

SHELLFISH INVESTIGATIONS

PROGRESS REPORT NO. 38

April 1, 1966-March 31, 1967

Fish Commission of Oregon

Research Division

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## INTRODUCTION

Progress Report Number 38 covers the activities of Shellfish Investigation during the period April 1, 1966, through March 31, 1967. The activities covered are those that are financed by state general fund monies. Federally financed activities are covered in quarterly and annual reports of each such program. These and other reports mentioned may be found in completed form at Portland, Clackamas, or Newport.

## PERSONNEL CHANGES

Shellfish personnel and changes during the report period appear in Table 1. The only major change was the resignation of W. A. DeBen who accepted employment with the Federal Water Pollution Control Administration, and his replacement by Laimons Osis.

## REPORTS PREPARED

Reports completed and distributed or submitted for publication appear in Table 2.

## BAY CLAMS

Bay clam work was confined to surveying all major estuaries to determine trends in abundance, age and growth studies, and investigating a number of minor problems.

Table 1. Shellfish personnel, April 1, 1966-March 31, 1967.

Name	Employed	Date terminated or transferred
Charles D. Snow	7-18-55	—
Darrell Demory	6-14-61	—
Waldemar DeBen	10-28-63	6-30-66
John R. Neilsen	6-10-64	—
Paul H. Reed	12- 1-65	—
Alan Kaiser	1-10-66	—
Laimons Osis	7- 1-66	—
Keith Johnson	6-13-66	9-16-66
Robert Jacobson	6-13-66	9-16-66
Shirley Root	6- 2-66	9- 8-66

Table 2. Reports submitted by the Shellfish staff,  
April 1, 1966-March 31, 1967.Information reports

DeBen, Waldemar

June 1966. Harvest of Intertidal Non-Food Invertebrates, 1962-1964.

Demory, Darrell

November 1966. Utilization and Regulation of Clatsop Beach Razor Clam Stocks.

Neilsen, John

March 1967. Nehalem Bay Dungeness Crab Survey May 17-18, July 19-21, and August 8-10, 1966.

Reed, Paul

July 1966. Controlled Rearing of Dungeness Crab Larvae and the Influence of Environmental Conditions on their Survival.

Snow, C. Dale

May 1966. Analysis of Present Crab Regulations and Recommendations for Commission Action.

July 1966. Leasing of Submerged Lands.

July 1966. Subtidal Clam Harvest.

July 1966. Summary of the 1965-66 Crab Season Sampling and Projected Landings.

Dec. 1967. Proposed Abalone Transplant.

Reports for publication

Reed, Paul H. The Calico Surfperch New to Oregon Waters. Research Briefs.

### Bay clam surveys

Bay clam surveys were conducted on all seven of Oregon's most important clam producing bays. These surveys are made at least every other year and when possible every year. Each survey is conducted as nearly as possible over the exact area of previous surveys by running compass courses from azimuth readings determined in previous years. These surveys are designed to determine trends in clam populations. Bays and species surveyed appear in Table 3.

Table 3. Clam beds surveyed and species of major importance.

	Species 1/				
	Gaper	Cockle	Softshell	Washington	Littleneck
Nehalem			X		
Tillamook	P	P	X	P	P
Netarts 2/	D	D	D	D	D
Yaquina	X	P	P	P	P
Siuslaw	P		X		
Umpqua			X		
Coos	X	P	P	P	P

1/ X Species surveyed for abundance.

P Species known to be present, but no estimate of abundance made.

2/ D General survey and mapping of area to determine distribution of most prevalent species.

### Nehalem Bay

The softshell clam population in Nehalem Bay continues to remain at a relatively high level of abundance. Examination of 3,500 square feet of clam bed revealed a density of 0.20 clams per square foot as compared to 0.15 found in 1965. This increase probably represents little or no change in the population status because of inherent problems in accurately counting softshell clam siphons.

### Tillamook Bay

Surveys in Tillamook Bay were made only on the softshell clam beds. This species remains at a high level of abundance with the surveys showing a density of 0.58 clams per square foot or virtually the same density found in 1963 and 1965 when densities were computed at 0.59 and 0.50 clams per square foot. The Tillamook softshell clam bed is large and difficult to get to, this probably accounts for the stable population of clams.

### Netarts Bay

The Netarts Bay survey was conducted to determine numbers of clam diggers and digging success, to map the bay in relation to areas of species occurrence, and note ecological changes that may be occurring because of sand movement. A fairly detailed map was completed and digger success was calculated to be 11.7 clams per digger, or virtually the same as found in the 1965 estimate.

### Yaquina Bay

Clam bed surveys in Yaquina Bay showed increases in gaper clam populations in all areas except Sally's Bend which remained at the same level as found in 1965. Idaho Point and the Breakwater both indicated dramatic increases in abundance. The Idaho Point count went from one clam per 200 square feet to one clam per 91 square feet and the Breakwater from one clam per 28 square feet to one clam per 4 square feet. Two items of considerable concern occurred during the report period. The first was the loss from filling with dredge materials of 30 acres of marginal clam beds and 60 acres of excellent clam beds. The second was the destruction of hundreds of thousands of subtidal clams from dredging. These latter



clams, though not available to diggers, were believed to furnish much of the larvae that set in the intertidal area. The results of this destruction will not be seen for several years. The loss of 60 acres of excellent clam beds was a major loss to the resource; however, the new fill makes the clam beds in Sally's Bend readily accessible to clam diggers and will probably tend to shift much of the digging intensity on Idaho Point into the Sally's Bend area. Surveys during the summer of 1967 should show whether this happens or not.

#### Siuslaw Bay

The population trend of softshell clams in Siuslaw Bay continued the upward trend exhibited in 1965. Counts on the main bed and Cox Island revealed a density of 0.07 clams per square foot as compared to 0.04 and 0.02 in 1965 and 0.01 and 0.02 in 1964. These counts are again approaching the levels found shortly after the bay had been closed for 3 years. It is conceivable that the decline in abundance resulted in a decline in digging pressure which is allowing the clam population to build up again.

#### Umpqua Bay

Surveys in Umpqua Bay revealed an increase in clam abundance over the 1965 surveys. The decrease in clam abundance in Umpqua Bay was discussed in Progress Report Number 37. At that time it was felt that the severe flooding of 1964-65 might have had a bearing on clam abundance. The 1966 survey tends to discredit this theory in one respect and substantiate it in another. It was noted in the 1965 survey that much silt and organic debris was on the clam beds. The 1966 report notes that this silt and debris overlay has firmed up and counting was much easier than

in 1965. Substantial numbers of clams were probably present in 1965; however, their presence was probably masked by the silt-debris deposition from the 1964-65 floods. We will continue to monitor this area for any ecological changes that this deposition might cause.

### Coos Bay

Gaper clam surveys in Coos Bay revealed an increase on one clam bed, the same density that was found in 1965 on another, and a continued decline in the bed adjacent to the pulp mill. This decline was discussed in Progress Report Number 37. In general, it may be stated that the gaper clam population remains at a better than average level in Coos Bay.

### Summary of surveys

The general trend of clam populations in Oregon's seven major estuaries appear to be a slight increase in abundance. However, silting and deposition of organic debris on clam beds by the 1964-65 floods may have tended to mask the presence of clams during the 1965 surveys. With the firming of tidelands in the absence of any serious flooding in 1966, the clams again were accessible for counting in 1966 and this may create an illusion of increasing abundance. Surveys in 1967 and 1968 should resolve this question.

### Growth studies

The program of marking and planting clams in the experimental clam bed in Yaquina Bay continued. Also, previously marked and planted clams were recovered, measured for growth, and returned to the bed. This is a long-term study and will be reported on in future reports. A length-

weight study was completed for Yaquina and Netarts bays and a regression line calculated for the cockle clam. From this work we can now sample the sport harvest much more efficiently with reduced effort.

### Life history studies

Considerable time was spent in studying key segments of the life history of the cockle clam. Attempts were made to determine gonad location and spawning period by histological examination of the foot and condition studies. Unfortunately, neither method proved satisfactory for our objectives. Several chemicals were used unsuccessfully to stimulate spawning; however, it was found, in cooperation with Oregon State University personnel, that an electrical stimulus would induce the mature male phase of the cockle to spawn. One successful spawning was eventually achieved and the resultant larvae reared by Oregon State personnel and planted in the experimental beds in Yaquina Bay by Oregon Fish Commission personnel. The results of this planting will be evaluated during the summer of 1967.

### General

During the report period some time was spent on observing subsurface movement of juvenile cockle clams. Preliminary observations seem to indicate a tendency for these animals to congregate in small groups. Further observations will be made. One permit was issued to harvest gaper clams by mechanical equipment from subtidal areas in Coos Bay. This operation was monitored by diver biologists while it lasted. After a short period the permittee, for some unknown reason, discontinued his work. Sampling of the personal-use bay clam catch in Yaquina Bay was continued during the summer of 1966. Utilization of Yaquina Bay clam beds continues to

increase with over 500 diggers being counted on several different tide days. Digger success remains relatively stable when people digging clams for the first time are removed from the counts.

### RAZOR CLAMS

Personal-use diggers were sampled, as in the past, on every other minus tide from April to September and commercially dug clams were checked for age composition and number of clams per pound. Some time was spent on public relations, and local court records were searched for clam violations. A survey of physical characteristics of razor clam beaches was begun and some exploratory digging was done.

### Harvest

During 1966 1.1 million clams were dug by 78,000 personal-use diggers and another 434,000 clams were wasted for a total harvest of 1.5 million clams (Table 4). Compared to 1965, fewer clams were taken home in 1966, but wastage increased 1.9 times (Figure 1). The number of razor clam diggers on Clatsop County beaches increased 2.6%.

Over half of the personal-use catch and nearly all the commercially dug clams came from the 2-mile Seaside beach. About 320,000 clams were dug commercially in 1966, a decrease of 45% from 1965. However, clams averaged 5.0 per pound in 1965 and 3.6 in 1966.

Table 4. Personal-use harvest of razor clams by area from Clatsop Beach, April-September 1966.

Area	Miles of beach	No. of diggers	Mean no. clams per digger	No. clams dug	No. clams wasted
1-4 1/5	16	36,945	13.1	483,980	213,435
5 2/	2	41,473	13.7	568,180	220,454
Total	18	78,418	13.4	1,052,160	433,889

1/ Necanicum River to Columbia River (North Beach).

2/ Tillamook Head to Necanicum River (Seaside).

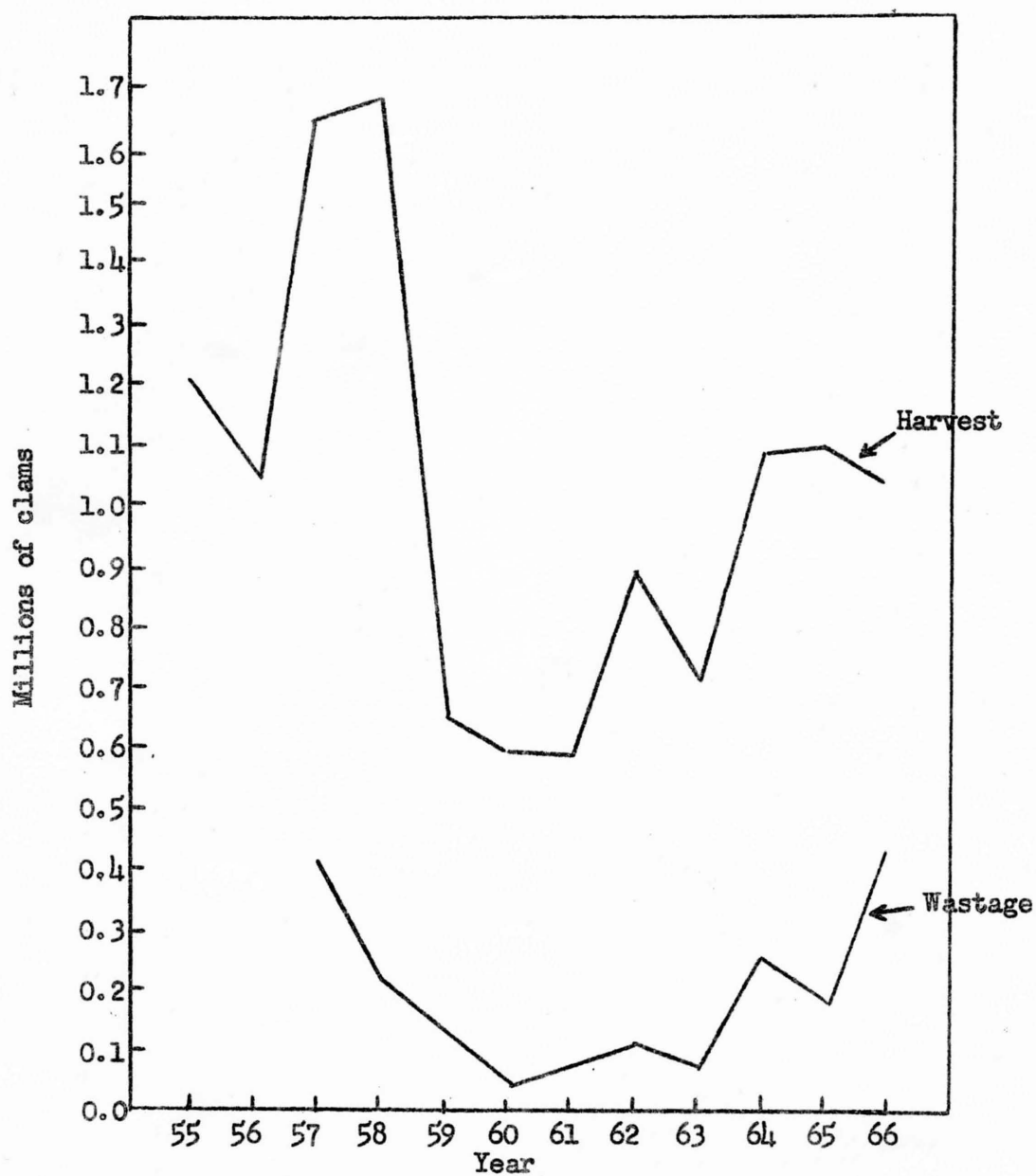


Figure 1. Personal-use harvest and wastage of razor clams from Clatsop Beach, 1955-66.

### Age composition

The per cent age composition for personal-use dug razor clams for 1964-66 is shown in Figure 2. The catch of first-year clams increased in 1966 but was below the record level of 1964. Combined with wastage, the harvest of first-year clams amounted to 57% of the total personal-use catch. Clams over 2 years of age contributed very little to the fishery.

### Public relations

Razor clam regulations, printed on 3 X 5 cards, were distributed to motels in the Seaside area with one card provided for each unit. Regulations on large posters were also placed along the Seaside Prom at 13 sites. Ten were later repaired or replaced due to vandalism.

Digging demonstrations were held at Fort Stevens State Park and Seaside. At Fort Stevens attendance averaged about 150 persons; however, the attendance at Seaside was so poor the program was discontinued there. It would be helpful if this program could be documented on colored slides and sent to other state parks.

### Law enforcement

Local court records show that only 170 razor clam cases were tried in 1966 as compared to 346 in 1965. The cases tried were: overlimit, 95; wastage, 71; no passbook entry, 3; undersize clams (commercial), 1. Fines averaged about \$15.00.

### Beach surveys

A study of the physical characteristics of various razor clam beaches was begun in 1966. Beach slope, hardness, sand composition, and near

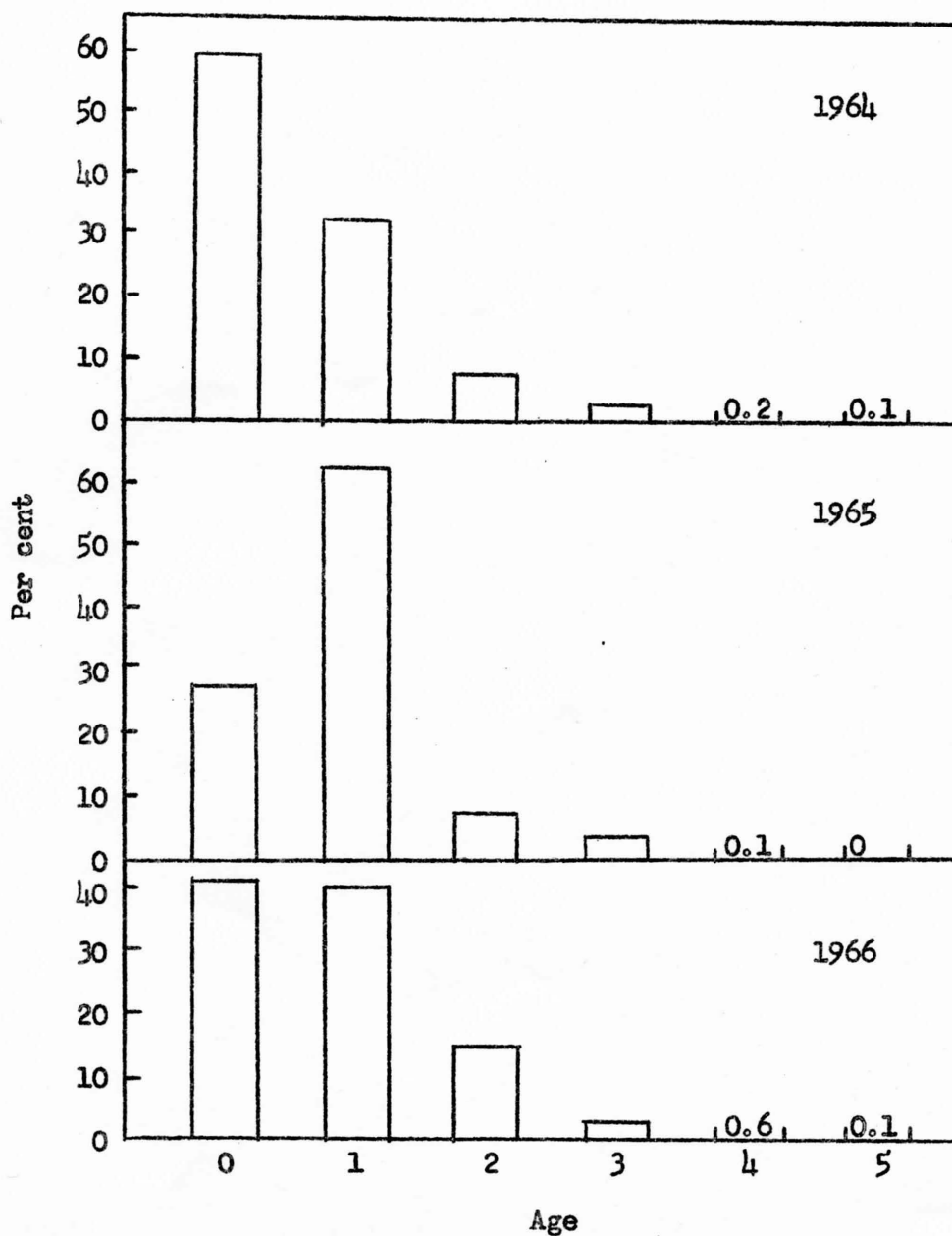


Figure 2. Age composition of personal-use razor clams from Clatsop Beach, April-September 1964-66.

shore currents were examined. Clatsop Beach was used as an index for optimum conditions and compared to the following beaches: Cannon Beach, Bay Ocean, Beaver Creek, Bastendorf, Whiskey Run, and Meyers Creek.

The data are still being analyzed, but some generalizations can be made. The beaches that tend to produce razor clams are broad with a gentle slope, are moderately firm, and contain fine, dark-colored sand. A separate report is being prepared for this study.

#### Exploratory razor clam digging

Small razor clams were found in abundance at Cannon Beach in 1965. In 1966, isolated areas provided excellent digging for the few people who learned about them. Cove Beach (on the Clatsop-Tillamook County line), Tolovana Park, and Indian Beach yielded the best results.

Data for Cove Beach show 42,000 clams were dug by 3,600 diggers. Only 10% of the catch was first-year clams.

Digging should be good in these areas during 1967 for large clams.

#### Summary

The 1966 razor clam catch was the third million-plus year in as many years and 1967 is expected to be another good year. The population seems to be increasing, but utilization is poor as the harvest of small clams and wastage continue to increase. This latter problem should be partially remedied when the beach closure from Tillamook Head to the Columbia River goes into effect July 15 through August 31, 1967. By 1968 we should see a change in size composition, age composition, and wastage.



CRABS

Crab work during the report period consisted of making further observations on mating behavior, investigating fishing complaints, participating in a cooperative preseason cruise, and monitoring the fishery landings and trend of the fishery.

Cooperative cruise

Upon invitation, Shellfish personnel participated in a preseason cruise out of the Crescent City-Brookings area. The objective of the cruise was to determine catch-per-unit effort before the crab season opened. Catch-per-unit effort was slightly less than found in 1965 and led to a prediction of total season landings of about the same magnitude or less than the 1965-66 season.

Mating behavior

In follow-up studies, five replications were made of the mating behavior study reported in Progress Report Number 37. In none of the five replications did we observe anything to repudiate observations made in the original study.

Crab larvae rearing

The crab larvae rearing project financed under PL 88-309 was continued during the year. Larvae were reared at different temperatures and salinities to determine optimum rearing conditions. The results of this study appear in quarterly and annual progress reports submitted to the funding agency.

### Condition sampling

Crabs were sampled from December 1965 through May 1966. Price disputes and a poor market created sampling problems and only about 50% of the normal sample was taken (5,847 crabs). Condition, as based on shell condition, was good at the season opening, ranging from 2-12% softshell along the Oregon coast, which is near or below the desired level of 10%. The mean size of crab sampled was 174.2 mm as compared to 169.9 mm for the 1964-65 season.

### Commercial production

The 1965-66 crab season was the best since 1960-61 when 11.3 million pounds were landed. Total landings for the 1965-66 season were 10.5 million pounds. Crab landings for the 1966-67 season are 6.9 million pounds through March 1967. Total landings are expected to be in excess of 9.0 million pounds; however, the port of Brookings was closed most of the season because of poor bar conditions and most crab normally landed from southern Oregon waters were landed in California. This may alter the predicted Oregon catch.

### General

Complaints of poor crab fishing by personal-use crab fishermen in Nehalem Bay resulted in a short-term study of that estuary to determine the validity of these complaints. Analysis of the data collected and comparison with other estuaries indicated that the complaints were valid; however, the cause of the problem remains unknown.

Another complaint came from the Bandon area from personal-use fishermen who wanted to outlaw the use of crab pots in the bay. Considerable

time was spent in contacting people and explaining the various aspects of ring-net versus pot fishing and the problem was resolved on the local level.

As occurs every summer, shed crab exoskeletons appeared in large numbers on the Oregon beaches. All reports were investigated and width frequencies taken on the shed exoskeletons. These width frequencies indicated that a high percentage of the molting crab would be of legal size at the start of the 1966-67 crab season.

#### ABALONE

A report of a scarcity of abalone in the Brookings area following the 1964-65 floods (Progress Report Number 37) necessitated exploratory work in that area. In general, it was found that the population was down with fair numbers of empty shells on the bottom. However, the divers did find 22 abalone which were tagged and released. An attempt will be made in 1967 to recover these animals. Contact with a California shellfish hatchery resulted in our being given 660 hatchery-reared juvenile red abalone. These animals were planted in Whale Cove where their survival and growth will be observed to determine the feasibility of a major stocking program. The results of this study will appear in future progress reports.

#### OYSTERS

Oyster work during the report period was confined to mortality studies, cooperative work with Oregon State University, and proposing legislation governing land leasing.

### European flat oyster

The European flat oyster was successfully hatched, reared, and set in the laboratory by Professor W. P. Breese. The resulting cultch was put out in Yaquina and Netarts bays and is being observed by Shellfish staff members.

### Legislation

The Shellfish staff worked with Portland office personnel in drafting legislation to revise current statutes regulating the leasing of oyster lands. This legislation was introduced as Senate Bill 193 and after several hearings in the Senate Fish and Game Committee was passed out to the house committee where it died when the legislature adjourned.

### Mortality studies

The oyster mortality study initiated in 1965 (Progress Report Number 37) was continued through the report period. To date information reveals very little mortality in Pacific oysters, none of which can be attributed to a disease problem, and lower mortality in native oysters through March than was anticipated. The results of this study can be found in quarterly and annual reports to the Bureau of Commercial Fisheries.

### INTERTIDAL ANIMALS

Work on intertidal nonfood<sup>1/</sup> animals consisted of coastal surveys, establishing permanent sampling stations and issuing collection permits.

### Coastal survey

The program to visit and map all of the rocky intertidal areas along the Oregon coast was continued with about 80% of the total area now having

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<sup>1/</sup> Includes animals that are edible, but not commonly used for food such as limpets, snails, sea urchins, etc.

been surveyed. During the summer of 1967 this phase of the work should be completed.

#### Barnacle setting

A long-term study to determine the time and intensity of barnacle larvae setting was started. Information obtained will be invaluable in protecting equipment used in salt water and knowing when barnacle larvae can be obtained for feeding larval crab.

#### Ecology studies

Permanent sampling stations were established in four areas to determine trends in abundance of nonfood invertebrates. This is a long-term study and will be reported on in future reports.

#### Collection permits

During the calendar year 1966, 150 permits were issued for the collection of intertidal nonfood animals for both commercial and scientific-educational purposes. Of the total, six were issued for commercial collection and 144 for scientific and educational purposes. Ninety-six per cent of the people receiving permits filed a report on the number of animals collected. Arthropods were the most numerous animals reported (59%) with annelids (21%), and echinoderms (12%) being the next two groups most actively being sought. The percentage increase in annelid collection was caused by the Undersea Gardens collecting large colonies of tube worms for public display.

MISCELLANEOUS

This classification is applied to items that reflect special work or isolated problems that are deemed worthy only of mention. The following is a list of such items: (1) several television and radio interviews on crabs, clams, and oysters; (2) investigating regulations of other states in regard to offshore mining; (3) attendance at scientific meetings, Corps of Engineers, port commissions, and public hearings on shellfish regulations; (4) sand removal permit investigations in Lane, Lincoln, and Clatsop counties; (5) maintaining and replacing intertidal and clam regulation posters; (6) collecting specimens for the Information and Education section; (7) lecturing to school groups and guiding some groups on field trips; (8) investigating disposal sites for proposed dredging projects; (9) participating in a scallop cruise with the Bureau of Commercial Fisheries; and (10) participation in open house activities of Oregon State University.

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