TRENDS AND DEVELOPMENTS

Fishing Vessel and Gear Developments

EQUIPMENT NOTE NO. 18--A NEKTON RING NET SAMPLER FOR USE ABOARD OCEANOGRAPHIC RESEARCH VESSELS:

Concerted efforts by marine scientists in the use and development of subsurface gear and techniques for sampling plankton while the research vessel is under way are of long standing. These efforts have not, however, solved the problem of sampling nekton in the surface layer of water from a moving vessel at sea. The valuable contribution that nekton provides to studies of marine resources has been recognized to the extent that routine sampling in the 1-meter surface layer has developed as an important phase of the exploratory fishing operation. Until recently, the primary tool used aboard exploratory fishing vessels to collect nekton specimens was the simple dip net. It was used when drifting during daytime or in conjunction with attraction lights when "laying to" at night and required the exclusive use of vessel time.

Described here is an effective, economical, and easily handled gear developed aboard the exploratory fishing vessels Silver Bay and Oregon of the U. S. Bureau of Commercial Fisheries for sampling nekton in the 1-meter surface layer of water from a moving vessel simultaneously with and without interference to other fishing activities.

The nekton ring net is designed to be used while the vessel is under way at reduced speed. It can be easily handled by one person with little or no interference with other shipboard activity. For this reason, except when the vessel is drifting or running at cruising speed, the nekton ring net may be operated round-the-clock.

The nekton ring net is essentially a circular net with a conical-shaped bag attached to a 1-meter-diameter steel ring and towed on a 3-leg bridle (fig. 1, see p. 10). The bag is constructed from four circular panels of consecutively graduating nylon netting of 2-; $\frac{1}{2}$-; $\frac{1}{4}$-; and $\frac{1}{16}$-inch stretched mesh respectively. The steel meter ring is constructed of galvanized 1-inch-diameter stock and the 3-leg bridle is of $\frac{3}{16}$-inch diameter, 3-strand, 1,050-

Fig. 2 - Pulling the retrieving line to bring the net to the side of the ship.

pound-test nylon rope. The bridle legs are 6 feet long, and each is spliced into a 3-inch (inside diameter) by $\frac{5}{16}$-inch-stock-galvanized steel bridle tow ring. A $\frac{3}{16}$-inch-diameter nylon tow line is attached to the bridle tow ring at one end and secured to a small boom extending out from the side of the vessel at the other end. Tow line length is var-

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 754

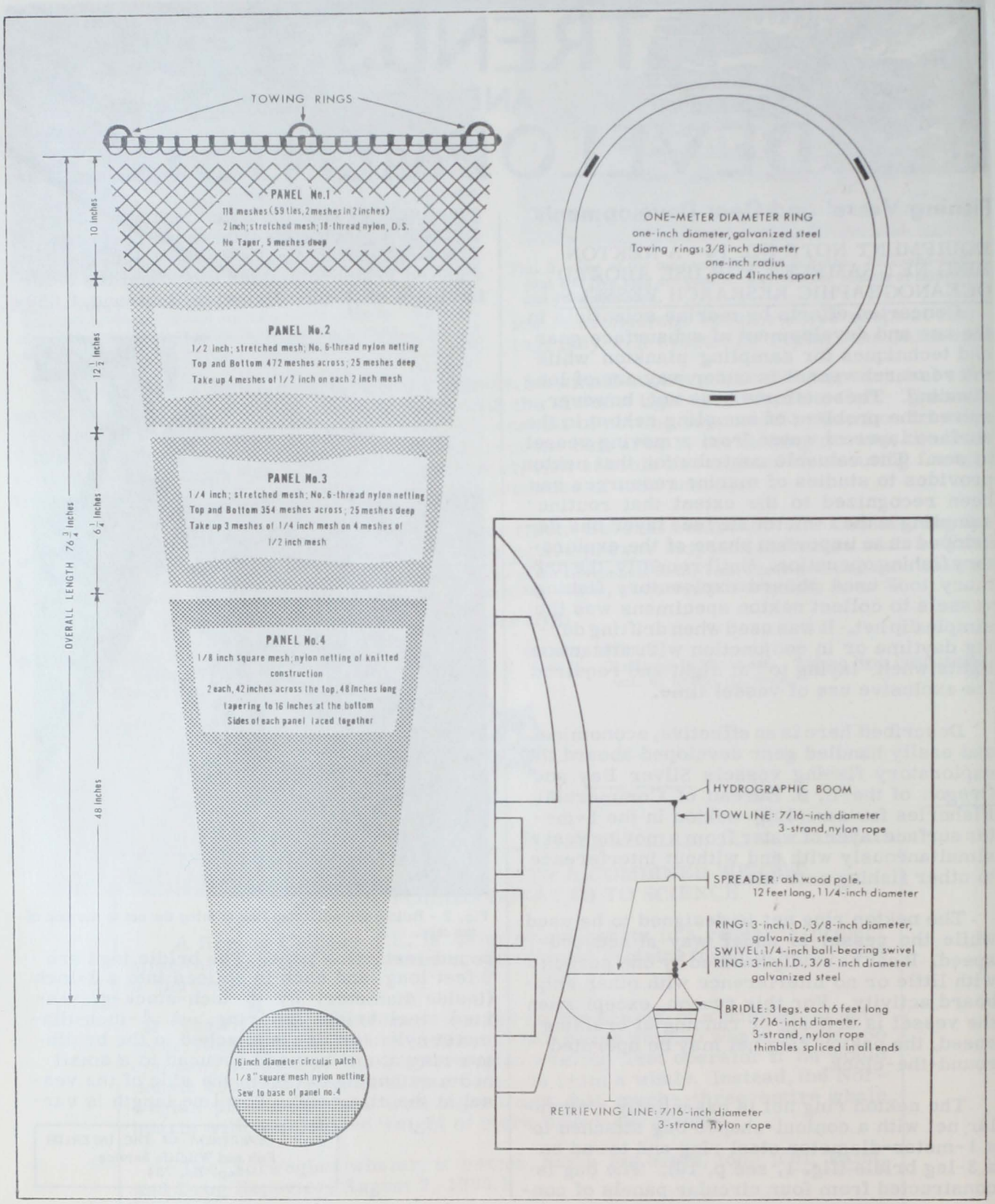

Fig. 1 - The specifications of the ring-net and associated gear.

iable depending upon boom height and vessel speed. Boom length is also variable, although a minimum of about six feet is needed to keep the net away from the side of the hull and out of wake turbulence. A $\frac{1}{4}$-inch (900-pound breaking strength) ball-bearing swivel is attached at the junction between the bridle and towline to prevent excessive kinking. For ease in handling, a $\frac{3}{16}$-inch nylon retrieving line is attached from the top inboard section of the meter ring to the vessel rail. Thus by pulling the retrieving line (fig. 2), strain is released from the bridle and transferred to the side of the meter ring, making retrieval a simple 1-man operation.

Towing speeds in excess of four knots, particularly in a following sea, may cause the net to skip along the surface or jump completely out of water. This can be remedied by attaching a 20-pound weight to the bottom of the meter ring, with little or no adverse effect on the catches. When additional weight and stability are desired, a length of galvanized steel chain weighing approximately seven pounds may be attached to the towline in front of the bridle ring.

To keep the net away from the hull when using a short hydographic boom as on the Oregon, a 12-foot, $1\frac{1}{2}$-inch-diameter ash spreader pole (fig. 3) may be used.

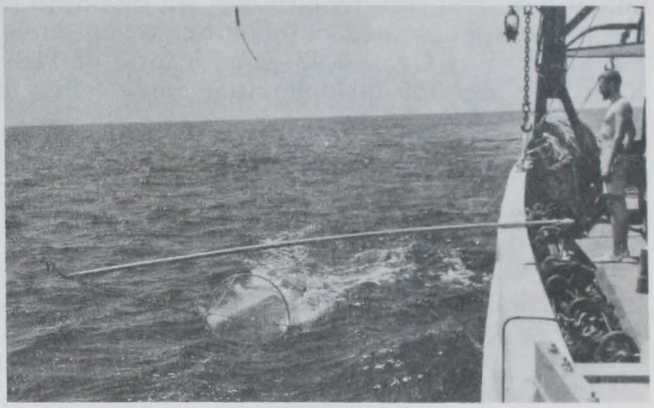

Fig. 3 - Nekton net in action, showing spreader pole keeping the net away from the vessel.

Care and observation of prevailing conditions such as towing speed, prevalence of sargassum weed, and presence of floating debris must be exercised to insure that quality specimens are obtained. Experience has shown that short tows (approximately 15 minutes long) and frequent retrieval tend to prevent damage to fragile specimens.

In the Gulf and South Atlantic operational area, the following groups have dominated the catches of the nekton ring net: Myctophidae, Xiphiidae, Istiophoridae, Pleuronectiformes, Synodontidae (larvae), Leptocephili, Excocitidae, Plectoganths, Carangidae, Cory-

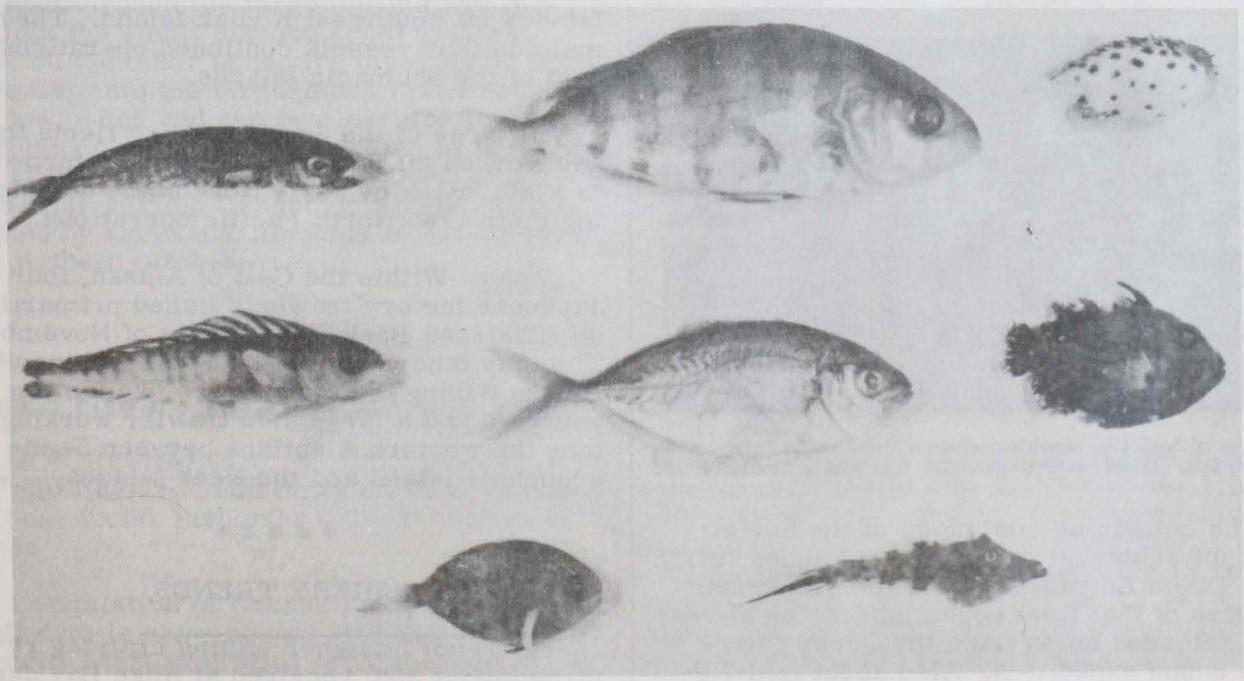

Fig. 4 - Typical components of the nekton taken in the nekton ring net.

phaenidae, and Hemirophidae. An example of the more spectacular catches occurred during Silver Bay Cruise 42 when a total of 113 Xiphiidae and 385 Istiophoridae were taken at five stations.

REFERENCE

DAVID, P. M.
1965. The Surface Fauna of the Ocean. Endeavour, vol. 24, no. 92 (May), pp. 95-100

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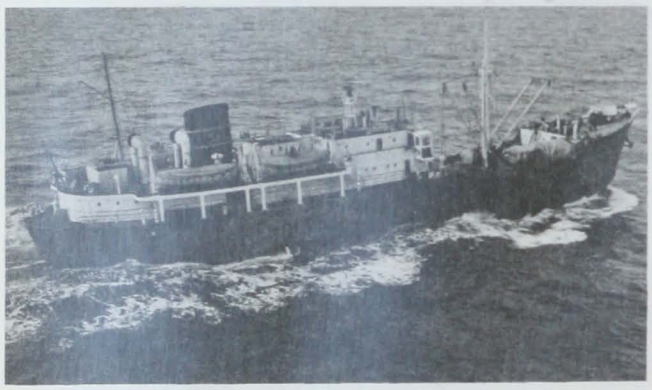
Alaska

FOREIGN FISHING ACTIVITY OFF ALASKA, NOVEMBER 1965:

U.S.S.R.: Early in November 1965, the fleet of about 70 Soviet vessels centered off southeast Alaska near Dixon Entrance was divided. About 50 of the Soviet vessels moved south and began fishing off central British Columbia in Queen Charlotte Sound north of Vancouver Island. They operated just outside Canada's newly established 12-mile fishing zone throughout most of November. Catches of the Soviet trawlers off Canada reportedly were composed of ocean perch, sole, and other bottomfish.



One type of Soviet factoryship operating in the North Pacific and Bering Sea. Length overall about 150 feet with a speed of 10-12 knots.

The remaining contingent of the Soviet fleet off southeastern Alaska continued to fish near Dixon Entrance and in mid-November the size of that fleet began increasing as vessels returned north from the Queen Charlotte Sound expedition. Also about mid-November the Soviet fleet off Dixon Entrance began moving to the north. By month's end that fleet was operating on the Yakutat and Fairweather Grounds between Cape Spencer and Cape St. Elias, an area the Soviets fished heavily earlier in 1965. Following the apparent termination of the Queen Charlotte Sound expedition, the size of the Soviet fleet in the eastern Gulf of Alaska returned to about 70 vessels, including 55 trawlers (5 of which were BMRT factory trawlers), about 10 reefers, and a few support vessels.

Another Soviet fleet of about eight BMRT factory trawlers fished Portlock and Albatross Banks off Kodiak Island during most of November. Several of those vessels joined the fleet off Yakutat late in the month, leaving about five factory trawlers off Kodiak.

With the appearance of at least 10 BMRT factory trawlers in the Gulf of Alaska during November 1965, it was presumed that the Soviet fleet fishing for Pacific ocean perch in the central and western Aleutians was reduced to a total of about 15 factory trawlers, serviced intermittently by support vessels.

Increasing shrimp fishing efforts by the Soviets in the Gulf of Alaska during November 1965 involved at least eight SRT-M trawlers. During the latter part of the month the Soviet shrimp fleet was divided, with one group of four vessels moving to the proven shrimp fishing grounds east of the Trinity Islands off southwest Kodiak Island. The remaining four vessels continued operations east of the Shumagin Islands.

All three of the Soviet whaling fleets that had worked off Alaska reportedly returned to Vladivostok by early November, completing their 1965 North Pacific operations.

Japan: Within the Gulf of Alaska, four Japanese factory trawlers fished primarily on Albatross Bank during most of November. The only other Japanese vessels fishing off Alaska during the month were two factory trawlers and a large side trawler working along the western Aleutians between Semisopochnoi Island and the Near Islands.

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KING CRAB FISHERY TRENDS, NOVEMBER 1965:

The record number of king crab tag returns (about 300) received at Auke Bay during November 1965 indicated that fishing

pressure in the Kodiak Island area is probably increasing. The 1965 king crab catch was expected to reach an all-time high of about 100 million pounds.

To insure high standards for the quality of king crab and to promote markets for king crab, the State of Alaska in 1965 set up an Alaskan King Crab Marketing and Quality Control Board. The Board's program for 1965 included a $50,000 contract for the promotion of king crab by an advertising agency in Seattle, Wash. Additionally, the Board has under study the work on king crab quality control being done by the Alaska Department of Health and Welfare, the U. S. Bureau of Commercial Fisheries, and the National Canners Association.

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TRAWL THAT SORTS SHRIMP AND FISH TO BE TESTED:

The U. S. Bureau of Commercial Fisheries exploratory Fishing and Gear Research Base at Juneau, Alaska, plans to build and test a 2-bag shrimp trawl. This shrimp trawl was first developed in France and was further modified in the Netherlands, according to the Dutch periodical Visserij-Nieuws. A unique feature of this trawl is an intermediate "sieve flap" which sorts out the shrimp from the fish catch. It seems that shrimp jump up on the water column when disturbed and leap through the large mesh sieve flap and into the small meshed upper cod end. Fish, on the other hand, are diverted by this sieve flap into the large-mesh lower cod end. The lower cod end can be closed or left open depending on whether a fish catch is desired. If it proves successful, such a trawl would aid Kodiak shrimp fishermen who have been plagued by excessive amounts of Alaska pollock in their catches.

Alaska Fishery Investigations

SALMON RESEARCH:

Following are brief notes on U. S. Bureau of Commercial Fisheries salmon studies in Alaska:

Compilation of Naknek Lake red salmon smolt data is showing that although age I and II smolts start migrating from the lake in May, the age II run is finished by late July, while the age I outmigration continues into September and possibly later. Comparison of sizes suggests that in agreement with other red salmon races the fastest growing progeny from a given brood year in the Naknek system migrate as age I fish and the slower growing fish leave the following year at age II.

Data collected during hydraulic sampling of sockeye eggs in Grassy Point Creek were analyzed. Of the 7,096,000 eggs potentially available for deposition, an estimated 1,347,000 eggs (1,052,000 live and 295,000 dead eggs) were present in the gravel on October 8, 1965. Survival from potential to actual egg deposition was computed to be 15 percent. The comparable figure for 1964 was 11 percent. Spawner density and loss to bear predation were less in 1965 and probably accounted for the higher survival in 1965.

California

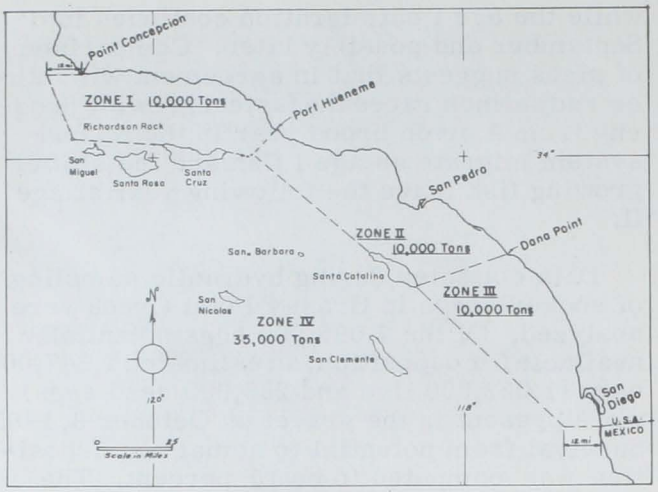
EXPERIMENTAL ANCHOVY FISHERY APPROVED:

In mid-November 1965, the California Fish and Game Commission approved regulations and permits for the controlled commercial catch in 1965/66 of not more than 75,000 tons of anchovies from California's offshore waters for reduction into fish meal, poultry feed, and other industrial products.

The maximum "take" of 75,000 tons will be cumulative for all permit holders in all prescribed areas through April 30, 1966, closing date of the authorized experimental season.

Commission regulations provide that the fishery may be terminated at any time the Commission finds that existing uses of anchovy--including live bait and forage uses--are jeoparidized, or when the resource is clearly endangered.

Applications for California reduction permits were accepted through December 1, 1965. As of November 20, the Commission had authorized the granting of permits to 9 commercial applicants representing 12 reduction plants. Authorization on all permits, however, was conditioned upon the administrative approval of the California Department of Fish and Game.



Anchovy southern permit area.

In addition to the overall seasonal reduction limit of 75,000 tons of anchovies, the Commission regulations have established sub-limits within 5 defined "zones" in offshore waters.

All waters north of Point Conception are included in a single-zone Northern Permit Area with a catch limit of 10,000 tons of anchovies for reduction. All bays and established live-bait areas are closed to commercial anchovy fishing.

The Southern Permit Area has been subdivided into 4 zones, with an overall limit of 65,000 tons of anchovies. Three of those zones, with limits of 10,000 tons each, lie shoreward of an irregular line drawn from Point Conception to Richardson Rock, to Santa Cruz Island, to Anacapa Island, to Catalina Island, and south to a point 12 miles seaward of the California-Mexico international boundary. Zone divisions within that section are defined by lines drawn seaward from Port Hueneme and from Dana Point. Closed areas within those 3 zones include all waters lying within 3 miles of the mainland shoreline, and within 3 miles of the leeward (east) side of Catalina Island.

The fourth zone in the Southern Permit A Area, bearing a 35,000-ton limit, encompasses all waters beyond the outer boundary of the 3 shoreward zones. (California Department of Fish and Game, November 20, 1965.)

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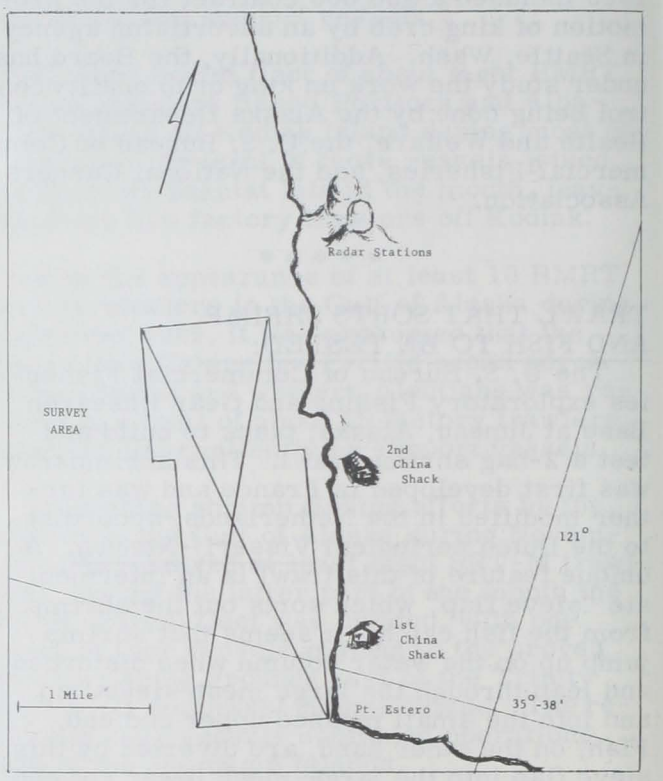
ABALONE OBSERVATIONS AND GROWTH STUDIES:

M/V "Mollusk" Cruise 65-M-2A-Abalone (September 13-27, 1965): The number and sizes of abalone in commercial fishing areas were estimated by random sampling methods during this cruise by the California Department of Fish and Game research vessel Mollusk. The coastal area from Pt. Estero to Cambria was where the vessel operated.



Survey area covered by M/V Mollusk Cruise 65-M-2A-Abalone, September 13-27, 1965.

During the cruise, 20 diving stations selected at random were occupied within two adjacent areas each 1 x $1\frac{1}{2}$ miles. Three areas had been selected but adverse weather limited diving to 2 of the 3 areas. Station depths ranged from 20 to 66 feet. Dives averaged from 30 to 40 minutes for each station, covering a 1,500-square-foot area along a 290° transit line at each station (100 ft. long x 15 ft. wide). All albalone that could be found within each station area were counted and measured.

Weather conditions were not good for diving, and a large swell and dirty water at the stations restricted observations in shallow water. Several dives were necessary at some stations before counts could be made. Aba-

lone were found on all but 7 of the 20 stations completed. Abalone may have been present at 2 other stations but because of a heavy swell and large amounts of sediment, observation was restricted.

The remaining 11 negative dives were over rocky areas in deep water where the bottom was predominantly sandy. Greatest concentrations were found in 40- to 60-foot depths. The greatest numbers of abalone found were in the 4- to $7\frac{3}{4}$-inch size group. About 50 percent more of that size group was found than in the survey made in December 1964. But 30 percent fewer of the 0- to 4-inch group and 20 percent fewer of $7\frac{3}{4}$-inch and larger abalone were found than in the 1964 survey.

Note: See Commercial Fisheries Review, March 1965 p. 25.

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ABUNDANCE OF DUNGENESS CRAB SURVEYED PRIOR TO OPEN SEASON:

M/V "Nautilus" Cruise 65-N-2g (October 4-29, 1965): To determine preseason abundance and condition of legal and sublegal Dungeness crab (Cancer magister) in the San Francisco area for prediction of the 1965/66 season, the coastal waters off San Francisco from the Russian River to Point Montara were surveyed by the research vessel Nautilus of the California Department of Fish and Game. Another objective was to collect female crabs for fecundity and fertility studies.

Sampling stations during this cruise were selected randomly from the crab areas between Point Montara and the Russian River. Commercial crab traps were baited with squid and rockfish and allowed to fish overnight at each of the 70 stations visited. Ten of the stations were fished for 2 days due to vessel difficulties.

A total of 6,193 crabs was taken at 70 stations in 697 traps. The catch consisted of 2,521 legal males, 3,443 sublegal males, and 229 females. The average legal catch per trap of 3.62 crabs was higher than the 1964 catch of 2.78 but lower than the 1963 catch of 4.3.

California Preseason Survey Catches and Predictions for Dungeness Crabs

Season	Legals	Sublegals	Predicted Catch	Actual Seasonal Landings
	No./Trap	No./Trap	Million Lbs.	Lbs.
1965/66	3.6	4.9	0.8-1.4	-
1964/65	2.8	2.1	0.6-0.9	787,619
1963/64	4.3	2.9	1.1-1.6	1,158,157
1962/63	4.1	3.5	0.7-1.6	1,429,780
1961/62	3.2	5.1	1.5	710,350

The best catches (numbers of legal crabs per trap) in 1965 were made from Bodega Bay to the Russian River in 10-22 fathoms of water. Good catches were also made south of the San Francisco Lightship in 15-25 fathoms of water. On the basis of the survey, it was believed the catch for the 1965/66 season would be 1.1 million pounds, with estimates ranging from 800,000 to 1.4 million pounds.

The average sublegal catch of 4.9 during the 1965/66 preseason survey was the highest since 1961/62 but does not indicate a strong population according to past preseason surveys. In 1962, after the survey showed 5.1 sublegals per trap, 1,429,780 pounds were landed--far below the long-term average of 3.8 million pounds.

The crabs caught in 1965 were in good condition with only 5 percent soft, but many of the crabs in the San Francisco area were barnacled and had missing legs. At Bodega Bay the crabs were of excellent quality and good size. Fifteen females with eggs were collected for fecundity studies.

Note: See Commercial Fisheries Review, March 1965 p. 24.

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MARINE SPORT FISH SURVEY OFF SOUTH CALIFORNIA CONTINUED:

Airplane Survey Flight 65-14 (October 7 and 13, 1965): Two separate one-day flights were made in October 1965 as part of a marine sport fish survey to count the number of fishing poles being fished from the shoreline, and if possible, the number of people attending them. The southern California coastline from the Mexican Border to Jalama Beach State Park was the area surveyed by the aircraft Cessna "182" N9042T of the California Department of Fish and Game.

The counts will be used to augment estimates of sportfishing effort derived from the ground survey. The aerial counts provide data for (1) an independent estimate of total effort, and (2) the calculation of a conversion factor to be used in deriving estimates of effort in those areas not covered by the ground crews.

The coastline from the Mexican Border north to Santa Monica was surveyed for about $1\frac{1}{2}$ hours on the afternoon of October 7. The flight was terminated at Santa Monica because of low coastal fog. A total of 40 poles

attended by 40 fishermen was counted. Fishermen were well scattered in the area surveyed. The only notable concentration was in the Point Fermin-White Point area where 9 fishermen (22.5 percent) were observed.

On October 13 the coastline was flown in a little more than two hours from the Mexican Border north to Santa Barbara Harbor. Low coastal fog and haze prevented continuing beyond that point. The count was 56 poles and 55 fishermen. Almost 9 percent of the total (5 poles) were being fished outside of the area encompassed by the regular shoreline sampling plan. Fishermen were fairly well scattered except from La Costa State Beach to Oceanside where 11 fishermen (20 percent) were counted.

The flights further substantiated the fact that about 10 percent of the observed fishing activity in southern California was taking place outside the area encompassed by the preselected shoreline sampling plan.

Note: See Commercial Fisheries Review, December 1965 p. 22.

Cans--Shipments for Fishery Products, January-September 1965

A total of 2,324,148 base boxes of steel and aluminum was consumed to make cans shipped to fish and shellfish canning plants in January-September 1965 as compared with 2,215,974 base boxes used during the same period in 1964. In 1965, an increase in the U. S. canned pack of Maine sardines and Gulf shrimp was offset somewhat by some decline in the pack of canned tuna.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by use of the factor 23.7 base boxes per short ton of steel.

Crab

PACIFIC NORTHWEST COASTAL FISHING SEASON OPENED DECEMBER 1, 1965:

The coastal commercial Dungeness crab fishing season in Oregon and Washington opened December 1, 1965. The Washington fishery had been originally set to open a month later, but was rescheduled to coincide with the Oregon fishery. (Washington Department of Fisheries, November 23, 1965.)

Federal Aid for Sport Fish and Wildlife Restoration

INTERIOR DEPARTMENT APPORTIONS ADDITIONAL FUNDS FOR FISCAL YEAR 1966:

Distribution of more than $11 million in Federal-aid funds for fish and wildlife restoration projects in the 50 States, Guam, the Virgin Islands, and the Commonwealth of Puerto Rico was made about the latter part of 1965, announced Secretary of the Interior Stewart L. Udall December 15, 1965. The distribution supplements $15 million released on June 5, 1965, bringing the total to more than $26 million. It completes the allocation for fiscal year 1966.

Of the total distribution, $19,236,000 is for wildlife restoration and $6,810,000 is for sport fishery projects. The money comes from excise taxes collected on sport fishing and hunting equipment.

The Interior Secretary said funds apportioned to the States will be used for fish and wildlife restoration projects involving the purchase of land, improvement of areas of land or water for fish and wildlife, and to conduct research for the restoration and perpetuation of those resources.

Under the Federal Aid program, the States initiate the projects and, if they meet the requirements established by the Department of the Interior, the funds allocated are used to reimburse the States up to 75 percent of the cost of completed projects.

The amount allocated for fiscal year 1966 under the Federal Aid in fish and wildlife restoration programs is $2,286,000 more than the $23,760,000 apportioned in fiscal year 1965.

Note: See Commercial Fisheries Review, August 1965 p. 34, March 1965 p. 28.

Fisheries Laboratory

NEW TROPICAL ATLANTIC BIOLOGICAL LABORATORY AT MIAMI:

A new Tropical Atlantic Biological Laboratory at Miami, Fla., operated by the Department of the Interior's Bureau of Commercial Fisheries, was dedicated on November 20, 1965. It is located at Virginia Key and is part of the world's largest tropical ocean science complex. The Virginia Key Campus of the Institute of Marine Science, University of Miami, was also dedicated at the same time. The new Federal Laboratory and the Marine Science Campus are on opposite sides of Rickenbacker Causeway in Biscayne Bay, a short distance from downtown Miami.

The new research installation at Miami is an expansion of the Bureau of Commercial Fisheries Biological Laboratory established in Washington, D. C., in 1958, and transferred to Miami in early 1965. The expanded facilities will enable the Bureau's laboratory personnel to continue investigations of the tropical and equatorial Atlantic. These include surveys on the distribution and abundance of surface schools of tuna and their availability to live-bait and purse-seining methods of fishing. Investigations also will be continued on variations in the physical, chemical, and biological environment that combine to produce concentrations of tuna schools.

The dedication of the Tropical Atlantic Biological Laboratory is the culmination of years of planning by the Bureau of Commercial Fisheries for the establishment of a laboratory devoted to the study of fishery-oceanography in the tropical Atlantic.

Great Lakes

MICHIGAN'S PLANS FOR REBUILDING SPORT AND COMMERCIAL FISHERY:

The Great Lakes have the potential of being the greatest sport and commercial freshwater fish-producing waters in the world, predicts the Fisheries Chief of the State of Michigan Conservation Department. He points out that Michigan, with control of 38,575 square miles of the Great Lakes, must assume a role of leadership in rebuilding the fishery in those waters.

The Michigan fisheries official stresses that "the major responsibility for whatever happens to the Great Lakes fishery must be ours." He said that the long rigorous campaign to control the sea lamprey and reestablish the lake trout in the Great Lakes is now foreseeable but that the alewife poses serious problems. The alewife is so numerous it has now become a threat to the survival of all species spawning within the Great Lakes. It accounts for over 90 percent of the quantity of all fish present in the Great Lakes and its numbers are expected to hold steady somewhere near that high level. Because of this, the Fisheries Chief says the time has come to question present objectives of management programs on the Great Lakes.

As the Fisheries Chief pointed out, this enormous potential of Great Lakes sport fishing is now being vigorously assailed by the alewife, helped by the remnant sea lamprey population, and that these problems should be approached by laying down new policies regarding recreational and commercial fishing. In considering some steps that can be taken, it was noted that the lake trout is well on its way to being re-established in Lake Superior. In Lake Michigan, however, it is doubtful that this species can successfully reproduce itself in face of predicted alewife populations. Recognizing this, and the fact that newly-returned lake trout will not spawn for 6 or 7 years, Michigan State fisheries personnel say restocking of the lakes with hatchery trout must be continued at the most rapid rate possible and that regulations must then be modified.

Another plan for improving Great Lakes sport fishing is to put all possible harvest pressure on the alewife. The best solution seems to promote sport fish that eat alewives. "If we can place a predator on the alewife that will be of interest to sport fishermen, we can promote sport fishing as well as help to solve the alewife question for commercial purposes," said the Fisheries Chief. Basically, this is the thinking in the Michigan Conservation Department's program to attempt establishing new species in the Great Lakes and its selection of the silver or coho salmon.

The Fisheries Chief said, "We have examined all facets relating to this fish, and now believe it an excellent choice for introduction to the Great Lakes. We think chances of success are extremely good. According to the Michigan Conservation Department,

silver salmon is comparatively cheap to raise and can be released in streams tributary to the Great Lakes at the size of 4 or 5 inches. It has a strong homing instinct; gives promise of a high return to good spawning streams where they will be planted. This species, together with others of importance such as the steelhead, brown trout, and brook trout, will be pushed by the State of Michigan toward maximum development in the Great Lakes. (Michigan Department of Conservation, Lansing, December 9, 1965.)

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MICHIGAN RECEIVES SUPPLY OF NORTHWEST SILVER SALMON EGGS FOR PLANTING PROGRAM:

Nearly 2.5 million silver (coho) salmon eggs were delivered the latter part of 1965 to the State of Michigan from the Pacific Northwest for introduction of that species in the Great Lakes during the second phase of the Michigan Conservation Department's three-year planting program. The eggs were provided by the States of Oregon, Washington, and Alaska for the cost of shipping and are being held at the Thompson, Harrietta, and Oden State hatcheries in northern Michigan. They will be hatched and reared at those hatcheries for release in northern Great Lakes tributaries in spring 1967 when they will have matured enough to migrate downstream into the big waters. Based on the success in rearing Michigan's first batch in 1965, Michigan fisheries specialists estimate that about 1.5 million young fish will be produced from the latest supply of eggs. High hopes are held for the fish adapting to Michigan waters.

The 1.2 million eggs from Washington come from a particular strain which has been widely used in the Northwest to establish new runs of silver salmon. Another 1.2 million eggs from Oregon are also expected to take to Michigan waters with a good degree of success. Rounding out Michigan's potential planting stock for 1967 are 50,000 eggs of specially adaptable strains which were delivered from Alaska in early December 1965. By the time young fish from this total supply of eggs are ready for release, Michigan will have launched the first plantings under an all-out three-year effort to establish runs of adult silver salmon in Great Lakes streams.

Initial releases will be made in spring 1966 when 750,000 young silver salmon (5 to 6 inches long) will be put in the Platte River near Honor in Benzie County, Bear Creek near Bear Lake in Manistee County, and the Big Huron River northeast of L'Anse in Baraga County. Those fish are expected to migrate downstream into Lakes Michigan and Superior, grow to maturity, and then return to spawn in the streams where they are to be planted. Some of the faster-growing planted fish will probably try migrating back to their release sites next fall.

The three northern streams to be stocked this spring will in 1967 receive most, if not all, of the fish to be raised from the 2.5 million eggs now in State hatcheries. Some of the young silver salmon may be planted in additional waters. Part of that decision will depend on how well this spring's planted fish show up in the three original streams during fall 1966. (News Bulletin, Michigan Department of Conservation, Lansing.)

Note: See Commercial Fisheries Review, January 1966 p. 32.

Great Lakes Fisheries Explorations and Gear Development

GEAR RESEARCH FOR GREAT LAKES AND INLAND FISHERIES, NOVEMBER 1965:

Highlights of Great Lakes and inland fisheries gear research and technical assistance by the U. S. Bureau of Commercial Fisheries Exploratory Fishing Base, Ann Arbor, Mich., during November 1965:

Oahe Reservoir Gear Research: The Oahe Reservoir field work for the 1965 season ended about mid-November when the Bureau's reservoir fishery research vessel Hiodon was taken from the water and placed in drydock near the Bureau's station. Trawling conducted near Mobridge before the haulout resulted in an average catch rate of 284 pounds per 15-minute drag. Carp accounted for 76 percent of the total November catch; the next principal species was sheepshead which accounted for only 6 percent.

Arkansas Farm-Pond Fish Gear Research: Several development and demonstration trials with the farm pond haul seine were carried out in November. The most noteworthy sets were: (1) in a 50-acre pond at Jonesboro where a 1,900-foot net caught 25,000 pounds of channel catfish (these were penned in a 250-foot by 50-foot enclosure to be removed

as needed); (2) in a 36-acre pond at Dumas where a 1,900-foot net caught 21,000 pounds of an estimated 50,000-75,000 pounds of channel catfish; and (3) in a 25-acre pond at the Bureau's Fish Farming Experimental Station at Stuttgart where a 1,900-foot net caught 2,300 pounds of an estimated 4,000 pounds of various species, including paddlefish weighing over 20 pounds.

Great Lakes Fishery Investigations

BIOLOGICAL RESEARCH AND SEA LAMPREY CONTROL, NOVEMBER 1965:

Some of the highlights of Great Lakes and Oahe Reservoir (South Dakota) biological research by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Ann Arbor, Mich., during November 1965:

Lake Superior: Biological research on Lake Superior during November was devoted to the assessment of whitefish on their spawning grounds and the distribution and abundance of young-of-the-year lake trout. Large-mesh gill nets set off the north side of Cat Island yielded 18 spawning whitefish with a single mature female. Trawling for young-of-the-year lake trout was conducted over inshore spawning grounds, resulting in the capture of four young trout. A total of 80 young-of-the-year trout were taken on all grounds during the 1965 season.

The Bureau's research vessel Siscowet made its last biological research cruise of the 1965 season in Lake Superior during November and was berthed for the winter in Bayfield, Wis.

Sea Lamprey Control and Research: Field operations during November were limited to tagging adult sea lampreys, fishing of fyke nets in index streams, and routine maintenance of the Big Garlic River trapping device.

By the end of the month 1,300 parasitic-phase sea lampreys had been tagged by the U. S. Bureau of Commercial Fisheries and the Fisheries Research Board of Canada. Most of the tagging occurred in the St. Marys River below the ship locks and northern Lake Huron off DeTour and Cedarville. Tags were recovered and reported by commercial fishermen--82 tag recoveries have been reported: 3 from Whitefish Bay, Lake Superior, 3 from northern Lake Michigan, and the remainder from Lake Huron.

Fyke-net fishing in 10 Lake Superior streams was over by the end of the month. A total of 83 recently transformed sea lampreys were taken from 4 of the streams. Sea lampreys were captured in 4 of 5 streams sampled in northern Lake Michigan. Fyke-netting was continued in the Ocqueoc River, Lake Huron. The total take at the end of the month was 4,600 sea lampreys. These were held at the Bureau's Hammond Bay laboratory for marking experiments. As of the end of November 1965, 6 groups of 100 sea lampreys were marked with sulphide dyes, fluorescent dyes, and physical marks.

Note: See Commercial Fisheries Review, January 1966 p. 35.

Gulf Fishery Investigations

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-35 (November 1-12, 1965): Small white shrimp of about 68 count were evident for the first time in fall 1965 from the up to 10-fathom depth in two statistical areas (area 13 and 14) covered during this cruise. As part of a continuing Gulf of Mexico shrimp distribution study, 8 statistical areas were covered by the research vessel Gus III, chartered by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex. The usual standard 3-hour tows made with a 45-foot flat trawl during the cruise totaled 25; 37 plankton tows, 38 bathythermograph (BT) casts, 147 water (Nansen bottle) casts, and 37 bottom grabs also were made.

Area 16 yielded a fairly good catch of 36 pounds of 21-25 count white shrimp from the up to 10-fathom depth, while areas 17, 18, and 19 yielded smaller quantities of white shrimp, mostly 51-67 count.

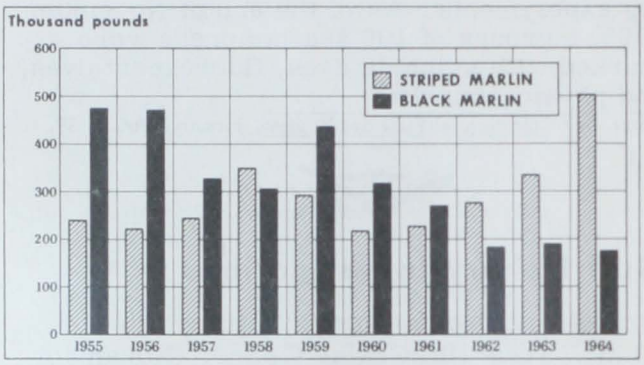
Catches of brown shrimp were spotty, with best trawl hauls at stations over 20 fathoms: Area 20 yielded 28 pounds of 26-30 count brown shrimp and area 17 yielded 13 pounds of 15-20 count. The amounts of brown shrimp taken in the different depth ranges of other areas covered were very small.

Notes: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.
(2) See Commercial Fisheries Review, January 1966 p. 36.

Hawaii

FISHERY LANDINGS, 1964:

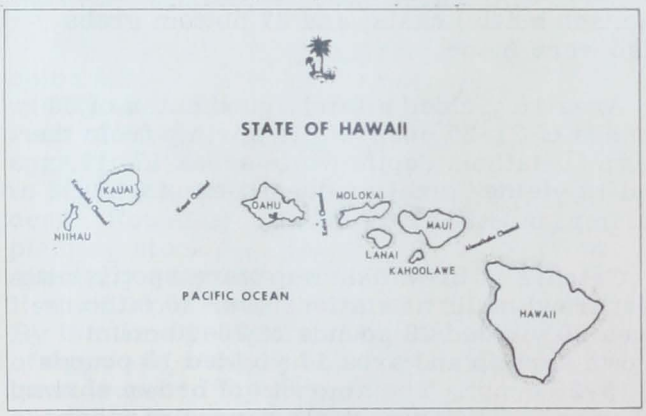
Commercial landings of fish and shellfish in the State of Hawaii in calendar year 1964 totaled 12.7 million pounds with an ex-vessel value of $2.8 million. Compared with 1963 that was a gain of about 1.0 million pounds (8 percent) and $168,500 (6 percent). Tuna (albacore, big-eyed, bluefin, little tuna, skipjack, and yellowfin) accounted for 82 percent of the quantity and 67 percent of the value of Hawaiian landings in 1964.



Hawaii catch of black and striped marlin, 1955-64.

Skipjack tuna is the major item in the Hawaiian fishery. The Hawaiian skipjack catch in 1964 totaled 9.0 million pounds valued at $1.2 million as compared with 8.1 million pounds valued at $1.1 million in 1963.

The high-priced big-eyed and bluefin tuna landings amounted to 839,485 pounds with an ex-vessel value of $493,568 in 1964--down somewhat from the 1963 landings of 948,253 pounds valued at $501,726.



The 1964 Hawaiian landings also included 500,117 pounds of yellowfin tuna, 501,814 pounds of striped marlin, 174,173 pounds of black marlin, 292,262 pounds of jack mackerel, 291,363 pounds of snapper, 160,526 pounds of big-eyed scad, and 107,912 pounds of jack crevalle.

Oahu led the Hawaiian Islands in landings during 1964 with 10.2 million pounds or 80 percent of the total. The Island of Hawaii was next with 1.6 million pounds, followed by Maui with 712,000 pounds. The remainder of the catch was landed at ports in the Islands of Molokai, Kauai, and Lanai.

The 1964 Hawaiian catch was taken by 743 fishermen. Fishing craft operated during the year included 57 vessels (craft of 5 net tons and over), 350 motor boats, and 24 other boats.

Note: See Commercial Fisheries Review, Jan. 1965 p. 33.

Industrial Fishery Products

U.S. FISH MEAL AND SOLUBLES:

Production and Imports, January-October 1965: Based on domestic production and imports, the United States available supply of fish meal for the first 10 months in 1965 amounted to 463,585 short tons--118,776 tons (or 20.4 percent) less than during the same period in 1964. Domestic production was

U. S. Supply of Fish Meal and Solubles, January-October 1965

Item	Jan.-Oct. 1965	Jan.-Oct. 1964	Total 1964
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	157,603	148,148	160,349
Tuna and mackerel	22,657	17,213	21,113
Herring	11,801	8,376	8,881
Other	17,527	33,019	44,909
Total production	209,588	206,756	235,252
Imports:			
Canada	36,866	46,784	54,769
Peru	204,841	300,820	348,025
Chile	5,201	11,302	12,942
Norway	49	-	-
So. Africa Rep.	2,900	13,487	18,581
Other countries	4,140	3,212	4,826
Total imports	253,997	375,605	439,143
Available fish meal supply	463,585	582,361	674,395
Fish Solubles:			
Domestic production	86,691	86,791	93,296
Imports:			
Canada	1,293	1,315	1,553
So. Africa Rep.	-	935	987
Other countries	2,536	1,802	1,965
Total imports	3,829	4,052	4,505
Available fish solubles supply	90,520	90,843	97,801

2,832 tons (or 1.4 percent) higher, but imports were 121,608 tons (or 32.4 percent) lower than in January-October 1964. Peru continued to lead other countries with shipments of 204,841 tons.

The United States supply of fish solubles during January-October 1965 amounted to 90,520 tons--a decrease of 0.4 percent as compared with the same period in 1964. Domestic production dropped 0.1 percent and imports of fish solubles decreased 5.5 percent.

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U.S. FISH MEAL, OIL, AND SOLUBLES:

Production, October 1965: During October 1965, a total of 12,698 tons of fish meal and about 9.1 million pounds of marine-animal oil was produced in the United States. Compared with October 1964, this was an increase of 4,120 tons of fish meal and about 3.5 million pounds of marine-animal oil. Fish solubles production amounted to 6,609 tons--an increase of 1,473 tons as compared with October 1964.

U.S. Production of Fish Meal, Oil, and Solubles, October 1965 1/ with Comparisons

Product	Oct.		Jan.-Oct.		Total
	1965	1964	1965	1964	1964
	(Short Tons)				
Fish Meal and Scrap:					
Herring	683	632	11,801	8,376	8,881
Menhaden 2/	6,913	4,693	157,603	148,148	160,349
Tuna and mackerel	2,983	1,720	22,657	17,213	21,113
Unclassified	2,119	1,533	17,527	33,019	34,809
Total	3/12,698	3/8,578	3/209,588	3/206,756	3/225,152
Fish solubles:					
Menhaden	4,152	2,603	68,687	64,673	68,738
Other	2,457	2,533	18,004	22,118	24,558
Total	6,609	5,136	86,691	86,791	93,296
	(1,000 Pounds)				
Oil, body:					
Herring	339	360	7,348	9,896	10,354
Menhaden 2/	7,445	4,187	162,997	145,098	157,730
Tuna and mackerel	822	729	4,328	4,151	4,816
Other (inc. whale)	483	331	4,663	7,008	7,298
Total oil	9,089	5,607	179,336	166,153	180,198

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Does not include a small quantity of shellfish and marine-animal meal and scrap because production data are not available monthly.

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Production by Areas, November 1965: Preliminary data as collected by the U. S. Bureau of Commercial Fisheries:

U.S. Production 1/ of Fish Meal, Oil, and Solubles, November 1965 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles
	Short Tons	1,000 Pounds	Short Tons
November 1965:			
East & Gulf Coasts	8,490	7,104	3,627
West Coast 2/	1,839	358	1,262
Total	10,329	7,462	4,889
Jan.-Nov. 1965:			
Total	219,917	186,798	91,580
Jan.-Nov. 1964:			
Total	217,488	174,456	90,557

1/Does not include crab meal, shrimp meal, and liver oils.
2/Includes American Samoa and Puerto Rico.

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U. S. MARINE OIL SUPPLY SITUATION AND FOREIGN TRADE, OCTOBER 1964-SEPTEMBER 1965 WITH COMPARISONS:

U. S. stocks of marine oils on September 30, 1965, were reported as 191.9 million pounds, an increase of 30 percent from those on hand a year earlier. During October 1964-September 1965, U. S. production of marine oils was about the same as in the preceding 12 months, but exports were down sharply while imports increased. (Fats and Oils Situation, November 1965, U. S. Department of Agriculture.)

U.S. Marine Oil Production, Imports, Exports, and Stocks, October-September 1963/64 and 1964/65

	Oct.-Sept.	
	1964/65	1963/64
	(Million Pounds)	
Production	189.9	192.0
Imports for Consumption:		
Marine-mammal oils	80.5	56.9
Fish-liver oils, medicinal	13.4	15.7
Other fish and fish-liver oils	0.9	4.4
Total	94.8	77.0
Exports: 1/		
Fish oils	116.7	196.4
Marine-mammal oils	0.7	7.3
Total	117.4	203.7
Marine oil stocks: 2/ Sept. 30, 1965	191.9	-
Aug. 31, 1965	204.4	-
Sept. 30, 1964	147.4	-

1/Includes re-exports.
2/Consists of factory and warehouse stocks including Government stockpile.
Note: Table does not indicate U.S. domestic consumption. For calendar year 1964, U.S. domestic consumption of marine oils was reported as 33.6 million pounds of sperm oil and 47.3 million pounds of fish and marine oils other than sperm oil.

* * * * *

SWINE GROW FASTER WHEN FISH MEAL IS ADDED TO DIET:

Swine-feeding trials to determine the protein supplemental value of fish meal when added to various cereal-vegetable protein mixtures have been conducted by the U. S. Bureau of Commercial Fisheries Technological Laboratory at College Park, Md. Results indicated

that pigs fed on corn-cottonseed meal supplemented with fish meal were marketed 34 days sooner, were 27 pounds heavier, and required less feed for each pound of gain than those animals fed on a corn-cottonseed meal diet alone.

In 92 days after the start of the experiment, pigs fed the corn-cottonseed meal diet containing 6-percent fish meal had reached 200 pounds (the prescribed marketing weight), while those receiving 3-percent fish meal in their diets weighed 184 pounds, and those receiving no fish meal only 173 pounds--a difference of 27 pounds.

Inland Fisheries Explorations and Gear Development

OAHE RESERVOIR TRAWLING STUDIES: Reservoir Research Vessel "Hiodon" Cruise 5 (October and November 3-5, 1965): This was another experimental trawling cruise in selected zones of Oahe Reservoir, South Dakota, located on the Upper Missouri River. Trawling operations by the reservoir fishery research vessel Hiodon of the U. S. Bureau of Commercial Fisheries were conducted in Zones 1, 2, 3, 4, and 6 of the reservoir during October 1965. Following the October explorations, the Hiodon concluded its Oahe Reservoir trawling experiments for 1965 with a 3-day survey November 3-5.

FISHING OPERATIONS: A total of 7 drags was made with a 35-foot (headrope) trawl and 52 drags were made with a 52-foot trawl. Mesh size (extended measure) of the cod end of the 35-foot trawl was $\frac{1}{2}$ inch and of the 52-foot trawl, $1\frac{3}{4}$ inches. Drags made over inundated flats totaled 57 and another 2 drags were made in the old river channel. Trawling depths ranged from 8 to 70 feet but most of the drags (46) were made at depths of 10 to 30 feet. Eight of the 52 drags made with the 52-foot trawl were made at night.

Normally, drags lasted 15 minutes each but 2 were 30-minute drags made in Zone 6. The catches of the 30-minute drags were similar in quantity and composition to the 15-minute drags.

Fouling of the gear was not a serious problem during the cruise. One drag was terminated early because of snags, and 2 drags were incomplete because the otter boards dug into the soft bottom. The largest catch per individual drag was made at night in Zone 6 when 1,625 pounds were caught; the smallest catch was in Zone 2 producing only one pound of fish.

FISHING RESULTS: The 59 drags made on the cruise caught a total of 11,365 fish (age group II or older) weighing 12,394 pounds for an average of 193 fish or 210 pounds per drag. Carp (average weight 2.0 pounds) accounted for 38.0 percent of the catch by number and 68.6 percent by weight. Yellow perch accounted for 42.0 percent of the catch by number but only 3.6 percent of the total weight and averaged 0.09 pounds in weight. Bigmouth buffalofish (average weight 2.8 pounds) made up 5.6 percent of the catch by number and 14.6 percent of the total weight.

Seven drags made during the November 3-5 explorations yielded a total of 1,770 fish (age group II or older) weighing 1,985 pounds for an average catch of 253 fish or 284 pounds per drag. The catch was made up (by weight) of 75.8 percent carp, 6.1 percent drum, 5.2 percent bigmouth buffalofish, and 4.3 percent carpsucker. Other species individually accounted for less than 2 percent of the total weight. Carp averaged only 1.5 pounds; bigmouth buffalofish, 2.9 pounds; drum, 0.5 pounds; and carpsucker, 1.5 pounds.

The most productive drag during the early November operations was made with the 35-foot trawl which caught 520 fish weighing 710 pounds (83 percent was carp). The least productive drag was made with the same trawl in the same area--140 fish weighing 50 pounds (27 percent carp and 23 percent yellow perch).

Of 3,900 young-of-the-year fish caught in the 7 drags, 57 percent were black bullheads and 31 percent yellow perch. Other species included black crappie, white bass, goldeye, drum, white crappie, northern pike, sauger, carpsucker, carp, and channel catfish. Of 72 yearling fish taken, 33 percent were goldeye, 24 percent sauger, and 21 percent carpsucker. Other yearling fish caught included black bullhead, yellow pike (walleye), bigmouth buffalofish, and northern pike.

Note: See Commercial Fisheries Review, January 1966 p. 38.

Maine Sardines

CANNED STOCKS, NOVEMBER 1, 1965:

Canners' stocks of Maine sardines on November 1, 1965, were up 60,000 cases from those of the same date in 1964, but down 566,000 cases from stocks on hand November 1, 1963.

The new Maine sardine canning season opened on the traditional date of April 15, 1965, and the pack to November 13, 1965, totaled 1,266,000 standard cases, as compared with the pack of 848,000 cases during the same period of 1964. Bad weather limited herring fishing in late November and herring landings were very light.

Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks, November 1, 1965, with Comparisons 1/

Type	Unit	1965/66 Season	1964/65 Season					1963/64 Season			
		11/1/65	7/1/65	6/1/65	4/1/65	1/1/65	11/1/64	7/1/64	6/1/64	4/1/64	1/1/64
Distributors	1,000 actual cs.	289	194	198	236	238	291	234	254	291	261
Canners	1,000 std. cs. 2/	689	295	203	314	538	629	514	499	658	1,063

1/Table shows marketing season from November 1-October 31.
2/100 $3\frac{3}{4}$-oz. cans equal 1 standard case.
Source: U.S. Bureau of the Census, Canned Food Report, November 1, 1965.

The new law legalizing year-round canning of Maine sardines removed the traditional December 1 closing date for the packing season. The new legislation opened winter canning to all Maine sardine packers and allows winter canning with domestic as well as imported herring. About 10 Maine sardine canneries were still operating in late November 1965.

Final data show the 1964 pack as 865,751 standard cases (100 cans of $3\frac{3}{4}$-oz.) canned in 23 plants in Maine. That was much less than the 1,619,000 cases packed during 1963, but more than the 754,000 cases packed during the regular season in 1961 when fishing was extremely poor.

The total supply available on November 1, 1965, was 1,518,000 standard cases, 5 percent more than the supply of 1,440,000 cases a year earlier.

Note: See Commercial Fisheries Review, October 1965 p. 36.

Menhaden

REVIEW OF U. S. MENHADEN INDUSTRY, 1965:

The menhaden fishery, the largest U. S. fishery in terms of landings, has again fallen short of expected production. Menhaden landings in 1965 were moderately above a year earlier, but still considerably below the more than 2-billion-pound annual catches of the early 1960's. During the entire 1965 season, landings in only two months equalled the average catch for the 1960-64 period. Atlantic Coast landings were on a par with 1964 while the Gulf of Mexico catch was up more than one-tenth.

The quantity of fish meal available for domestic distribution during 1965 was down substantially due to a decline of more than one-third in United States imports--domestic fish meal production from menhaden and other finfish (excluding meal from shellfish and marine animals) was near that of 1964. Preliminary estimates point to production of more menhaden meal in 1965 but less meal from other finfish.

Brailing menhaden from the pocket or bunt of a purse seine. Fish meal, oil, and solubles are produced from menhaden. More modern purse seiners are now equipped with large suction hoses to transfer the fish from the net to the vessel.

World production of fish meal in 1965 probably was somewhat below a year earlier, due largely to the sizable decrease in Peruvian output. Over the past 5-6 years, Peru has become the world's largest producer-export-

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er of fish meal. In 1965, however, the anchoveta resource was not as abundant as in 1964, resulting in a sizable decrease in Peru's anchovy meal production. Therefore, United States fish meal imports from Peru in 1965 were down considerably from the record of 1964.

The price of fish meal in the United States is affected to some extent by the domestic demand for fish meal as a feed ingredient by both the broiler and livestock industries. However, world supply and demand affects the domestic price level to a much larger degree. In 1965, world production of fish meal was down from a year earlier, and demand, both domestic and foreign was strong. Those factors caused U. S. prices of both domestic and foreign meal to advance to a record high of $186 per ton in November 1965. At this price level, there are indications that the ratio of fish meal to other feed ingredients used in broiler and animal rations may be further reduced.

The U. S. broiler industry is the largest single user of fish meal. Further expansion in the broiler industry is expected because of: (a) an expanding number of people, (b) an increase in per capita disposable income, and (c) broiler meat prices as related to prices of other meat products. As more broilers are produced, the quantity of fish meal consumed will increase when fish meal prices are competitive with other high-protein feedstuffs. Based on research in least-cost broiler ration formulation and June 1965 wholesale prices of feed ingredients, fish meal prices were competitive when below $157 per ton. If high fish meal prices continue, the broiler industry may experiment with rations which include other feed ingredients and find that the results are comparable to rations with fish meal included. (Branch of Current Economic Analysis, Division of Economics, U. S. Bureau of Commercial Fisheries.)

Michigan

NEW STATION FOR WARM-WATER FISH RESEARCH PLANNED:

As the first step toward establishing a warm-water fish research station in southeastern Michigan, a privately-owned fish-rearing facility south of Saline, Mich., was leased late in 1965 by the State of Michigan Conservation Department. The property will be bought outright after July 1, 1966, if the money needed for the purchase is appropriated. The new facility will be used as a unit of the Conservation Department's Institute for Fisheries Research at Ann Arbor, Mich.

First efforts of preparing the leased property for fisheries studies will be aimed largely at making improvements on 17 fish-rearing ponds. Some attention will also be given to several buildings covered by the lease. Longer-range plans call for developing about 14 additional ponds, and building an experimental aquarium or "wet" laboratory.

After the site is readied for operation as a full-fledged research station, it is hoped to carry out three major fish studies in the ponds. One of the studies will be on the production of fish-food organisms. Basically, that research will be to try to determine which types of organisms can best be increased to provide better food supplies for fish. Under a second branch of investigations, some of the station's ponds will be used to study bluegills which will have been subjected to radiation. The main thing it is hoped to find out is whether radiation can be used effectively to sterilize bluegills. The emphasis on that research will be efforts to come up with a technique which will control overpopulations of stunted bluegills.

The third main research project scheduled for the new station will involve studies on the natural reproduction of bass and the survival of bass eggs and fingerlings. Factors such as water temperatures, food supplies, water chemistry, and predation will be weighed in an effort to learn their effects on that species.

Several other research projects are being planned for the scheduled experimental aquarium. Among them will be a study measuring pituitary extract in the blood systems of bluegills to see if fish growth can be speeded up. Tests will also be conducted in the aquarium in an attempt to find a suitable chemical dye which can be used for the large-scale marking of fish to assist fact-finding and management work. (News Bulletin, Michigan Department of Conservation, Lansing, November 18, 1965.)

Nautical Charts

LISTS FOR ATLANTIC AND GULF COASTAL WATERS:

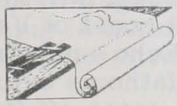
The free distribution to mariners of catalogs listing all available nautical charts for use in navigating U. S. Atlantic and Gulf coastal waters was scheduled to begin January 2, 1966, by the Coast and Geodetic Survey, U. S. Department of Commerce. Similar catalogs will be issued in mid-summer for the Pacific and Alaskan coasts. The catalogs will be accordion-folded, similar in format to road maps.

The catalog for the Atlantic and Gulf coasts also includes Puerto Rico and the Virgin Islands; for the Pacific coast it includes Hawaii, Guam, and the Samoan Islands; and for the Alaskan coast it includes the Aleutian Islands.

The catalogs list the numbers of all charts, the areas they cover, chart prices, and the scale of each chart. Both small craft and conventional charts are listed. Small-craft chart numbers and the outline of the area covered are shown in green and the conventional nautical charts in magenta and blue. The catalogs also include a list of tide tables, coast pilots (sailing direction), current tables, and tidal current charts.

Nautical chart diagrams have been available before, but on a much more limited scale. Information up to now has generally been furnished only for specific areas rather than for entire coasts.

An initial printing of 60,000 to 70,000 copies has been run off for distribution at exhibits of Commerce's Environmental Science Services Administration at boat shows along the Atlantic and Gulf coasts. The catalogs are also available, in person or by mail, from chart distribution centers at Coast and Geodetic Survey offices in San Francisco and New York and at the Survey's sales office, 1125 Commerce Building, Washington, D. C. 20230. A list of the 600 agents who sell nautical charts is also available in a similar format.



New York

NEW SITE TO BE ACQUIRED FOR NEW YORK CITY WHOLESALE FISH MARKET:

New York City plans to acquire a 100-acre site in the Hunts Point section of the Bronx for the establishment of a wholesale fish and meat market. The Mayor of New York has certified $2.3 million in additional funds for the purchase and directed the various City agencies to proceed with the acquisition. It was hoped that the sale could be consummated early in 1966.

The new fish and meat markets will house the fish dealers located in the existing Fulton Fish Market and the wholesale butchers in the present 14th Street, Brook Avenue, and Harlem Meat Markets. The Hunts Point site will offer modern quarters with truck-loading platforms and direct rail connections. The Hunts Point site is contiguous to the 126-acre New York City Product Terminal. When completed, the new meat and fish market together with the produce terminal will form the largest perishable food distribution center in the world. (New York City Wholesale Markets Progress Report, November 1965.)

Note: See Commercial Fisheries Review, July 1965 p. 30.

North Atlantic

SOVIET FISHING ACTIVITY OFF COAST, DECEMBER 1965:

Soviet vessel fishing activity in December 1965 increased slightly over the previous month and was about normal for that time of year. A total of 35 Soviet vessels was sighted during the month. They were identified as 28 fish-factory stern trawlers, 2 "Skyplev Class" processing and refrigerated stern trawlers, 4 refrigerated fish transports, and 1 medium class side trawler. This compared with an estimated 25 vessels in November 1965 and 20 vessels in December 1964.

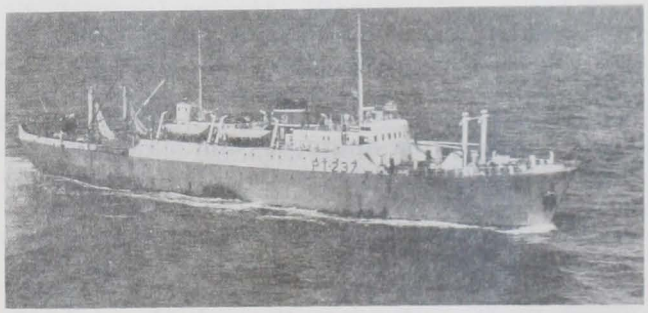


Fig. 1 - Soviet stern trawler-factoryship of Pushkin class fishing in North Atlantic.

The Soviet vessel observations were made by the staff of the Fisheries Resource Man-

agement Office, U. S. Bureau of Commercial Fisheries, Gloucester, Mass., which conducts weekly reconnaissance flights cooperatively with the U. S. Coast Guard.

Fig. 2 - Another Soviet factory-type stern trawler in North Atlantic.

Except for a short period late in the month, Soviet fishing operations were generally confined to the "southeast part" of Georges Bank, 120 to 130 miles southeast of Cape Cod, fishing at depths of 30 to 50 fathoms. The majority of vessels were actively fishing. Heavy to moderate catches of fish on deck and in their trawls appeared to be primarily whiting, scrod haddock and related mixed groundfish. U. S. fishing vessels reported excellent catches of scrod haddock throughout the month, while fishing in the immediate vicinity of the Soviet fleet.

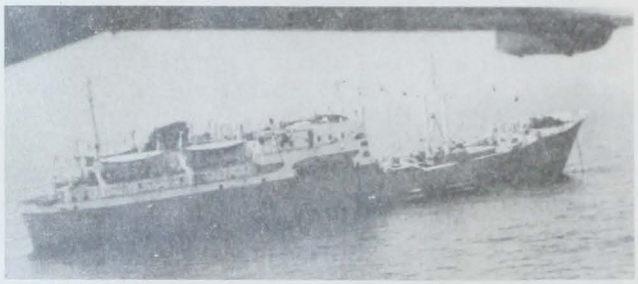


Fig. 3 - Soviet refrigerated fish transport operating in the North Atlantic.

Late in December the Soviets abruptly shifted their fishing operations southward along the 100-fathom curve from Block Canyon (60 miles south of Block Island, R.I.) to Veatch Canyon (30 miles south of Nantucket lightship). Apparently due to insufficient quantities of fish in those areas, the Soviets resumed their operations on Georges Bank. It was expected, however, that they would return to fish for red hake as they did so successfully from January through March 1965.

The British factory stern trawler Fairtry I was seen on Georges Bank during the month. The sisterships Fairtry II and Fairtry III were sighted on the "northeast peak" of Georges Bank in February 1964.

A very limited number of Soviet fishing vessels have been operating off the Eastern Nova Scotia areas.

Note: See Commercial Fisheries Review, January 1966 p. 40.

North Pacific Fisheries Explorations and Gear Development

HAKE AND ANCHOVY POPULATION SURVEY:

M/V "John N. Cobb" Cruise 74 (October 11-November 18, 1965): To determine the geographic and bathymetric distribution of schools of Pacific hake (Merluccius productus) and anchovy (Engraulis mordax) along the coasts of Vancouver Island, British Columbia, Washington, and Oregon as far as Coos Bay during October and November was the primary objective of this cruise. Secondary objectives by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb were to: (1) obtain biological data on those species, (2) obtain additional data relative to the catching efficiency of the Mark II "Cobb" pelagic trawl, and (3) obtain bathythermograph (BT) data.

The gear used was the same as for previous hake explorations in that the echo-sounder was used to locate the fish schools and the "Cobb" pelagic trawl was used to fish favorable looking echograms.

Onshore-offshore echo-sounding transects were made at oblique angles to the coasts between the 20- and 200-fathom contours; between Willapa Bay and Destruction Island, parallel transects were run from the 20- to 60-fathom contour.

During the first three weeks of the cruise the area from Cape Flattery, Wash., to Cape Cook on the west coast of Vancouver Island was surveyed. Echo-sounding indicated hake at a depth of 65 fathoms over a bottom depth of 80 fathoms of water off Barkley Sound, Vancouver Island. A one-half-hour tow (lat. 48° 41' N., long. 125° 44' W.) yielded a catch of 18,000 pounds of hake. The fish ranged from 51 to 68 centimeters (20.1 to 26.8 inches) and averaged 57 centimeters (22.4 inches)

long. Sounding transects showed the school to be about 4 miles wide and 6 miles long, and that it was confined to a small area of Barkley Sound (80-fathom depth) which extended into La Perouse Bank. The surrounding area of 50-fathom depths or less showed no signs of hake. A 1-hour tow was made on light echo-tracings at lat. 48°45' N., long. 126°12' W. which yielded 200 pounds of hake. They also averaged 22.4 inches with a range of 19.6 to 27.2 inches. That area was about 20 miles west of the Barkley Sound school of hake over a bottom depth of about 80 fathoms. The fish were about 65 fathoms from the surface. No hake were located from that point to Cape Cook.

During the last 3 weeks of the cruise, sounding transects were made from Cape Flattery, Wash., to Coos Bay, Oreg. No appreciable signs (echo-tracings) of either hake or anchovies were found during that period. A 30-minute tow on a light echo-trace at lat. 47°35' N., long. 124°50' W. yielded 90 pounds of dogfish (Squalus acanthias), 80 pounds of rockfish (Sebastodes sp.), and 3 female hake in a near-ripe stage.

Related activities of the cruise included: (1) the collection of biological data by personnel of the Bureau's Seattle Biological Laboratory, (2) the delivery of hake samples to the Seattle Technological Laboratory for meat analysis, and (3) making the usual bathythermograph (BT) observations.

Note: See Commercial Fisheries Review, December 1965 p. 41.

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PELAGIC FISHING GEAR RESEARCH: M/V "St. Michael" Cruise 7 (August-November 1965): A 100-day gear research cruise for fishing hake and herring was completed November 16, 1965, by the exploratory fishing vessel St. Michael, chartered by the U. S. Bureau of Commercial Fisheries. Fishing for hake was conducted along the coast of Washington from Cape Flattery to the Columbia River. Other cruise activities included diving operations in Puget Sound near Seattle, and herring fishing in inside waters of Bellingham Bay and in the Strait of Georgia.

Scheduled objectives of the cruise were:

1. Test the effectiveness of a $\frac{2}{3}$-scale pelagic trawl, a 440-mesh "Cobb" pelagic trawl, a 640-MONO-pelagic trawl, and a lampara trawl No. 2 on Pacific hake (Merluccius productus).

2. Using the above nets from the vessel St. Michael, conduct parallel comparative tows with another Bureau chartered vessel, the Western Flyer, using a standard 18 "Cobb" pelagic trawl.

3. Evaluate various electronic telemetry devices, including a variable resistor catch-load indicator, wing-tip depth sensing units, headrope transducer, simplified bottom contact indicator, Furuno Net Sonde, and Standard Control, Inc.'s Depth Telemetry System.

4. Assist the Western Flyer to locate hake schools off the coasts of Washington and Oregon.

5. With the aid of SCUBA-equipped scientists, visually evaluate the physical characteristics of various pelagic trawls in operation. Determine effect of non-symmetrical bridles on net opening.

6. Make underwater observations of fish within the influence of a trawl and photograph their reactions.

7. Conduct fishing trials for herring (Clupea harengus pallasii) using a Canadian-type small-mesh midwater trawl.

EQUIPMENT: The St. Michael is a 72-foot seine-type vessel powered by a 380-hp. engine and was operated by a four-man crew. Hydrofoil otterboards and electrical towing cable were used on all drags.

Tests were conducted using the following nets which were constructed of multifilament web except the 640-MONO-pelagic trawl:

1. 640-MONO-pelagic trawl (similar to a standard "Cobb" trawl except that it has 640 meshes across the mouth instead of 600 meshes, the anterior 400 meshes of the body are made of ribbon type monofilament web, and the posterior 200 body meshes and wings are of multifilament web).

2. A $\frac{2}{3}$-scale pelagic trawl (same proportions as a standard "Cobb" pelagic trawl except using 2" instead of 3" web).

3. A 440 pelagic trawl (a shortened version of the standard, having 440 meshes across the mouth instead of 600 meshes).

4. Lampara trawl No. 2 (a trawl with very long wings similar to a lampara seine). It differs from the original net in that the rope and chain headrope and footrope are replaced by wire rope and the percentage web hang-in is less.

5. Canadian-type herring trawl (a small pelagic trawl having a 73-foot headrope and variable mesh size from 5" at headrope to $1\frac{1}{4}$" mesh at cod end).

RESULTS: Comparative drags: A limited number of parallel drags was made by the St. Michael near the Western Flyer which towed a standard 18 pelagic trawl. Both the $\frac{2}{3}$-scale and 440-trawls caught hake at about the same rate as the standard size net. Maximum catch for the $\frac{2}{3}$-scale trawl was 18,000 pounds in 60 minutes and 45,000 pounds in 90 minutes for the 440 trawl.

The 440 trawl moved through the water about 15 percent faster than the standard net, using the same vessel horsepower, thus making it easier to control in strong cross tides. No similar data is available for the $\frac{2}{3}$-scale trawl.

No comparative tows were made using the lampara trawl No. 2. Four independent tows

on good echo-sounding traces yielded an average of 7,200 pounds of hake per tow, considerably less than expected. The largest single tow was 12,000 pounds.

ELECTRONIC DEVICES: A quick disconnect electrical jumper system was successfully tested. It was used to by-pass the otterboards so energy could be transmitted from the vessel to various telemetry devices located on the trawl. Conventional $\frac{1}{2}$" cable bridles were replaced with electrical conductor cable.

Prior to the development of the jumper system, depth-sensing units were terminated at the otterboards. The depth of the otterboards in relation to the trawl was not exactly known. During the diving operation, the divers found that the otter boards were only 5 to 10 feet deeper than the top wing tips. Using the jumper system allowed the sensing units to be placed at each upper wing tip, each lower wing tip, or at one upper and lower wing tip. In this way, the exact depth of the headrope and footrope was known and centered in the greatest fish concentration.

Some success was achieved in using a headrope transducer connected to the wing tip bridle termination which read out on the pilothouse depth-sounder. When functioning properly, fish passing into the net, depth of the footrope, and depth from footrope to the ocean floor was shown on a chart. Additional testing of this device is necessary.

A catch-load indicator composed of a variable resistor attached to the cod end was tested. The signal was transmitted through a wire threaded along a corner ribline to the bridle and towing cable and up to the pilothouse where it read out on a calibrated ammeter. Only limited success was achieved with this instrument due to water leakage in the electrical components. When perfected, this device will be of major value in the trawl fishery.

The bottom contact indicator, composed of a mercury switch attached to a heavy weight, also utilized the electrical towing cable to transmit an electrical signal from the switch to a light in the pilothouse. The object was to suspend the weight a predetermined distance below the otter board on an electrical cable. When the weight struck bottom, the new angular position would cause the switch to actuate. The pilothouse light then came on, indicating that the otter board was a distance above bottom equal to the cable length. In practice, the weight necessary to hold the switch nearly vertical while under tow was too great to be conveniently handled.

A Furuno "net sonde" was tested as a net depth indicator; it worked well for three tows before it malfunctioned.

The Standard Control, Inc.'s Depth Telemetry System was equipped with an inadequate meter readout. A new meter was obtained but was not tested.

UNDERWATER OBSERVATIONS: Net Configuration: All variations of the "Cobb" pelagic trawl had effective configurations. Diver observations were made in less than 120 feet, using 40 fathoms towing cable. Not enough towing cable can be put out to permit full net expansion during diver observations. The $\frac{2}{3}$-scale pelagic trawl opens to about 40 by 23 feet across the mouth. The 440-pelagic trawl opens to about 70 by 30 feet, and the 640-pelagic trawl opens to about 75 by 34 feet. The lampara trawl No. 2 had an improved configuration over the original design tested in 1964. Wings and mouth opened to a maximum of 20 feet vertically. A Canadian-type midwater herring trawl constructed of variable mesh web was evaluated by divers. This net has an excellent configuration in the water. Because of its smaller size, it can be towed much faster for a given power than any of the pelagic trawls. A large amount of water is strained, indicated by the fact that the divers took a current reading of 2.8 knots within the trawl.

Net Bridles: Instead of the usual 60-fathom bridles, 40-fathom bridles from the otterboard to the trawl wing tips were used. Underwater measurement showed there was no loss in net opening. Both 60-fathom and 40-fathom bridle sets were tested using electrical conductor cable. There was no measurable effect on the trawls when one electrical bridle was paired with a $\frac{1}{2}$" conventional cable.

Fish Behavior: Divers observed bottomfish, herring, smelt, and squid within the influence of the trawls. Fish could easily swim along within the "Cobb" pelagic trawls. However, herring (5 to 7 inches long) had difficulty maintaining their position within the Canadian-type trawl when water flow was over 2.5 knots. The divers observed squid (10 to 12 inches long) which swam with her-

ring against a 2-knot water current in the trawl for several minutes. The large-mesh web permitted them to escape when they became tired and drifted into it.

Hake, which had been caught during a 30-minute tow in 25 fathoms of water, were hauled in to a 10-fathom depth and then the tow was resumed for another 90 minutes. Divers descended to observe the effect of a 15,000-pound catch on the configuration of the trawl. No hake were found swimming in the trawl body. Few fish were in the anterior portion of the cod end. A large bag of fish (about 10 feet in diameter) formed at the bitter end of the cod end. This caused the forward part of the cod end to be stretched nearly closed and possibly the trawl mouth area to be reduced, suggesting that the net catch rate probably goes down as the catch increases. Most hake were able to swim away when the cod end was opened at 10 fathoms by the divers.

Midwater herring trawling experiments: The variable web Canadian-type midwater trawl was fished in northern Puget Sound. Echo traces indicated large schools of herring and smelt were present and some catches were made by local purse-seine vessels. Seven drags were made on excellent traces. The largest single catch was about 800 pounds of mixed herring and smelt.

GENERAL OBSERVATIONS: Although fish signs observed on the echo-sounder were good, and the underwater configuration of the lampara trawl and Canadian-type midwater trawl was excellent, fish catches by both nets were less than expected. Herring, smelt, and squid appear to swim out of a net; conversely, hake have little swimming endurance and are readily carried back to the cod end.

Note: See Commercial Fisheries Review, October 1965 p. 44.

Oceanography

MARINE ENGINEERING EXPERIMENT STATION PROPOSED BY SOUTHERN NEW ENGLAND GROUP:

A 6 member committee was formed in late 1965 by the Southern New England Marine Sciences Association (SNEMSA) to study the possibilities of establishing a marine engineering experiment station.

"As now envisioned, the experiment station would be a nonprofit research organization which would seek to bridge the gap between university scientists and industry with the ultimate objective of reaping greater benfits from our ocean resources," said the dean of the University of Rhode Island Graduate School of Oceanography, who is also Chairman of SNEMSA.

The Southern New England Marine Sciences Association was formed in the spring of 1965 by the University of Rhode Island and marine-oriented businesses and industries to promote the Southern New England region as a national center for study and development of ocean sciences. The 71 members of the Association are concentrated in the 75-mile strip of land from New London, Conn., to Woods Hole, Mass. (University of Rhode Island, December 7, 1965.)

Note: See Commercial Fisheries Review, July 1965 p. 38.

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NEW INSTITUTE FOR OCEANOGRAPHY SET UP WITHIN U. S. DEPARTMENT OF COMMERCE:

The formation of an Institute for Oceanography was announced December 26, 1965, by the Environmental Science Services Administration (ESSA) of the U. S. Department of Commerce.

ESSA was established in July 1965 within the Department of Commerce to serve as a focus for national efforts to describe, understand, and predict man's natural environment. It includes the Weather Bureau, the Coast and Geodetic Survey, and the former Central Radio Propagation Laboratory of the National Bureau of Standards.

The Institute for Oceanography, one of ESSA's four Institutes for Environmental Research, will conduct a comprehensive research program designed to gain new knowledge of the ocean and its boundaries with the atmosphere, the shore, and the sea floor. Its wide range of marine research activities includes marine geology and geophysics, physical oceanography, and the interactions between the ocean, the earth, and the atmosphere.

"Greater understanding of the ocean is needed to improve and expand the services ESSA provides," the administrator of the agency said in announcing the creation of the new Institute. "Lack of knowledge about the

interactions between the atmosphere and the ocean is a major obstacle to long-range weather forecasting and to improving predictions of ocean waves, water temperatures, coastal currents, and surf and other ocean conditions."

"Safe and economical use of the ocean," he states, "requires that we know much about the whole complex and fascinating marine environment. By expanding man's knowledge in the fields of physical oceanography and marine geology, the Institute for Oceanography will assist those groups interested in exploiting ocean resources."

The new Institute for Oceanography has headquarters in Washington, D. C., and field installations at Norfolk, Va., Seattle, Wash., and Honolulu, Hawaii. In addition to those oceanographic research projects conducted wholly within the Institute, it will encourage and support cooperative research programs carried out jointly with universities and private institutions.

Working with the Coast and Geodetic Survey, the Institute for Oceanography will continue the scientific exploration and mapping program (SEAMAP) which is part of the Interagency Committee on Oceanography's U. S. National Plan for Ocean Surveys. Those systematic oceanographic surveys will be conducted aboard vessels operated by the ESSA Coast and Geodetic Survey. In the past, the SEAMAP program has been limited to the area between the Aleutian and Hawaiian Islands. It will be expanded in 1966 when two new oceanographic vessels are commissioned by ESSA. Those two ships--the Oceanographer and the Discoverer--will be the largest, most modern oceanographic research vessels built in the United States. Each vessel will have more than 4,100 square feet of laboratory area.

Data gathered aboard vessels of the Coast and Geodetic Survey are used by the Institute's scientists in studies of marine geology and geophysics. The marine geologists investigate the topography of our Continental Shelves to learn how they were formed and how they have changed with time. Characteristics and distribution of bottom sediments and the environmental processes that caused them also are studied by the marine geologists. The Institute's geophysical research includes marine gravity and magnetic studies at sea and investigations of seabed structures below the sea floor.

In the field of physical oceanography, Institute scientists investigate ocean circulation, tides, and waves, as well as the physical and chemical properties of sea water. An important task facing the Institute is the development of new methods of predicting the height of tsunamis or seismic sea waves, in order to improve the accuracy of forecasts issued by the Coast and Geodetic Survey's Seismic Sea Wave Warning System.

The Institute's physical oceanographers also conduct basic oceanographic research leading to increased understanding of the dynamic processes at work in the oceans. Such knowledge is essential for developing techniques of predicting changes in those ocean characteristics--such as waves, currents, temperature, and the overall marine environment--which are important to the activities of man.

In the Institute for Oceanography, meteorologists and oceanographers will work together to achieve new understanding of the intricate relationships between the ocean and the atmosphere. The atmosphere affects the ocean as much as the ocean affects the atmosphere.

Studies leading toward the understanding and prediction of the affects of waves, tides, and currents on the Continental Shelf and along the coasts also are being undertaken by the Institute.

An oceanographic laboratory, co-located with the Coast and Geodetic Survey Marine Center at Seattle, Wash., is a field facility of the Institute. That laboratory carries out programs in physical and geological oceanography and marine geophysics in cooperation with the Institute's other laboratories and with the Coast and Geodetic Survey.

In addition, the Institute for Oceanography includes two small specialized research groups--one located at the University of Hawaii, and the other at the University of Washington--which have been established so that Institute and university scientists can work closely on problems of mutual interest.

Through the activities of the new Institute, the Coast and Geodetic Survey and its other scientific groups, ESSA expects to learn more about the ocean so that it can provide improved oceanographic services as required by the nation to support its marine operations.

(U. S. Department of Commerce, December 26, 1965.)

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"SEA SPIDER" SET IN ATLANTIC TO SERVE AS STABLE OCEANOGRAPHIC BUOY:

In September 1965, the first stable oceanographic buoy, nicknamed Sea Spider, was installed in half-mile deep water off the coast of South Carolina.

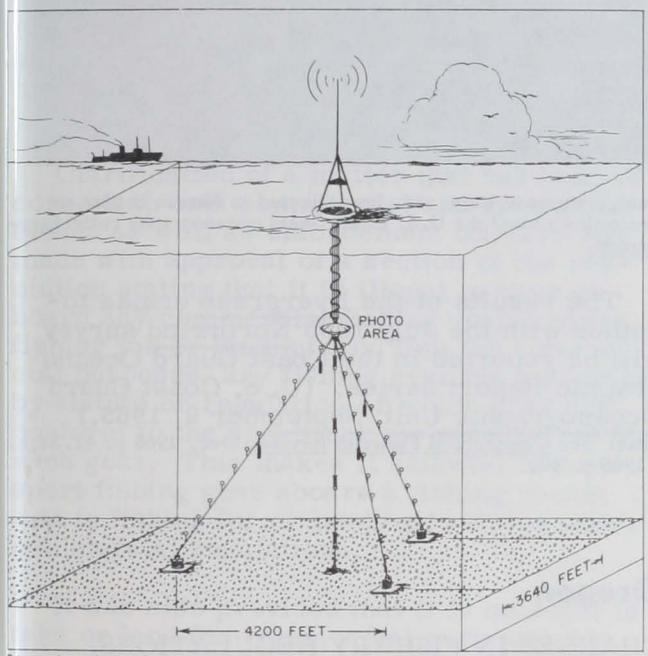

Fig. 1 - Artist's diagram of Sea Spider showing anchoring system.

Sea Spider, designed and installed by scientists of the Woods Hole Oceanographic Institution, Woods Hole, Mass., is a saucer-shaped aluminum float securely held to the ocean bottom by four long steel cables. Various instruments and buoyant hollow glass spheres are attached along the spider-leg cables and the saucer, which is placed 110 feet below the ocean surface to avoid buffeting by wind or waves.

A telemetering buoy at the sea surface transmits data collected from those instruments by radio to a nearby oceanographic vessel.

The structure will give oceanographers their first virtually motionless reference point and instrument support in the deep ocean. It is far more stable and reliable than other sea-measuring instruments, which are usually suspended or towed from surface vessels or are attached to buoys anchored by a single cable.

Fig. 2 - Shows aluminum sphere of Sea Spider anchored 110 feet below the surface.

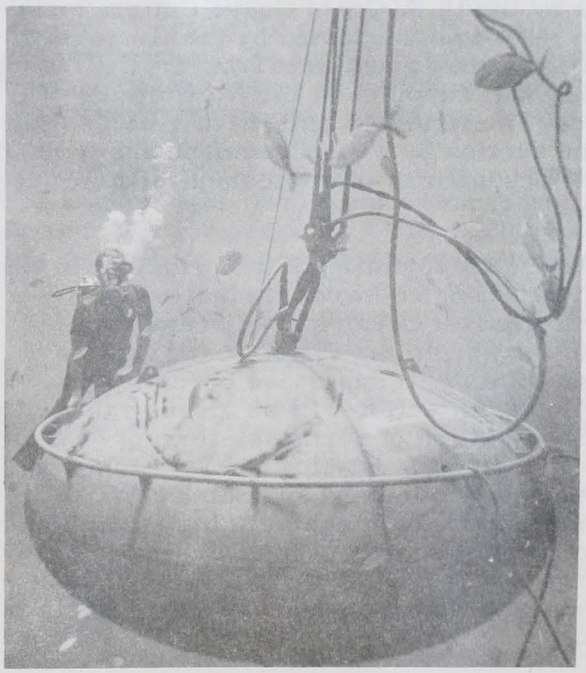

Fig. 3 - Closer view of topside of Sea Spider.

These traditional instrument bases are not very steady since they sometimes swing around with a radius almost as great as the depth of water. During a period of 21 hours, oceanographers found that the Sea Spider buoy moved less than 10 feet in any direction.

The instruments on Sea Spider, placed on Blake Plateau which is part of the U. S. continental shelf in the Atlantic Ocean, will record such measurements as ocean currents, temperature variations, and underwater sounds.

As divers were installing and checking the equipment, they noticed large schools of fish attracted to the spherical buoy throughout the 3-week test. Scientists believe the sphere might be modified for biological studies of the ecology and habits of fish in the deep ocean. (Science News Letter, October 16, 1965, and Woods Hole Oceanographic Institution, September 24, 1965.)

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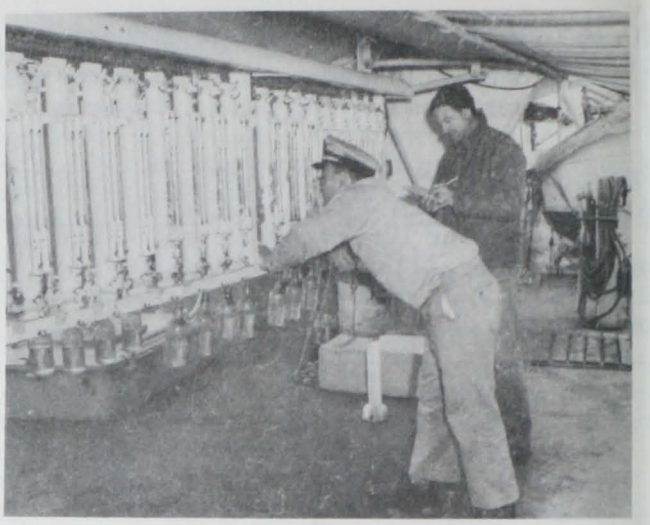
BOUNDARY BETWEEN ARCTIC AND NORTH ATLANTIC OCEANS SURVEYED BY U.S. COAST GUARD CUTTER "EVERGREEN":

The U. S. Coast Guard Cutter Evergreen was scheduled to conduct an oceanographic survey along the boundary between the North Atlantic and Arctic Oceans from Greenland to Iceland to Scotland in October and November 1965. The July 1965 transects in that area by the U. S. Coast Guard Cutter Northwind were to be repeated by the Evergreen. Thus information obtained from the Evergreen cruise will supplement the Northwind's efforts. The itinerary called for 1 occupation of the section between Greenland and Iceland and 4 occupations of the Iceland-Scotland section.

The main objective of the cruise is to study the interchange between the waters of the North Atlantic Ocean and adjacent seas. A field party from the Coast Guard Oceanographic Unit will supervise observations. Particular attention will be given to the study of the variation of northeast-flowing Atlantic water and southwest-flowing Norwegian Sea water between Iceland and Scotland. The accumulation of information in that area is necessary for the study of heat and water exchange and to contribute to a greater understanding of cyclic phenomena in the North Atlantic.



Temperatures of water samples collected in Nansen bottles are recorded aboard the U.S. Coast Guard oceanography cutter Evergreen.

The results of the Evergreen cruise together with the July 1965 Northwind survey will be reported in the Coast Guard Oceanographic Report series. (U. S. Coast Guard Oceanographic Unit, September 9, 1965.)

Note: See Commercial Fisheries Review, Dec. 1965 p. 42, Sept. 1965 p. 40.

Oregon

CHANGES IN FISHERY REGULATIONS ADOPTED BY FISH COMMISSION:

In an effort to streamline and modernize Oregon's commercial fisheries code, the Oregon Fish Commission, at its regular monthly meeting held November 8, 1965, adopted a number of regulation changes, reworded several of its directives, and spelled out definitions of various terms used in regulatory matters.

Among the regulation matters treated by the Oregon Fish Commission were the following:

It was made mandatory for the skipper of each licensed trawl vessel to maintain a log showing details on the landings of fish. The log is to be made available upon request to an authorized representative of the Commission for examination and transcription of information. All data received by the Commission are treated as confidential. The Commission considers that this information is

vital to the proper management of the highly important trawl fishery.

Shad and striped bass regulations on the coastal rivers were defined, with minor changes including elimination of weekend closures in the fishery.

It was made unlawful for commercial fishermen to have in their possession any salmon taken as an incidental catch when fishing under provisions of regulations covering the commercial fishery for shad and striped bass. It was stipulated that any salmon caught in such nets must be returned to the water immediately and with the least possible injury to the fish.

Clarification of a matter that has been of concern to both commercial and sports fishermen as well as enforcement officers was made with approval of a section of the resolution stating that it is illegal to have on board any commercial fishing vessel while fishing for or landing food fish for commercial purposes, any fishing gear not authorized by statute or regulation or which does not conform to the specifications established for such gear. This makes it unlawful to have sport fishing gear aboard a fishing vessel that is fishing for or landing food fish under commercial regulations.

It was also provided that it is unlawful to take or land for commercial purposes any sturgeon over 6 feet in length in the round, or to remove the head or tail of a sturgeon prior to its being initially received at the licensed premises of a wholesale fish dealer or canner.

A variety of other matters were treated under the Resolution adopted by the Commission. Copies of the detailed order, Administrative Order FC 136, are available on request from the Oregon Fish Commission, Portland, Oreg.

In other action, the recommendation that the lower Columbia River seal program be continued at its present level was approved. The $25 bounty on harbor seals taken in the lower Columbia will be continued and the Commission directed negotiations to continue the contract on seal hunting activities in the lower river at the same level as in recent seasons. (Oregon Fish Commission, Portland, December 9, 1965.)

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NEW SALMON FISHWAY COMPLETED FOR COLUMBIA RIVER SYSTEM:

The completion in late 1965 of Sheep Ridge Dam fishway on the Lostine River in Wallowa County, Oreg., has given the fish-producing potential of that important Columbia River system tributary a substantial boost, according to the Oregon Fish Commission.

The Sheep Ridge facility consists of three reinforced concrete retaining walls or sills placed across the full width of the stream creating a stairstep arrangement or pools leading to the impounded water above the dam. This arrangement makes it a simple matter for salmon and steelhead to pass over the irrigation diversion structure even at low-water stages. In addition to installation of the sills, the project also involved the placing of rock riprap at the ends of the sills to prevent erosion and undermining of the concrete work. The project was planned and supervised by the Oregon Fish Commission under terms of a contract with the U. S. Bureau of Commercial Fisheries.

The new fishway, coupled with a similar structure at the City of Lostine's domestic water diversion dam located a mile downstream from the Sheep Ridge site, assures anadromous fish access to at least 15 miles of upriver spawning area during all water stages. The Lostine Dam fishway was completed in March 1963 by an engineering firm under contract with the Oregon Fish Commission. The cost of this project was also provided by the U. S. Bureau of Commercial Fisheries under terms of the Columbia River fisheries development program.

Although runs of spring chinook and steelhead salmon have been maintained in the Lostine over the years, passage of fish has been difficult or impossible during periods of low water. The Fish Commission's Columbia River fisheries management project leader said it is difficult to make any precise prediction as to the effects of the two fishways on the Lostine runs. Improved passage conditions should reduce loss of adult fish by preventing concentration of fish below the dams during low-flow periods when they are more vulnerable to predation and poaching. There has been a small run of silver (coho) salmon in the lower part of the river and it seems likely that ready access will encourage that species to utilize more extensively some of the upstream spawning areas, said the Columbia River fisheries

management. (Oregon Fish Commission, December 13, 1965.)

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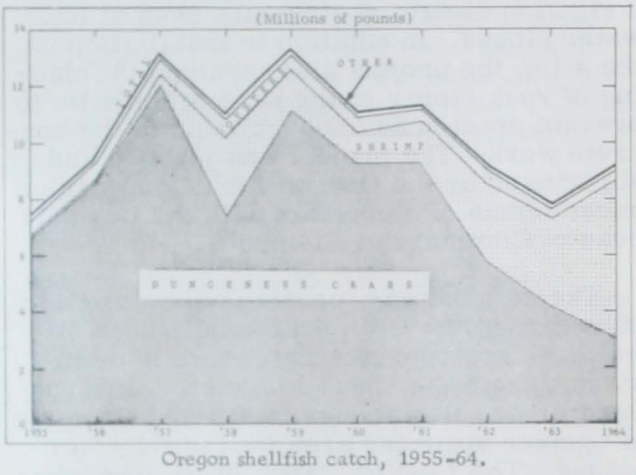
LANDINGS OF FISH AND SHELLFISH, 1963-1964:

Commercial landings of fish and shellfish in Oregon during 1964 totaled 57.2 million pounds with an ex-vessel value of $7.0 million--a drop of 7 percent in quantity and 9 percent in value from 1963. The decline was due mainly to a drop in tuna landings. Seven species--flounder, salmon, ocean perch, shrimp, rockfish, tuna, and Dungeness crab--made up almost 93 percent of the 1964 landings.



Oregon shellfish catch, 1955-64.

Salmon: The 1964 salmon landings totaled 9.9 million pounds with an ex-vessel value of $2.7 million as compared with 1963 landings of 8.3 million pounds valued at $2.6 million. Silver salmon landings increased in 1964 while king salmon landings declined.

Bottomfish: The 1964 bottomfish landings consisted mainly of 15.4 million pounds of flounder (down 6 percent from 1963), 9.7 million pounds of ocean perch (up 21 percent), and 5.2 million pounds of rockfish (same as in 1963).

Tuna: The Oregon tuna landings were only 4.4 million pounds in 1964 as compared with 11.4 million pounds in 1963.

Shellfish: Shrimp, Dungeness crab, and oysters accounted for about 99 percent of the Oregon shellfish catch. Shrimp landings in 1964 were 5.3 million pounds valued at $720,000 as compared with 1963 landings of 3.0 million pounds valued at $263,000. Dungeness crab landings in 1964 amounted to 3.4 million pounds with an ex-vessel value of $839,000 compared to 4.2 million pounds valued at $870,000 in 1963. The Pacific oyster harvest in 1964 yielded 334,000 pounds of oyster meats valued at $106,000, a slight decline from 1963.

Oysters

SUPPLEMENTAL FEEDING OF OYSTERS TESTED:

Ways of feeding oysters commercially, or of supplementing the food of oysters held in ponds, were being tested in 1965 by scientists in marine stations at the Virginia Institute of Marine Science, Gloucester Point, Va., the Bears Bluff Laboratories in South Carolina, and the Florida Board of Conservation Marine Laboratory.

The director of the Virginia Institute of Marine Science stated that the Institute through the work of Dexter S. Haven, head of the Department of Applied Science, has pioneered in basic research leading to these studies as early as 1959. The Institute's director said, "From his work, Haven found that both wheat flour and cornstarch when fed to oysters in quantities as low as 5 parts per million increased the yields or the 'fatness' of oyster meats over that of oysters feeding on natural foods in river water." The results of those studies were reported to scientists in talks presented during conventions in 1961 and 1963 and were published in Chesapeake Science in March 1965.

It was stated that Haven anticipates conducting further feeding experiments in 1966 in which oysters will be held in salt-water tanks or ponds where their diet can be supplemented with starch. The outcome of this work will indicate whether or not it may be economically feasible to feed oysters before offering them to the raw bar trade, or possibly to employ supplemental feeding to increase yields in commercial production of oysters.

A scientist of the Bears Bluff Laboratories in South Carolina has for several years explored the use of tidal ponds for oyster culture. He began supplemental feeding of oysters in tanks in 1963. Instead of using starch, he has tested the use of rice chaff and rice, both local products of South Caro-

lina. His preliminary experiments indicate that oysters gain weight when either rice chaff or rice is added to water flowing over them.

During the past two years, a team of scientists at the Florida Board of Conservation Marine Laboratory fed oysters pulverized corn meal as a source of starch, and their reports confirm Haven's earlier studies showing that there is a spectacular increase in the fatness of oysters fed that diet. When asked if he anticipates that the quality and flavor of oysters can be improved with special additives to oysters' natural diet, Haven said that this could only be found out by conducting the experiments which he planned in 1966.

Haven believes that the techniques he has developed for feeding oysters may be useful to biologists who need to hold oysters under laboratory conditions with a minimum flow of river water. Oyster biologists at the Virginia Institute of Marine Science are exploring the use of the technique in keeping oysters in spawning condition throughout the winter by using starch for supplemental feeding. This is contributing to several phases of oyster research now in progress at the Institute's Gloucester Point laboratory. (Virginia Institute of Marine Science, December 15, 1965.)

Salmon

U.S. PACIFIC COAST CANNED STOCKS, DECEMBER 1, 1965:

On December 1, 1965, canners' stocks (sold and unsold) in the United States of Pacific canned salmon totaled 2,478,058 standard cases (48 1-lb. cans)--136,811 cases less than on November 1, 1965, and 661,996 cases less than on December 1, 1964, when stocks totaled 3,140,054 standard cases.

Table 1 - Total Canners' Stocks of Pacific Canned Salmon, Dec. 1, 1965

Species	Dec. 1, 1965	Nov. 1, 1965	Dec. 1, 1964
	(No. of Actual Cases)		
King	123,126	140,743	94,648
Red	1,902,932	1,983,736	674,711
Coho	193,729	232,458	222,095
Pink	767,120	793,674	1,977,112
Chum	305,471	328,219	782,844
Total	3,292,378	3,478,830	3,751,410

On the basis of total stocks of 3,292,378 actual cases (consisting of cans of $\frac{1}{4}$-lb., $\frac{1}{2}$-lb., 1-lb., etc.), red salmon accounted for 1,902,932 cases (mostly 1-lb. and $\frac{1}{2}$-lb. cans) or 57.8 percent of the total canners' stocks on December 1, 1965; pink salmon accounted for 767,120 cases or only 23.3 percent (499,786 cases were 1-lb. talls). Next came chum (305,471 cases, mostly 1-lb. talls), followed by coho or silver (193,729 cases), and king salmon (123,126 cases).

Carryover stocks at the canners' level totaled 733,575 standard cases on July 1, 1965, the approximate opening date of the Pacific salmon packing season. Adding the 1965 new season pack of 3,541,187 standard cases brought the total available supply for the 1965/66 market season to 4,274,762 standard cases.

Shipments at the canners' level of all salmon species from July 1 to December 1, 1965, totaled 1,796,704 standard cases. The carryover of 733,575 standard cases on July 1, 1965, the beginning of the 1965/66 sales year, was substantially lower (37.6 percent) than the carryover of 1,175,588 cases a year earlier.

The 1965 U. S. pack of Pacific canned salmon (including Alaska) of 3,541,187 standard cases was 9.7 percent below the 1964 pack of 3,922,356 cases. By species, the new pack was made up of (1964 pack in parentheses): king, 95,503 standard cases (78,155); red 2,013,077 cases (831,815); coho, 170,064 cases (202,610); pink, 951,688 cases (2,055,311); chum, 310,855 cases (754,465).

Data on canned salmon stocks are based on reports from U. S. Pacific Coast canners who packed over 94 percent of the 1965 salmon pack. (Division of Statistics and

Table 2 - Total Canners' Stocks on Hand December 1, 1965 (Sold and Unsold), By Species and Can Size

Case & Can Size	King	Red	Coho	Pink	Chum	Total
	(Actual Cases)					
48 $\frac{1}{4}$-lb.	6,798	244,715	66,770	4,165	66	322,514
48 $\frac{1}{2}$-lb.	99,439	675,335	74,064	234,214	61,817	1,144,869
48 1-lb.	16,592	976,829	42,839	499,786	234,017	1,770,063
12 4-lb.	297	6,053	10,056	28,955	9,471	54,932
Total	123,126	1,902,932	193,729	767,120	305,471	3,292,378

Table 3 - Canners' Shipments from July 1, 1965, to December 1, 1965, By Species and Can Size

Case & Can Size	King	Red	Coho	Pink	Chum	Total
	(Actual Cases)					
48 1/4-lb.	7,402	180,333	58,068	4,328	1	250,132
48 1/2-lb.	69,413	307,680	58,484	178,126	32,275	645,978
48 1-lb.	4,139	483,794	65,261	549,851	264,526	1,367,571
12 4-lb.	42	3,406	4,213	28,984	7,050	43,611
Total	80,912	975,213	186,026	761,289	303,852	2,307,292

Economics, National Canners Association, December 29, 1965.)

Note: See Commercial Fisheries Review, January 1966 p. 46.

South Atlantic Fisheries Explorations and Gear Development

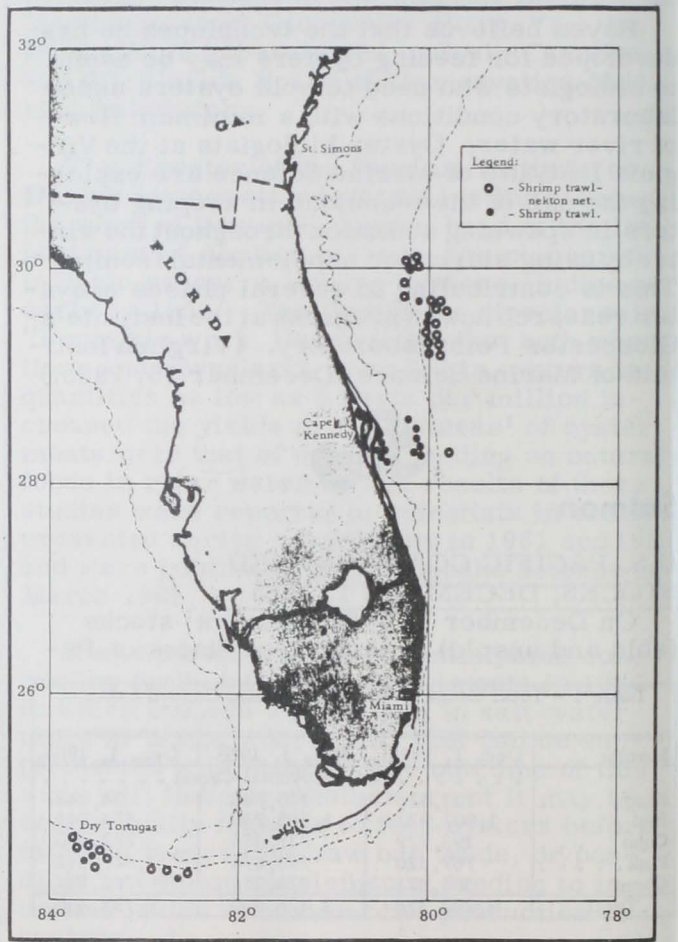
ROYAL-RED SHRIMP GROUNDS OFF FLORIDA COAST SURVEYED:

M/V "Oregon" Cruise 105 (November 17-December 3, 1965): A seasonal assessment of the royal-red shrimp (Hymenopenaeus robustus) stocks on grounds off St. Augustine, Fla., and the Dry Tortugas was made during this 17-day cruise. Another objective of the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon was to evaluate the related marine life communities of the continental slope area.

During the explorations, trawling transects using 40-foot flat trawls were conducted from 100 to 400 fathoms in each area covered; 65-foot flat trawls were used to determine shrimp abundance where good concentrations were indicated.

On the St. Augustine beds, good catches of royal-red shrimp were made in 185 to 200 fathoms. The best 3-hour drag yielded 125 pounds of heads-off shrimp in 195 fathoms. Ten 3-hour drags on those grounds yielded a total of 490 pounds of heads-off shrimp. Although shrimp ranged widely in size and were larger in deeper water, they averaged 36-40 count throughout the grounds. Catches of 15 to 55 pounds (heads-on) of the Florida lobsterette (Nephropsis aculeata) were taken concurrently with royal-red shrimp.

Royal-red shrimp were not located in commercial concentrations off the Dry Tortugas. Temperature transects through that area revealed that ideal bottom temperatures for royal-red shrimp (50° F.) were uniformly distributed between the 150- and 300-fathom curves. Such a condition usually results in population scatter. Trawling transects from 100 to 400 fathoms bore out this relationship as royal-red shrimp were taken as deep as 340 fathoms. The best catch yielded 15 pounds of heads-off shrimp (21-25 count) in a 3-hour drag using a 40-foot flat net. Shrimp caught off Dry Tortugas averaged a larger size than those off St. Augustine.



Station pattern of M/V Oregon Cruise 105 (November 17-December 3, 1965).

Several drags were made off Cape Kennedy in 28 to 38 fathoms to locate brown shrimp (Penaeus aztecus) with catches light and scattered. Large white shrimp (Penaeus setiferus) of 16-20 count were taken in 6 to 8 fathoms, averaging 25 pounds of heads-off shrimp per hour drag with a 40' flat trawl.

Deep-water drags in both areas worked yielded small quantities of whiting (Merluccius albidus), hake (Urophycis regius), and two species of rattails (Coelorhyncus carminatus and Nezumia bairdii). A large school of unidentified fish 2 to 3 fathoms off the bottom was recorded on the depth-finder in 240 fathoms southwest of Key West during one drag. Off St. Augustine, cancroid crab (Cancer borealis) were taken in quantities up to 175 pounds per 3-hour drag.

One-meter nekton-net stations yielded several juvenile swordfish (Xiphias gladius) and large numbers of juvenile dolphin (Coryphaena sp.), mullet (Mugil sp.), and lanternfish (Myctophidae).

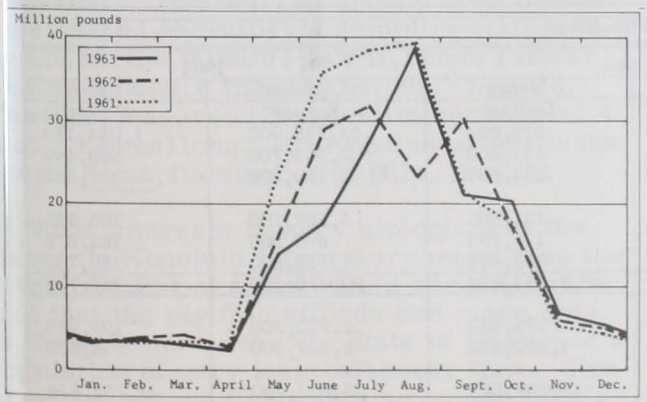
Seven little tuna (Euthynnus alletteratus) and 4 skipjack (Katsuwonus pelamis) were caught on trolling lines. A few small schools of both species were seen off Cape Kennedy, and a single small school of little tuna was observed off the Dry Tortugas.

Note: See Commercial Fisheries Review, May 1965 p. 37.

Texas

FISHERY LANDINGS, 1964:

Summary: Commercial landings of fish and shellfish at Texas ports in 1964 were 145.1 million pounds with an ex-vessel value of $29.5 million. That was a drop of 21.3 million pounds and $539,000 from 1963. Decreased landings in the menhaden and shrimp fisheries were the main reason for the decline.



Texas landings by months, 1961-63.

Shrimp: Texas landings of headless shrimp in 1964 amounted to 41.6 million pounds (66.1 million pounds, heads-on) with an ex-vessel value of $26.1 million. That was a decrease of 2.5 million pounds and $447,000 from 1963. However, Texas remained the top shrimp-producing State and accounted for 37 percent of the quantity and 42 percent of the value of domestic shrimp landings at Gulf of Mexico ports in 1964.

Brown shrimp continued to dominate the annual Texas harvest with 1964 landings of 25.9 million pounds (heads-off) valued at $16.8 million. The species made up 62 percent of total Texas shrimp landings in 1964 compared with 71 percent in 1963 and 69 percent in 1962. Waters along the Texas coast produced 19.9 million pounds of brown shrimp in 1964 compared with 25.9 million pounds in 1963. Landings of brown and pink shrimp from the high seas off Mexico totaled 9.2 million pounds (heads-off) compared with 7.5 million pounds in 1963. White shrimp landings were the highest on record since the beginning of the collection of detailed shrimp statistics in 1956. The bay systems along the coast produced 51 percent of the 1964 white shrimp catch. No commercial landings of seabob were reported in 1964.

The Brownsville-Port Isabel area accounted for 33 percent of the 1964 Texas shrimp landings; Aransas Pass-Rockport, 23 percent; Freeport, 22 percent; Galveston Bay area, 14 percent; and Port Arthur-Sabine Pass, 8 percent.

The average ex-vessel value of headless shrimp at Texas ports in 1964 was 63 cents a pound compared with 60 cents in 1963 and 77 cents in 1962.

In 1964, U. S. companies had fishing and processing permits in several Central and South American areas. Such activity was on a large scale in both number of vessels engaged and the magnitude of processing capabilities. Foreign operations have become an integral part of the supply complex of the Texas shrimp industry.

Oysters: In Texas the oyster fishery ranked third in volume of landings and second in value in 1964. Fishermen harvested a record 3.4 million pounds of oyster meats valued at $1.1 million. That was 739,000 pounds greater than the record quantity produced in 1963. The yield of select quality meats from public reefs averaged about two gallons a Texas barrel (296 pounds shell weight). There were no reports of "oyster kill" or meat discoloration during the year. Galveston and

Trinity Bays accounted for 87 percent of the State's total harvest; San Antonio Bay, 8 percent; and the remainder from 3 other areas along the coast. About 275 oyster-dredge units and several tong crews worked in the State for about 5 months during the year.

Blue Crab: In 1964, Texas blue crab landings of 2.5 million pounds valued at $176,000 were below the 3.0 million pounds valued at $200,000 in 1963. Production areas shifted to bays in northern Texas with 60 percent of the catch coming from the Galveston-Sabine areas and being trucked to processing plants along the coast. Four regular processors and two smaller plants operated in 1964, although none received the desired volume of crab at any time during the year.

Edible Finfish: Landings of edible finfish in 1964 amounted to 6.4 million pounds valued at $1.3 million, compared with 6.6 million pounds valued at $1.3 million in 1963. Red snapper landings in 1964 of almost 2.3 million pounds were only 2 thousand pounds below the record landings of 1908. Landings of spotted sea trout totaled 978,000 pounds valued at $252,000 compared with 1.2 million pounds valued at $302,000 in 1963. Black drum landings remained at the 1962-63 level of 1.4 million pounds despite the cancellation of contract drum netting in the Laguna Madre early in 1964. In recent years the closing of more inshore waters to net fishing has caused a general decline in the volume of domestic edible finfish landings.

Vessel Construction: The building of new fishing vessels continued at a rapid pace throughout 1964 when 64 new vessels were documented in Texas. Some of those vessels were taken to Caribbean and South American countries for use in the shrimp fishery. However, all will maintain U. S. registration and be manned by U. S. citizens. Texas shipbuilders at Aransas Pass, Freeport, Port Isabel, and the Galveston-Port Arthur area have established a "custom-made" trend in shipbuilding with the size, material, and hull design adapted to the individual needs of the purchasers. Vessels to be used as long-range craft were specifically constructed for fishing offshore under adverse conditions.

Thirty-four vessels were removed from documentation in 1964. Most of those were lost at sea. Four Texas vessels were sold and transferred to foreign flags.

Tuna

U. S. PACIFIC COAST ALBACORE FISHING SEASON FOR 1965 ENDS:

Strong southwesterly winds and near-record rainstorms prevailed along the entire West Coast during November 1965. High winds and rough to very rough seas kept the Pacific Northwest albacore tuna fishing fleet tied at dockside.

The 60-degree F. sea surface isotherm remained close to the coast from Cape Mendocino south to Point Conception, and albacore fishing was good off Morro Bay and Davidson Seamount whenever winds and seas

Texas Fishery Landings, 1963-1964

Species	1964		1963	
	Quantity	Value	Quantity	Value
Fish:	Pounds	Dollars	Pounds	Dollars
Menhaden	66,686,400	822,024	83,735,900	1,034,170
Snapper, red	2,249,800	631,200	2,168,700	590,440
Sea trout, spotted	977,700	251,681	1,190,200	301,601
Drum:				
Black	1,409,300	124,508	1,362,700	106,935
Red (redfish)	446,900	111,793	685,600	165,878
Other fish	1,381,800	172,448	1,332,200	158,702
Total Fish	73,151,900	2,113,654	90,475,300	2,357,726
Shellfish:				
Crabs, blue	2,484,800	175,552	2,982,200	199,968
Oysters	3,357,100	1,092,582	2,617,900	913,835
Shrimp (heads-on):				
Brown and pink	47,432,400	18,969,673	55,811,100	21,752,846
White	18,617,100	7,173,287	13,719,500	4,805,748
Other	3,600	1,151	700,800	32,899
Squid	23,500	2,350	37,400	3,884
Total Shellfish	71,918,500	27,414,595	75,868,900	27,709,180
Grand Total	145,070,400	29,528,249	166,344,200	30,066,906

Note: Oysters are reported in pounds of meats (8.75 pounds per gallon). All other species are shown in round weight. The weight of heads-on shrimp was determined by multiplying heads-off weight by the following factors: brown 1.61; pink 1.60; white 1.54, royal-red 1.80; and seabob 1.53.

ibated. Landings continued to rise in southern California, and by the end of November totaled 10,730 tons.

Albacore landings at Pacific Northwest ports during the 1965 season were estimated at about 7,500 short tons. Canneries in Astoria, Oreg., took about 6,500 tons; canneries in Seattle, Aberdeen, and Anacortes probably took all of the remainder.

Total albacore tuna landings for the West Coast during the 1965 season were about 13,230 tons, ranking just below the average over the 21-year postwar period. The season could well have been the poorest on record, had it not been for the Pacific Northwest landings, which were among the highest on record since World War II. The California albacore fishery in 1965 was the poorest season since 1947.

Note: See Commercial Fisheries Review, November 1965 p. 36.

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RECORD SIZE ALBACORE CAUGHT OFF HAWAII:

The largest albacore tuna known to science turned up during late 1965 in the Honolulu fish auction market in Hawaii. It was a male that weighed a whopping 98 pounds; the previous record was set in 1955 by another male that weighed 93 pounds.

The fish was spotted by a biological technician of the U. S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu. The laboratory technician attends the predawn fish auction daily to sample the Hawaiian catch. "I've worked around albacore before, in the Laboratory's sampling station in Samoa but the minute I saw it, I knew I never saw an albacore that big before," he said. The fish measured 128.4 centimeters (about 4 feet 2 inches) long. The fish was caught by the vessel Ilima, fishing out of Hilo, Hawaii.

What interests fishery biologists at the Bureau's Honolulu Laboratory more than the establishment of a new world record, is the fact that the big fish affords one more clue to the existence near the State of Hawaii of a population of very large albacore tuna. The previous record fish was also caught off Hawaii, and albacore taken in the Hawaiian fishery average larger than those taken in the major fisheries--those off the United States coast and off Japan. According to a fishery biologist at the Bureau's Honolulu Biological Laboratory, Hawaiian fishermen catch less than 10 tons of albacore tuna a year. About 60,000 tons a year are taken by the Japanese in the Pacific Ocean and about 25,000 tons by the mainland U. S. fisheries.

The Bureau biologist and other scientists have established the fact that the Japanese and American fisheries draw upon a common stock. Albacore tagged off the Pacific northwest have turned up in the Japanese catch. It is the Bureau biologist's theory that the albacore spawn in the tropical Pacific and then migrate to the north temperate Pacific. For several years, they remain in the temperate eastern Pacific or cross the Pacific to mingle with the albacore off Japan. Late in their lives they reach sexual maturity and return to the warm waters of the tropics to spawn. It is this old, spawning stock that the Hawaiian fishery samples, the biologist says. Evidence that the albacore spawn in warm seas comes from finding very young but recognizable albacore in the stomachs of predatory billfish landed near Hawaii.

The age of the record albacore specimen recently caught is estimated at about 14 years. Its weight of 98 pounds far exceeds the Hawaiian average of about 70 pounds, which itself is far above the 20 to 30 pounds of the U. S. and Japanese fisheries. The fish was caught at a depth of about 350 feet.

The record size fish created little stir in the auction market. The fishermen recognized it as being exceptionally large, but said that in the past they had taken even larger ones that were unreported. The fish was auctioned off and wound up that evening on Honolulu dinner tables.

U. S. Fishing Vessels

FISHERIES LOAN FUND AND OTHER FINANCIAL AID FOR VESSELS, OCTOBER 1-DECEMBER 31, 1965:

From the beginning of the program in 1956 through December 31, 1965, a total of 1,728 applications for $44,070,515 was received by the U. S. Bureau of Commercial Fisheries, the agency administering the Federal Loan Fund. By that date, 896 applications ($19,612,154) had been approved, 558 ($13,116,964) had been declined or found ineligible, 229 ($8,524,758) had been withdrawn by the applicants before

being processed, and 45 ($784,751) were pending. Of the applications approved, 328 were approved for amounts less than applied for--the total reduction was $2,031,888.

The following loans were approved from October 1 through December 31, 1965:

New England Area: Raymond F. Stoddard, Portland, Me., $4,670; Trawler Notre Dame, Inc., Chelsea, Mass., $50,000; and Manuel F. Roderick, Inc., Stoneham, Mass., $60,000.

South Atlantic and Gulf Area: Louis E. Wiegand, Miami, Fla., $15,000.

California: James M. Battle, Eureka, $6,630.

Pacific Northwest Area: Calvin W., Nellie I., and Caral E. Johnson, Astoria, Oreg., $23,082; James H. and Leola E. Baumgartner, Coos Bay, Oreg., $15,000; Kenneth N. Holland, Anacortes, Wash., $10,092; Edward B. and Myrtle L. Kary, Ilwaco, Wash., $15,750; Michael J. Carr, Mercer Island, Wash., $10,751; Herbert O. Bromley, Port Townsend, Wash., $6,000; and L. H. Chaney, Seattle, Wash., $9,000.

Alaska: Roman Cabanilla, Cordova, $8,000; J. A. Rollin, Cordova, $5,300; Perry C. and Julia R. Coburn, Ketchikan, $24,000; Harold T. and Mavis Irene Hendricksen, Ketchikan, $5,000; Philip C. Hoffman, Ketchikan, $3,500; Charles A. McVicker, Ketchikan, $9,000; Jones Paul Hotch, Klukwan, $4,000; Hans Broadland, Petersburg, $10,000; Neal J. and Jan P. MacDonald, Petersburg, $29,600; and Paul I. Olson, Petersburg, $6,000.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the fourth quarter of 1965, a total of 8 applications for $635,100 was received. Since the program began (July 5, 1960), 94 applications were received for $8,564,495. Of the total, 74 applications were approved for $5,487,187 and 11 applications for $1,389,900 were pending as of December 31, 1965. Since the mortgage insurance program began, applications received and approved by area are:

New England Area: Received 14 ($1,646,750), approved 10 ($1,217,178).

California: Received 2 ($1,262,000), approved 2 ($1,262,000).

South Atlantic and Gulf Area: Received 61 ($3,509,024), approved 53 ($2,416,939).

Pacific Northwest Area: Received 12 ($2,071,125), approved 5 ($526,296).

Alaska: Received 5 ($75,596), approved 4 ($64,774).

The first applications for a Fishing Vessel Construction Differential Subsidy under the Bureau's expanded program were received in December 1964. Through December 31, 1965, a total of 55 applications for $11,638,500 had been received. Public hearings on 34 applications were completed during that period and 8 invitations to bid on a vessel were sent out.

U. S. Foreign Trade

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

United States imports of tuna canned in brine during January 1-December 4, 1965, amounted to 43,649,271 pounds (about 2,078,536 standard cases), according to preliminary data compiled by the U. S. Bureau of Customs. That was an increase of 2.0 percent from the 42,801,114 pounds (about 2,038,148 standard cases) imported during January 1-November 28, 1964.

The quantity of tuna canned in brine which could be imported into the United States during the calendar year 1965 at the 12½-percent rate of duty was limited to 66,059,400 pounds (or about 3,145,685 standard cases of 48 7-oz. cans). Any imports in excess of that quota would have been dutiable at 25 percent ad valorem.

Washington

CHANGE PROPOSED IN LEGAL DEFINITION OF COMMERCIAL SALMON TROLLING GEAR:

At a public hearing held in Olympia, Wash., December 18, 1965, by the Washington State Department of Fisheries, proposed changes discussed in the 1966 sport fishing regulations for food fish included a proposal to redefine commercial salmon trolling gear.

It was proposed that the legal definition of commercial salmon trolling gear be changed so that it would be unlawful to troll for salmon commercially with gear that is not permanently fixed or fastened to the vessel. Under the new definition, gear commonly used in salmon angling would not be legal in commercial salmon trolling.

Following public comment on the proposals, final regulations were to be adopted at another public meeting scheduled for December 21. (Washington State Department of Fisheries, December 3, 1965.)

* * * * *

SPORT SALMON FISHERMEN BARRED FROM COMMERCIAL FISHERY:

A new Washington State regulation makes it unlawful to troll for salmon commercially with gear that is not fixed or fastened to the vessel.

The new regulation is designed to close what might be called a "loophole," through which the 3-fish limit for Washington sport salmon fishermen could be circumvented by the device of obtaining a commercial trollers' license under which the licensee could take as many salmon as he wished.

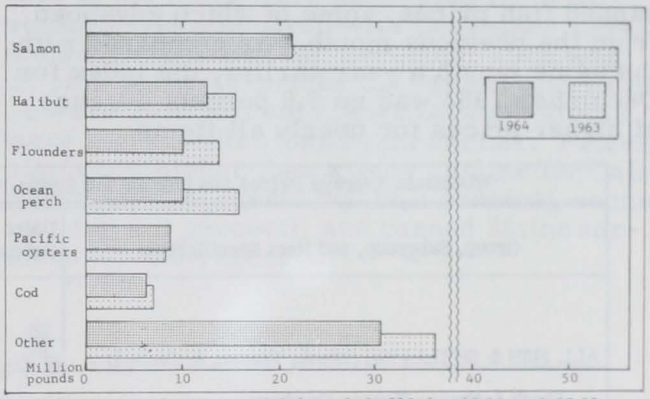
"The practice of catching salmon on sport gear and selling them," the Director of the Washington Department of Fisheries said, "is growing at a rapid rate and if not curtailed now would soon create a severe management problem. This growth includes all sizes of 'comm-sport' boats, including the large, modern sport charter vessels which carry thousands of anglers each year. Our goal is to make available to our citizens the maximum sustained benefits from the fisheries resource. We feel that the primary product of our sport fishery is recreation and adherence to the 3-fish bag limit in the recreational fishery brings about sharing of the sport catch among greater numbers of the angling public . . . . Under the new regulation, the serious small-boat commercial troller may continue fishing by switching to the use of fixed gear."

* * * * *

LANDINGS OF FISH AND SHELLFISH, 1963-1964:

The 1964 commercial landings of fish and shellfish in Washington State totaled 100.9 million pounds with an ex-vessel value of $15.6 million, a decline of 33 percent in quantity and 27 percent in value from 1963. Salmon was the leading species in 1964, followed by halibut, flounder, ocean perch, and Pacific oysters.

Salmon: The 1964 salmon catch in Washington totaled 21.3 million pounds valued at $6.5 million, a drop of 61 percent in quantity and 42 percent in value from the previous year. The decline was due mainly to an off-cycle year for pink salmon in 1964 and a light catch of sockeye salmon. Also, the catch of king salmon declined from 6.4 million pounds in 1963 to 5.6 million pounds in 1964. But the catch of silver salmon jumped from 6.1 million pounds in 1963 to 9.4 million pounds in 1964. The chum salmon catch amounted to about 3.1 million pounds in both years.



Washington landings of fish and shellfish, 1964 and 1963.

Halibut: The 1964 landings of halibut in Washington (by United States fishermen) totaled only 12.1 million pounds valued at $2.3 million as compared with 15.4 million pounds valued at $2.7 million in the previous year.

Bottomfish: The otter-trawl fleet also reported a general decline in landings of most species in 1964. The 1964 landings included flounder 11.3 million pounds (13.3 million in 1963), ocean perch 11.3 million pounds (15.6 million in 1963), true cod 6.2 million pounds (6.3 million in 1963), and rockfish 5.9 million pounds (8.0 million in 1963).

Shellfish: The 1964 shellfish landings consisted mostly of 8.2 million pounds of oyster meats valued at $2.2 million (about the same as in 1963) and 5.2 million pounds of Dungeness crab valued at $1.1 million (down 23 percent in quantity and 21 percent

in value from 1963). The shellfish landings also included small quantities of clams and shrimp.

Note: See Commercial Fisheries Review, May 1964 p. 36.

Wholesale Prices

EDIBLE FISH AND SHELLFISH, DECEMBER 1965:

There was a general downward trend in prices from November to December 1965 and the wholesale price index for edible fishery products was down slightly. At 119.3 percent of the 1957-59 average, the overall index in December 1965 was down 0.1 percent from the previous month. The exception to generally lower December prices for fresh and frozen fish and shellfish was in canned fish prices, some of which advanced from the previous month. As compared with the same month a year earlier, the index for December 1965 was up 8.9 percent because of higher prices for nearly all items.

December 1965 prices were down from the previous month for ex-vessel large haddock (down 16.6 percent) and at New York City for fresh round yellow pike (down 8.4 percent). Those lower prices were only partly offset by higher prices at Chicago for Lake Superior fresh whitefish (up 8.7 percent) and a slight increase in prices for frozen western dressed halibut. As a result, the subgroup index for drawn, dressed, or whole finfish dropped 4.0 percent from November to December. As compared with December 1964, the subgroup index for December 1965 was up 11.0 percent. December 1965 prices for all items in the subgroup ranged from high to sharply higher than a year earlier--up 20.2 percent for ex-vessel haddock, 19.2 percent for frozen halibut, and 22.6 percent for Great Lakes whitefish.

In the subgroup for fresh processed fish and shellfish, prices for fresh haddock fillets in December were down 8.4 percent from the previous month. Prices for other items in the subgroup were unchanged. The subgroup index dropped 0.6 percent from November to

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, December 1965 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Dec. 1965	Nov. 1965	Dec. 1965	Nov. 1965	Oct. 1965	Dec. 1964
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					119.3	119.4	118.0	109.5
Fresh & Frozen Fishery Products:					120.6	122.7	121.1	113.8
Drawn, Dressed, or Whole Finfish:					123.4	128.5	131.9	111.2
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.15	.18	119.6	143.4	181.0	99.5
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.48	.48	141.0	140.5	142.0	118.3
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.88	.88	122.3	122.3	117.0	115.6
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.63	.58	93.3	85.8	78.3	76.1
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.71	.78	116.2	126.9	99.9	114.6
Processed, Fresh (Fish & Shellfish):					123.5	124.2	119.1	111.9
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.44	.48	105.7	115.4	119.0	109.3
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.91	.91	106.6	106.6	101.4	105.5
Oysters, shucked, standards	Norfolk	gal.	8.75	8.75	147.6	147.6	141.2	120.1
Processed, Frozen (Fish & Shellfish):					110.6	110.9	107.6	112.8
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.41	101.4	103.9	100.1	92.5
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.40	.40	115.8	117.3	117.3	115.8
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.32	.32	112.2	112.2	107.0	105.2
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.91	.91	107.9	107.3	102.6	113.8
Canned Fishery Products:					117.5	114.0	113.0	102.2
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	27.50	27.00	119.8	117.7	117.7	92.6
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	12.25	11.56	108.8	102.6	102.6	102.6
Mackerel, jack, Calif., No.1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	7.13	7.13	120.9	120.9	120.9	105.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.25	10.25	131.5	131.5	121.9	128.3

1/ Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

December but was up 10.4 percent from December 1964 principally because of sharply higher prices in December 1965 for standard shucked oysters (up 22.9 percent).

Dressing fish aboard a New England trawler.

Prices for frozen fillets in December 1965 were generally lower than in the previous month. The subgroup index for frozen processed fish and shellfish at 110.6 percent of the 1957-59 average dropped 0.3 percent from the preceding month. Prices were lower than in November for frozen flounder fillets (down 2.4 percent) and small haddock fillets (down 1.3 percent). Frozen shrimp prices at Chicago were up slightly from the previous month. The subgroup index in December was down 2.0 percent from the same month a year earlier. While prices of some species of frozen fillets were higher than in December 1964, frozen shrimp prices at Chicago in December 1965 were down 4.8 percent from December a year earlier.

The December 1965 subgroup index for canned fishery products rose 3.1 percent from the previous month. Prices for canned pink salmon in December were 1.8 percent higher than in November because of this past season's short pack, and there were indications of a much stronger market for canned tuna (prices up 6.0 percent from November to December). Prices for other canned fish products in the index were unchanged from November. As compared with December 1964, the subgroup index for December 1965 was up 15.0 percent--prices for canned pink salmon were 29.4 percent higher because stocks were more limited than a year earlier. Prices also were higher than a year earlier for California jack mackerel (up 14.2 percent), canned tuna (up 6.0 percent), and canned Maine sardines (up 2.5 percent).

NEW HYDROFOIL CRAFT TO BEGIN PASSENGER SERVICE

A new chapter in maritime history was made in Baltimore, Md., when the forerunner of a fleet of fast, 75-passenger hydrofoil craft hit the water for the first time. Named HS Victoria, the ship can hit 40 knots top speed when "foilborne," and was expected to go into service in fall 1965 between Seattle, Wash., and Victoria, B. C. This past summer she underwent sea trials in Chesapeake Bay.

HS Victoria is 64 feet 9 inches long, has a range of 180 nautical miles and carries a crew of three. Resting on her hull, the craft draws more than 14 feet, but when up on her foils can skim over the surface with a draft of 7 feet 6 inches. The hydrofoil is powered by twin gas turbines.

The new ship, when in passenger service, will make three 75-mile round trips a day. The owners say the vessel is the predecessor to a fleet of such craft planned for operation between major port cities in the United States and abroad.

The basic concept of a hydrofoil is a ship on stilts, 2 aft and 1 forward. Each stilt has a pontoon on the bottom. The ship rests on the hull at slow speeds and rises on the foils as momentum is picked up. The HS Victoria was built by a Baltimore shipyard. (Science News Letter, August 7, 1965.)