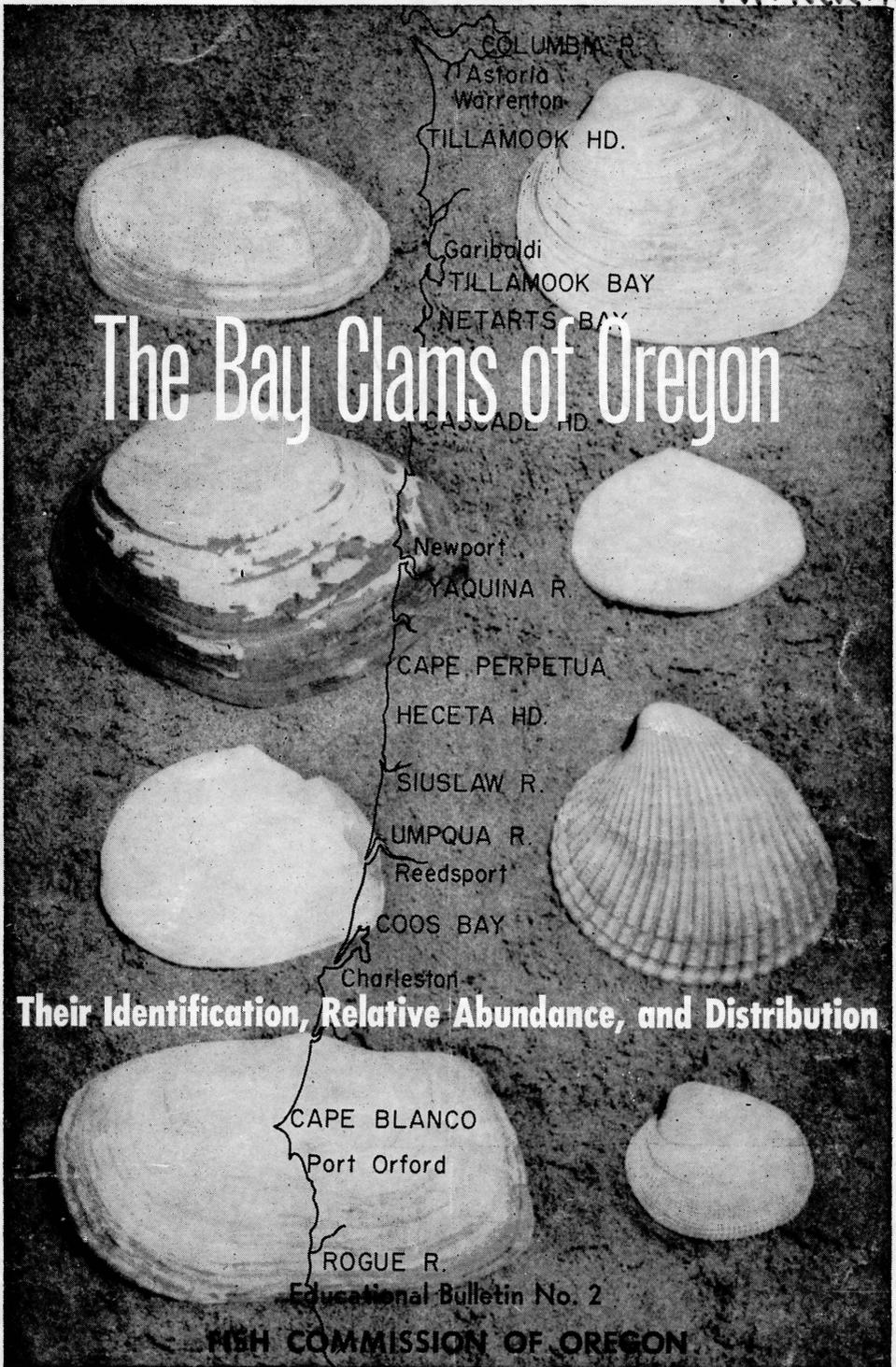


John V. Byrne  
MARRIAGE



# The Bay Clams of Oregon

Their Identification, Relative Abundance, and Distribution

Educational Bulletin No. 2

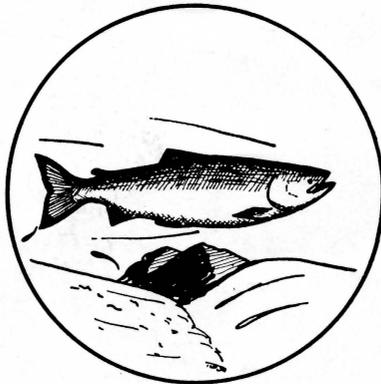
FISH COMMISSION OF OREGON

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# THE BAY CLAMS OF OREGON

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By

**LOWELL D. MARRIAGE**

**1958**

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## INTRODUCTION

Oregon's coastline has a number of bay or estuarine areas where several species of bay clams are taken both commercially and by sport diggers. The U. S. Bureau of Fisheries authorized a survey of these resources during World War I (Edmondson, 1920 and 1923). Oregon has long been cognizant of their importance, but funds were not made available for detailed surveys by the state until the spring of 1947, at which time a permanent laboratory for the study of shellfish was established in Newport, Oregon.

From 1928 to 1957, inclusive, the total commercial clam production in Oregon varied from a low of 57,000 pounds in 1929 to a peak of 659,000 pounds in 1940. For the years 1941 to 1950, inclusive, an average of 58 per cent of all clams taken commercially were bay clams, with razor clams comprising the remaining 42 per cent (Table 1). In addition, preliminary surveys indicate a large amount of recreational production. The daily bag limit of bay clams (all species) for noncommercial diggers is the first 36 taken, regardless of size, of which not more than 18 may be gaper clams (horseclams). Gaper clams may not be taken between January 1 and June 30, both dates inclusive.<sup>①</sup>

**Table 1. Total Oregon Commercial Clam Production in Pounds,  
Including the Shell, 1928-56**  
(For Fiscal Years Beginning April 1)

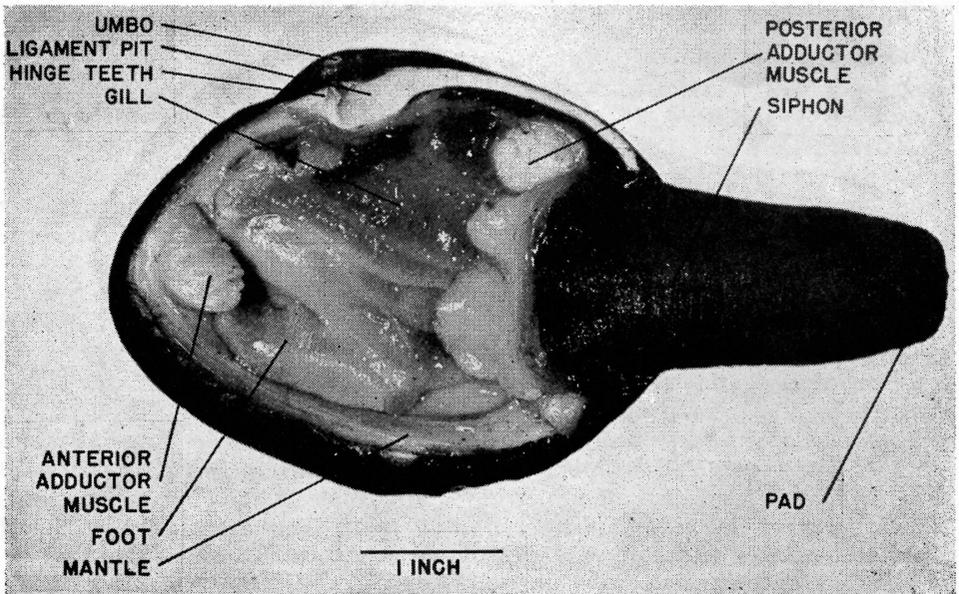
Year	Production All Clams	Bay Clams <sup>②</sup> Only	Year	Production All Clams	Bay Clams Only
1928	110,000	.....	1943	197,000	178,000
1929	57,000	.....	1944	268,000	204,000
1930	163,000	.....	1945	284,000	306,000
1931	143,000	.....	1946	417,000	265,000
1932	132,000	.....	1947	344,000	178,000
1933	128,000	.....	1948	332,000	122,000
1934	224,000	.....	1949	350,000	135,000
1935	469,000	.....	1950	487,000	149,000
1936	448,000	.....	1951	444,000	155,000
1937	472,000	.....	1952	468,000	149,000
1938	664,000	.....	1953	402,000	135,000
1939	608,000	.....	1954	310,000	134,000
1940	659,000	.....	1955	279,000	113,000
1941	338,000	214,000	1956	227,000	124,000
1942	135,000	121,000			

<sup>①</sup> Regulations are subject to change at any time.

<sup>②</sup> No breakdown into bay and razor clams prior to 1941.

Species of clams found within the mouth of a river or bay are commonly referred to as "bay clams", although in some instances they inhabit the outer open beach. For example, the common bay habitat of the cockle *Clinocardium nuttalli* (Conrad 1837), is on sand-mud flats; they can, however, be found in small numbers on the open Oregon coast where they are frequently taken from crab pots by crab fishermen. Also the razor clam, *Siliqua patula* Dixon, usually found on the open beach, is present inside several of the bays of Oregon.

10 ↑



**Internal anatomy of gaper clam and common anatomical parts used in describing species of bay clams.**

## Glossary

*Anterior*—terminal portion of the clam opposite the siphon(s).

*Beak or umbo*—the rounded peak located near the hinge region of the shell.

*Foot*—the organ used for locomotion.

*Height*—the straight-line distance between the umbo and the ventral margin of the shell at approximately right angles to the length measurement.

*Hinge*—the point of articulation of the two valves of the clam.

*Hinge tooth*—any of the prominent internal processes originating on the valves in the hinge region.

*Length*—the straight-line distance between the anterior and posterior extremes of the shell.

*Ligament*—a cartilaginous band of tissue which holds the valves together.

*Ligament pit*—the cavity in the hinge region which anchors the ligament (the gaper clam has a large ligament pit).

*Mantle*—the fleshy lobe inside the valves which bears the shell-secreting glands. Bivalves have a pair of mantles, one for each valve.

*Pad*—the leather-like pads adherent to the tip of the gaper clam siphon.

*Periostracum*—the skin-like covering of the outside of the shell.

*Posterior*—the terminal portion of the clam containing the siphon.

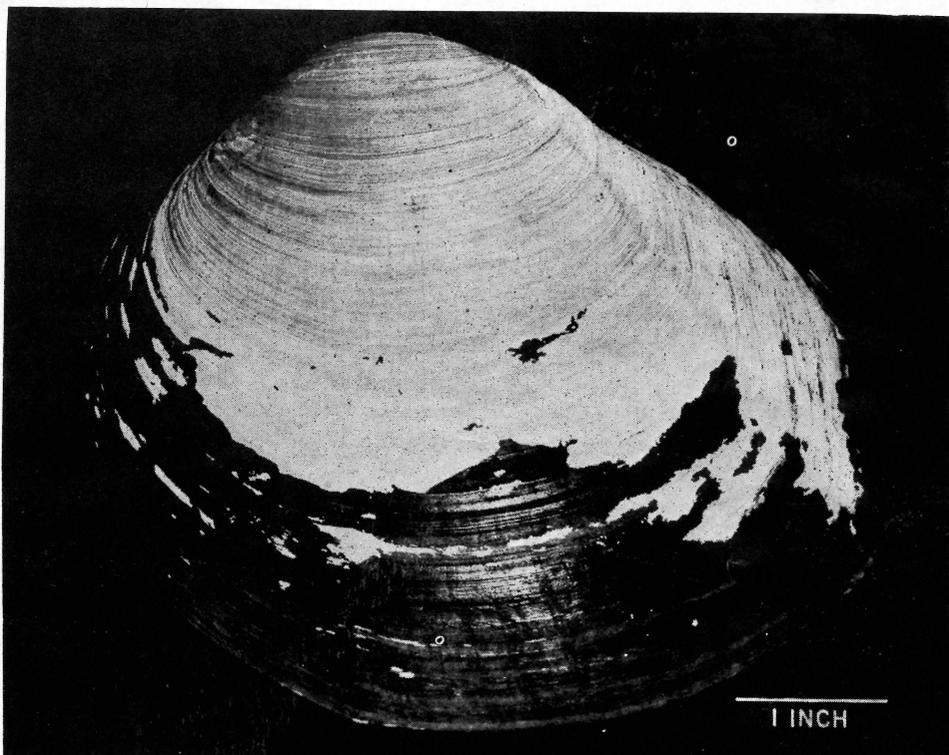
*Rib length*—a straight-line measurement of the longest radiating rib of the cockle or littleneck clam shell beginning at the umbo and terminating at the ventral margin.

*Siphon*—a tubular protuberance of the mantle margin through which water is conveyed to and from the gills. The excurrent and incurrent siphons may be separate or joined; when joined they are oftentimes referred to as the neck.

*Valve(s)*—the two shells of a clam are called valves; hence, the commonly used term bivalve.

## DESCRIPTION OF SPECIES

Tidelands of Oregon's rivers and bays provide habitats for a variety of species of bay clams and other invertebrates. For the purpose of uniformity, one common name has been assigned each bivalve mentioned in this report. The common name is followed by its scientific name and the name of the person who first described it. The scientific names are those used by Fitch (1953).



**The Gaper Clam, *Schizothaerus nuttalli* (Conrad) (1)**

A few of the common names associated with this clam are Empire clam in the Coos Bay area, blue-neck and blue in the Tillamook-Netarts area, and horseneck or horseclam in many places.

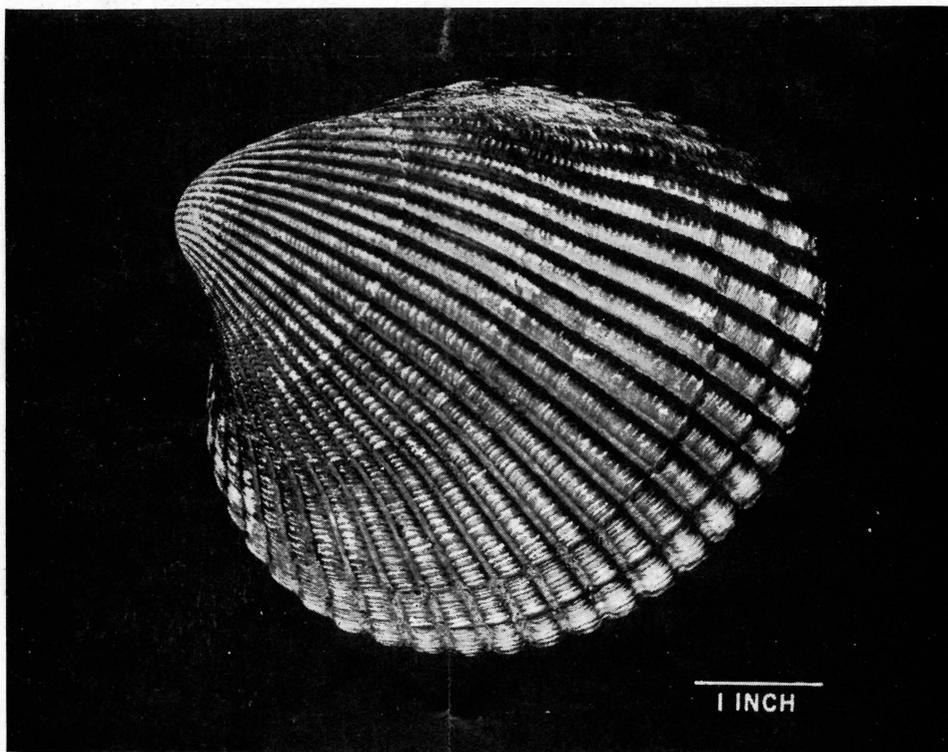
The shell of this clam may be recognized by its large size, by the gape at the posterior end, and by the large ligament pit. The newer growth of the shell is covered with a brown periostracum in life. A large neck with dark, wrinkled skin and two leather-like flaps on the tip protrudes from the gaping posterior end. In Yaquina Bay, algae of the genus *Polysiphonia* and barnacles of the genus *Balanus* have been found clinging to these flaps and camouflaging the presence of the clam.

The clam inhabits the tidal flats of the larger bays and reaches its peak of abundance in a mud-sand mixture. It is usually found 14 to 16 inches beneath the surface of the tide flat but this depth varies considerably. The tip of the siphon (neck) showing at the surface or the depression

resulting from retraction of the siphon, reveals the presence of this bivalve. Contrary to popular belief, the gaper does not dig after being disturbed but remains sedentary most of its life. Digging is confined to gradual adjustment of the clam to its size, substrate, and other related factors. A garden spade or shovel makes a very effective tool for gathering gapers.

Gaper clams in the commercial landings average  $5\frac{1}{2}$  inches in length,  $4\frac{1}{4}$  inches in height, and  $1\frac{1}{4}$  pounds in weight (see glossary for definitions of shell measurements). Individual specimens have been recorded up to 7 inches in length and reports of larger specimens are common.

Immediately after spawning, about 15 per cent of the total weight of the gaper clam is edible. This percentage gradually increases until just before spawning when about 35 per cent of the total weight is edible.



**The Cockle, *Clinocardium nuttalli* (Conrad 1837) (2)**

The cockle is easily identified by the many prominent, evenly spaced ridges (ribs) on the exterior of the shell. These originate at the umbo and radiate in a fan-like pattern terminating at a scalloped edge. Another name in general use for this clam is the cockerel.

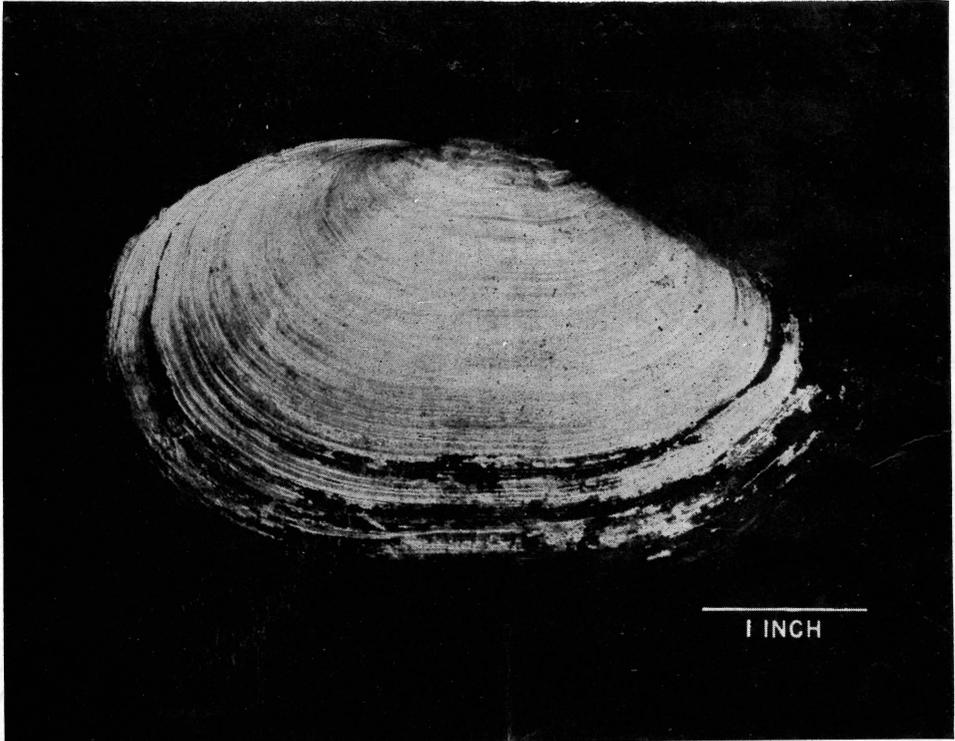
As in most of the bivalves the color of the shell is affected by the habitat. Cockles found in sandy bottom-soil have a light-brown color, while those in a more muddy bottom-soil have a dirty-grey hue.

The very large, muscular foot enables this clam to travel short distances and to dig under the surface of the tide flat from 1 to 3 inches.

Because of its short siphon the cockle is not adapted to depths common for the gaper and softshell clams. When disturbed, this clam retracts all body parts and the valves close tightly. The cockle frequently attains 4 inches in longest rib length (straight-line measurement) but the average size harvested is about 3 inches. The largest specimen ever encountered in Oregon by the author measured slightly over  $4\frac{3}{4}$  inches and weighed 1 pound 10 ounces live weight. This clam, taken in Tillamook Bay July 8, 1952, was about 10 years old, according to the rings on the shell.

Harvesting is usually accomplished by dragging a rake through the upper 1 to 3 inches of soil.

From 10 to 15 per cent of the total weight of the live clam is edible.



**The Softshell Clam, *Mya arenaria* (Linnaeus) (3)**

The softshell clam is commonly called the eastern or mud clam. Its shell is of medium size, ovate, thin, brittle, and chalky. The interior hinge region of the left valve has a large hinge tooth projecting at right angles to the plane of the shell which readily distinguishes it from the other common species of clams in Oregon.

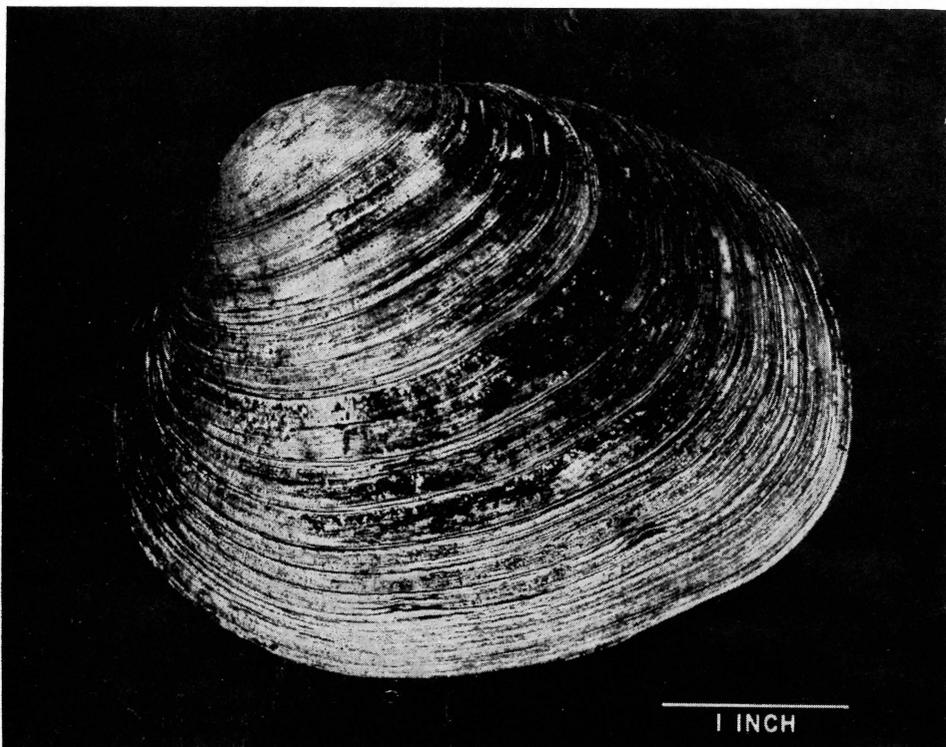
Like the gaper clam the softshell has an elongated siphon which allows it to live from 8 to 14 inches beneath the surface of the clam flats. A shovel is used for harvesting.

The softshell varies considerably in size among the bays and even within

individual bays. Specimens from the Umpqua River, where conditions for growth appear to be near optimum, often measure 6 inches in length.

The most common habitat for this clam in the bays of Oregon is the firmer mud flats, although occasionally it can be found in gravel and sand flats. It appears at the mouths of many of the smaller rivers where other species of clams are not to be found and is also found in the larger bays farther upbay than the other species.

About 20 per cent of the total live weight of the clam is edible.



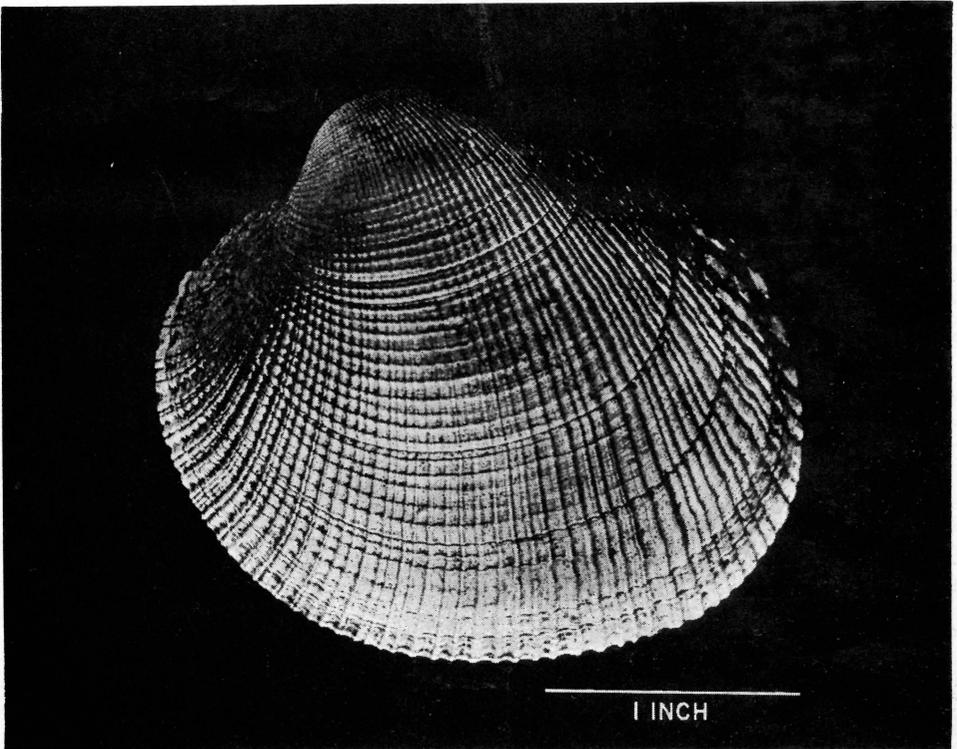
**The Butter Clam, *Saxidomus giganteus* (Deshayes) (4)**

The butter clam is also known as the Washington clam, quahog, Coney Island, beef-steak clam (because of the color of the meat), and the great Oregon clam. It is identified by the large, external ligament; the heavy, ovate shell; the fine, concentric lines of growth on the exterior of the shell; and the relatively short, black-tipped siphon.

Oregon, unlike its neighboring state Washington, has relatively few beds of butter clams. This may be due to the lack of suitable habitat, or other inhibiting factors. Butter clams are commonly found in a gravel-mud-like soil, and where this type of soil exists in Oregon there are scattered beds of butter clams. They are generally found from 6 to 12 inches beneath the surface of the beds.

The average length of Oregon butter clams in samples of noncommercial landings is  $3\frac{1}{2}$  inches.

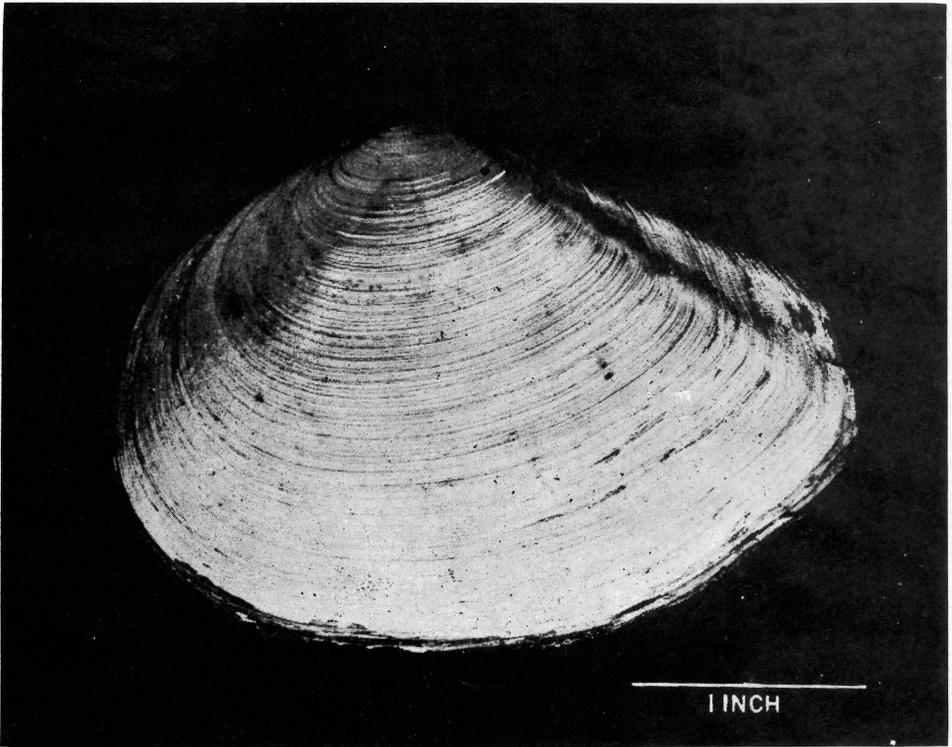
A shovel or potato fork is commonly used for harvesting this bivalve.



**The Littleneck Clam, *Protothaca staminea* (Conrad) (S)**

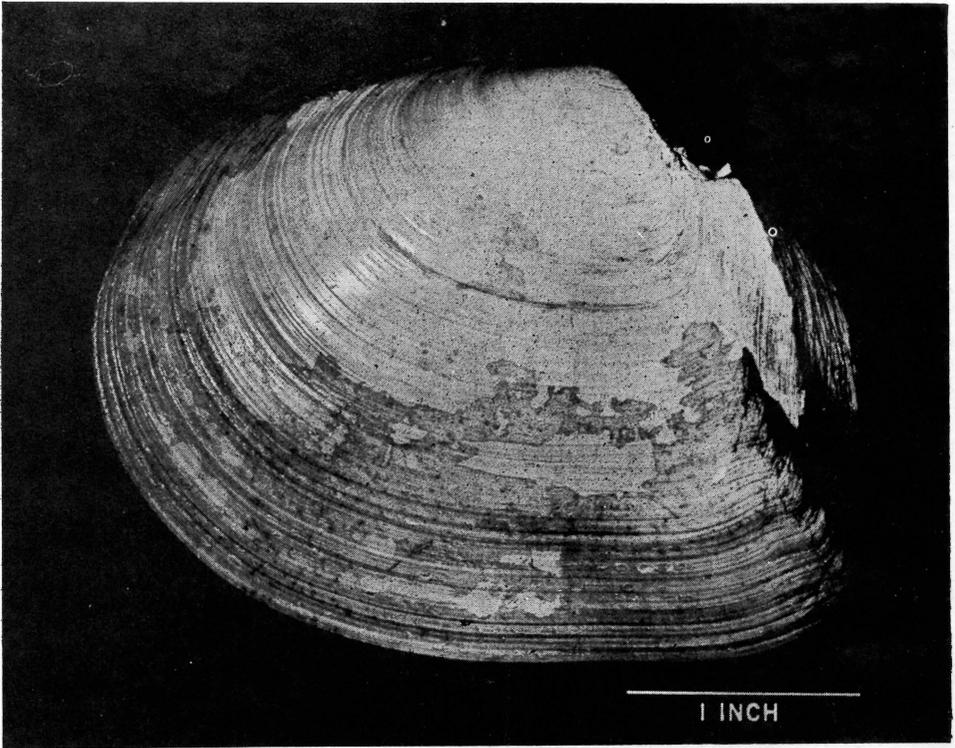
The littleneck clam, also called rock clam and butter clam, is similar to the cockle in that the radiating ribs are present, but it lacks the deeply-scalloped edge. In addition, concentric growth lines at right angles to the radiating ribs give a cross-hatched appearance. The color is variable but in the main is a cream or grey. It is often indistinctly mottled with brown markings.

The littleneck clam requires a habitat similar to that of the butter clam. It is also scarce in Oregon's estuary areas and consequently is of little importance to the commercial fishery. In areas of greater abundance this clam is harvested by turning over the soil with a fork or shovel. More commonly it is taken only incidentally while raking for cockles. Oftentimes this clam may be found lying exposed on the surface of the beds. Littleneck clams taken by sport diggers commonly average  $2\frac{1}{2}$  inches in rib length.



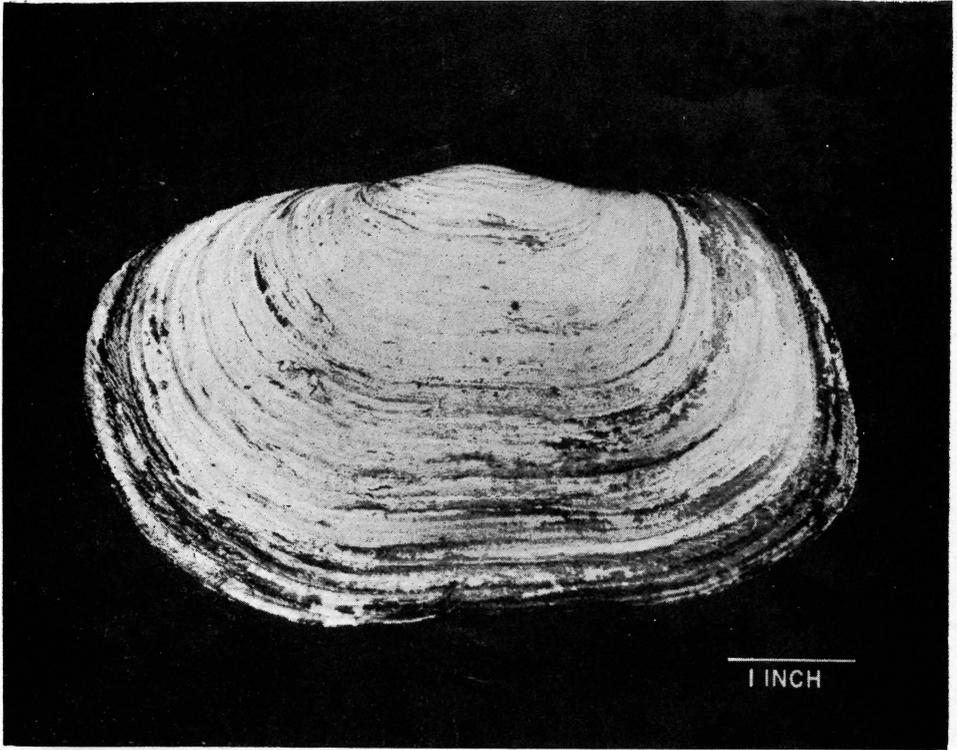
**The Bent-Nose Clam, *Macoma nasuta* (Conrad) (♂)**

This small clam rarely exceeds 2 inches in length. It has a divided siphon which gives the impression of two necks. The common name "bent-nose" is derived from the curvature of each valve at the posterior end. Its habitat is similar to that of the gaper and cockle but lies from 6 to 8 inches beneath the surface of the flats. It is considered a delicacy by those few people who are aware of its edibility but is little used because of its small size. It is found in all of the larger bays of Oregon.



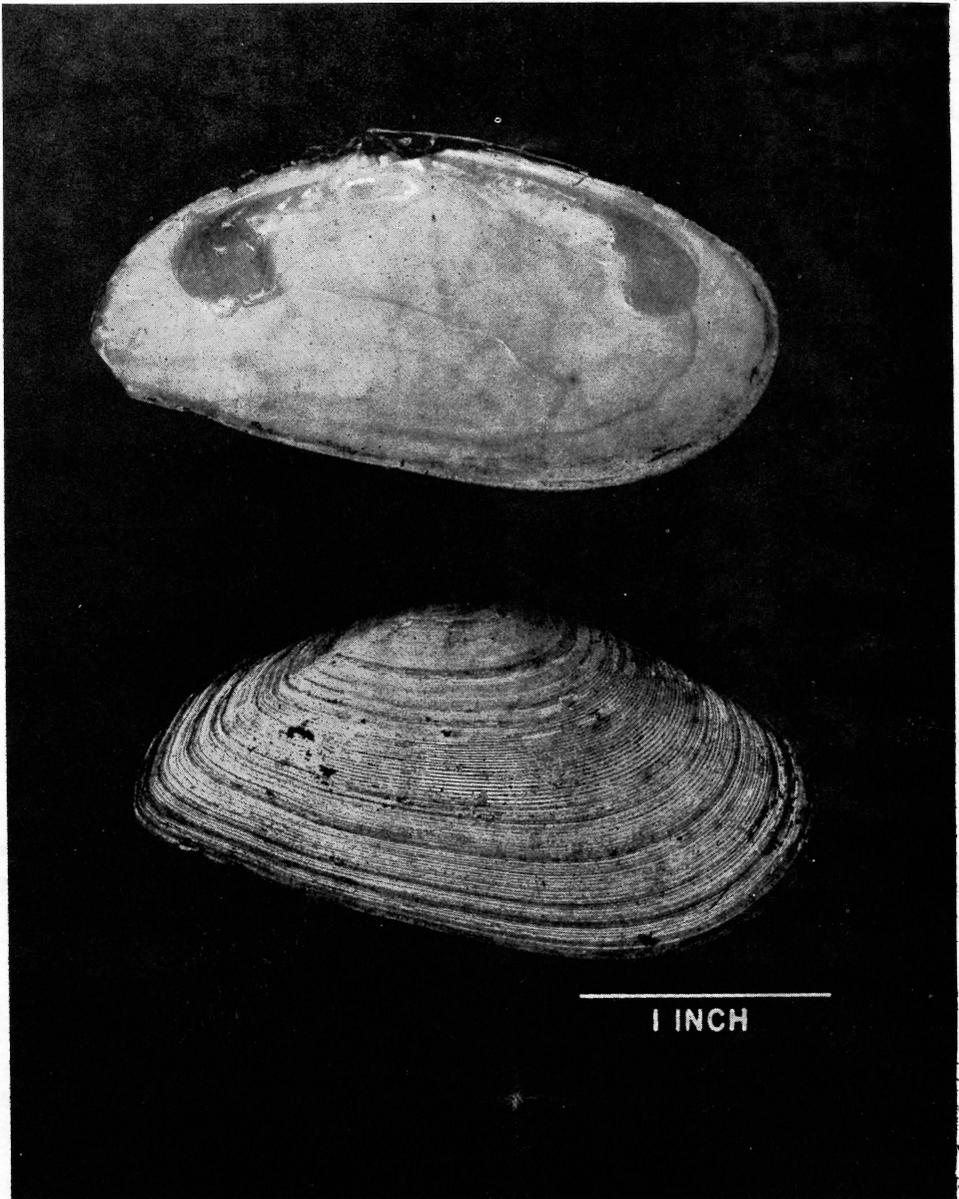
**The Sand Clam, *Macoma secta* (Conrad) (7)**

The bleached, white shells of dead sand clams often lie completely open and give the appearance of wings; hence the common name, butterfly clam, in some areas. It is found in the more sandy clam flats in relatively small numbers as compared with the cockle. The valves have a very shallow cup. Like its close relative *M. nasuta* this clam has a split siphon. The clam is edible but rarely used. Specimens from Netarts Bay reach  $4\frac{1}{4}$  inches in length. It is also known to occur in Yaquina Bay and is probably present elsewhere.



**The Geoduck, *Panope generosa* (Gould) (8)**

The author has verified records of this clam in Oregon from Netarts Bay only, where it is occasionally dug. It is the largest of the Oregon bay clams. The body parts are too large for the shell and the animal is unable to withdraw completely. The shell gapes at both ends but especially at the posterior. The geoduck is distinguished from the gaper by the absence of leather-like flaps on the tip of the siphon and the absence of the deep ligament pit in the hinge region. Shells of the geoduck are large and nearly rectangular. One specimen dug May 27, 1949, in Netarts Bay measured  $6\frac{3}{4}$  inches in shell length and weighed  $6\frac{1}{2}$  pounds.



**The Bodega Tellen, *Tellina bodegensis* (Hinds) (9)**

The bodega tellen is a sand-inhabiting clam found scattered along the entire Oregon coast. It has been present in some years in quantities large enough for harvesting in Coos Bay, Yaquina Bay, and Tillamook Bay. Samples average  $2\frac{1}{2}$  inches in length and  $1\frac{1}{8}$  inches in height. The relatively heavy white shell is rounded anteriorly and pointed posteriorly and has distinct concentric lines.

## DISTRIBUTION

Table 2 is offered as a guide to the general abundance and distribution of the major species of bay clams.

In the larger bays, where all the common species of bay clams are present, the softshell beds of importance are generally found in the upbay regions where the water is less saline, or in inlets where fresh water is being discharged. The cockle, gaper, butter, and littleneck clams are generally found in the lower regions of the bay where the salinity is influenced to a greater extent by the proximity of the ocean.

The softshell clam is the only bay clam adaptable to the conditions found in the smaller "fresh water" bays such as Nehalem, Nestucca, Salmon, Siletz, and Coquille.

**Table 2. Major Species of Bay Clams and Relative Abundance**

<i>River or Bay</i>	<i>Gaper</i>	<i>Cockle</i>	<i>Softshell</i>	<i>Butter Clam</i>	<i>Littleneck</i>
Nehalem .....	0	0	2	0	0
Tillamook .....	3	3	2	1	1
Netarts .....	3	3	1	2	1
Nestucca .....	0	0	1	0	0
Salmon .....	0	0	1	0	0
Siletz .....	0	0	1	0	0
Yaquina .....	3	3	2	1	1
Alsea .....	1	1	2	0	0
Siuslaw .....	1	0	2	0	0
Umpqua .....	1	0	3	0	0
Coos Bay .....	3	2	1	1	1
Coquille .....	0	0	1	0	0

0—not known to be present  
 1—present but scarce  
 2—fairly abundant  
 3—present in considerable abundance

### Miscellaneous Species

There are numerous other species of clams found in Oregon's bays that do not warrant mention in this report because they are only rarely, if ever, utilized.

There are also two species of oysters present in the larger bays of Oregon. These are the native oyster, *Ostrea lurida* (Carpenter), and the exotic Pacific or Japanese oyster, *Crassostrea gigas* (Thunberg).

The native oyster is an inhabitant of Yaquina and Netarts Bays, and was formerly found in Coos Bay. It is very much depleted in numbers. The Pacific oyster is being cultivated quite extensively in Tillamook, Netarts, Yaquina, and Coos Bays and has been planted experimentally, at one time or another, in Nehalem, Siletz, Alsea, and Umpqua Bays.

10 - SILIQUA (RAZOR)  
 (11 - OSTREA LURIDA)  
 (12 - CRASSOSTREA GIGAS)

## DESCRIPTION OF BAYS

As an aid in the description of the various bays the total acres enclosed by the boundaries of the respective bays and the acres of tideland in the various bays are presented in Table 3. Only those areas affected by tidal action were included in the acreage measurements. Coos, Tillamook,

Table 3. Summary of Bay Acreages<sup>①</sup>

Bay or River	Total Area Acres	Tidelands <sup>②</sup> Area-Acres	Relative Position Based on	
			Total Area	Tideland Area
Coos Bay .....	9,543	4,569	1	2
Tillamook .....	8,839	5,147	2	1
Umpqua .....	5,712	1,548	3	4
Nehalem .....	3,766	1,180	4	5
Yaquina .....	2,853	1,741	5	3
Netarts <sup>③</sup> .....	2,406	.....	6	....
Alsea .....	2,227	.....	7	....
Siuslaw .....	1,589	597	8	6
Siletz <sup>④</sup> .....	1,203	.....	9	....
Nestucca <sup>⑤</sup> .....	1,149	.....	10	....
Coquille .....	703	.....	11	....
Salmon <sup>⑥</sup> .....	438	.....	12	....

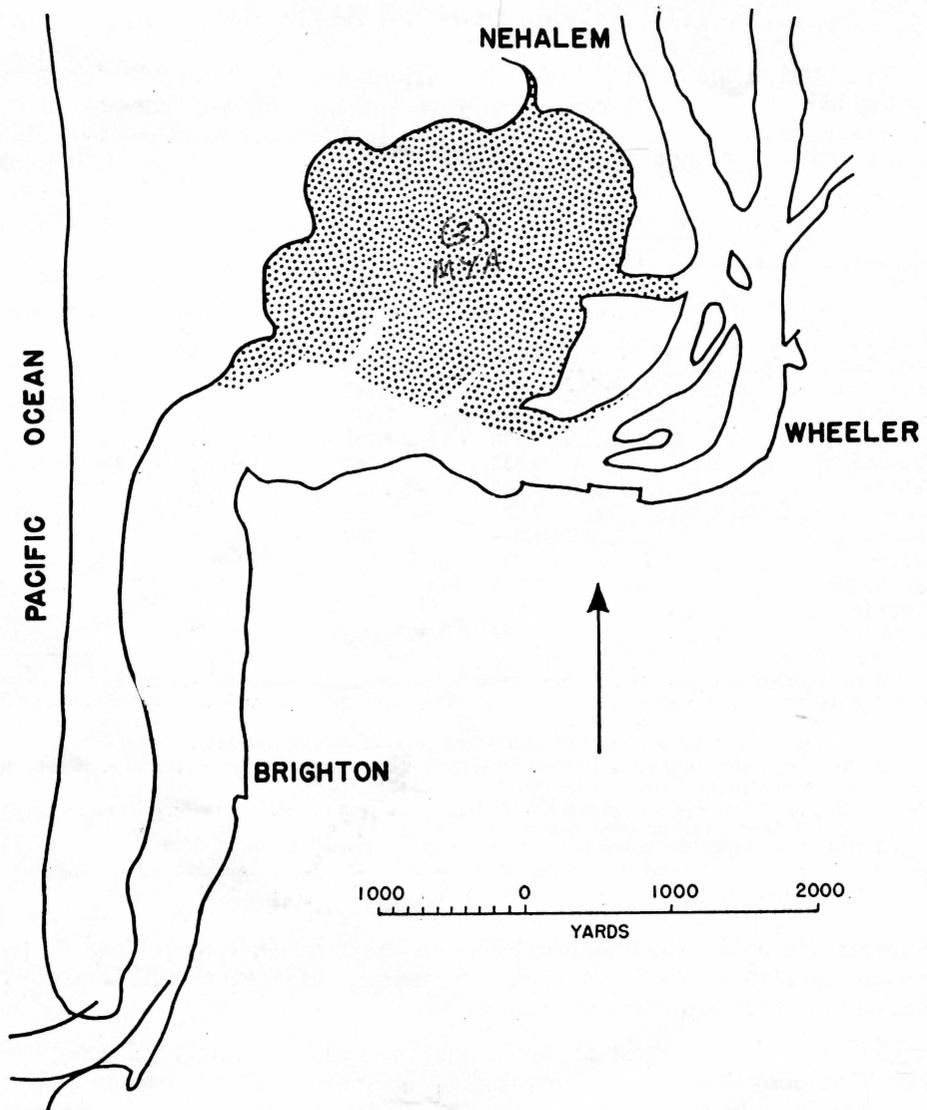
- ① Areas calculated from USCGS bay charts; when bay charts were not available coastal charts were used, thus reducing the accuracy of measurement because of reduction in scale. Areas are subject to revision.
- ② No charts available for measuring tideland acreage of some of the bays.
- ③ No commercial harvesting in Netarts before 1948 because of local agreement prohibiting taking of clams for commercial use.
- ④ Although Siletz had no commercial landings from 1943 to 1949 it remained legally open for commercial harvesting until August 12, 1948.
- ⑤ Nestucca was closed to commercial harvesting of clams August 12, 1948.
- ⑥ Salmon River has had little or no commercial production but was legally open until August 12, 1948.

Yaquina, Umpqua, Siuslaw, and Nehalem Bays produce more than 95 per cent of the state's total commercial bay clams. It is, therefore, these bays that are of most interest for comparison.

Coos Bay is the largest of the Oregon bays although only a little larger than Tillamook Bay, but Tillamook Bay has more tideland acreage. These two bays contain 45 per cent of the total tideland acreage of the state.

Next in order on the basis of total size are Umpqua and Nehalem Bays. It can be seen, however, that the clam-producing area (tideland) in both bays is smaller than that of Yaquina Bay. Netarts, Alsea, Siuslaw, Siletz, Nestucca, Coquille, and Salmon Bays follow in order of decreasing total size.

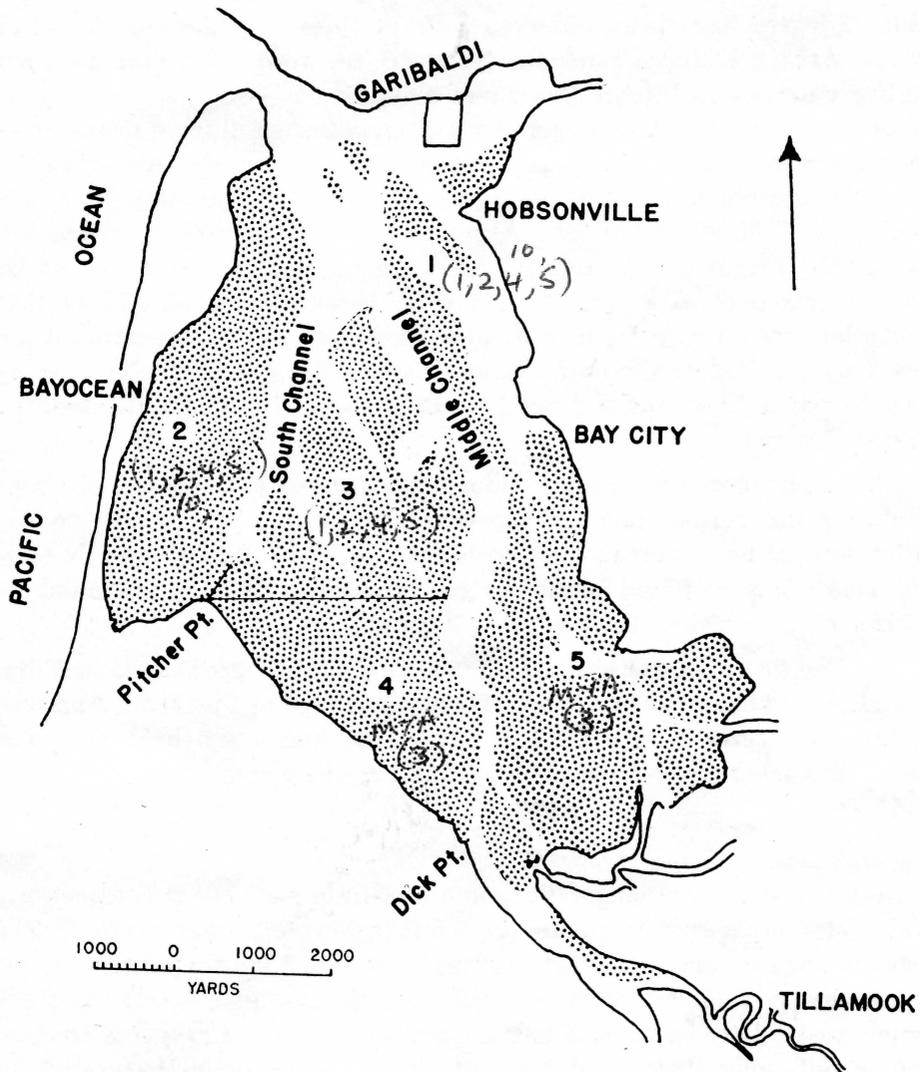
While clams may be plentiful, the amateur may very well come back empty-handed because he does not know where to go. With this thought in mind, a brief description of the main clam beds for each bay is given. For ease of location, the bays are given in order of their appearance on Oregon's coastline from north to south. All tideland heights referred to are deviations from mean lower low water.



### Nehalem Bay

Nehalem Bay is comparatively long and narrow in outline. It supports a sizeable population of the softshell clam. The main beds are located 3 miles upriver from the mouth, to the north of the main river channel in a cove formed by a bend in the river bed. An estimated 375 acres of clam flats of variable productivity lie in this area with small beds found scattered at other places within the bay along both sides of the channel. Patches of marsh grass dot the main clam beds and here the softshell is literally dug in the grass. Despite fairly heavy digging pressure, the beds appear to be maintaining themselves at a good level of abundance.

The main beds may be reached by walking, but a boat is recommended.



### Tillamook Bay

Tillamook Bay, the second largest bay on Oregon's coastline, is 70 miles south of Astoria. This bay has many miles of beaches from which bay clams may be gathered.

There is a ready market for the cockle clam in Tillamook Bay as bait for both the local crab fishery and the recreational bay and ocean fishery. This clam is also used in the restaurant and fresh market trade. It is popular with tourists and other recreational clam diggers for use in their favorite clam recipe. The cockle clam supports 76 per cent of the Tillamook Bay commercial clam production.

Tillamook Bay is divided into five areas in the preceding diagram for ease of location of the clam flats. Area 1 is the group of islands and tide flats lying at the forepart of the bay off Bay City, Hobsonville, and Gari-

baldi. Diggers have been observed here at tides of a plus 0.4 foot and lower. Area 2 includes tidelands lying off the town of Bayocean from the bay entrance to Pitcher Point and extending bayward to the edge of the South Channel. Clam diggers have been observed digging in this area when the tides ranged from a plus 2.7 to a minus 1.7 feet. Area 3 is the triangular portion of tidelands lying in the center of the bay between South Channel and Middle Channel. Although no extensive observations regarding the height of this area have been made, one observation showed clam diggers here at a plus 0.6 foot tide. Area 4 is designated as that triangular area upbay from, but adjoining, area 3 and separated from area 5 by the Middle Channel. Area 5 is that portion of tidelands lying upbay from a line drawn from Bay City to Dick Point following the Middle Channel.

Although there is no sharp dividing line in regards to species of clams inhabiting the various areas it can generally be said that gaper, cockle, butter, and littleneck clams may be found in areas 1, 2, and 3 while soft-shell clams may be found farther upbay in areas 4 and 5. Small numbers of razor clams may be found in areas 1 and 2.

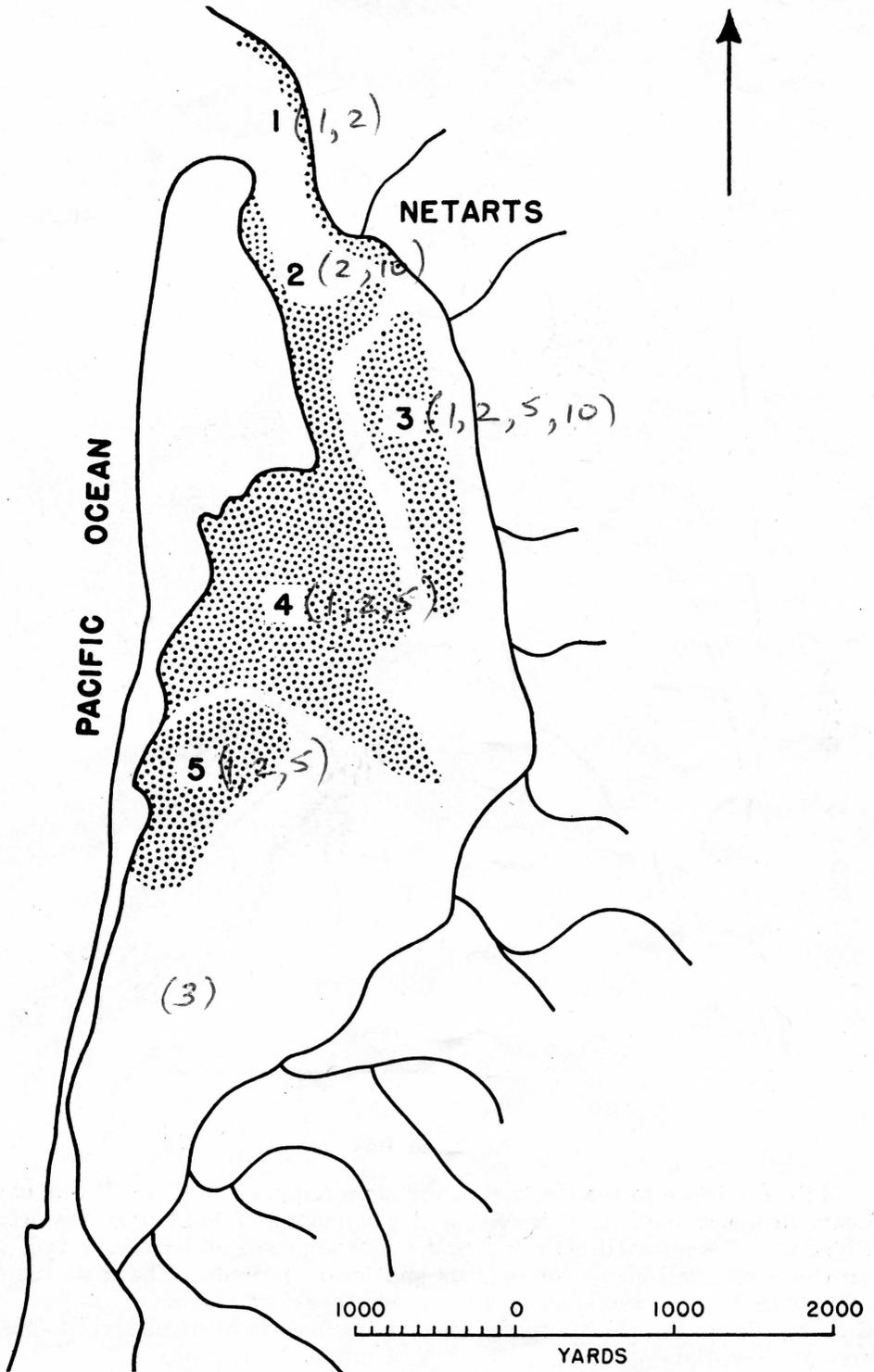
The Pacific or Japanese oyster has been found to grow well in Tillamook Bay and oyster growers have taken advantage of this fact. Approximately 3,000 acres of tidelands in areas 2, 3, and 4 are held as oyster claims and are being used for the cultivation of oysters.

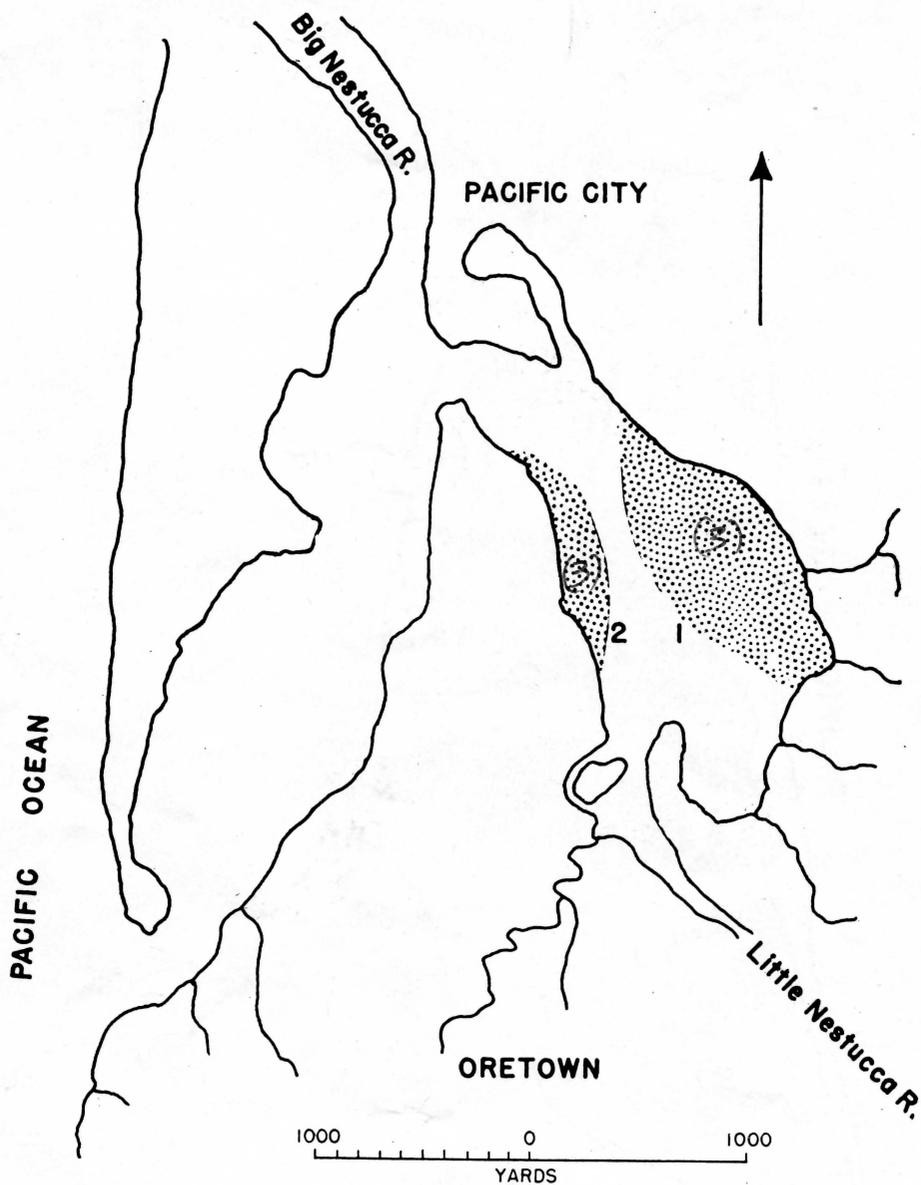
### **Netarts Bay**

Netarts Bay is less than 5 miles south of Tillamook Bay. It is essentially a salt water bay with only minor creeks discharging fresh water into it. The resort town of Netarts depends to a great extent upon the shellfish resources of the bay as a tourist attraction. During the summer season moorage owners make daily excursions to the clam beds upbay and diggers have no trouble obtaining their legal limit of clams. Commercial harvesting of bay clams is limited to supplying cockle clams for bait for both a small local crab fishery and for recreational fishing.

Gaper clams may be found in areas 1, 3, 4, and 5; cockles in areas 1, 2, 3, 4, and 5; butter clams in areas 1, 3, 4, and 5; littleneck clams in areas 3, 4, and 5; some softshell clams are present upbay from area 5; and razor clams are present in small numbers in areas 2 and 3. All areas are well exposed on tides of minus 1 foot or lower; however, except for area 1 all areas must be reached by boat.

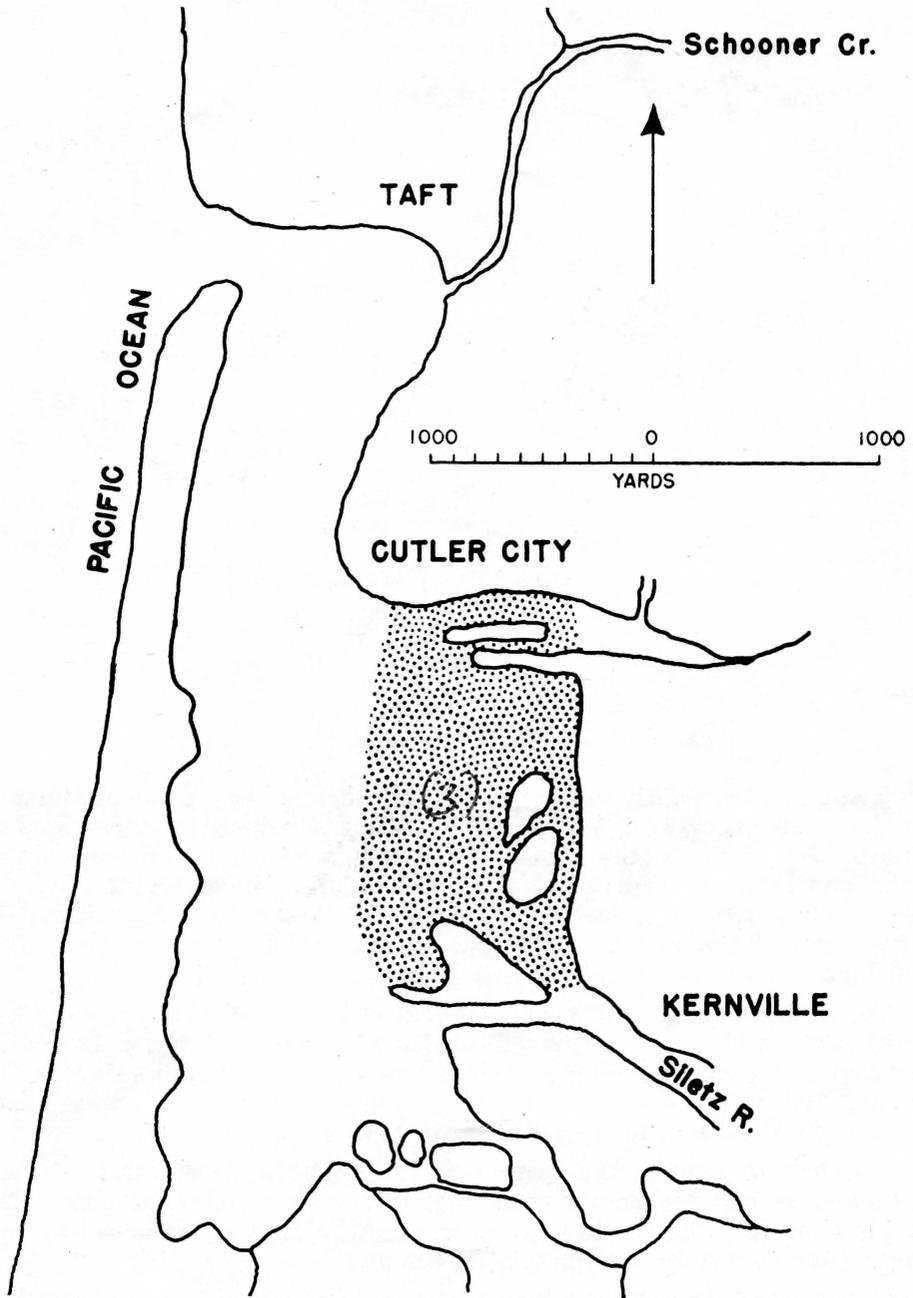
Approximately 300 acres of tideland in Netarts Bay are used for cultivation of the Pacific oyster. The native oyster is present in very small numbers upbay from area 5.





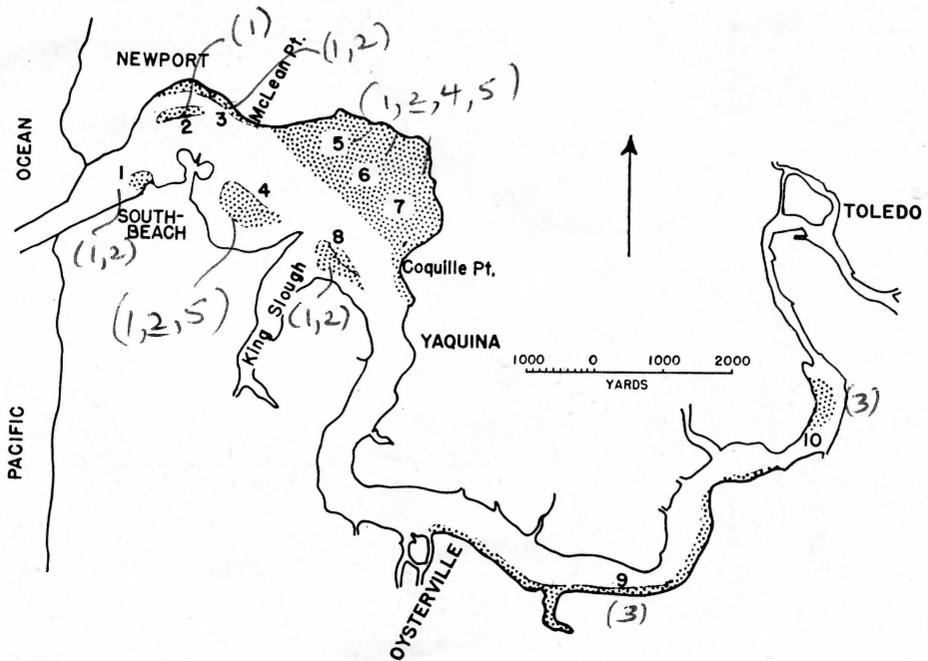
### Nestucca Bay

With reference to the location of the clam flats one should call this bay Little Nestucca Bay, for it is within the boundary of the Little Nestucca River that the softshell clam is found. Although not an extensive bed, it furnishes softshell clams for tourists and local residents. The main clam area, area 1, is approximately 2 miles southeast of the town of Pacific City and is accessible by road. Across the bay is a smaller clam bed, area 2. The flats are well exposed at a minus 0.7 foot tide.



**Siletz Bay**

The softshell clam is found sparingly in this bay in the area between Cutler City and Kernville. Many old logs and snags have settled on the mud flats and among these the softshell is dug. The clams are generally harvested by local residents only. Tides of a minus 0.6 foot bare the flats sufficiently for digging.



### Yaquina Bay

Yaquina Bay, which ranks third in commercial bay clam production, produces an average of 40,000 pounds annually which is approximately 20 per cent of the state's total.<sup>①</sup> It is centrally located on the Oregon coast and receives fresh water from the Yaquina River. Tidewater extends upbay over an inverted "S" course for 12½ miles. Approximately 1,700 acres of tideland are within this area, which places Yaquina Bay third in size in regard to tideland acreage.

The cockle clam constitutes 66 per cent of the Yaquina Bay commercial production, and gaper clams and softshell clams constitute 28 and 6 per cent, respectively. Other species of clams found in Yaquina Bay are the butter, littleneck, bent-nose, and sand clams. Occasionally razor clams are dug in small numbers on the sandy bars within the bay.

Cockles are used in the restaurant trade, in the fresh sea food markets, and as bait for both recreational and commercial fishermen. The cockle clam has tight fitting valves and can be held in water-submerged cages (live-boxes) in anticipation of demand.

Gaper clams do not lend themselves to live-boxing for any length of time and therefore must be utilized soon after their removal from the clam flats. They support a limited restaurant trade, and a more substantial amount is sold to retail markets.

Like the gaper clam, the softshell clam is generally not held in the shell

<sup>①</sup> Average production 1943-49.

prior to marketing as it is not long-lived out of water. The softshell clam is used in a limited quantity in restaurants and also for home consumption.

Yaquina Bay has been divided into 10 areas in the preceding diagram. Area 1 supplies gapers and a few cockles mostly to the residents and tourists from Southbeach, a small settlement immediately adjacent to the area. No boat is needed to reach this readily available clam flat which is used most by recreational clam diggers. The flats are easily accessible on any minus tide.

Area 2, an area of approximately 12 acres of tidelands, varies in height from 8 feet at the upbay end to 1 foot at the downbay end. The extreme height upbay is due to dredging waste deposited in 1948. The upper end is sandy-gravel interspersed with dead clam shells while the lower end is shifting sand. Although gapers exist in the entire area, they are not often dug because of the relative inaccessibility of the area.

Area 3, a small strip of tideland lying on the northerly side of Yaquina Bay and extending from the trollers' docks to McClean's Point, is a readily available source of small gapers and cockles. It lies immediately adjacent to a public road. This area also supports a sizeable ghost shrimp fishery (*Callinassa* sp.). The shrimp are used as bait for nearby bay and ocean fishing. This tide flat is bared at a plus 1.0 foot tide.

A road near one edge of area 4 admits clam diggers to this beach. Considerable quantities of cockles and gapers are harvested by both commercial and recreational diggers. Littleneck clams may be found incidentally during digging operations. A plus 1.5 feet tide or lower is needed to expose the clam flats in this area.

Areas 5, 6, and 7, more commonly known collectively as Sally's Bend, contain approximately 500 acres and form the largest single clam flat in the bay. Here, conditions for the growth of bivalves appear to be near optimum. The three areas are separated by two main drainage channels. A plus 2.0 feet tide bares part of area 6, the highest tideland of the three. Considering the three areas as a unit it is possible to obtain clams from the flats on tides as high as plus 1.5 feet. It is advisable to use a boat to reach these tidelands rather than to depend on wading across shallow channels from shore.

Area 8 is on the same side of the channel but upbay from area 4. This is the farthest upbay area with sizeable quantities of gapers and cockles, although the softshell clam is found still farther upbay. Area 8 is exposed on a 0.0 foot tide.

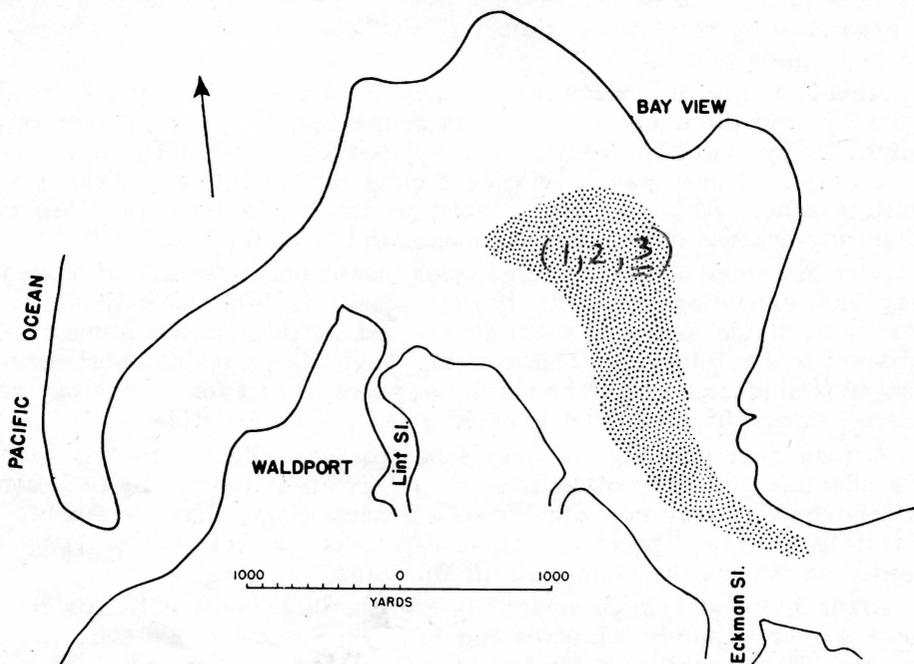
Areas 9 and 10 contain the main beds of the softshell clam. As there is no road along the southern bank of Yaquina Bay, a boat is needed to gather clams in area 9. Area 10 is an 18 acre tideland island ranging in height from plus 4.0 feet to minus 2.0 feet and represents, more or less, the upper limit for clams in the bay.

Scattered beds of softshell clams may also be found along the northern side of Yaquina River and in many of the small sloughs leading off the main bay.

In summary, gapers and cockles are found in areas 1 through 8; butter clams in areas 5, 6, and 7; littleneck clams in areas 4, 5, 6, and 7; and softshell clams in areas 9 and 10. The commercial harvesting of cockles

and gapers comes mainly from areas 4, 5, 6, and 7, and the commercial harvest of softshell clams comes from areas 9 and 10.

Also, approximately 300 acres in Yaquina Bay are now being used to grow Pacific oysters. One hundred fifty acres are reserved for cultivation of the native oyster.



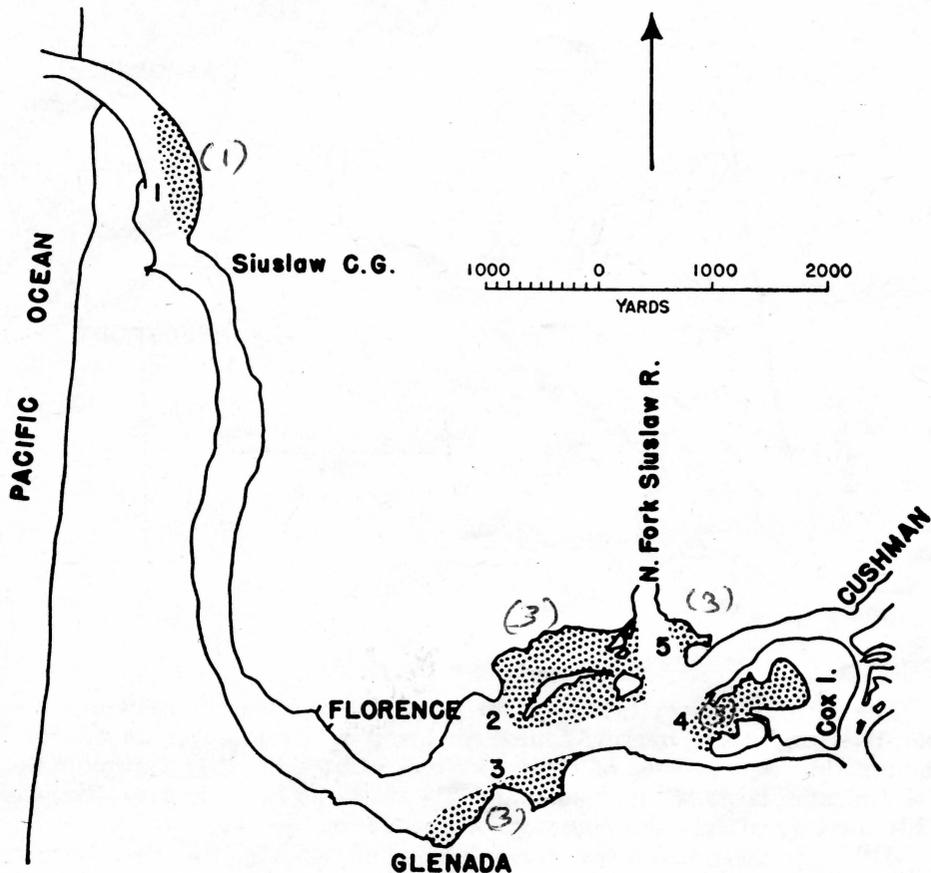
### Alsea Bay

The softshell clam supports most of the fishery in Alsea Bay, although the cockle clam and the gaper clam are present in small numbers. A boat is needed to gain access to the main beds which are located about 2 miles upbay from the town of Waldport between the old railroad trestle and the mouth of Drift Creek on the north side of the river. The softshell clams are used in small quantities commercially but are utilized more often by local residents and tourists for personal use.

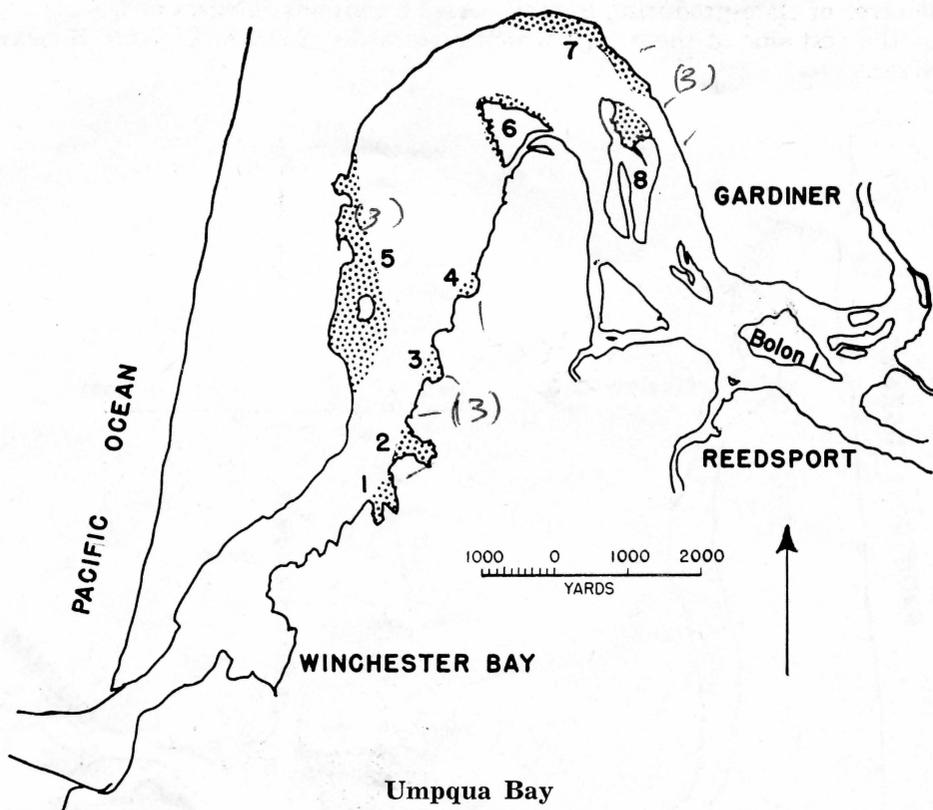
### Siuslaw Bay

At the mouth of the Siuslaw River there is a small bed of gaper clams charted as area 1. Above the town of Florence the river area widens and here are found tide flats and islands inhabited by the softshell clam. Area 2, the largest single clam flat in the Siuslaw River, contains approximately 300 acres, and is immediately adjacent to a public road and accessible on foot. Softshell clams of large size and excellent quality were formerly dug here by both commercial and recreational diggers. In recent years the clams have been at a low level of abundance. Two smaller beds are combined into area 3, near the town of Glenada, and along the south bank of the river. The region off Cox Island, area 4, includes approximately

80 acres of clam-producing ground. Area 5 contains 20 acres and is located on the east side of the bridge which crosses the north fork of the Siuslaw River.



The upstream limits for the survival of the softshell clam are the town of Cushman on the main river and Bull Island about  $1\frac{1}{4}$  miles up the north fork of the Siuslaw River; the downstream limit for all practical purposes is the town of Florence.



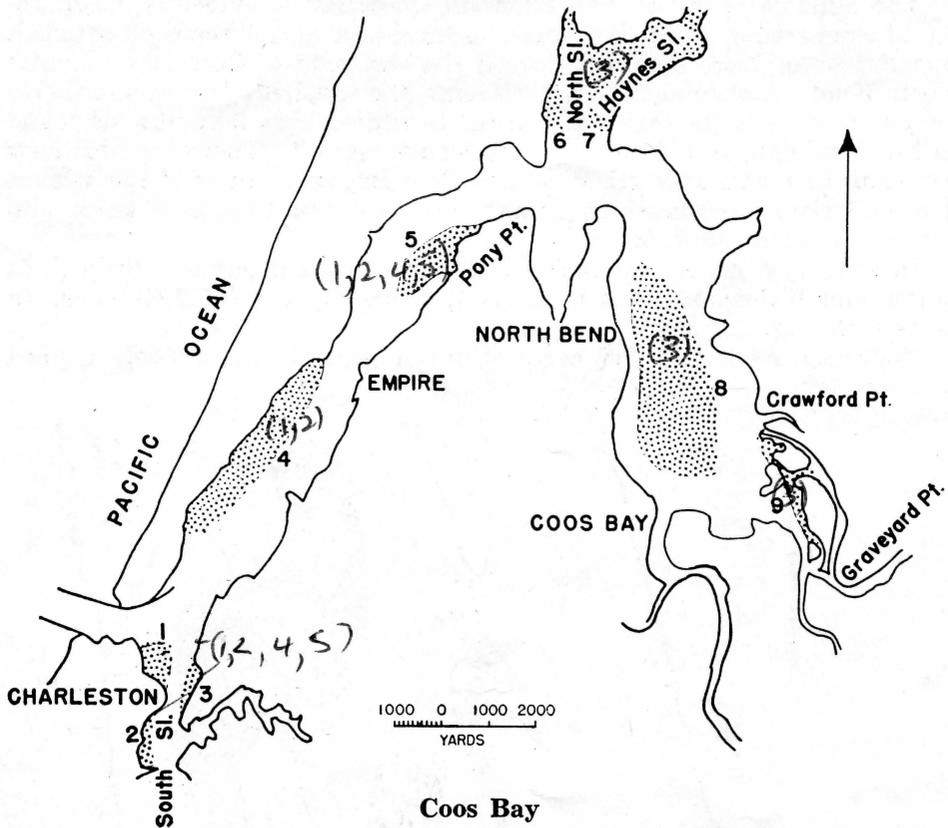
### Umpqua Bay

The Umpqua River is similar to the Siuslaw River in having a comparatively long and narrow course, in being a "fresh water bay", and in having the same species of clams present. However, it is approximately  $3\frac{1}{2}$  times as large in total area and  $2\frac{1}{2}$  times as large in tide flat area. This directly affects the commercial production.

Although there are a few trails leading to some of the clam beaches, it is to the digger's advantage to use water transportation to reach most of the clam beds. On the easterly bank of the bay are a series of coves, areas 1 through 4, known as Jordan Cove, Macey Cove, Double Cove, and Henderson Cove, respectively. Softshell clams may be found in all of these areas. The largest clam flat in the bay, area 5, more commonly called Middleground, is located on the westerly bank. Clams sampled from Middleground on September 7, 1949, averaged 4 inches in length. The Point, area 6, on the northern tip of the bay also has clams in abundance. Softshell clams of large size and numbers are found in area 7, across the bay from area 6, and in area 8, across the main river channel from the town of Gardiner.

The upbay limit for the softshell clam may be considered the highway bridge across Bolon Island. The extreme downbay limit is Winchester Bay, where only scattered beds of softshell clams may be found. Winchester Bay also has a very small population of gaper clams.

In general, a plus 2.0 feet tide will expose the Umpqua tidelands sufficiently for clam digging.



Coos Bay

Coos Bay residents prefer the gaper clam, which supports virtually 100 per cent of the fresh clam market in this area. An average of 80,000 pounds of this species is landed each year, which is 40 per cent of the state's total bay clam landings.

Recreational clam diggers find easy access to clam beds in the Charleston area, where it is not difficult to obtain the legal limit of clams. Area 1 is on the west shore of South Slough just north of Charleston in the old Government Dock area. Area 2 is on the same shore of South Slough but south of Charleston. Area 3, a clam bed on the east shore of South Slough, receives a great deal of digging effort and yields a large number of clams. Tidelands of these areas are exposed on tides of 0.0 feet or lower. Areas 1, 2, and 3 contain the gaper, cockle, butter, and littleneck clams. Gapers and cockles are most numerous.

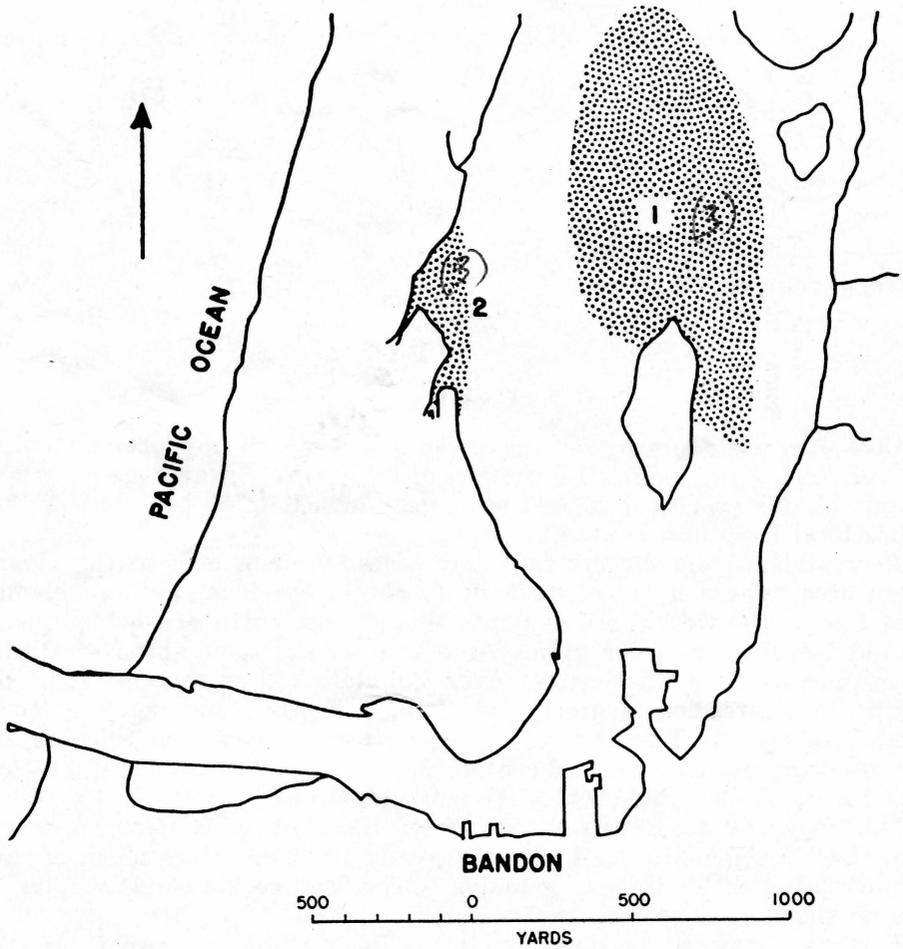
Downbay and across the channel from the town of Empire are more clam flats, designated area 4, accessible only by boat. Here much of the commercial catch for the bay is taken. Gaper and cockle clams are available on tides of 0.0 feet or lower.

Farther upbay, adjacent to the North Bend municipal airport, is another clam bed, area 5. This represents the upper limit in Coos Bay for the gaper, cockle, butter, and littleneck clams. Area 5 is exposed on a tide of 0.0 feet or lower. The softshell clam increases in abundance upbay from this area.

The abundance of softshell clams in Coos Bay is evidently much reduced compared with former years. Edmondson (1920) reported softshell populations of "considerable" size on the east side of Coos Bay opposite North Bend. According to early residents, the softshell clam was formerly very numerous in the upper bay area. Scattered beds may now be found in North Slough, area 6, and Haynes Slough, area 7. There are also beds between the towns of North Bend and Coos Bay on a series of low islands and tide flats designated as area 8, and between Crawford Point and Graveyard Point, area 9.

In summary, gaper and cockle clams are found in areas 1 through 5; butter and littleneck clams in areas 1, 2, and 3; and softshell clams in areas 6 through 9.

There are more than 500 acres of oyster ground now actively farmed in Coos Bay.



**Coquille Bay**

About three-quarters of a mile upbay from its mouth the Coquille River, southernmost Oregon bay in which bay clams are found, widens

and offers the conditions necessary for the growth of the softshell clam. Although the beds are not extensive, they furnish clams for some of the restaurants and residents in the Bandon area.

The main beds, area 1, may be reached without the use of a boat on tides of plus 3.0 feet or less. Area 2 is across the channel and a boat is needed to reach this bed.

The upbay limit for the softshell clam is about 3 miles above the bay's entrance.

## LITERATURE CITED

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