



Nantucket fishing boats. (Photo: Robert K. Brigham)

# 1968 PRODUCTION OUTLOOK IS NOT ENCOURAGING

The 1968 production outlook for the U. S. fishing industry is not encouraging. Groundfish abundance off New England is down--including haddock, cod, pollock, and flounder. Shrimp production, primarily in the Gulf of Mexico, is expected to be less than in 1967. Salmon production should improve over 1967, a particularly poor year, but may not reach 1965 and 1966 levels. The catches of Northern lobsters and sea scallops are not likely to increase much, if at all. Little change is ex-

pected in catches of crabs and oysters. Imports will continue to be the major source of edible fishery products in 1968--providing more than half the available supplies.

Prices will work up slowly during 1968. During the first quarter, retail prices for canned tuna and frozen shrimp are expected to be relatively favorable for consumers. Little increase is expected for these two items this year.



## THE 1967 STORY

Latest data, as of Jan. 22, 1968, indicate that supplies of edible fishery products in 1967 dropped about 3 percent--70 million pounds--below 1966. Imports did not increase as anticipated, although domestic production did drop, as expected. Besides the small run of salmon, there were disappointing catches of Northern lobsters, sea scallops, haddock, ocean perch, Atlantic coast flounders, and whiting; all contributed to the reduced domestic production.

Except for canned salmon, stocks at year's end were not unusually low, but they reflected the reduced supplies of many popular items. Cold-storage holdings of fillets of cod and haddock were below those of a year ago. Also lower were holdings of halibut, swordfish, whiting, spiny lobster tails, oysters, crabs and crab meat, scallops, and cured fish. On the plus side, frozen stocks of shrimp were sharply above those of a year ago. (BCF Branch of Current Economic Analysis.)



# UNITED STATES

## Friday Meat Hurts New England Fishermen

During the 9 months following the decree of the Roman Catholic Bishops of the United States abolishing meatless Fridays, the estimated average prices of New England fish were 12.5 percent lower than normal "after considering all other factors that affect fish demand." The loss to the New England industry was estimated at about \$3 million. "Although the short-run impact of the Church decrees has resulted in economic loss to the fishing industry, the long-run demand for fish remains uncertain."

This is reported by economist Frederick W. Bell in the December 1967 issue of "The New England Business Review" of the Federal Reserve Bank of Boston, Mass.

The fishing industry's problems were aggravated by smaller catches in early 1967, which depressed already-sagging revenues. To make matters worse, meat and poultry--chief competitors of fish--were plentiful in 1967 and their prices were dropping.

### Two Church Actions

In February 1966, Pope Paul VI decreed that Catholics no longer had to abstain from eating meat during Lenten weekdays, except on Fridays. (Lent is the 40 weekdays from Ash Wednesday to Easter.) Also, he empowered national conferences of bishops to end the ban on eating meat on Fridays during the rest of the year. In the United States, in November, the bishops announced that the ban would be lifted in December.

### Short-Run Effect

Bell states that the U. S. Northeast is an excellent area in which to assess the impact of the bishops' decree on fish consumption: much fresh fish is landed and distributed widely, and 45.1 percent of the population is Catholic, over twice the percent in any other region, according to the U. S. Department of Commerce.

To study the problem, 7 species of fish distributed to a large Catholic population were selected. These comprise about 72 percent by quantity and 79 percent by value of the catch landed in New England ports--excluding lobster, clams, oysters, and miscellaneous marine products. "It is unlikely that the latter are heavily tied to meatless Fridays." The species considered were:

Species	Principal Ports
Sea Scallops	New Bedford
Yellowtail flounder	New Bedford-Pt. Judith-Provincetown
Scrod (small haddock)	New Bedford-Boston-Gloucester
Large haddock	New Bedford-Boston-Gloucester
Cod	New Bedford-Boston-Gloucester
Ocean perch	Gloucester-Portland-Rockland
Whiting	Gloucester-Provincetown-Portland

Bell's study focused on 2 time periods: the 10 years before the decree, January 1957 to November 1966, and the period after the decree, December 1966 to August 1967. February and March were excluded because Catholics must not eat meat on Lenten Fridays.

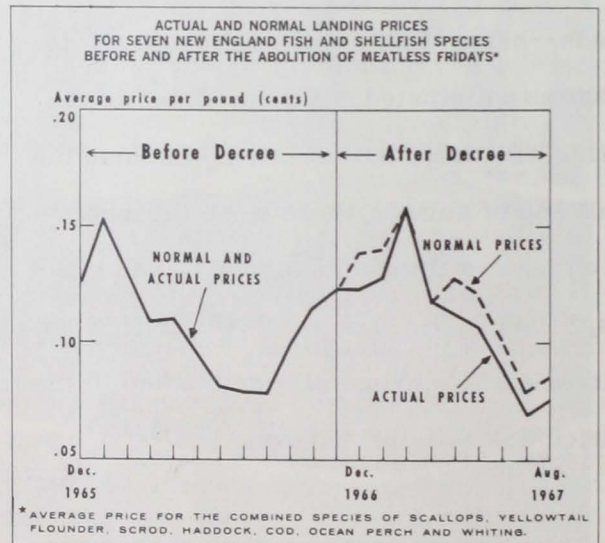


Table 1 - Impact of the Abolition of Meatless Friday on New England Landing Prices for Seven Fish and Shellfish Species (December 1966-August 1967)<sup>1/</sup>

Species	Actual Price Per Pound <sup>3/</sup>	Actual Revenue	Normal Price Per Pound <sup>4/</sup>	Normal Revenue <sup>5/</sup>	Decline in Revenue <sup>6/</sup>	Percent Change in Revenue and Price
	\$	\$1,000	\$	\$1,000	\$1,000	%
Sea scallops . . .	66.1	2,943	79.3	3,546	603	-17
Flounder <sup>2/</sup> . . .	11.7	2,989	13.6	3,476	487	-14
Scrod . . . . .	11.3	4,228	11.5	4,314	86	- 2
Haddock . . . .	13.6	2,512	17.4	3,180	668	-21
Cod . . . . .	8.9	1,949	9.9	2,166	217	-10
Perch . . . . .	4.1	1,859	4.4	2,020	161	- 8
Whiting . . . . .	3.1	1,251	3.8	1,563	312	-20
Total (all species)	9.2	17,731	10.6	20,265	2,534	-12.5

1/Excludes February and March.

2/Yellowtail flounder.

3/Weighted average (weighted by quantity landed).

4/Normal price is determined by all demand factors which affect price, except bishops' decree.

5/Normal price multiplied by actual landings.

6/Normal revenue minus actual revenue.

Source: Federal Reserve Bank of Boston and BCF.

He reports: "After statistically controlling all demand factors that affect landing prices, the study showed that in the period after the bishops' decree prices were lower than normal for all seven species considered. Normal prices are defined as those resulting from all other demand factors except the bishops' decree."

His analysis discloses that landed prices of fish in New England averaged 12.5 percent lower than normal after the decree. The drop in monthly prices below normal ranged from about 21 percent for haddock to 2 percent for scrod.

For the 7 species, the fishing fleet lost about \$2.5 million from December 1966 to August 1967 (excluding February and March). Using the average price decline of the 7 to estimate the approximate price decline for the remaining New England species (excluding lobsters, clams, oysters, and others) indicates that the total loss may be over \$3 million for December-August. The economic loss is distributed among many communities; New Bedford is hardest hit.

Bell says his findings are consistent with those of other surveys. A recent one of suburban families in Chicago, Ill., found 35 percent eating less fish than before the decree. The Gallup poll in January 1967 revealed that 54 percent of the 45 million U. S. Catholics planned to eat meat on Friday.

As far as the effect of the Pope's decree permitting Catholics to eat meat during Lenten weekdays, except Fridays, Bell

believes more post-decree Lenten months must be studied before "the exact impact may be assessed."

#### Other Problems for Industry

From December 1966 to August 1967 landings of the 7 species dropped 23 percent under the figure for the year-earlier period. "Holding all other demand factors constant, the decline in landings produced a 16 percent decline in industry revenue or approximately \$4.4 million." Bell attributes the decline to rough weather in early 1967 and seasonal scarcity of fish in the Northwest Atlantic.

Table 2 - Change in Landings for the New England Fishing Industry (Period Following the Abolition of the Meatless Friday Compared with the Prior Period)

Species	Landings		Percent Change
	12/65-8/66	12/66-8/67 <sup>1/</sup>	
	. . . . (1,000 Lbs.) . . . .		%
Sea scallops . . . .	9,104	5,167	-43
Yellowtail flounder	50,041	34,979	-30
Scrod . . . . .	60,760	47,642	-22
Haddock . . . . .	30,517	22,206	-27
Cod . . . . .	20,896	23,959	+15
Ocean perch . . . .	62,326	53,791	-14
Whiting . . . . .	57,092	37,903	-34
Total (all species)	290,736	225,647	-22

1/Includes February and March.

Source: BCF.

The monthly index of meat and poultry prices averaged 4 percent below 1966's--resulting in a drop in fish prices of about 5 percent. This produced a loss of \$1.5 million in December 1966-August 1967 for the 7 species. "Although the decline in landings and the fall in meat and poultry prices may be

just temporary, they have served to aggravate the impact of the bishops' decree."

#### Long-Run Effects are Uncertain

Bell believes it is too early to assess the long-run reactions of Catholics to the church changes--"perhaps, 18 to 24 months will be necessary." To do this, answers would have to be obtained for several important questions:

1. Did Catholics eat more fish than non-Catholics before the decree? Non-Catholic demand for fish may be considered "normal"--"without artificial inducements." If Catholics ate more fish than other groups before the decree, this extra consumption might have vanished after the decree and produced Bell's findings.

2. Catholics may have eaten the same amount of fish as non-Catholics--but reduced consumption for a short period with their new freedom. If this is what happened, "it might imply long-run optimism for the industry since Catholics may, after a time, return to 'normal' fish eating habits of non-Catholics."

3. There is a possibility, less pleasant for the industry, that "both Catholic and non-Catholic demand was artificially created by the institution of meatless Fridays." Many restaurants and institutions served fish on Friday and that may have induced non-Catholics to eat more fish than usual.



### 1967 New England Landings Dropped Sharply

New England food fish landings in 1967 were 354 million pounds--down 78 million pounds from the 432 million of 1966. Industrial fish landings were 73.7 million pounds, compared to 77.2 in 1966.

Landings at Boston Fish Pier were 77 million pounds; in 1966, they were 89 million. The big drop was in scrod haddock--33 million, compared with 48 million in 1966. Average exvessel price for all fish landed in Boston--12.11 cents a pound--was only slightly above 1966.



## Washington State Water Standards Approved

Secretary of the Interior Stewart L. Udall has approved the water quality standards adopted by the State of Washington to protect and improve the quality of its hundreds of miles of interstate and coastal waters. The standards provide that existing water quality will be retained or improved.

Under the Water Quality Act of 1965, the States were given the opportunity to establish standards to enhance the quality of their interstate and coastal waters, subject to approval by the Interior Secretary.

Washington joined 10 other States whose standards have been approved in whole or in part.

The Washington standards provide for multiple use of interstate and coastal waters, including swimming, boating, oyster harvesting, and salmon migration. All these waters will be made suitable for swimming, except the 3 industrial harbor areas of Seattle, Everett, and Bellingham. The standards include a time schedule for building a secondary-treatment facility for all domestic, commercial, and industrial wastes discharged to fresh water streams by 1972.

#### Thermal Effects

Secretary Udall noted that a recently started two-year study of the effects of raising water temperature by power plants and other operations in the Columbia River Basin should help to resolve the differing limitations imposed by Washington and neighboring Oregon on the allowable change in water temperature. The study is being made by officials of Washington and Oregon; Interior's Federal Water Pollution Control Administration, and the Atomic Energy Commission. Temperature changes in streams, and their effects on fish and other aquatic life, are a concern of Interior Department.

Water quality standards have been approved in whole or in part by: Oregon, except for a small part including the Klamath River and Goose Lake drainage areas; Georgia, New York, Indiana, South Dakota, Arkansas; Idaho, except for Bear River Basin; Maryland, Massachusetts, and North Dakota, except for Red River of the North.

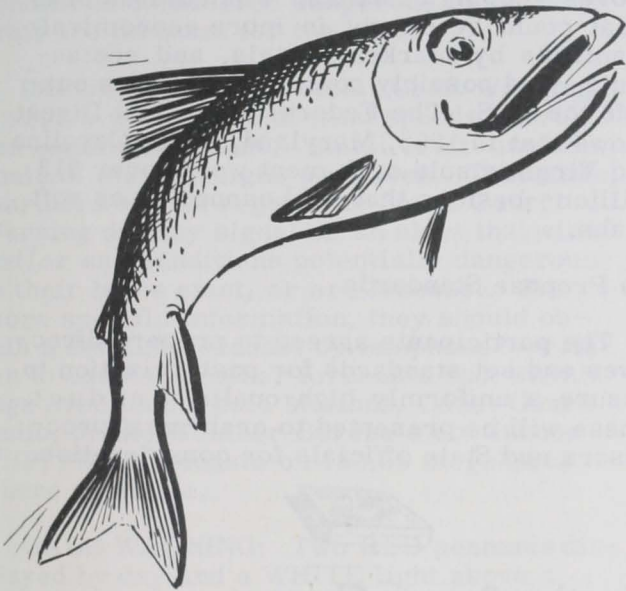
Standards submitted by the remaining States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, and the Virgin Islands are being reviewed.



## Lake Trout Are Back in the Swim

The lake trout of Lake Superior, driven close to extinction by the fierce attacks of the eel-like sea lampreys, have been rescued by--man. In 1967, the lake trout were more abundant than at any time in nearly 30 years; they had increased over one-third in just one year. And only 2 percent of the trout examined showed the wounds of the lifesucking lampreys.

The lampreys first made their way into the Great Lakes in the 1940s--and came close to annihilating the lake trout of Lakes Michigan, Superior, and Huron.



### Counterattack

In 1958, scientists of BCF and the Canadian Government launched a 2-fold lamprey-control program, which was administered by the Great Lakes Fishery Commission. A "lampricide," a chemical developed by BCF scientists to kill only the larvae and young of lampreys, was spread through the parts of streams in which lampreys spawn.

And, to fill the ravaged ranks of the lake trout, vast quantities of juveniles were put into the affected lake areas.

By 1961, in Lake Superior, the tide of battle began to turn. Since then, the lake trout

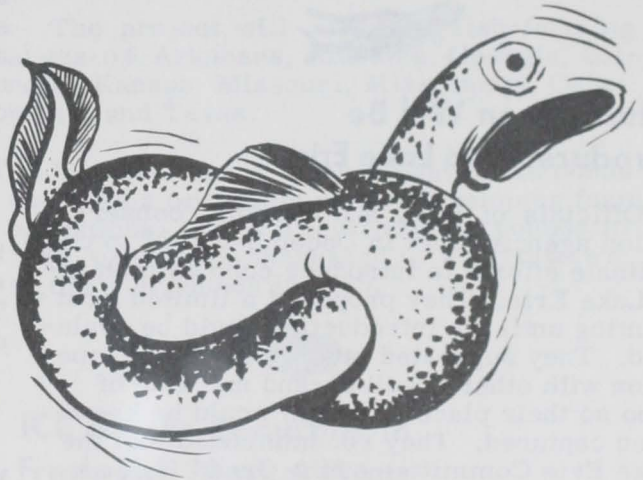
have increased steadily--and the lampreys have declined steadily.

### Many Streams Treated

After Lake Superior, and by the end of 1966, all lamprey-infested streams entering Lake Michigan were treated. Hatchery-reared trout fingerlings were first put into the lake in 1965 and have grown well.

To aid Lake Huron's trout, lampricide treatment has begun of infested streams in the U. S. and Canada that flow into the lake.

Overall, the lampricide has been used on more than 250 infested streams that make their way into the Great Lakes.



### Lamprey Control May Cut Alewives Too

Lamprey control also may aid in the campaign against the unusually abundant herring-like alewife that was a great nuisance to Lake Michigan communities in 1967. Alewives died in great numbers. They were expensive to haul away, forced out some private owners, and hurt the tourist trade. Now, with fewer lampreys present, fewer lake trout and coho salmon will be killed by them. So more of the salmon now being planted will survive--and eat more alewives.

### Millions of Lake Trout Planted

In 1967, 5½ million lake trout were planted in Lakes Superior and Michigan by Ontario

Province, the States, and the Bureau of Sport Fisheries and Wildlife. All in all, about 24 million hatchery-produced trout have been introduced into those lakes since the program started.

#### Salmon Thriving

In 1966 and 1967, Michigan put almost 4 million coho and chinook salmon into Lakes Superior and Michigan. In 1967, fishermen caught 31,000 coho, most over 11 pounds, in Lake Michigan. About 15,000 smaller cohos were caught in Lake Superior.

#### "Splake" May Make Splash

Canada has had good results from a 5-year experiment with "splake," a lake trout-brook trout mixture. She is considering introducing it into Lake Huron in 1969-70.



### Coho Salmon Will Be Introduced Into Lake Erie

Officials of U. S. and Canadian conservation agencies met in December 1967 to coordinate efforts to introduce coho salmon into Lake Erie. They proposed a limited first planting until the introduction could be evaluated. They suggested studies of coho competition with other species--and marking of coho so their place of origin would be known when captured. They recommended that the Lake Erie Committee of the Great Lakes Fishery Commission serve as coordinating agency; also, that the Commission act as clearinghouse for information on the program, and assign tagging marks to agencies.

The officials represented the Province of Ontario, the States bordering Lake Erie, Bureau of Commercial Fisheries, Bureau of Sport Fisheries and Wildlife, and the Commission.

#### States to Introduce Coho

In spring 1968, Pennsylvania proposes to introduce 100,000 coho fingerlings, Ohio 25,000, and New York may plant some.



### Three States Seek to Standardize Crab-Meat Pasteurization

Representatives from Maryland, North Carolina, and Virginia met at the Virginia Institute of Marine Science, Gloucester Point, Va., recently to discuss pasteurization of crab meat. The group included seafood processing specialists, members of State health departments, seafood packers and marketers, and researchers.

#### Larger Market Possible

It is generally agreed that the industry will benefit from marketing larger quantities of pasteurized crab meat because this improves keeping qualities. Pasteurized crab meat could be bought in more economical quantities by markets, hotels, and restaurants--and possibly could find markets outside the U. S. The Federal Statistical Digest shows that in 1965, Maryland, North Carolina and Virginia sold crab meat worth over \$13 million--besides that sold canned or as soft crabs.

#### To Propose Standards

The participants agreed to prepare directives and set standards for pasteurization to assure a uniformly high-quality product. These will be presented to crab-meat processors and State officials for consideration.



### Weather Bureau Changes Coastal Warning Terms

The WHOLE GALE warning used in weather forecasts for marine interests along the coasts and on the Great Lakes will be changed to STORM warning, effective March 1, 1968, according to Dr. George P. Cressman, Director of the U. S. Weather Bureau. The term STORM also will be applied to the flag-and-light signals formerly called WHOLE GALE signals, which are displayed at coastal locations.

STORM warnings and displays will indicate that winds of 48 knots (55 miles an hour) or more are expected.

HURRICANE WARNINGS will be issued to mariners and displayed as signals only when

storms of tropical origin are expected to cause winds of 64 knots (74 miles an hour) or more. When there is no tropical storm, a STORM warning will indicate forecast winds of any velocity over 47 knots.

These changes will make Weather Bureau terminology conform to that used internationally.

Now, the warnings and display signals will be:

**SMALL CRAFT WARNING:** One RED pennant displayed by day--and a RED light over a WHITE light at night--to indicate winds up to 33 knots (38 miles an hour) and/or sea conditions considered dangerous to small craft are forecast for the area.

**IMPORTANT!** The Small Craft Warning covers a wide range of wind speeds and/or sea conditions. Also, "small craft" include boats of many designs and sizes. Therefore, mariners should regard the Small Craft Warning display signal as an alert that wind and/or sea conditions potentially dangerous to their boats exist, or are forecast. For more specific information, they should obtain a detailed forecast by telephone--or listen to coastal weather forecasts and warnings over local radio stations, Coast Guard radio, or the Weather Bureau's continuous VHF/FM broadcasts on 162.55 megahertz where available.

**GALE WARNING:** Two RED pennants displayed by day and a WHITE light above a RED light at night to indicate winds within 34 to 47 knots (39 to 54 miles an hour) are forecast for the area.

**STORM WARNING:** A single square RED flag with a BLACK center displayed by day, and two RED lights at night, to indicate that winds 48 knots (55 miles an hour) and above, no matter how high the velocity, are forecast for the area.

**IMPORTANT!** If the winds are associated with a tropical cyclone (hurricane), the "Storm Warning" display indicates forecast winds of 48 to 63 knots (55 to 73 miles an hour).

**HURRICANE WARNING:** Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day, and a WHITE light

between two RED lights at night, to indicate that winds 64 knots (74 miles an hour) and above are forecast for the area.



## EDA Approves BCF Fish-Farming Proposal

The Economic Development Administration (EDA) will provide BCF with \$149,300 in technical assistance funds to help pay for an assistance program to the fish-farming industry in 9 South Central States. BCF will contribute \$73,700 and provide research and information on harvesting, processing, and marketing catfish.

### 9 States Will Benefit

The project will cover the fish-farming areas of Arkansas, Alabama, Georgia, Illinois, Kansas, Missouri, Mississippi, Oklahoma, and Texas.

In recent years, growing catfish in ponds has been a profitable way of developing farm operations. From a few thousand pounds in 1963, production increased to estimated 15,000,000 pounds in 1965.



## ICC Blocks Reduction in Fresh-Fish Market Area

On Dec. 28, 1967, the Interstate Commerce Commission (ICC) overruled one of its examiners who had sought to reduce the area served by the Railway Express Agency (REA). At present, much fresh fish is distributed direct to restaurants and retailers by REA because it has a wider distribution area than motor carriers at each metropolitan terminal. Motor carriers are restricted to a smaller commercial delivery zone.

### Examiner's Ruling Overturned

The ICC examiner had ruled that REA areas be cut to the sizes of motor carriers delivery limits. The action by the entire ICC maintains the present system.

The Secretary of the Interior supported REA on behalf of the U. S. fishing industry to continue the wide distribution of fresh fish.





### Customs Bureau Studies U. S. Imports of Canadian Cod Fillets

A notice was published by the U. S. Bureau of Customs in the "Federal Register," Jan. 5, 1968, stating that there are reasonable grounds to believe or suspect that the purchase price and exporter's sales price of the cod fillets, frozen, from Eastern Canadian provinces is less than foreign market value. This value is defined in Antidumping Act of 1921, as amended.

Customs officers have been directed by the Commissioner of Customs to withhold appraisals of such frozen codfish until it is determined whether it is being sold at less than fair value. Retroactive antidumping duties cannot be assessed on imports that have been appraised.



### Import Regulations on Salmonid Fish Species or Eggs Amended

New regulations, effective July 1, 1968, covering import of certain harmful birds and fish species or fish eggs that may shelter diseases were announced Dec. 31, 1967,

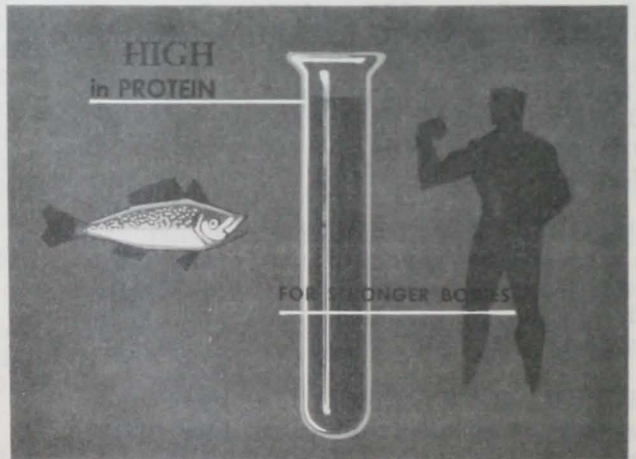
by Interior Department's Bureau of Sport Fisheries and Wildlife (BSFW). They were published in the "Federal Register," Dec. 21, 1967.

Section 13.7 of the regulations is entitled, "Importation of live or dead fish, mollusks, and crustaceans or their eggs." It requires that imports of live or dead fish of the family Salmonidae be certified free of viral hemorrhagic septicemia and myxosoma cerebralis, the organism causing "whirling disease" of trout. The diseases have brought heavy losses to trout hatcheries in Europe. These diseases pose no threat to human health.

#### Exceptions

There are exceptions to the certification requirement: (1) salmon landed in North America and brought into the U. S. for processing or sale; (2) any salmonid caught in the wild in North America under a sport or commercial fishing license; (3) salmonid fish species or eggs that have been canned, pickled, smoked, or otherwise prepared which destroys the 2 diseases.

The fish-import prohibition was set after talks with the Canadian Wildlife Service.



## OCEANOGRAPHY

### Manpower Is 'Vital Ingredient' of Marine Sciences, Says Wenk

More progress was made in the marine sciences in the 1960s than during the preceding 100 years, but the "really crucial decade" will be the 1970s. And manpower is the "vital ingredient" of the marine sciences. So said Dr. Edward Wenk Jr., Executive Secretary, National Council on Marine Resources and Engineering Development, to the Symposium on Manpower for Oceanography in Houston, Texas, Nov. 20, 1967.

The oceans have had a profound influence on U. S. economic and political development, Dr. Wenk continued. Despite the Nation's "ocean-oriented beginnings, our natural awareness of the importance of the sea waxed and waned. Our indifference to the sea has been reflected in many ways. Although we achieved some notable firsts with charts of the tides, currents, winds, and shoals, our study of the ocean has lagged behind most of our other scientific pursuits."

#### Congress Helped

In 1966, the 89th Congress enacted the Marine Resources and Engineering Development Act. It became U. S. policy, for the first time in history, "to develop, encourage, and maintain a coordinated, comprehensive, and long-range program in marine science for the benefit of mankind." Dr. Wenk explained: "Congress was no longer thinking in terms of narrow scientific disciplines, but in terms of the social purposes to which science and technology might be directed."

Discussing the challenge of the sea, Vice President Humphrey, chairman of the National Council on Marine Resources and Engineering Development, said the sea may contribute to the solution of the following great human problems:

- "There are one and one-half billion hungry people in the world. The full food potential of the seas, seriously neglected in the past, must be realized to combat famine and despair...."

- "Seventy-five percent of our population lives along our coasts and Great Lakes... (yet) only three percent of our ocean and

Great Lakes coastline has been set aside for public use or conservation...."

- "The continuing threats to world peace require our Navy to maintain a high level of readiness and versatility through a sea-based deterrent and undersea warfare capability...."

- "Thirty million Americans swim in the oceans, 11 million are salt-water sport fishermen, and 8 million engage in recreational boating in our coast States, yet industrial wastes being dumped into the ocean tributaries will increase 7-fold by the year 2000 unless there are drastic changes in waste handling."

- "Ocean-generated storms cause millions of dollars of damage annually along our coasts, but marine weather warning services are available to less than one-third of our coastal areas."

Dr. Wenk noted that as population grows, the demands for energy will keep pace. Off-shore oil and gas will grow in importance in 1970s and beyond.

#### Range of Marine Science Activities

The marine sciences encompass many activities. Wenk listed: "national security; fisheries development and seafood technology; transportation; recreation; pollution abatement and control; international cooperation; marine minerals, chemicals, and energy resources; health; shore and harbor engineering; weather prediction and control; and the romance of pure science, too. Underlying and cutting across those functions are basic oceanographic research, mapping, ocean observation and prediction, general purpose engineering, data collection and analysis, and specialized education."

Occasionally, crises will focus attention on these activities, Wenk noted, "but in the absence of a crisis, how can we unite the ocean sciences and public policy?" The Marine Resources and Engineering Development Act of 1966 assigned leadership to the President and set up the Marine Sciences Council to help him. No objective of U. S. marine science activities is more important than one included in the Act: "The effective utilization of the scientific and engineering resources of the Nation, with close



Fig. 1 - Measuring a sample of the catch. Size of fish concerns both scientist and fisherman. (Photo: "Seattle Times")

cooperation among all interested agencies, public and private, in order to avoid unnecessary duplication of effort, facilities, and equipment waste."

#### Marine Sciences Manpower Today

Dr. Wenk affirmed: "In the United States today our oceanographic research ranks with the world's best. Our scientists rank with the world's finest. Other nations have small numbers of extremely competent scientists, but only the USSR can be compared to the United States for the extent and quality of its research capability."

This situation portrays to Dr. Wenk "a most evident truth," first of 4 points he made at the symposium:

#### I

"Manpower is the vital ingredient of the marine sciences."

In the past 6 or 7 years, the U. S. "sharply increased its investment in training, education, and facilities in oceanography as in the

other natural sciences. The results are becoming evident.

Oceanographic Degrees		
Year	Enrollment	Ph. D. Degrees Granted
1961	105	9
1963	188	8
1965	520 (est.)	25
1967	980 (est.)	60 (min.)

From 1957-1963, financial support quintupled. "That almost explosive growth" was made possible because "a core of newly trained professionals" had emerged. It had become possible to attract into ocean research,



Fig. 2 - Job Corps trainees from Wellfleet, Mass., join BCF's "Albatross IV" for demonstration cruise. Ship's staff explained equipment. Biologists of BCF's Woods Hole Laboratory demonstrated scientific gear in electronic rooms and labs. A fishing tow was set. Group watches cod end being lowered into sorting box. (Photos 2-4: Robert K. Brigham)

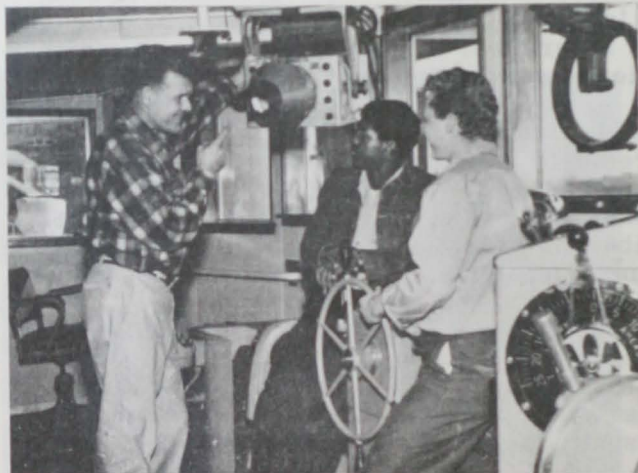


Fig. 3 - Albatross IV's 2nd mate, Robert Grant, explains wheelhouse equipment to Job Corpsmen.



Fig. 4 - J. J. Murray (wearing USDI helmet), a BCF Safety Officer, shows trainees in on-the-job classroom safety precautions to follow while spooling trawling cables onto trawl winch drums.

Program is sponsored by New Bedford (Mass.) Fishermen's Union and local Seafood Producers Assoc. under U. S. Labor Department's Manpower Training and Development Act. It provides valuable instruction in commercial fishing to youths interested in making it their livelihood.

Program includes on-the-job experience aboard vessels and on-shore instruction in net mending, navigation, and engine and deck equipment and repair. As a result, 61 new fishermen have been added to New England fishing fleet.

competent men trained in other disciplines. More and better-equipped research ships and specialized laboratories became available.

Dr. Wenk emphasized: "Manpower is the vital ingredient in the marine sciences, and not just in terms of numbers. We need diversity and quality as well as quantities of people. We need intellectual as well as statistical support. We need to take a head-count even more than we need to take a nose-count."

## II

"When we consider the variety of marine science activities, we realize the different kinds and combinations of manpower involved."

Oceanography involves every field of science and every field of engineering, economics, law, public administration, foreign affairs--and institutions, the U. S. Government and all governments, States, industries, and universities. When Congress established this program, it "thought in terms of large

social purposes. And in implementing the legislation, we are aggressively seeking ways and means of linking the oceans to the needs and aspirations of people." However, there is a danger in "arbitrary linkages," and the "essential core of science" must not be overlooked.

Dr. Wenk emphasized: "In my view, the best way of guarding against that hazard is by maintaining a creative, vigorous, and growing foundation of basic research and education. We must do everything possible to attract the best young minds to this field recognizing that we are in competition with others offering glamour and challenge."

## Sea-Grant Program

Dr. Wenk pointed to the value of the Sea-Grant concept, part of the Marine Sciences Program, which includes many disciplines, including law and economics. Its philosophy is that "it is the collaborative effort of all these skills that gives the marine enterprise its strength." The program is being conducted in the universities--"with continuous interaction among the Federal Government, the schools, and industry to examine common problems and to pool diversified resources, facilities, and specialized talents for their solution."

The Sea-Grant program "recognizes that we need people with different levels of training--technicians, practitioners with B.S. degrees only, master's degree professionals, Ph.D.'s, and those with postdoctoral education. It recognizes that we need great varieties of specialists and generalists, from the sciences, the social sciences, the humanities, and other fields. And it recognizes that we must have people who can think horizontally as well as vertically."

Dr. Wenk made clear: "I believe in the multidisciplinary approach, for it is the only way to make progress in today's complex society using today's complex technologies." But he cautioned against a development that was the third major point he made at the symposium:

## III

"We cannot let the complexity of requirements for either manpower or technologies obscure the core of oceanography."

The multidisciplinary approach does not imply that "oceanographers will be superseded

by general scientists, jacks-of-all-trade." Dr. Wenk quoted from "Effective Use of the Sea," the report of the President's Science Advisory Committee. It recognized the oceanographer's role: "From these individual scientists come most of the ideas which are translated into questions about the oceans, which, in turn, motivate larger, organized data-collecting projects... Our reason for mentioning the role of these individuals is to emphasize how essential they are and to insure that this effort is not overlooked in the hurly-burly of larger plans."

Dr. Wenk emphasized that the oceanographer, far from being obsolete, was "at the core of the marine sciences effort of the present and the future. The only concern I have about his role is that I want to see it strengthened."

#### IV

"While more progress has been made in the marine sciences in the 1960s than in the preceding 100 years, the really crucial decade will be the 1970s."

Dr. Wenk asked the members of his audience what contributions they, their institutions, and their professions were prepared to make over the next 10 years to meet such problems as: "feeding the world's hungry masses with food from the sea; preserving the quality of the coastal zone; strengthening international cooperation; enhancing safety at sea; rehabilitating our harbors and cities; recovering the minerals from the continental shelf and the deep oceans; exploring the oceans, observing and predicting the atmosphere, and controlling the weather; basic and applied research as well as engineering relating to the marine sciences; and educating those who would do such jobs."

#### 3 Critical Manpower Needs

When oceanography was young, Dr. Wenk said, there were no scientists with specialized training. Its rapid growth was made possible by bringing in people with training in one of the more basic sciences. Teachers of oceanography agree that "the prime requisite is a sound foundation in basic science... specialized formal study is not a requisite for a competent oceanographer" and it is desirable to attract people from other disciplines at the postdoctoral level.

He listed 3 critical marine sciences manpower needs:

1. "We must maintain the momentum and increase the level of support for the scientific study of the sea, with related education."

He said the Marine Sciences Council is examining multi-year support and ways of increasing and funding long-range ship operations. "We expect the Federal role to continue to be one of leadership, planning, and assistance to all sectors involved in marine sciences activities." But the private sector must be intimately involved in its traditional role of developing resources. "They have a need for specialized manpower and thus a responsibility to share in training through fellowships and research grants."

To maintain the momentum, oceanography needs an improved status and more money within institutional boundaries and budgets. Schools should consider training foreign students in the marine sciences.

2. The second critical priority need is to intensify the training of engineers. "Ocean engineering integrates many existing engineering and scientific disciplines and applies them to the ocean environment. The field is

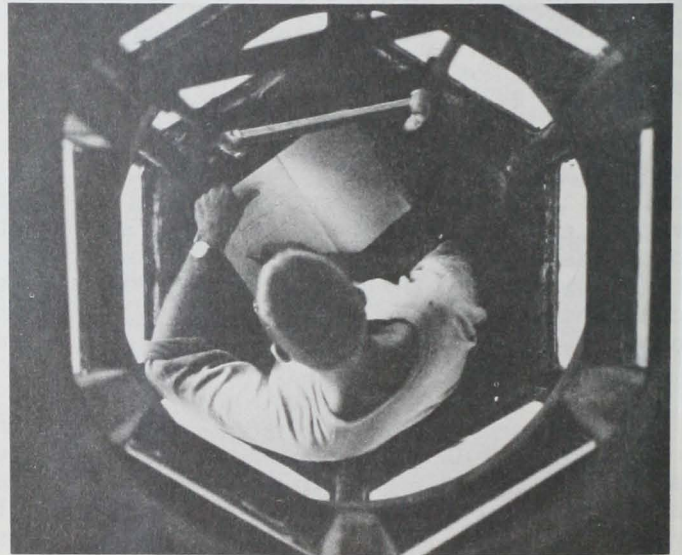


Fig. 5 - Vehicle to study ocean's upper layers. Biologist Reginald Gooding in observation chamber of raft "Nenuë" of BCF's Biological Laboratory in Honolulu.

Gooding designed and built it to study fishes that accumulate under floating objects at sea. View chamber extends 7 ft. under water. In cramped quarters, biologists view and photograph many creatures.

(Photo: J. J. Magnuson)

similar in scope and concept to aeronautical and astronautical engineering, which are directed toward and controlled by the environment in the atmosphere and outer space."

At the Massachusetts Institute of Technology, ocean engineering "emphasizes the principles governing the systems for the exploration and utilization of ocean resources, the conduct of oceanographic research, and the recovery of objects from the ocean floor." It includes special surface vehicles, submerged vehicles, stationary floating platforms and structures, support of ocean mining and oil drilling, and other subjects.

3. "The third critical priority need is to train technicians who can assist both the scientist and the engineer aboard ship, in the laboratory, in the marshlands, or wherever the oceanographer or ocean engineer's work takes him and the marine sciences team."

This team will need many disciplines, levels of competence, and training. Scientists and engineers will be able "to switch from land-based, non-ocean-oriented activities with relative ease," if universities have refresher courses, or training is available somewhere else.

Education and training will be necessary. Junior colleges and technical schools have been increasing and they can be adapted easily to meet the needs for technicians. "Our colleges, universities, and oceanographic institutions have but to mesh their programs with those of nearby junior colleges--found now in all 50 States--to provide a total educational system adapted to the needs of the marine sciences and society in the 1970s."

A source of manpower is the economically deprived. "They share the problems of the seas but not the benefits. They inhabit the waterfront slums and work at the most menial jobs on the docks. What I am suggesting is that we move towards solving this shortage of technicians by carrying the story of oceanography to minority groups who would be attracted to these opportunities. Then let us make certain that we train and promote them as rapidly as their progress permits."



## "Discoverer" Seeks Clues to Origin of Continents

During February and March, the U. S. Coast and Geodetic Survey ship Discoverer will be seeking evidence that Africa might once have been connected to North America in one supercontinent. The Discoverer sistership of the "Oceanographer," is conducting a 3-month, 20,000-mile expedition to gather information from the depths of the South Atlantic off the west coast of Africa.

The Discoverer's survey off west Africa is along the 1,200-mile edge of the continent between Dakar and Abidjan. Subbottom penetration soundings are being made along the 1,000-fathom (6,000-foot) isobath or contour line. A seismic reflection profiler is used to detect the geologic structure below the sea bottom.

"The purpose is to try to match the continents at a point halfway between the surface of the continents and the deep sea. The 2½-mile-high continental slopes, which connect the continental shelves with the deep-sea floor, are the true geologic boundaries of the continents."

### 1 vs. 2 Supercontinents

If the concept of one supercontinent is correct, then the Discoverer should find evidence linking Africa to North America. The bulge of Africa around Dakar would fit, jigsaw-puzzle style, into the southeastern U. S.--from about Cape Hatteras, N.C., to Florida, and then outside the Bahama Islands.

But if the survey produces evidence that the area around Abidjan fits against northeastern Brazil off the Amazon River, it would tend to support the 2-continent theory.

In 1967, the Oceanographer made similar surveys along the east coast of South America and off Australia.



## Foreign Fishing Off U. S. in December 1967

### IN NORTHWEST ATLANTIC

Nineteen fishing vessels from Poland, East and West Germany, and the Soviet Union fished in the Northwest Atlantic off southern New England, New York, and the New Jersey coasts in December 1967; 46 were sighted in November 1967. No foreign fishing vessels were reported off the east coast during December 1966.

Weekly sightings showed sharp decline from 16 vessels in first week of December to a scattered few by year's end.

Soviet: For the third consecutive month, there were only 5 or 6 factory stern trawlers and an occasional supply ship--scattered widely along southern New England areas and off Long Island, N. Y. At times, these vessels fished only 15 miles from Long Island.

Although her vessels were usually observed actively fishing, no catches were observed. Over the past several months, these vessels were presumed engaged in exploratory fishing. Late in the month, one factory stern trawler was reported fishing off Virginia. The catch was believed to be red hake and whiting.

In December 1966, no Soviet vessels were sighted off east coast.

Polish: The sizable fleet deployed on Georges Bank and off southern New England since mid-1967 shifted its attention at end of November to fishing grounds off eastern Nova Scotia and Newfoundland. Two vessels fished briefly south of Block Island, R. I., early in December.

East German: One freezer stern trawler was observed fishing among other vessels south of Long Island. It was reported off New Jersey among West German vessels in late December.

West German: Early in December, 8 freezer stern trawlers were sighted in a 15-mile area 15 to 30 miles south and southwest of Montauk Point, L. I. Trawls containing huge catches of fish, believed herring, were observed on board.

By mid-month, a New Jersey sport fishing boat operator reported that 7 West German stern trawlers were fishing 20 to 30 miles southeast of Manasquan Inlet, New Jersey. They were presumed fishing for herring.

### IN GULF OF MEXICO

No foreign fishing vessels were sighted off U. S. during November.

### OFF CALIFORNIA

Soviet: 18 vessels were sighted during December. Most were large stern factory trawlers (13 units); but 1 medium freezer trawler, 2 fishery research vessels, 1 refrigerated fish transport, and a passenger ship also were sighted.

Only 2 of the 18 stayed the entire month; the rest only a week or two at different times. From 5 vessels sighted in first week, fleet increased to 12 by mid-month, then decreased to 3 during last 2 weeks.

The vessels moved all month--indicating Soviet fisheries there are not yet firmly established.

In first week, Soviets fished off Crescent City in northern California with 6 stern factory trawlers. By mid-month, a few of these had gone as far as San Nicolas Island off San Francisco. From there, some might have gone further south towards Mexico. By month's end, only 2 trawlers were fishing off northern California.

During second week, most Soviet fishing was off San Francisco and near Santa Barbara Island in southern California. At least 8 stern trawlers were sighted off San Francisco: 5 fishing, the others apparently in transit southward. Those off Santa Barbara were a modern 6,300-gross-ton refrigerated fish carrier (the "Sibir") receiving frozen catch packed in paperboard boxes from 2 large stern trawlers. After unloading, all 3 vessels went north.

During second-half December, only 2 stern trawlers fished off northern California; 2 others were in transit.

Although 2 research vessels were seen for short periods off California, it is unlikely that much research was done. The flagship of the Pacific Institute for Fisheries and Oceanography, "Akademik Berg," was sighted 18 miles

southeast of San Nicholas Island (about 40 miles southwest of Los Angeles) on December 5. Apparently, she was on her way to explore for new commercial stocks in the South Pacific off New Zealand and Australia. The "Ogon," which had spearheaded fishery research in the northeastern Pacific, entered San Francisco Bay on December 18 for emergency medical treatment of a crew member. The vessel waited until his discharge from the hospital just before Christmas.

No violations of U. S. 12-mile contiguous fishing zone were reported, but on 4 occasions Soviet vessels fished just beyond zone (from 12-13 miles off U. S. shore).

No information on species caught is available. Only once was Soviet catch identified: one stern factory trawler was catching "red and black" bottomfish about 12 miles off Crescent City.

The pattern of Soviet fishing in December 1967 was similar to that of December 1966, with one exception: the vessels sighted had doubled. If past experience can indicate future trends, these developments in Soviet fisheries off California may be expected: From January through March 1968, fewer than 10 vessels will operate off California. Some will fish, others will conduct exploratory commercial fishing, and many will transit to and from South Pacific fishing grounds. By April 1968, the fleet will at least double and remain at that level until Pacific hake fishing starts off the Pacific Northwest. From then on, Soviet fisheries off California will fluctuate, depending on success of hake and ocean perch fisheries to the north.

The scattered information available on Soviet fishing off California again indicates that only part of the fleet is sighted by surveillance patrols. During 1967, an average of about 5 was sighted weekly. The actual number was perhaps 2 or 3 times that figure.

Japanese: In mid-December, a 500-gross-ton seiner left Japan to fish bluefin and yellowfin tuna in the eastern Pacific Ocean. The vessels plan to fish "off the California coast" until about March 1968, then to proceed southward to waters off Mexico and central America. About June, it will enter the tuna fishery in the Atlantic Ocean off Africa. By the end of December 1967, this vessel had not been sighted off the U. S. coast.

## OFF PACIFIC NORTHWEST

Soviet: Bad weather and poor visibility made surveillance of foreign fishing off Washington and Oregon difficult in early and late December. The vessels sighted decreased rapidly in late November and first week of December--from about 35 to fewer than 10. All were fishing vessels, mostly large stern factory trawlers. No processing vessels were sighted, an indication that catches were not too good. Some stern trawlers, however, had their reduction plants operating, indicating production of fish meal. The number of vessels sighted was somewhat larger than in December 1966.

Soviet vessels operated off Oregon during first-half December; during second part, they were sighted mostly off Washington. By December's end, only 2 stern trawlers were fishing about 15 miles west of Destruction Island, Washington.

No information is available on the species caught.

One research vessel (the Ogon) was sighted conducting undetermined research; late in month she was off San Francisco for the emergency medical evacuation.

Japanese: 2 stern trawlers and 1 support vessel were reported operating at various times and points off Washington and Oregon, and northward off southern British Columbia. It is believed these vessels were taking hake and Pacific ocean perch.

## OFF ALASKA

Soviet: The number increased steadily from 20 in early December to about 70 vessels in late December. The main reason was the discontinuation of fisheries off Pacific Northwest.

The Pacific ocean perch fishery in Gulf of Alaska was conducted by 8-15 vessels. Three stern factory trawlers and one medium trawler fished off southeast Alaska. One stern factory trawler operated on Yakutat grounds and another fished Portlock Bank area. At least 3 stern trawlers fished on Albatross Bank (east of Chirikof Island). During first week, 6 stern factory trawlers fished for perch along central Aleutians and apparently stopped in mid-December.



The deep-water trawl fishery, between 600 and 900 meters, was resumed north of Fox Islands in early December by 5 medium freezer trawlers; by month's end, 3 more freezer trawlers joined fishery, mainly sablefish and turbot.

The winter flounder fishery began in early December, when 8 trawlers appeared on traditional grounds in eastern Bering Sea, about 45 miles north of Unimak Island. By month's end, the fleet numbered about 50.

Japanese: Fishing effort increased from fewer than 10 vessels during first week to about 45 ships by month's end.

The number of factory trawlers fishing Pacific ocean perch in Gulf of Alaska varied from 2 early in month to 4 by end. One trawler fished along 100-fathom curve between Yakutat grounds and Portlock Bank early in December. During same period, a second operated off southeast Alaska near Cape

Ommaney. During last week, a smaller stern trawler entered Kodiak for medical assistance, and then resumed fishing in Gulf of Alaska. The 4th factory trawler was scheduled to depart Japan prior to Christmas to resume perch fishing in Gulf.

Two factory ships, accompanied by about 16 trawlers and 2 reefers, began "winter trawl fishery" for Alaska pollock in early December in eastern Bering Sea north of Fox Islands. One fleet will fish primarily for Alaska pollock to produce minced meat. In late December, 2 more fish meal and oil factory ships, with 18 trawlers, joined trawl fishery. These 2 fleets are producing fish meal and oil; they are using primarily flatfishes and Alaska pollock.

Two long-liners continued to fish for sablefish in central Gulf of Alaska through most of December. One long-liner was reported, in mid-December, fishing off eastern Aleutians north of Fox Islands.



#### FREE BCF FISHERY INDUSTRIAL RESEARCH JOURNAL

At intervals, the Bureau of Commercial Fisheries publishes "Fishery Industrial Research," a journal of research papers dealing primarily with fishery technology--fishing methods, marketing, fish preservation, etc.--and occasionally with economics.

Anyone may receive this journal by requesting to be put on the mailing list. Write to:

Bureau of Commercial Fisheries  
Branch of Reports  
Bldg. 67, U. S. Naval Air Station  
Seattle, Washington 98115

# STATES

## Massachusetts

### SEA HERRING FISHERY CHANGES

During 1967, tactics and fishing areas shifted in the Massachusetts sea-herring purse-seine fishery. Before, the fishery centered in the Cape Cod area during spring and fall. Landings were under 2 million pounds. An airplane spotted surface schools, which were fished with shallow purse seines.

In fall 1967, Canadian herring seiners fished the offshore waters near Cape Ann. They used sonar gear to locate subsurface schools and were equipped with deep seines. The catches were unloaded directly from seines to U. S. fishing vessels, redocumented as carrier vessels, and landed at Gloucester, Mass.

From August through November 1967, Gloucester landings--classed duty-free imports--were about 12 million pounds. Over one half was landed during October.



## California

### 1967 PELAGIC FISH LANDINGS DROPPED

The Resources Agency of California reported in December 1967 the pelagic fish catch for that month and for 1967:

Species	December		January 1 - December 31		
	1967 <sup>1/</sup>	1966	1967 <sup>1/</sup>	1966	10 Yr. Mean 1956-1965
	. . . . . (Landings in Tons) . . . . .				
Anchovy . . . . .	1,360	6,196	33,166	31,140	7,353
Mackerel, jack . . . . .	1,215	1,169	18,426	20,431	36,584
Mackerel, Pacific . . . . .	10	185	379	2,315	19,046
Sardines . . . . .	5	4	76	439	26,774
Squid . . . . .	800	1,183	9,632	9,513	6,394
Total . . . . .	3,390	8,737	61,679	63,838	96,151

<sup>1/</sup>Estimated. Accumulated landings are revised monthly.

\* \* \*

### LANDINGS OF ANCHOVIES

The current anchovies-for-reduction season runs from Sept. 15, 1967-May 15, 1968.

Through Jan. 1, 1968, California fishermen landed 5,413 tons of anchovies for reduction, reports the California Department of Fish and Game. This was 2,013 tons over landings reported in December 1967.

The Department said the price for anchovies at San Pedro remain unsettled. Los Angeles fishmeal prices--about \$124 a ton--remain below those of previous years. This probably is an obstacle to achieving price agreement at San Pedro.

### Quota Set in August 1967

In August 1967, the Fish and Game Commission approved California's third consecutive anchovy reduction season. It set a 75,000-ton quota, the same as in past seasons. But the quantity to be taken in inshore zones is lower and the zones smaller. The bulk of the landings through January 1, 4,600 tons, was in the Northern permit area--north of Point Conception.

### 191,000 Anchovies Tagged

As of early January, 190,986 anchovies had been tagged by Department personnel. During December 1967, 13 tags were recovered, bringing total to 523. Twelve of the 13 tags were brought in at Monterey, and one at San Pedro. The fish had been free from 119 to 645 days. A tagged anchovy taken at San Pedro apparently had been eaten by a bonito or mackerel; the tag was recovered from a plant processing only the larger predator.

\* \* \*

### SAN FRANCISCO CRAB FISHERY IS DECLINING

The San Francisco crab fishery has declined to the point where about one-third the vessels have stopped fishing, reported the Resources Agency of California in December 1967. Some of these entered the northern California fishery. Approximately 40 vessels are still in the fishery

Strong winds, coupled with poor catches, caused most fishermen to pull gear only once or twice a week. As of mid-December 1967, about 525,000 pounds had been landed in the San Francisco area. The price to fishermen dropped from 30 to 22 cents per pound the day after the northern California opening on December 1.

## N. California Price Even Lower

In northern California, the price for crab dockside was 18 cents per pound. The season started slowly. Bad weather kept most of the fleet tied up the first week. Weather improved during the second week, and fishermen in Eureka and Crescent City were able to land approximately 1.4 million pounds by December 17. On December 18, a price dispute kept boats tied up until December 21. Then dealers agreed to continue to pay 18 cents per pound, with specified poundage market limits.



## Oregon

### SPRING CHINOOK SALMON RELEASES UNDERWAY

The annual Willamette River spring chinook salmon releases are underway at its hatcheries, reports the Oregon Fish Commission. Until mid-March, the Willamette River from Eugene to the mouth of the Columbia River will be full of young ocean-bound migrants. When the season's releases are complete, more than five million 5- to 6-inch-long spring chinook will be on their way to the sea.

In December 1967, about 1,800,000 smolts--salmon ready to migrate immediately upon release--were liberated from the Fish Commission's Willamette and McKenzie Hatcheries. Those releases were followed in January 1968 by "1,680,000 from Marion Forks Hatchery into the North Santiam below Big Cliff Dam, another 1,300,000 into the Middle Fork Willamette from the Willamette Hatchery, 200,000 from the McKenzie Hatchery, and 150,000 from the South Santiam Hatchery."

In early January 1968, over 50,000 spring chinook smolts from the Sandy Hatchery were released into the upper reaches of the Sandy River. In addition to the smolts, the commission also has ready to release three million unfed fingerlings. One million will go into Green Peter Reservoir and another million into Fall Creek Reservoir. Foster Reservoir on the South Santiam and the Mollala River each will receive one-half million fry.

## 1967 Run Largest Since 1956

The 1967 Willamette River spring chinook run was the largest since 1956. A record number of adult salmon returned to the Commission's hatcheries. Hatcherymen took an additional 2½ million spring chinook eggs for the Washington Department of Fisheries' mammoth hatchery on the Cowlitz River.

More than 1,600 of the adult salmon that returned to the commission's Willamette hatcheries were transplanted into the upper Clackamas River. Another 800 were transferred to the Fish and Wildlife Service hatchery on Eagle Creek; over a thousand were hauled to Fall Creek and Green Peter Reservoirs for natural spawning.



## Florida

### EXPERIMENT IN 'FARMING THE SEAS'

Florida State University is "farming the seas" in an experiment to raise shrimp from the larval stage. Dr. Carl H. Oppenheimer, chairman of the department of oceanography, said his department will study the feasibility of growing shrimp on a commercial scale using indoor tanks.

Dr. Oppenheimer said shrimp never have been grown commercially in the U. S., but the Japanese cultivate fish, shrimp, oysters, and other sea animals in large quantities. He has visited some Japanese installations.

The experiment is supported by a \$35,000 grant from Armour Research and Development Company.



## Michigan

### PLAN SET FOR COMMERCIAL GILL NET FISHING

Regulations concerning the use of gill nets by commercial fishermen in Michigan waters of the Great Lakes were approved by the Michigan Conservation Commission at its December 1967 meeting, reports the Great Lakes

News Letter. They are expected to protect trout and salmon stocks being planted in the lakes without severely restricting commercial operations. The action is a compromise. An earlier proposal had called for a virtual ban on gill nets on the state's sections of Lakes Michigan and Superior.

The plan becomes effective in April 1968. It calls for a permit system to regulate the use of small-mesh gill nets-- $2\frac{1}{2}$  to  $2\frac{3}{4}$  inches--in waters less than 35 fathoms, and nets of  $4\frac{1}{2}$ -inch mesh or larger at depths designated by the Department of Conservation. No restriction will be placed on small-mesh nets used in waters over 35 fathoms deep. Permit holders will be required to submit catch records. The data will aid in fishery management.



## Alaska

### SCALLOPS ARE NEWEST FISHERY

The Alaska fishing industry has shown increasing interest in the commercial prospects for sea scallops since BCF's "John R. Manning" located good concentrations in the Gulf of Alaska in 1963.

Industry interest was turned into action by two recent developments: the slump in king crab landings, down 20 percent in 1967, and the sharp increase in East Coast scallop prices which, in December 1967, was \$1.30 per pound, compared with 65 cents a year earlier.

BCF's Exploratory Fishing and Gear Research Base has loaned scallop dredges and other gear to interested vessel owners. Two Kodiak-based vessels, "Virginia Santos" and "Cloverleaf," went looking for scallops near Kodiak--with some success.

#### How Vessels Fared

The Virginia Santos, with an experienced Nova Scotian scallop fisherman aboard, took

1,500 pounds of scallops in a short day on the flats very close to Kodiak. On another short trip, 4 hours' dragging time, she took 70 bushels; one 30-minute drag produced 20 bushels. Everyone concerned with the operation was optimistic. The experienced scallop fisherman said that their catches could be regarded as good as anywhere.

The Cloverleaf, fishing in Raspberry Straits (Afognak Island) with a home-made rake affair, delivered 4,000 pounds to Point Chehalis Packing Co. on her last trip. Recovery was running about 13.2 percent.



## Texas

### QUALIFIES FOR U. S. AID AS RESULT OF HURRICANE BEULAH

Texas qualifies for up to \$50,000 of U. S. aid to restock the oysters killed by Hurricane Beulah in September 1967, reports the Coastal Fisheries Coordinator for the Texas Parks and Wildlife Department. A notice from the Secretary of the Interior said the State was eligible for funds set aside for the rehabilitation and restoration of natural resources because the oyster loss resulted from "natural causes."

#### Central Coastal Area Considered

The State is considering reseeding oysters in the central coastal area, where ram-paging rivers devastated the oyster beds. The San Antonio-Espiritu Santo Bay System is an area where reseeding could reestablish oysters faster than could natural spawning from surviving stock in nearby areas.

Oysters would be transplanted on historically productive reefs in the spring--after the oyster fishing season and just before the spawning period.



## BUREAU OF COMMERCIAL FISHERIES PROGRAMS

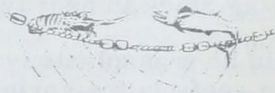
### Pacific Hake's Behavior Limits Efficient Harvest to Daylight Hours

Research by BCF's Exploratory Fishing and Gear Research staff at Seattle, Wash., has revealed knowledge useful to the commercial fleet about the daily vertical movement of Pacific hake. As sunset approaches, the dense schools of hake present near the sea bottom during daylight hours begin to rise and disperse. As sunrise approaches, the hake begin to descend again toward the bottom and regroup. During early-morning daylight hours, the hake have resumed schooling near the bottom. Exploratory catch rates of hake were much higher during daylight than during night fishing in the same general area where hake signs were detected by electronic gear.

#### Catch Rates

Catch rates with a modified "Cobb" pelagic trawl ranged from 10,000 to 60,000 pounds per half-hour for daylight fishing--compared to 60 to 6,000 pounds per half-hour during late-evening and nightfishing. This behavior pattern limits efficient harvest of the fish with existing fishing techniques to daylight hours.

The daily vertical migrations of hake coincide with the daily vertical movement of euphausiids, a dominant shrimp-like food organism of the hake. However, the daily changes in vertical distribution and integrity of hake schools may occur with or without euphausiids present.



### Shad Bests Nehu as Skipjack Bait

The threadfin shad (*Dorosoma petenense*) produced higher catch rates than did nehu (*Stolephorus purpureus*) as live bait for skipjack tuna (*Katsuwonus pelamis*) in Hawaiian waters. (BCF's "Charles H. Gilbert," Cruise 106, Oct. 30-Nov. 28, 1967.)

Experimental pole-and-line fishing using these baits was conducted with 4 tuna schools 8 to 28 miles west and northwest of Niihau Island. Threadfin shad also was chummed in

the vicinity of bird flocks on 5 other occasions; small skipjack tuna were observed to come to the stern on 2 of these occasions.

The experimental fishing results are:

Station No.	No. of Fishing Periods	Skipjack Catch		Skipjack Catch Per Minute	
		Shad	Nehu	Shad	Nehu
5	7	128	90	6.9	6.2
6	6	143	65	15.9	7.6
8	10	158	32	10.2	2.2
9	1/2	42	26	4.7	8.7
Total . . . . .		471	213	9.4	6.1

1/Ran out of nehu after first fishing period.

Except at station 9 (see map), where highly unequal fishing periods make results questionable, the threadfin shad produced higher catch rates than did nehu. This is attributed to a marked difference in the behavior of the two baits. Most threadfin shad tended to swim downwards at angles of about 20°-45°, while most nehu swam downwards at angles of about 40°-80°. The nehu also swam faster than the shad. This resulted in the skipjack being distributed deeper in the water when nehu were fished--and closer to the surface (and the hooks) when shad were fished.

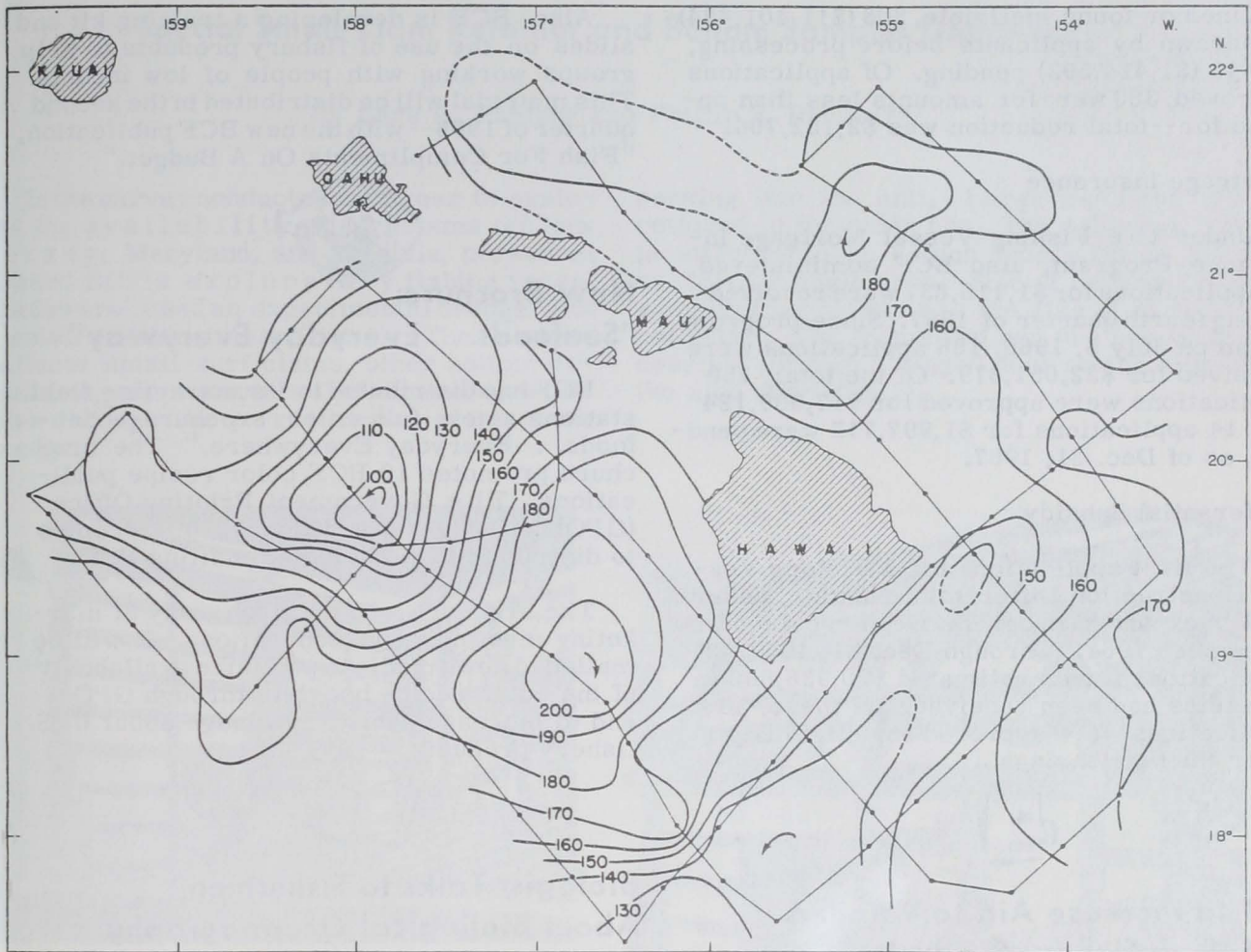
The total catch of skipjack was 694. The range in fork lengths was 49.1-67.1 cm., the range in weight was 6.5-18 pounds.

#### Determine Thermocline Structure

A second major mission of the Gilbert was to determine the thermocline structure in the vicinity of the Hawaiian Islands.

A total of 101 BT lowerings was made. Two major eddies, each 100 miles in diameter, were located southwest of the islands. One, with its center near 20° N. and 158° W., rotated counterclockwise, raising the thermocline approximately 70 m. above its equilibrium level. The other, located near 18.5° N., 156.5° W., rotated clockwise, depressing the thermocline some 70 m. Over the rest of the cruise track, to the south and east of the islands, the thermocline was relatively featureless and flat.

There was some evidence that the two large eddies moved westward during the 2-week duration of the study, but it was not possible to



Track chart for Charles H. Gilbert cruise 106 showing depth of 20° isotherm (meters), Nov. 15-28, 1967.

determine the extent of this motion with a single ship in the time available.

Surface current velocities of 1 to 2 knots were associated with the eddies, as judged by the set experienced by the ship.



### Lake Superior Smelt and Chub Catches Are Good

Despite winter conditions, BCF-directed exploratory fishing in Lake Superior using the privately owned trawler "Hiawatha" (out of Duluth, Minn.) produced fair-to-good catches of smelt and chubs.

One 4-day cruise in early December 1967 landed an average 599 pounds per hour of

mixed smelt and chubs. A later 4-day December cruise landed 26,439 pounds of virtually pure smelt at average rate of 2,937 pounds per hour.

About 60 percent of smelt caught during both cruises were jumbo size: 4 to 6 fish per pound in the round.



### Report on Financial Aid to Fishing Industry

From the beginning of the Federal Fisheries Loan Fund in 1956 through Dec. 31, 1967, 2,058 applications for \$55,011,668 were received by BCF, the administering agency. By that date, the record was: 1,066 applications (\$24,957,653) approved, 640 (\$15,385,223)

declined or found ineligible, 303 (\$11,101,494) withdrawn by applicants before processing, and 49 (\$1,414,592) pending. Of applications approved, 380 were for amounts less than applied for--total reduction was \$2,152,706.

### Mortgage Insurance

Under the Fishing Vessel Mortgage Insurance Program, also BCF administered, 11 applications for \$1,116,837 were received during fourth quarter of 1967. Since program began on July 5, 1960, 186 applications were received for \$22,051,879. Of the total, 150 applications were approved for \$17,939,124 and 14 applications for \$1,997,712 were pending, as of Dec. 31, 1967.

### Differential Subsidy

The first applications for a Fishing Vessel Construction Differential Subsidy, under BCF's expanded program, were received in December 1964. Through Dec. 31, 1967, 86 applications for an estimated \$20,936,500 in subsidies had been received. Of these, 56 applications were approved for eligibility after Public Hearings.



### BCF to Increase Aid to Retailers in Selling Fishery Products

BCF will increase its efforts to help retailers sell their fishery products. It has arranged to present its techniques of seafood merchandising to the annual convention of the Supermarket Institute at Cleveland in May. BCF will prepare its presentation with technical assistance from the National Fisheries Institute. After the convention BCF will work with local groups.



### Useful Information for Low-Income Groups Prepared

BCF contributed information on fish to a 120-page booklet, "Project Headstart Food Buying Guide And Recipes," recently published by the Office of Economic Opportunity (OEO). OEO has distributed 150,000 copies.

Also, BCF is developing a training kit and slides on the use of fishery products to help groups working with people of low income. This material will be distributed in the second quarter of 1968--with the new BCF publication, "Fish For Compliments On A Budget."



### New Brochure: "Seafoods. . . Everyday Everyway"

BCF has distributed to its marketing field stations a new, full-color, brochure--"Seafoods. . . Everyday Everywhere." The brochure promotes 10 BCF color recipe publications. The Government Printing Office (GPO) has bought an additional 250,000 copies to distribute to its selected mailing list.

The brochure will be given away at marketing meetings and conventions. It will be mailed to news media to publicize availability of the color recipe booklets through GPO--and to increase public knowledge about U. S. fishery products.



### Biologist Talks to Fishermen About Biological Oceanography

Biologist Kenneth Sherman of the BCF Biological Laboratory, Boothbay Harbor, Maine, has been giving a series of talks on biological oceanography and Gulf-of-Maine herring to meetings of Maine State Marine Fisheries Extension Committees. This is the second series given by the laboratory's biologists at these meetings.

The first dealt with observations on lobsters made by SCUBA divers.

The talks, generally well received, are considered a valuable way to acquaint fishermen with BCF programs, goals, and accomplishments.



## Special Small-Clam Retainer and Bottom Sampler Designed

By Lars A. Fahlen\* and Phillip S. Parker\*\*

In the survey conducted last year to evaluate the availability of surf clams off New Jersey, Maryland, and Virginia, personnel aboard BCF's exploratory fishing vessel "Delaware" used an experimental dredge with a small-clam retainer (fig. 1). The retainer collects small surf clams, other bottom organisms, and materials that otherwise would pass through the peripheral slots of the dredge.

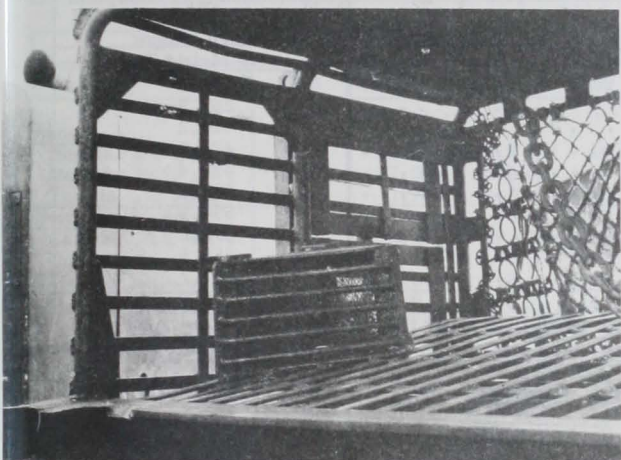


Fig. 1 - Entrance to small-clam retainer mounted in bottom of a surf-clam jet dredge.

The technique used can be utilized by other research agencies. The collecting unit can be fitted on any dredge similar to the sea clam dredge.

### The Retainer or Sampler

The specially constructed retainer or sampler is a triangular-shaped box that has steel rods across the entrance and a collecting bag on the back side. The entrance has  $\frac{1}{2}$ -inch round steel welded horizontally  $1\frac{1}{2}$  inches apart. The rods allow small items that are washed out of the bottom, and those that lie on the bottom, to pass into the sampling unit--but prevent the large materials from

passing into the unit. Large materials are retained in the chain bag. The collecting bag is attached to an 8-inch square frame of  $\frac{1}{2}$ -by  $1\frac{1}{4}$ -inch angle iron. Size of netting in the sampling bag controls the size of material collected. The frame and bag are easily accessible through a hinged door on the side of the sled cage (fig. 2).

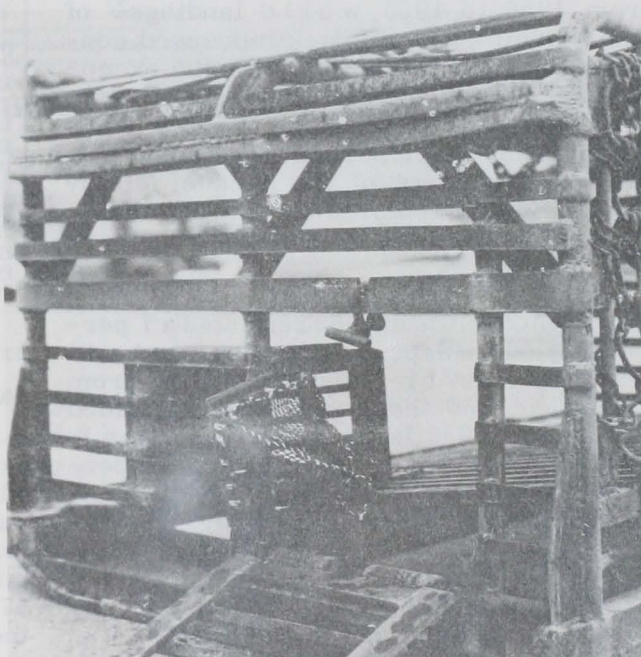


Fig. 2 - Small-clam retainer bag and hinged door in side of jet dredge. Door provides easy access to collecting bag.

The sampler is attached to the inner right side of sled cage and is positioned so that its collecting bag is well forward of the chain bag at rear of cage. As retainer is attached to dredge, small surf clams and small-size materials are taken whenever the experimental dredge is used in normal fishing operations.

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Note: This is Equipment Note No. 23.

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