 2) loss of valuable pink salmon spawning ground on Seton Creek due to hydroelectric power development.

The Commission believes that yearling sockeye smolts can be produced successfully by artificial rearing if these procedures are followed:

"Limit spring and summer rearing to self-cleaning, rectangular circulating ponds of the type developed by Roger Burrows of the United States Fish and Wildlife Service. These ponds eliminate waste products rapidly and create a uniform environment with a resulting uniformity in the distribution of fish.

"Exercise care in pond loading in respect to available space and water supply.

"Use care in all fish cultural practices, especially in the initial feeding of young fry.

"Maintain daily fluctuation in water temperature to restrict the outbreak of both bacterial gill disease and virus infection.

"Do not release the yearling fish until they are known to tolerate salt water."



BCF Home Economist to Broadcast in Spanish

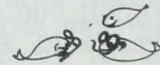
A BCF home economist will conduct a live, public-service broadcast over the Spanish-language radio station KCOR, San Antonio, Texas, on November 4. She also will tape 30- and 60-second public-service spot announcements. The tapes will be mailed to 80 Spanish-language radio stations throughout the country.



Trout Farmers Meet In October

The U.S. Trout Farmers Association (USTFA) will meet at Traverse City, Mich., October 8, 9, and 10, reports Jay N. Roundhouse, USTFA president, and convention chairman. The convention will include one day of touring trout farms and hatching facilities. The first and last days will be devoted to cultural problems and to marketing. The potential of recreational trout farming will be emphasized.

About 180 trout growers and those of allied industries and professions attended the 1960 convention. Roundhouse expects as many this year.



New Company to Publish Marine Books

A new book publishing and selling firm, the International Marine Publishing Company, has been established in Camden, Maine. The firm will supply books on such subjects as: fishing industry, oceanography, marine photography, seamanship, and boat building. Where no published book can be provided, the company will attempt to fill the need with its own publications. The books and other products will be sold through normal retail outlets.

Three publications are now in the works: one on the history of dories and how to build them, a photographic appreciation of the Chesapeake Bay oyster industry, and a book on handling small sailing and power boats in heavy weather.



Fishery Legislation Proposed in Congress

Aware of growing public concern about the repercussions of unrestrained technology on the environment, both the President and the Congress have responded constructively.

Executive Action

On May 29, the President established an Environmental Quality Council composed of himself, the Vice President, the Secretaries of Interior, Agriculture, Commerce, Transportation, Health, Education and Welfare, and Housing and Urban Development. At the same time, he established a Citizens' Advisory Committee on Environmental Quality. Its members are persons who have been serving on the now defunct Citizens' Advisory Committee on Recreation and Natural Resources.

The President said:

"...In our time, technological development threatens the availability of good air and good water, of open space and even quiet neighborhoods. . .the quality of our American environment is threatened today as it has not been threatened before in our history. Each time we receive new evidence of the declining quality of the . . .environment.

"I am asking the Council, with the assistance of the Citizens' Advisory Committee, to examine the full range of variables which affect environmental quality. . .to review existing policies and programs, and to suggest ways of improving them. Its members must assess the impact of new technologies and encourage scientific developments which will help us protect our resources.

"...this new body must anticipate new problems even as it focuses on present ones. It is not enough that it provide answers to the questions we are asking today. It must also address the new questions which will face us tomorrow."

House Response

More than 25 members of the House of Representatives have introduced bills and resolutions pertaining to environmental quality. They range from a resolution creating a House Committee on the Environment, to one that would expand the Department of the Interior and redesignate it the Department of Resources, Environment and Population.

Senate Action

At least 46 Senators have introduced or cosponsored bills and resolutions aimed at preserving environmental quality.

On July 10, the Senate considered and passed S. 1075, a bill to establish a national policy for the environment; to authorize studies, surveys, and research relating to ecological systems, natural resources, and the quality of the human environment; and to establish a Board of Environmental Quality Advisers.

The report of the Committee on Interior and Insular Affairs on S. 1075 states, in part:

"The inadequacy of present knowledge, policies, and institutions is reflected in our Nation's history, in our national attitudes, and in our contemporary life. We see increasing evidence of this inadequacy all around us: critical air and water pollution. . .the degradation of unique ecosystems; needless deforestation; the decline and extinction of fish and wildlife species. . .thermal pollution, and many, many other environmental quality problems.

"As the evidence of environmental decay and degradation mounts, it becomes clearer each day that the Nation cannot continue to pay the price of past abuse. The costs of air and water pollution, poor land-use policies and urban decay can no longer be deferred for payment by future generations. These problems must be faced while they are still of manageable proportions and while alternative solutions are still available.

"One of the major factors contributing to environmental abuse and deterioration is that actions--often actions having irreversible consequences--are undertaken without adequate consideration of, or knowledge about, their impact on the environment. . .seeks to overcome this limitation by authorizing all agencies of the Federal Government, in conjunction with their existing programs, and authorities, to conduct research, studies, and surveys related to ecological systems and the quality of the environment. (It) also authorizes the agencies to make this information available to the public, to assist State and local governments, and to utilize ecological information in the planning and development of resource-oriented projects."

--Barbara Lundy

OCEANOGRAPHY

Strange Buoys Thrive in Puerto Rican Waters

The crews of vessels passing 20 miles south of Ponce, Puerto Rico, can see "a weird, bright orange bud attached to a yellow stem and protected from sun, wind and rain by a white umbrella." It seems about to bloom.

"We know it's alive because we can hear a good, loud audio tone from its monitor radio transmitter and are getting positioning data on it from a high-flying satellite," reported Bob Kee, a U.S. Naval Oceanographic Office (NOO) oceanographic engineer. He helped develop and plant the exotic blossom in about 5,000 feet of Caribbean water.

Complex Buoy Array

The strange ocean flower is a complex buoy array that contains the Interrogation Recording Location System (IRLS). This system was designed to record and transmit oceanographic data to an interrogating satellite. It is supported in the Caribbean waters by an anchored subsurface buoy and a spar float.

Kee said IRLS now transmits to the satellite only a limited amount of oceanographic data--on wave heights and sea states needed to assess the array's ocean environment. The satellite is the polar-orbiting NIMBUS B II launched last spring by the National Aeronautics and Space Administration (NASA). Also, other instruments beneath the orange bud (which is a radar reflector) tell the satellite--and the scientists who later interrogate its recording and storing mechanisms--that the buoy system is well.

Array's Information

Kee explained: "We are learning how far the array's mast has tilted and how far the mast is from the water's surface as well as the direction in which its antennas are pointing--performance information that we are comparing with weather and general oceanographic data to see how well the system is working in the hostile ocean environment. The array also has instruments aboard to notify the scientists of buoy leaks and mooring cable breaks.

The Future

The present experiment is designed primarily to test IRLS' performance. It is the first phase of an idea conceived by NOO and NASA scientists to determine the possibility of using a satellite to locate and interrogate oceanographic instruments placed on platforms throughout the world's oceans.

These future platforms may be thousands of IRLS-instrumented buoy arrays. The platforms also may include ships of opportunity--Naval and commercial ships not normally equipped for oceanographic surveying. The scientists already are thinking about developing compact electronic instrument packages designed to take oceanographic measurements. These devices would be installed on the ships that travel both established sea lanes and remote, deep-ocean areas.

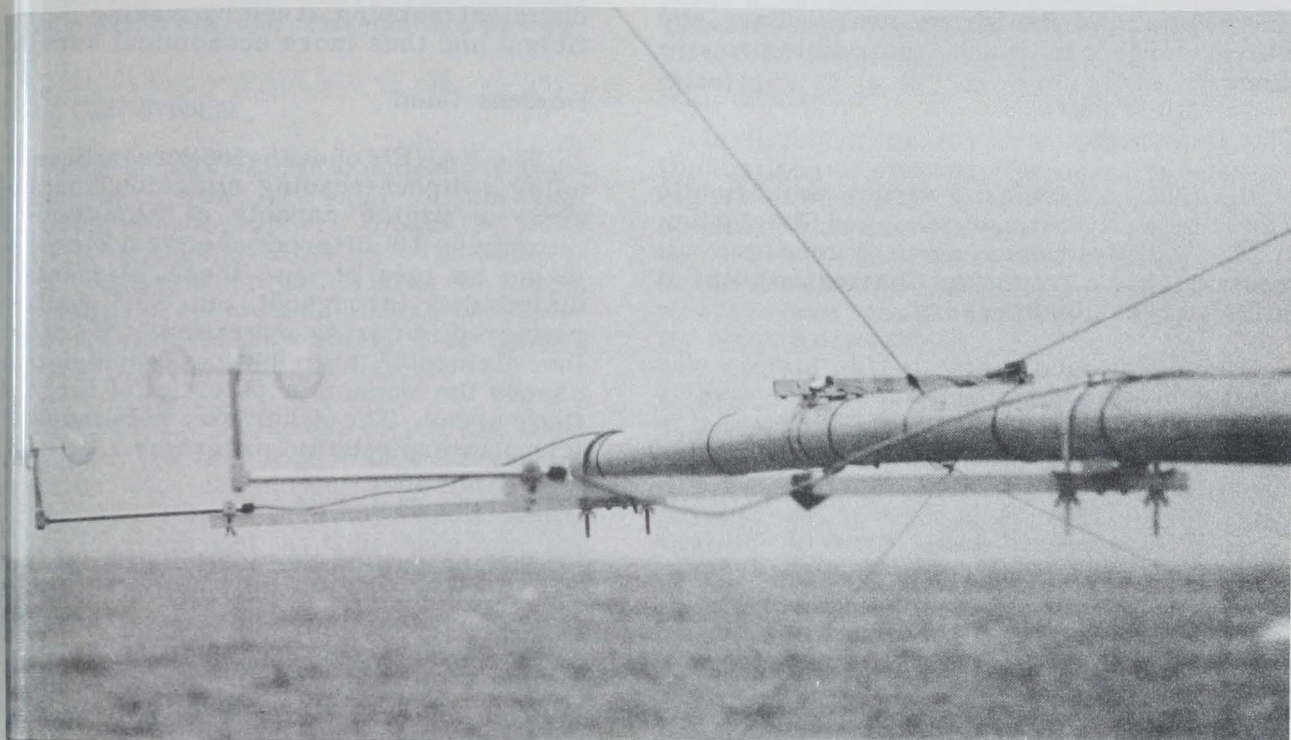


A Step Toward Global Ocean Forecasting System

U.S. Naval Oceanographic Office (NOO) scientists believe they now have equipment to measure wind velocities that are needed to compute "momentum flux." This flux is a complex air movement that produces waves by transferring energy across the ocean surface. The equipment is a boom and 2 wind gauges strong enough, when driven into steady Trade Winds, to measure wind velocities.

The equipment was tested about 100 miles north of Barbados in the British West Indies. The results showed that it may now be possible to install rigging and instruments designed to measure horizontal wind velocities (wind's speed and direction as it blows across the ocean) aboard Navy and commercial ships.

P. S. DeLeonibus, the cruise's chief scientist, said this capability is an important step in developing a world-wide ocean forecasting system. One day this system may operate like the daily U.S. weather-prediction network.



WINDING ANEMOMETERS MEASURE WIND--Two of the 4 cup anemometers attached near end of 10-meter boom extending forward from bow of GILLISS. These record horizontal wind velocities for wind-wave specialists. The measurements may help them learn how to compute momentum flux--complex air movements that produce waves by transferring energy across ocean surface.

The Equipment

The rigging and instruments," he explained, "could be attached to ships stationed in deep ocean areas where the construction of mobile platforms designed to support oceanographic and meteorological measuring devices is not possible."

This system would be based on quick computer mathematics obtained from descriptions of ocean and atmospheric conditions recorded by instruments aboard ships and mobile platforms. Forecasts resulting from the network would ensure safety of ships at sea. They also would speed passages and help fishing and mining industries to tap the ocean's riches.



Storm Surge Studied

Water not wind is the "most deadly and destructive feature of the hurricane," according to U.S. Weather Bureau experts studying coastal floods caused by storm surges along the east of the Atlantic and Gulf coasts.

At ESSA's National Hurricane Center in Miami, Fla., weathermen are gathering data on every aspect of these sudden, storm-generated rises of water levels along the shore. The results, already complete for some areas, will enable forecasters to point out specific danger areas when a storm approaches the U.S.

What Storm Surge Is

The height of a storm surge can vary greatly over a relatively short stretch of coastline. This would depend on geographic features and where the storm itself is in relation to the shore. A surge of only a few feet that could flood hundreds of square miles of low-lying delta land at a river's mouth could go practically unnoticed 50 miles up the coast.

The Weather Bureau states that the classical definition of storm surge is the abnormal rise of the sea along the shore, resulting primarily from storm winds and low atmospheric pressure. However, many factors help determine the height the surge will reach as it travels from storm center to coast. Superimposed on the normal astronomical tide and storm tide are heavy, storm-produced waves

and swells. As the storm nears shore, the storm surge can reach "incredible proportions."

The Deadliest

In 1893, a hurricane struck the Atlantic Coast between Savannah, Ga., and Charleston, S. C. A tremendous wave submerged all coastal islands around the Charleston area. It killed 1,200-2,000 persons.

The deadliest disaster in U.S. history was the 1900 Galveston, Tex., hurricane. Nearly 6,000 persons died. Most of them drowned in Gulf waters, which rose as high as 20 feet in a few hours.

In 1957, a storm surge over 13 feet high was created by Hurricane Audrey. It inundated parts of the flat Louisiana coast. In some sections, the surge flooded areas 25 miles inland. The death toll was 390.

The storm-surge data being compiled are available to local officials and civil defense agencies.

The Weather Bureau has practical advice for coastal residents threatened by the hurricane storm surge: If a hurricane "watch" or "warning" is issued, tune in radio or television for the latest advisories and bulletins from the ESSA Weather Bureau. These will include information on expected rises of coastal waters.



Gulf of Mexico Oceanographic Study Underway

Oceanographers of the U.S. Naval Oceanographic Office (NOO) are conducting an intensive 1-year shipboard probe into the oceanography of the Gulf of Mexico. They are working with geologists from the U.S. Geological Survey (USGS) aboard the USNS KANE to collect oceanographic and geological data from the Gulf. They are seeing much of their geochemical information analyzed almost as soon as they gather it.

To Dr. Charles W. Holmes, a USGS staff geologist, positive results from this combination of data-gathering and data-processing techniques "will be a breakthrough in geo-

chemical mapping at sea by making more efficient and thus more economical surveys."

Devices Used

The KANE's oceanographers—analysts are using a direct-reading emission spectrometer—a device capable of simultaneously measuring 10 different chemical elements—to get an idea of how these elements are distributed throughout the Gulf sediment retrieved in coring operations. By mapping the elements' distribution, geologists can assess the economic potential of large sea floor areas. The result may help industrialists plan exploitation programs.

Sea-Floor Elements

NOO scientists are particularly interested in understanding the distribution of elements throughout sea-floor sediments. They can use maps and analyses based on these data as guides in predicting ocean-floor geological changes, which are needed by the Navy and the maritime community.

Survey Aims

The scientists hope the probe will clarify some historical theories on how the Gulf was formed and how it may look in the future. They want to substantiate recent data that point to more oil-producing sands than previously have been determined for offshore Gulf areas. The data also indicate the presence of high concentrations of zirconium, a heavy metal with a high melting point that can be used in alloys.



Probe Warm Eddy Near Gulf Stream

Oceanographers of the U.S. Naval Oceanographic Office (NOO) hope that analysis of temperature and salinity data collected during a recent scientific cruise in Atlantic coastal waters will help them to learn "how warm water eddies form, develop and sometimes disappear in ocean waters." Al Fisher, the survey's chief scientist, said the eddy study is part of a program designed to give oceanographers working as ocean forecasters greater understanding of how temperature conditions in relatively shallow continental shelf waters fluctuate in relation to time and space.

The analyzed results will provide the Navy with wave, current, and temperature predictions.

Eddy of Gulf Stream

Working about 75 miles northeast of Cape Hatteras, N.C., near the edge of the Gulf Stream, the oceanographers aboard the USNS GILLISS first pinpointed the eddy and collected their temperature data. It is a warm, highly saline phenomenon. Unlike the nearby warm Gulf Stream waters, it is limited apparently to near-surface waters.

Fisher noted: "Although we do not know exactly how a warm water eddy forms, we believe that this one may be associated with physical conditions, which may result during offshore movement of the Gulf Stream as the strong current passes Cape Hatteras."

Last attempts to locate this eddy were not always successful and the oceanographers believe it may disappear from time to time. Fisher said the eddy has been observed in the past either as "a tongue protruding from the Gulf Stream or as an independent feature."

THE GILLISS Operation

As the GILLISS steamed along a grid pattern across the area containing the eddy, the oceanographers used recording systems to obtain continuous data on water-surface temperature and salinity. They dropped expendable bathythermographs--instruments designed to record temperature as they sink to bottom--at 4-mile intervals along the grid.

The oceanographers examined the relationship between the warm eddy and the surrounding colder waters. At 19 different stations along the ship's route, they stopped the ship to lower instruments that measured continuously temperature and salinity at subsurface depths. These readings gave the scientists an idea of the eddy's structure. The instruments will be used, with surface temperature, to draw a 3-dimensional picture of the phenomenon.

Air Support

To help determine the eddy's boundaries, other scientists working aboard a research airplane made remote-sensing flights over the area on 4 of the 10 survey days. Airborne expendable bathythermographs and the

plane's radiation thermometer were used. The airborne scientists recorded temperature data from both surface and subsurface waters.

In-flight data analysis showed temperature fluctuations of several degrees. This allowing the scientists to pinpoint where the eddy's boundary was in relation to the surrounding cold waters. This information was relayed to GILLISS scientists, who used it to determine where to take detailed temperature and salinity measurements.

During one 5-hour period, the airborne scientists ordered it flown as low as 200 feet over the ship to compare plane instrumentation with the GILLISS'. Results of the comparison will be used to aid data analysis and to evaluate new plane instrumentation.

Marine Animals Surveyed

Both air and ship oceanographers also look for the types and numbers of marine animals in a survey area because these, like ocean conditions, can hamper transmittal of sound signals during Naval sonar ranging operations.

The scientists reported several whales and hundreds of porpoises.



U. of Washington Sponsors S. American Oceanographic Tour

The University of Washington is sponsoring a South American study tour in oceanography, Jan. 16-Feb. 8, 1970. The tour will travel by air, sea, and land from San Diego, Calif., to the Galapagos Islands, Punta Arenas, Trinidad and Tobago, and intermediate points of interest.

It will be conducted by University oceanographers and local biologists and geologists for laymen--and offer "on-site observation and study of intertidal and near-shore environments, tropical marine biology, coastal engineering, coral reefs, volcanoes, beaches, and fjords."

For information: University of Washington, Office of Short Courses and Conferences, 327 Lewis Hall, Seattle, Wash. 98105.

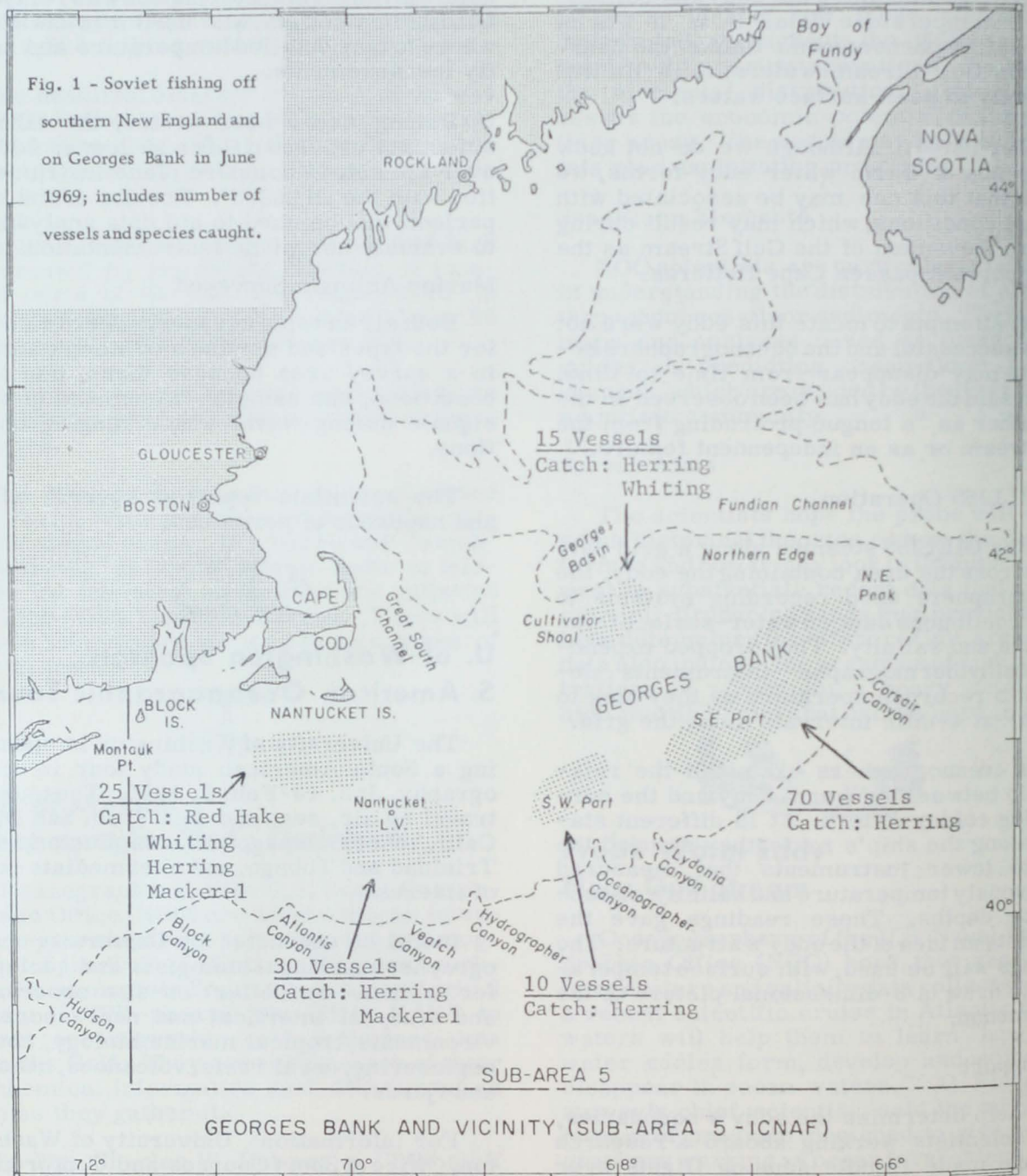


Foreign Fishing Off U.S. in June

Bad weather reduced surveillance in the Northwest Atlantic in June. About 146 foreign fishing and support vessels were sighted, 25% fewer than the 201 sighted in May.

OFF SOUTHERN NEW ENGLAND & GEORGES BANK

Soviet: One hundred and forty vessels-- 28 factory stern trawlers, 96 medium side trawlers, 6 factory base ships, 9 refrigerated fish transports, and 1 tanker were sighted. (In June 1968, 103 had been sighted.)



Polish: Two stern trawlers and 1 side trawler were sighted.

Bulgarian: The factory stern trawler 'Flamingo' was sighted off southern New England in May, and again in June. Late in June, the stern trawler 'Bekas' joined her about 30 miles south of Martha's Vineyard. Catches reportedly were herring and mackerel.



Fig. - Bulgarian stern freezer trawler 'Flamingo' fishing off New England.

Greek: The trawler 'Paros' had been fishing in Cultivator Shoals, Georges Bank since May and, by June 23, had caught about 22 metric tons -- $\frac{1}{2}$ her 700-ton capacity. Catches were 94 tons of cod, 58 tons of flounder, 22 tons of haddock, 40 tons of herring, scup, and mackerel, and 16 tons of other species.

MIDDLE ATLANTIC, SOUTH ATLANTIC & GULF OF MEXICO

foreign fishing vessels reported.

PACIFIC NORTHWEST

Soviet: Sixty-five vessels were sighted-- 38 stern and 10 side trawlers fishing hake, 99 vessels whaling, 3 conducting fishery research, and 12 support vessels. By mid-June, nearly all except the whalers were off the Washington coast. (In June 1968, 83 vessels including 43 stern trawlers had been sighted.)

The whaling fleet was off south Oregon. The whales were seen being towed by a factory ship, parts of 4 were on deck, and 8 were bled and flagged in vicinity of catcher boats.

Japanese: No vessels sighted. (In June 1968, 3 stern trawlers had been reported.)

OFF ALASKA

Soviet: From 20 to 25 vessels were sighted, about the same as in May 1969 and June 1968.

In the ocean perch fishery, 1 to 3 factory trawlers fished along the 100-fathom curve in the Gulf, and 3 to 12 factory trawlers, 3 medium trawlers, and 1 refrigerated carrier were along the Aleutians.

About 10 trawlers and 1 refrigerated carrier fished pollock, sablefish, arrowtooth flounder, and rockfish northwest of the Pribilofs, off Shelf edge in central Bering Sea. About 2 medium trawlers were northwest of Unimak Pass in eastern Bering Sea.

Japanese: Vessels increased from slightly over 400 in late May to 530 by late June.

In the ocean perch fishery, 2-12 stern trawlers and 1 refrigerated transport fished in the Gulf, 2 to 6 stern trawlers were along Aleutians, and 15-20 independent stern trawlers, and at least 2 refrigerated transports were along Shelf edge in eastern and central Bering Sea.

Five factoryship fleets in the Bering Sea trawl fishery for Alaska pollock and flatfishes to be used for minced fish meal, meat and oil centered on the Shelf edge in the Bering Sea, northeast of the Pribilofs.

By late June, 8 high-seas salmon fleets were in central Bering Sea, 2 were around Attu in western Aleutians, and another was south of western Aleutians, out of Alaskan area.

The Bering Sea herring fishery--2 factoryships, 40 gill-netters, and 2 cargo vessels--ended after first week, when 2 vessels were apprehended for fishing in U.S. contiguous zone.

South Korean: Seven small trawlers, 1 factoryship, and 2 refrigerated transports fished on the Shelf, northeast of the Pribilofs, close to the Japanese minced-fish-meat-and-meal fishery. Catches primarily were Alaska pollock. A larger stern trawler operating independently also fished pollock in the same area.

Late in June, 5 gill-netters and a refrigerated transport began fishing salmon in outer approaches to Bristol Bay, north of Alaska Peninsula. Catches were mature sockeye salmon on their way to Bristol Bay.

STATES

Alaska

1964 ALASKAN QUAKE MOVED MOUNTAINS, SHIFTED ISLANDS

The force of the 1964 Alaskan earthquake shifted islands, moved parts of vast mountain ranges horizontally 50 feet, and sank some mountains almost 10 feet. This has been reported by ESSA's Coast and Geodetic Survey.

The Good Friday earthquake was the strongest ever recorded on the North American continent. The seismic sea wave that followed caused 131 deaths and over \$750 million damage. Scientists still are assessing the effects.

Book Contains Findings

Some of their findings are reported in the third volume of "The Prince William Sound, Alaska, Earthquake of 1964 and Aftershocks," prepared by the ESSA agency. This volume contains research studies and interpretations in geodesy and photogrammetry.

Among the findings are:

1. The Chugach and Kenai Mountains, about 80 miles from Anchorage in southeastern Alaska, shifted southward about 50 feet.
2. The mountain masses south of Portage subsided 9.84 feet.
3. Three islands in Shelikof Strait--Ushagat, Afognak, and Kodiak--shifted to east and south.
4. Montague Island, at edge of Prince William Sound, the earthquake center, was lifted over 30 feet. This unpopulated island, about 50 miles long and 10 miles wide, was tilted: one side rose more than 10 feet above the other, and shifted its position 40 to 50 feet.
5. The Matanuska Valley settled about 1.6 feet.
6. The earthquake was so strong and followed by so many aftershocks that "the earth's crust was fractured in many different forms throughout the entire region."

7. The ocean floor between Kodiak and Montague Islands rose about 50 feet, the greatest uplift ever recorded. Gravity studies indicated "a massive intrusion of magma (molten rock from within the earth) caused the uplift.

Findings Based on 1964-68 Surveys

The findings are based on 1964-68 surveys. Scientists emphasized that the findings were relative. No one could be absolutely sure of what happened. But the findings were based on painstaking surveys by geodetic, photogrammetric, and hydrographic field parties.

Charles A. Whitten, the Coast Survey's chief geodesist, analyzed the movement of mountain ranges and islands. He stated: "The resurveys have indicated that the Chugach Mountains (which are south of the Matanuska River), the Kenai Mountains, and the island in Prince William Sound have all shifted to the south."

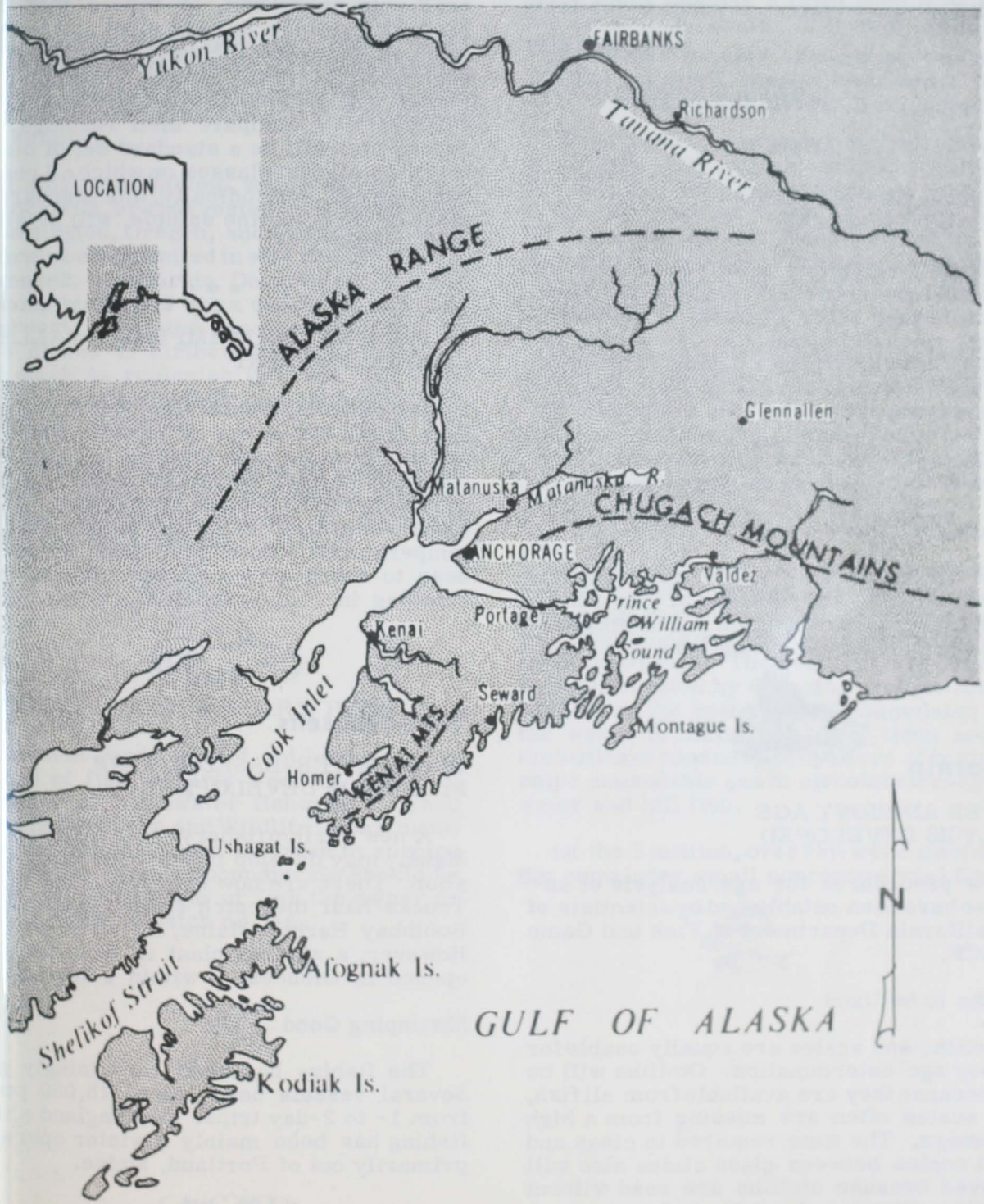
He added that the shift began "with a slight elongation across the Matanuska Valley, accumulating to a maximum of the order of 1 meters (50 feet) for the southeastern slope of the Kenai Mountains, Montague Island, and the nearby regions extending into the Gulf of Alaska."

Whitten continued: "Repeat surveys made in 1967 across Shelikof Strait show that Ushagat Island, Afognak Island, and Kodiak Island have been displaced to the east and south with a direction that is fully related to the displacement of the Kenai Mountains."

He said the maximum movement occurred between Homer Spit and the south side of the Kenai Mountains, a distance of less than 5 miles.

Other findings:

1. The maximum earth subsidence from Glennallen towards Fairbanks was 7 feet. In the Alaska Range along the Richardson Highway, an upheaval of .3 to .8 foot occurred.
2. From Matanuska to 15 miles southeast of Fairbanks, maximum subsidence was 1 foot.



Mountain ranges moved 50 feet, some mountains sank 10 feet into the earth, and islands were shifted by force of 1964 Alaskan earthquake, according to new findings of tremor's effect recently made public. Drawing depicts area hit hardest by strongest earthquake ever recorded on North American continent.

3. In general, subsidence from Seward to Anchorage ranged from 2.3 to 6.2 feet. From Anchorage to Matanuska to Glennallen, the subsidence ranged from .167 foot to 5.1 feet.

The new earthquake volume can be purchased from Government Printing Office, Washington, D. C. 20402, for \$4.25.

* * *

SEA LIONS OBSERVED ON AN ALEUTIAN ISLAND

Two BCF scientists observed Steller sea lion rookeries on Ugamak Island in the Aleutians from June 3-21. Ugamak, on the southwest approach to Unimak Pass, is part of the Aleutian National Wildlife Refuge. The rookeries are heavily populated in June, when the pups are born. The scientists estimated that there were more than 15,000 sea lions around the island. Storms cause a substantial loss of pups from rookeries on steep beaches.

Prepare for Future Study

The scientists also established counting and photographic stations, and access routes to rookeries, in preparation for a proposed future sea-lion population and behavior study.



California

FASTER ANCHOVY AGE ANALYSIS DEVELOPED

New procedures for age analysis of anchovies have been established by scientists of the California Department of Fish and Game and BCF.

Otoliths to be Used

Otoliths and scales are equally usable for anchovy age determination. Otoliths will be used because they are available from all fish, while scales often are missing from a high percentage. The time required to clean and mount scales between glass slides also will be saved because otoliths are read without mounting. The samples collected during each quarter of a year will be divided equally among 4 readers; quarterly summaries will be compiled.

Check Systems Devised

Routinely, each pair of otoliths will be read only once. But, to insure that all 4 readers continue to read alike and to detect changes in reader accuracy, 2 check systems have been devised. During a quarter, each reader will receive at least one sample read by another to compare their readings. The second test will be a standard set of otoliths covering all age-classes on which all readers have agreed. Periodically, this standard set, labeled like a routine sample, will be sent to each reader.

* * *

CATFISH FARMS IN IMPERIAL VALLEY AROUSE INTEREST

The establishment of Imperial Enterprises with about 300 acres of catfish ponds has created considerable interest in California's Imperial Valley. About 380 acres are under production and 500 more are planned. Almost ideal conditions exist in water, soil, and temperatures. Until now, most sales have been to catch-out ponds, but interest is developing in restaurant and market outlets.



Massachusetts

GLOUCESTER-BASED SHRIMP FISHERY IS DEVELOPING

A new shrimp fishery based in Gloucester, Mass., may develop into a year-round operation. There are now 7 vessels in the fishery. Trucks haul the catch from Gloucester to Boothbay Harbor, Maine, for processing. However, a shrimp plant is expected to be opened in Gloucester within a few months.

Shrimping Good

The fishing has been surprisingly good. Several vessels have landed 15,000 pounds from 1- to 2-day trips. New England shrimp fishing has been mainly a winter operation primarily out of Portland, Maine.



Oregon

PORTS CLOSED TO CALIFORNIA-CAUGHT SHRIMP

On August 5, the Oregon Fish Commission closed Oregon ports to landings of pink shrimp caught off California. The California Department of Fish and Game had closed California ports earlier.

The small pink shrimp, widely used in seafood cocktails, are harvested from large beds of Washington, Oregon, and California. The California bed is limited in size and intensively managed. California Department of Fish and Game biologists set a quota annually for the harvest. When the quota is reached, the bed is closed to further fishing, leaving a good stock to replenish the bed. The 1969 quota of 3 million pounds was expected to be reached on August 2.

The Oregon Fish Commission action only prohibits landings of shrimp caught south of the Oregon-California border. It does not apply to shrimp taken off Oregon.



Texas

ADVICE FOR STOCKING FARM PONDS

New farm ponds should not be dumps for any kind of fish, asserts Fred G. Lowman, supervisor of freshwater fisheries in Waco of the Texas Parks and Wildlife Department. Special attention should be given to species and numbers. New impoundments should be stocked with the kinds of fish the owner or operator wants to catch or use.

It is very important to restrict the number to what the water will be able to support. Lowman emphasizes that it would be futile to place black bass in a farm pond if no one in the area fished there. The same is true of other species.

Catfish Before Black Bass

When bass and channel catfish are going to be put in a stock tank, the best results may be expected when the catfish are introduced in the fall--before releasing the black bass the following spring. Bass stocked in farm ponds in the spring often grow large enough by fall to consume most catfish, or other fish stocked at the same time.

Lowman says people hurt their chances for good fishing when they release fish of varying sizes and species.

* * *

PORT OF HARLINGEN FISH KILL DUE TO PROLONGED POLLUTION

The recent estimated kill of 5 million fish in the Arroyo Colorado and the Port of Harlingen was due to a "natural" form of pollution, report biologists of the Texas Parks and Wildlife Department. They explain that hydrogen sulfide, created by decaying organic matter, settles to the bottom and accumulates until the water is disturbed. Low tides and the disturbance caused by propellers of boats and ships caused this gas to circulate through the water and kill fish.

Of the 5 million, over 99% were menhaden, the remainder small noncommercial fish.

