PART XXI.

THE CRAB, LOBSTER, CRAYFISH, ROCK LOBSTER, SHRIMP, AND PRAWN FISHERIES.

By RICHARD RATHBUN.

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1.—THE CRAB FISHERIES.

(a.)—FISHERIES OF THE ATLANTIC AND GULF COASTS.

COMMON EDIBLE CRAB, OR BLUE CRAB.

1. NATURAL HISTORY AND USES OF THE BLUE CRAB.

The common edible crab, or blue crab (*Callinectes hastatus*, Ordway), occurs in greater or less abundance along the entire eastern and southern coasts of the United States, from Massachusetts Bay to Mexico, and gives rise to an industry which, among crustaceans, is second only to that of the lobster. It is used both as food and bait, and also to some extent as a fertilizer.

From a part of this region three additional species of the same genus, regarded by some authorities, however, merely as varieties of this species, have been recorded. They are: *Callinectes ornatus*, ranging southward from Charleston Harbor, South Carolina, and *Callinectes larvatus* and *tumidus*, occurring in Southern Florida and the West Indies. These several species, including the blue crab, resemble one another so closely that they would probably not be distinguished apart by the fishermen, and it is not unlikely that one or more of the additional forms may contribute toward the market supplies in some places. Of their relative abundance, however, we know nothing positively, but among large numbers of specimens sent from the Southern markets we have failed to recognize any form but the genuine blue crab. From New Orleans, La., we have received two species of crabs belonging to other genera, which are sold in the markets but to what extent we are not informed. One of these is the lady crab (*Platyonichus ocellatus*) also occurring on the Atlantic coast, but neither of these species is enumerated separately in the returns of the crab fisheries of Louisiana.

The stone crab (*Menippe mercenarius*) fishery of the Southern States constitutes, however, a totally distinct and well-defined industry, and the same can be said with regard to the rock crab (*Cancer irroratus*) and the Jonah crab (*Cancer borealis*) of the New England coast, so far as they are fished for.

NAME.—*Callinectes hastatus* has received a long list of vernacular names, many of which are quite local in their application. Those most in use are as follows: "Edible crab," "common crab," and "blue crab," toward the north; "sea crab" and "channel crab" along the middle and southern Atlantic coast, and "gulf crab" in the Gulf of Mexico. The more local names are

"green crab" (New Bedford), a term which properly belongs to a smaller species, not regarded as edible on our coast; "paddler" (Vineyard Sound, Narragansett Bay, and Long Island Sound); "blue claw"; "bay crab" and "river crab" (New Jersey); and "lake crab" (Gulf of Mexico). The terms "soft crab" and "hard crab," although having reference to different conditions of the same species, are frequently used as common names to designate the edible crab.

It may be well in this connection to describe the names applied by crab catchers to the different conditions of the crab during the period of shedding its old and growing its new shell, as they will be used on the following pages without further explanation. The hard-shell crab, or "hard crab," as it is commonly called, when about ready to shed its shell, but before the shell has actually broken, is termed a "comer." During the various stages of shedding, from the time of the breaking of the old shell to the soft shell state, it is called a "buster," "peeler," or "shedder." As soon as the crab has freed itself from its old covering it is a "soft crab," but a slight hardening makes it a "paper shell," and a greater hardening, as long as the shell remains flexible enough to bend without breaking, entitles it to the name of "buckler." The buckler, however, soon becomes a hard crab. It is probable that the female crabs moult soon after spawning, for after the eggs have hatched, the egg coverings still remain attached to the swimmerets and can only be gotten rid of by the operation of shedding.

SIZE.—The average size of the blue crabs sent to market ranges from 4 to 6 inches in width across the carapax; extreme dimensions are 7 to 10 inches.

DISTRIBUTION, SEASON, ABUNDANCE.—The winter habits of the blue crab have never been carefully studied. Cold weather drives the crabs away from the shores and into somewhat deeper water, where they are supposed to pass the winter without much activity, or even partly buried in the soft muddy or sandy bottoms. During the warmer months of the year they keep close to the shores, and enter the shallow water areas in immense numbers, affording an excellent opportunity for their capture.

As would naturally be expected, the crabbing season, or, more explicitly, the season in which crabs may be taken in shallow water, varies in duration on different parts of the coast, according to the climatic conditions. At the North the season is considerably shorter than at the South, and during mild winters crabs can be taken close to the shore, on the coasts of the southernmost States, during nearly every month of the year. On the coasts of Southern New England and Long Island, the season extends from about May to October or November. On the New Jersey coast, the season opens somewhat earlier and lasts until cold weather begins. At the mouth of Chesapeake Bay, and from there to Georgia, it extends from March to November, but the best months are said to be generally those from May to September. In Western Florida the usual season is from March to December, and in the Gulf of Mexico it is about the same; but, as mentioned above, warm winters in this region keep the crabs in nearly the same localities which they inhabit during the summer. Crabs are not always taken for food and shipment at the South throughout the season of their abundance near shore. Warm weather interferes with the industry, and in such cases most of the fishing is done in the spring and fall. Soft crabs are only obtainable during the warmer months of the year.

During the period designated as the crabbing season, crabs are to be found near shore in all localities favorable to them within the limits of their distribution. They inhabit principally muddy and sandy bottoms, entering the bays, sounds, inlets, rivers, creeks, and all other indentations of the coast, as well as living upon the outer shores and sand-bars. Brackish water appears to be as favorable to their existence as salt, and they often ascend the rivers to where the water is absolutely fresh. It is probable that even during the summer they may occur in moderate

depths of water farther from the shore, but in such localities they would not be generally noticed when they could be obtained nearer land. According to correspondents, they are obtained for food and bait in the summer months in all depths from high-water mark to 3 or 4 fathoms, but mostly where they can be reached with a hand net. As above stated, cold weather drives the crabs away from the shore and causes them to seek depths which are not subject to sudden changes of temperature. Nearly all observers agree in stating that during the winter months they remain quiet and more or less concealed in the bottom mud or sand. At this season they are often taken by means of tongs and spears, but being then obtained with so much difficulty, the winter crab fishing has never assumed any considerable proportions. In some localities it appears that the crabs do not entirely leave the very shallow water in the fall, but a few bed near the shore, where the conditions are favorable, and these crabs are said to suffer greatly in times of extreme cold. A very severe winter kills many of them, and after heavy winter storms many dead ones may often be found thrown upon the beaches by the waves. After an unusually cold winter, crabs are less abundant than after a mild one. Little can be said regarding the depths frequented by crabs in the winter season. They are taken for food in depths of 3 to 4 fathoms, but probably live also in much deeper water. A correspondent at Hampton, Va., states that the winter crabs are less savory than those procured in the summer, their flesh being rather soft and watery.

According to the statements of many persons along the entire coast from Cape Cod to Mexico, edible crabs are as abundant now as they have been at any previous time. Despite the immense quantities taken and sold or destroyed, there has been no apparent diminution in their numbers. They vary in abundance from year to year, being especially scarce after severe winters; but if they are less abundant one year, they are just as likely to be more abundant the next. Still it would not be wise to countenance an indiscriminate fishing, for there is no reason why the crab fisheries, like many others, might not be overdone. We are informed that on one section of the New Jersey coast, where a law exists to protect crabs during the winter, they have apparently increased in abundance since the law has been enforced.

HARD AND SOFT CRABS.—Both hard and soft shell crabs are used as food and bait, but for both of these purposes the soft-shelled individuals, called simply "soft crabs," are greatly preferred in nearly all localities. While shedding, however, and as long as they remain soft, the crabs generally seek shelter and protection in secluded places or by partly burying themselves out of harm's way.* It is also certain that soft crabs are much less abundant than hard ones at any time, as the shedding period is of several months' duration, and it is probable that but a comparatively small proportion shed at exactly the same time. Soft crabs are, therefore, much more difficult to obtain than hard ones, and being in greater demand, bring much higher prices; in many places they are regarded as great luxuries. Soft crabs have this advantage, that there is little waste in preparing them for the table; but with hard crabs, on the contrary, the external coating or shell is thick and hard and constitutes a large proportion of both the body and the claws. At the South, however, it is considered that the soft crab is fit only for frying, while hard crabs may be prepared in a multitude of ways. Only hard crabs are used at the canneries. The quantity of hard crabs consumed upon our coast probably far exceeds that of soft crabs, but the aggregate value of the latter appears to be much greater.

CRABS AS BAIT.—Crabs form an excellent bait for many kinds of fish taken with the hook and line, and are very extensively used for that purpose throughout their entire range from Cape Cod to Texas. About New Bedford they are especially recommended for tautog, and during some seasons nearly all the catch of crabs, amounting at times to many thousands in number a week,

is employed in the tautog fishery. They are, however, also used for other species of fish in the same region.

On the coasts of Long Island and New Jersey they appear to be as favorably regarded as at New Bedford for many kinds of salt-water fish, and are much more extensively employed. The species of fish for which they are said to answer on the New Jersey coast is a very long one, and includes nearly all the species taken there for food with hook and line. North of the mouth of Chesapeake Bay, in Virginia, the principal kinds of marine invertebrate animals used as bait are as follows, in the order of preference: Soft crabs, which are considered to be by far the best, hard crabs, clams and mussels, the latter being but rarely employed. About Norfolk, prawns form the best bait for rockfish, but next in preference for the same species of fish comes the soft crab. Both soft and hard crabs are also classed among the principal baits of this region for nearly all the species of edible marine fish.

Southward from here, along the remainder of the Atlantic coast, extends the great shrimp and prawn region, and wherever shrimp and prawns occur and can be conveniently obtained they form the favorite baits for nearly all kinds of hook and line fishing. In their absence crabs must often be resorted to, and they are used to a very large extent.

On the Gulf coast of the States crabs are also used as bait for all the species of fish for which shrimp will answer. Soft crabs and very small hard crabs are preferred.

2. METHODS OF FISHING AND TRANSPORTATION.

METHODS OF FISHING.—The most common and effective appliance in use for crab catching is the simple scoop-net or dip-net, consisting of a rather shallow net, of moderately coarse mesh, fastened to a ring or hoop, which is attached to a handle of suitable length, dependent upon the manner in which the net is to be used. This scoop-net, generally called "crab-net," is employed alone for catching crabs in very shallow water, but in deeper water, where the net cannot be conveniently used on the bottom, or where the crabs cannot be seen from the surface, it is customary to bring in the aid of auxiliaries, in the shape of baited lines. These lines may be used singly, several being easily managed by a single person, or be arranged after the fashion of cod trawl-lines or trot-lines. They are intended merely to entice the crabs to the surface of the water, within reach of the scoop-net, and are seldom furnished with hooks. On the coast of Georgia they sometimes employ the so-called hoop-net, which is simply a piece of twine netting tied to a barrel hoop. It is weighted in the center, and, after being baited with a piece of meat, is lowered to the bottom in shallow water where the crabs are known to occur. This appliance is similar in construction and mode of use to the hoop-net pots formerly employed in the lobster fishery of New England. Seines are also used in crabbing, and in favorable localities are very effective. Oyster or clam tongs and eel-spears are about the only additional implements used in the crab fishery. They are, however, seldom employed, excepting in winter, after the crabs have retreated to deep water and have embedded themselves in the mud, and but little is done with them at any time.

Incidentally crabs are taken in lobster-pots, gill-nets, and fish-seines, and on fish-hooks and eel-spears, when they are usually regarded as a great annoyance and seldom retained as food. They are especially troublesome to the seiners on some portions of the Southern coast, as they become entangled in the nets and greatly interfere with operations. Thousands are often captured in the seines, and when they cannot be sold are thrown upon the shore or used for fertilizing purposes.

Nearly all the soft crabs obtained are caught by means of the scoop-net or hands alone, as crabs will not take the bait while in the soft state, and are seldom captured in the seines. Baited

lines for enticing hard crabs within reach of the scoop-net are in common use, wherever crab fishing is pursued as an industry, from New York to Galveston, Tex. As stated above, the usual form of line employed is constructed after the pattern of the trot-line used in ordinary fishing, but without hooks; in the crab fishery it bears the same name. The crabber's trot-line consists of a main line from 250 to 1,200 feet long, with smaller lateral lines, 18 inches or more in length, arranged at regular intervals of about 18 inches to 2 feet. At Hampton, Va., one-half-inch manilla rope is used for the main line. The bait, usually consisting of beef, tripe, raw meat, or fish, is simply tied to the lateral lines.

There are several ways of setting the trot-lines, each of which is managed by one or two persons. In some places, as at Hampton, Va., each end of the trot-line is furnished with an anchor and buoy, and one man tends each line in a small skiff, about 16 feet long by 3 feet wide. Arriving at the fishing-ground, he drops one end of the trot-line overboard, with its anchor and buoy, and rows off, paying out the entire length of the line, until the other end is reached with its anchor and buoy, which are likewise thrown over. The line is then constantly examined, the man in his skiff passing continuously backwards and forwards, drawing himself along by means of the main line, after the manner of under-running cod trawl-lines. The crabs as they are drawn to the surface of the water, clinging to the bait, are removed by means of a scoop-net and thrown into the boat. Another method of setting the lines is to tie the ends to poles, which are thrust down into the bottom, so as to allow the lateral lines to rest upon the sand or mud. On the Louisiana and Texas coasts, the trot-lines are used from the beaches, each being tended by two persons. The main line, which usually measures about 1,200 feet long, is stretched along the beach at the water's edge and the lateral lines are thrown outwards as far as they will reach. The lateral lines are then hauled in in quick succession, the men passing continuously backwards and forwards and securing the unsuspecting victims in their scoop-nets, as they are cautiously drawn upon the beach.

CRAB CARS OR PENS.—In localities where large quantities of crabs are taken for shipment to market, in the soft-shell state, it is generally customary to make arrangements by which the hard crabs nearly ready to shed, called "comers," can be kept in confinement until they have cast their hard covering. This practice is extensively resorted to on the northern coast of New Jersey by the use of floating cars or pens, made of laths or thin boards, each fisherman possessing several of them. They are usually from 4 to 8 feet square and about 1 foot deep, with a partition through the center and a cover. When the crabber arrives with his catch, he places the "comers" in one compartment and the "busters" in the other. The cars, which are kept moored in some sheltered cove a short distance from the shore, are examined two or three times a day, and the soft crabs as they appear are taken out and packed for shipment. Soft crabs left for any length of time with the hard crabs are liable to be injured by the latter, and in warm weather the new skin or shell is said to harden rapidly.

METHODS OF SHIPPING.—Crabs are shipped to market in various ways, but generally alive. Soft crabs are usually packed in boxes, with moist seaweed or salt grass, each one being carefully placed at a certain angle, with the front edge of the body up, so as to prevent, as far as possible, the escape of the moisture from the gills. They are also packed snugly together to prevent lateral movement, the quantity stowed in each box ranging all the way from four to fifty dozens. During warm weather ice is sometimes used in the packing. The shipping-boxes for soft crabs on the Northern New Jersey coast are about 3 feet long by 2 feet wide and 3 inches deep. They are constructed of pine boards or laths, and have a capacity of from four to six dozens each. A thin layer of grass or seaweed is first placed in the bottom of the box, then the crabs in the

manner above described, and finally another layer or covering of the same grass or seaweed. In this condition they will remain alive for several days, except in very warm weather. Hard crabs are generally sent in barrels. Baskets are also employed for transporting crabs in some localities, especially at New Orleans, and on other parts of the Gulf coast. On the Southern coast crabs are sometimes boiled before shipping.

3. EXTENT AND CHARACTER OF THE FISHERY.

The crab industry of the Atlantic and Gulf coasts is very extensive, and gives employment to many persons. It had, however, never been carefully studied previous to the investigations for the census of 1880, and being carried on mostly in a small way by fishermen scattered irregularly along the coast, it has been impossible in the short time at our disposal to bring together anything like a complete account of its extent and value.

The crab fishery, like most other fisheries, is not kept up continuously throughout the year, and the people engaged in it during the summer generally have other occupations in the winter. A large share of the crab catchers are women and children, especially at the South, where many of the colored people, living upon the sea-coast, devote a portion of their time to hunting out the soft crabs and selling them in the nearest towns. At numerous places, however, a regular crab fishery is carried on throughout the entire season for the purpose of supplying the larger markets, like New York, Charleston, Savannah, and New Orleans, or the crab canneries, as at Hampton, Va. The number of crabs used as bait is very great and their value considerable.

Southern New England cannot be said to have any regular crab fishery. About New Bedford many crabs are taken for bait and for eating, and at other places smaller quantities are captured and made use of; but very few persons, if any, devote their entire attention to this industry, even for a short period. Most of the blue crabs eaten in the interior New England towns and in Boston, come from farther south, through the New York markets. New Bedford makes some shipments to Providence and New York. Both the north and south shores of Long Island furnish many crabs, the bulk of those not used at home going to New York and Brooklyn. New Jersey is the center of the soft crab industry, and many more soft crabs are taken there for home consumption and shipment than in any other State in the Union. The fishery is principally confined to the section of coast between Sandy Hook and Barnegat Inlet, and a large share of the crabs sold in New York come from this region.

The lower part of Chesapeake Bay, bordering on the States of Virginia and Maryland, is said to be the center of distribution, as regards abundance, of the edible crab; but the fishery in this region, outside of the canneries, is not as important in money value as that of New Jersey, mainly perhaps for the reason that the larger markets are more distant, and soft crabs not so easily obtained. The large crab canneries are all located here. In North Carolina the crab fishery is mainly confined to the neighborhood of Wilmington, and in South Carolina to the neighborhood of Charleston, at both of which places a large business is carried on. Savannah is the center of the Georgia crab industry, which is very extensive. Florida appears to be but little interested in crab fishing, although crabs are abundant on both the eastern and western coasts. Mobile, Ala., receives large quantities of crabs from the neighboring coast for its own use, but ships only a few. The crab fishery is extensively pursued on the coasts of both Louisiana and Texas to supply the markets of New Orleans, Galveston, and interior towns.

In the Northern cities and towns crabs are regularly sold in the markets along with fish, but at the South (from North Carolina southward), they are generally hawked through the streets by negroes.

Three large canneries, two located at Hampton, Va., and one at Oxford, Md., are engaged in packing crabs in hermetically sealed cans during the crabbing season. This industry is of recent origin, but has already assumed considerable proportions. It is described further on.

4. COAST REVIEW OF THE BLUE CRAB FISHERY.

NEW ENGLAND.—The blue crab is not known from north of Massachusetts Bay, where it is of rare occurrence, but it ranges along the entire southern coast of New England from Cape Cod to New York. At no place upon this section of coast, however, is crab-catching carried on as a regular business, mainly for the reason that this species of crab is less abundant here than to the south of New York, where it is more easily and cheaply obtained. Blue crabs are common in Buzzard's Bay, especially in the vicinity of New Bedford, and enter the mouths of the rivers during the summer in large numbers. Acushnet River, near New Bedford, is described as a great abiding place for crabs in the summer season, and as affording good facilities for their capture. In the spring the average weekly catch is stated to be about four hundred crabs, but in the fall the number taken is sometimes as great as forty thousand per week. Some of these crabs are used as food, being retained in New Bedford or sent to Providence or New York, but by far the greater portion are employed as bait for tautog. Among the other species of fish for which this crab is utilized as bait in this vicinity are the striped bass, rock bass, cod, squeteague, and blackfish. When shipped away, they are packed in boxes with seaweeds, ice being added in warm weather.

In Vineyard Sound blue crabs are less abundant, and are only taken occasionally by persons desiring them for their own use. The Newport markets are partly supplied with blue crabs from Narragansett Bay, where they are said to be more abundant and more easily taken than the Jonah crab (*Cancer borealis*), which also occurs there, and is the only other species of crab used in Newport. Soft blue crabs are also sent to Newport from New York.

All of the other larger towns and cities on the Southern New England coast (Stonington, New London, New Haven, &c.,) make use of greater or less quantities of crabs caught in their immediate vicinity, but these places probably receive most of their supplies from New York. At the smaller towns and villages crabs are probably also collected at times, when desired for home consumption, but nowhere in this region can crab-catching be regarded as an established industry, nor is it possible to give an estimate of the number of crabs annually taken and disposed of. The season extends from April to November, but varies according to the conditions of temperature, some years being more favorable than others. The fishing is carried on mostly by means of dip-nets or scoop-nets, the crabs being sometimes enticed to the surface of the water by the use of baited lines. Incidentally crabs are obtained, often in great abundance, in lobster-pots, fish-seines, and other nets. In the winter they are occasionally speared by eel fishermen, who find them buried in the muddy bottoms.

NEW YORK.—Blue crabs are abundant at many places on the muddy and smooth sandy shores of Long Island, and are taken in considerable quantities for home consumption and for shipment to New York. Small scoop-nets, rakes, and trot-lines are used for their capture. The practice of confining hard crabs, nearly ready to shed, in floating cars until they become soft shell, is pursued in some localities. Soft crabs sell at from 35 cents to $1.50 per dozen, according to their abundance. Hard crabs bring from 75 cents to $1.50 a hundred. The principal markets for the Long Island crab fisheries are New York City and Brooklyn. Shipments are generally made by rail. Hard crabs are shipped to New York from Long Island during the entire year, but soft crabs are first sent to that market about July 15, the shipments continuing until about October.

According to Mr. Fred. Mather, most of the hard crabs sent to market from Long Island come

from Moriches Bay, on the south side. They are taken by means of trot-lines, with the snoods 2 or 3 feet apart. These are baited with meat, eels, or other kinds of fish, and the line is under-run by a man in a small boat, the crabs being taken up in a scoop-net. Shipments are made to New York in second-hand cement barrels, obtained from the East River Bridge Company, at a cost of 10 cents each. The Long Island Railroad transports the empty barrels free of charge for the sake of the freight when full. The principal other places on Long Island where Mr. Mather found the crab fishery carried on, though to a less extent, both for home consumption and shipment, were: Canarsie, Flatlands, Sheepshead Bay, Gravesend Bay, Bay Shore, Cold Springs, Oyster Bay, and Centreport, Huntington Bay.

The product of this fishery for New York State, including Long Island, to which the industry is mainly confined, amounted in 1880 to 1,624,583 pounds, valued at $69,234. The crabs were mostly taken and sold in the hard-shell state.

NEW YORK CITY MARKETS.—The blue crab is about the only species of crab that is sold in the New York markets. Hard crabs are received in greater or less quantities during every month of the year, but most abundantly during the winter. Soft crabs first begin to arrive about May 1, from the coast of Virginia; about the 1st of June, from the mouth of Chesapeake Bay; about June 15, from the New Jersey coast, and about July 15, from the coast of Long Island. The greatest consumption of soft crabs is from July 1 to September 1, when the daily sales sometimes reach 2,000 dozens. This amount may, however, be considered as the maximum.

Mr. Eugene G. Blackford, of New York City, furnishes the following estimate of the average sales of soft crabs in Fulton market, by months, for each summer during the past two or three years:

	Dozens.
May	2,600
June	9,000
July	22,500
August	22,500
September	1,500
Total	58,100

The prices of these crabs vary with their abundance and the time of year, from 50 cents to $2 per dozen. Sometimes, but rarely, the price falls as low as 25 cents per dozen. One dollar a dozen is regarded by Mr. Blackford as a fair average price for the entire season, making the total value of the sales for one season about $58,000.

The quantity of hard crabs sold annually in Fulton market averages about 750,000 by count, the average price being about 1½ cents each, and the total yearly valuation, $11,250. They come mostly from the south side of Long Island. About one-fourth of the crabs sold in New York are shipped to other places, but the above estimates do not cover the entire amount marketed in that city, according to the returns from other States.

NEW JERSEY.—The edible crab is abundant along the entire New Jersey coast, coming out of its winter haunts in the early spring and thronging the shoal waters during the summer. Its summer habitats are the bays and sounds, the mouths of creeks and rivers, and even the salt flats and shoals, where the tides ebb and flow, in depths of a few inches to 10 feet and more. Many are often left exposed at low water, and some ascend the streams to where the water is decidedly brackish or even nearly fresh. In the winter they generally go into deeper water, and bed in the mud, but sometimes they remain concealed in the shallow water near shore.

The shedding season is said to begin the latter part of May and to continue until October. During this period a great number of men and boys and even women engage in crabbing, pressing into their service all the old boats and scows available. On the Northern New Jersey coast,

from Sandy Hook to Barnegat Inlet, the crab fishery is of great importance, but farther south it is as yet of very little account.

Between the two places above mentioned this industry is perhaps more extensive than in any similar district of the entire coast, giving employment, as it does, to over five hundred men and boys during at least four months of the year. As a rule, only soft crabs, or those about to shed, are taken for food, but there is also a certain trade in hard crabs, which are used for fish bait as well as food. The soft crabs bring from four to eight times as much as the hard ones, the price depending upon their abundance.

Notwithstanding the immense quantities of crabs annually taken on this coast, there appears to have been no decrease in their numbers, and they continue as plentiful now as they have been in former years. This may be accounted for by the fact that the female crabs have spawned before shedding, or at least do not carry spawn on the outside of the body during the shedding season, and hence but few crabs with matured spawn are taken and destroyed. Crabs vary in abundance, however, from year to year, being more plentiful some years than others, and a very cold winter is said to kill large numbers, and make them less abundant the following spring. One correspondent informs us that they are most abundant on the shore at times of full and new moon, but this may be due to the fact that at such times the tides ebb lower and leave a greater breadth of shore exposed. The enactment of a law in some places to protect the crabs in winter has had the desired effect of increasing their abundance in the following spring and summer.

Crabs can be taken throughout the year, but the regular season, when they are most easily obtained and the only season when the soft crabs are found, is from April or May to November. The best months are said to be June, July, August, and September. After October or November they must generally be sought for in from 6 to 20 feet of water, with long-handled tongs, which are sometimes employed, but the winter fishery is of slight importance. Crabs do not, however, always go into deep water in the winter, for they sometimes bed in the shallow channels and inlets, and in such locations the winter mortality is great if the weather becomes unusually severe.

The common method of capturing crabs in the summer is with a crab or scoop net, having the ring or hoop about 1 foot in diameter and the handle from 7 to 8 feet long. In water too deep for the use of the scoop-net alone, lines baited with raw meat or fish are employed to entice the hard crabs to the surface. Small hauling seines are also sometimes used. For the winter fishery long-handled tongs or rakes are brought into play. In those sections where the crab fishery amounts to a regular industry, not only are the soft crabs secured, but also the "comers" and "busters," which are kept in cars until they shed.

As stated above, the crab fishery of New Jersey is mostly confined to the section of coast between Sandy Hook and Barnegat Inlet, and, in fact, as a regular industry, it is mainly limited to a few localities, such as Shark, Squan, and the North and South Shrewsbury Rivers. But considerable quantities of crabs are also taken along the entire northern coast, and smaller amounts toward the south. The greater part of the entire catch during the summer is sent away. A certain quantity is used by the inhabitants of the coast, and a large number are sold to summer hotels, boarding-houses, and restaurants in the crabbing region. At Atlantic City, where the number of summer visitors is very great, the demand for crabs equals the entire supply caught in the neighborhood. At the same place crabbing is pursued as a pastime by the summer visitors and some twenty to thirty men and boys are engaged in assisting these amateur crabbing parties. Fifty to one hundred persons may be seen at times on pleasant days occupied in this way, and this fishery is now considered by many as better sport than that with hook and line. A winter fishery was attempted along the Southern New Jersey coast several years ago, but it did

not prove successful. The fishermen visited the bedding places of the crabs and took them from the mud by means of oyster and clam tongs.

It is estimated that about three-fourths of the crabs sent away from the Northern New Jersey coast (Sandy Hook to Barnegat Inlet) go to New York City and other northern markets; about one-sixth to Philadelphia, and the remainder to interior cities and towns of New Jersey. The New York markets are first supplied from New Jersey about the middle of June, after which time until late in the fall, shipments are being constantly made. Hard crabs are sent in barrels packed in seaweed. Soft crabs are packed more carefully with seaweed or salt grass in boxes or crates, being stowed closely together to prevent injury. Shipments are made by rail, steamers, and sailing vessels.

Crabs serve as bait for nearly all kinds of salt-water fish taken with hook and line. Hard crabs only are used. They are most extensively employed for blackfish or sea bass, and to a lesser extent for many other species.

The following notes on the crab fisheries of Northern New Jersey, furnished by Mr. Charles Doughty, of Fairhaven, are so complete in themselves, that we copy them *verbatim:*

"The fishing season begins about the middle of May, and lasts until the latter part of September. During this period the men and boys in the vicinity of the river mouths and shallow bays provide themselves with long-handled dip-nets and small boats. Each boat is manned by only a single person, who stands in the bow and poles it with the handle of his net slowly along the shore in search of crabs. The depth of water usually resorted to varies from a few inches to 5 or 6 feet. The experienced fisherman can tell whether the crabs he meets with are suited to his purpose or not by their color. A soft-shell crab is much brighter than a hard shell, and those nearly ready to shed have the claws more highly colored, some parts being of a reddish and others of a bluish tint. When he is in doubt as to the condition of a crab which he supposes is about to shed, he breaks off a point of shell or a joint of one of the smaller legs, and if a new shell is forming underneath, the crab is reserved, otherwise it is thrown back into the water. It is considered that about half an hour is required for casting the shell, after the crab is ready to shed, and the crab increases about one-third in size at each molting. The new shell begins to harden in about six hours after shedding, and is supposed to become fully hardened in about thirty-six hours. No hardening appears to take place out of water. After the fishing is over, the crabbers return to the shore where their cars are moored. These are usually 4 to 8 feet long, and about 1 foot deep, with a cover, and are divided in the middle by a partition. They are made of laths or thin boards, and are moored in some sheltered cove a short distance from the shore. The crabs are separated into two lots, the "busters" and soft crabs going into one compartment, and the "comers" into the other. The cars are examined two or three times a day, and the soft crabs taken out and packed for shipment. The boxes used are about 3 feet long by 2 feet broad and 3 inches deep, and hold from 4 to 6 dozens each; they are made of thin pine or laths. A layer of grass or seaweed is first arranged in the bottom of the box, and the crabs are then packed in closely, being placed at such an angle that the moisture will not run from the gills. They are finally covered with seaweed, and in this condition will last several days."

From another source we obtain the following account of certain crab-pens, differing from the above, situated at the mouth of the South Shrewsbury River. We do not know to what extent such inclosures are used, but at the place visited by our informant there were four wooden pens located near the bank, and also several cars floating close by. The pens had a capacity of 4,000 crabs each, and were devoted to the four conditions of the crab known to the fishermen, one being for hard crabs, another for "comers," the third for "busters," and the fourth for soft

crabs. These pens were visited several times a day. While being prepared for and awaiting shipment, the soft crabs are sometimes kept in large refrigerators.

Crab fishing has been pursued on the Northern New Jersey coast for many years, and as long ago as 1855 formed an extensive industry. At that time it was customary to tow a small car behind the boat for holding the crabs just ready to shed, many of which would molt before the shore was reached. About twenty years ago the present form of shedding cars was introduced, and since then it has been almost universally adopted by the fishermen. Previous to its introduction, however, pens were made along the shore, in which the shedder crabs were kept until they had become "soft shell." These pens consisted merely of small sections of the shore line fenced off in such a way as to prevent the escape of the crabs, and they reached a short distance into the water.

During the season of 1880, five hundred and fifteen men and boys were engaged in the crab fisheries of the New Jersey coast between Sandy Hook and Barnegat Inlet. The total catch of soft crabs for that region the same year amounted to 285,825 dozens, valued at $128,612. A fair average daily catch per man is sixty soft crabs, but as many as one hundred and twenty are sometimes taken; some of the best crabbers will make a thousand dollars in a single season, while others make less than a hundred. The average stock is about $250 per man, which would equal a catch of 550 dozens, netting 45 cents a dozen. About 50,000 dozen hard crabs were used in this region as bait during 1880, their value being reckoned at about $6,250. These were partly caught by the fishermen themselves during their leisure hours, and were partly supplied by children who received about 12 cents a dozen for them. It is impossible to make an accurate estimate of the number of hard crabs used as food. The total number of soft crabs consumed along the entire New Jersey coast and shipped from there during 1880 is estimated at 302,075 dozens. For the same region and time, the estimated number of hard crabs used as bait was 59,500 dozens. The total catch of crabs for the New Jersey coast in 1880, therefore, amounted to at least 361,575 dozens, valued at $142,292.

DELAWARE.*—The crab fisheries of Delaware are of considerable importance, especially in Indian River and Bay, and a large part of the male population, as well as a few colored women, are engaged in it to a greater or less extent during the shedding season of the crabs. This fishery is said to have been started at Indian River, in 1873, by two men who came from Long Branch, N. J., for the purpose of catching and shipping crabs to market. Since then, however, the fishery has been wholly carried on by residents of the vicinity.

Crabs are very plentiful along many portions of the Delaware Bay shore. Mr. D. R. Tomlinson, of Dover, states that soft crabs abound on the beaches in the vicinity of Kit's Hammock from the 1st of June to September, and hard crabs from May to November. According to Mr. Van Burkalow, of Magnolia, both hard and soft crabs may be taken in abundance on the bay shore, but as a rule only enough are caught to supply the local inhabitants. He estimates that about 1,000 bushels are secured, during the summer, between Little Creek and Jones's Creek. During a period of very cold weather, in February, 1880, says Mr. A. Hill, of Milford, and immediately after a gale, an enormous quantity of crabs was driven ashore on the west side of Delaware Bay, so many in fact that in some places they lay in windrows on the beaches. One man shipped several barrels of these crabs to Philadelphia, but they did not pay the cost of shipping. But few soft crabs are taken at Lewes, although at least twenty-five thousand hard crabs are caught and disposed of annually in that locality. In the towns of Roxanna and Williamsville, and elsewhere along the extreme southern coast of Delaware, no regular crab fishery exists. The most important crab fisheries of Delaware are those of Indian River.

* The account of the crab fisheries of Delaware has been furnished by Capt. J. W. Collins, of the U. S. Fish Commission.

The crab-catchers of the vicinity of Dover are, as a rule, professional fishermen, who, during the summer, after the close of the trout season, gather large quantities of crabs and carry them to Dover, where they hawk them through the streets, together with fish of several species which they may have caught at the same time. Between Dover and Lewes, crab fishing does not appear to be regularly carried on. The residents of the towns in this section who desire crabs for their own use, can readily obtain them almost any time by simply dipping them up from the outer edge of the beaches. At Lewes, however, the crab fishery is combined with that for other species, and most of the men engaged in it may be regarded as professional fishermen. South of Cape Henlopen, in the towns bordering on Rehoboth Bay and Indian River, a large proportion of those employed in crabbing are boys, and colored women also take a slight part in the fishery. The fishermen, whether young or old, are, as a rule, also farmers. Mr. Harmond, of Millsborough, states that he has in his employ during the fishing season, from May 1 to September, twelve men, all of whom, with one exception, are farmers.

Most of the boats employed in the crab fisheries of Indian River are patterned somewhat after the sharpie, being flat-bottomed, sharp-bowed, and wide-sterned; they are constructed of pine boards in the simplest manner possible, and at very slight expense, their average value, as stated by the fishermen, being from two to three dollars each. About two hundred and fifty of these boats are in use in the crab fisheries of Indian River and Bay. In addition to these skiffs especially designed for crabbing, the boats used in the other fisheries are also employed to a large extent for the same purpose.

The principal appliance for catching crabs is a small scoop-net of the ordinary pattern, having a bow from 12 to 15 inches in diameter, with a shallow net-bag, attached to a pole from 10 to 12 feet long.

On the south side of Indian River, many of the crab catchers have small live-cars, which they drag after them as they wade along in search of crabs. The latter, as they are taken, are transferred to the cars, in order that they may be kept alive until the time of shipment arrives. When larger boats than the skiffs above described are used, the cars are towed astern of them or alongside.

At Lewes, crabs are frequently taken incidentally in the gill-nets and haul-seines of the fishermen, who do not regard them as of much value. In regions where the fishery is regularly carried on, however, the fisherman, as a rule, stands in the bow or stern of his skiff, shoving it along with the handle of his dip-net, at the same time watching closely for "shadows" on the bottom. The depth of water visited rarely exceeds 3 or 4 feet, and is sometimes shallower. When a crab is sighted, it is quickly picked up in the dip-net and thrown into the midship section or well of the skiff. When the water is warm, the crabbers often wade along, towing their skiffs after them. On the south side of Indian River, many of the boys and others use the crab-cars above described instead of boats.

According to Mr. Isaac Harmond, the crab fishery continues active for about three months, or from the 1st of May to the 1st of August. During this period, however, the men fish very irregularly, some going out only four or five times in a season, while others go much more frequently. They are said to average, as a whole, about one-fourth of their time crabbing during the season of three months. The crabs are caught mainly about the full and change of the moon, being most abundant for three or four days at each of these periods.

Nearly all the crabs caught north of Cape Henlopen are retailed by the fishermen in the towns and rural districts of that section. At Dover the catch is mostly sold in the town, the soft crabs bringing 18 cents a dozen, and the hard crabs 80 cents a hundred. At Lewes the few soft crabs

taken are eaten by the fishermen. Large numbers of hard crabs, however, obtained in the vicinity are hawked through the village streets by the fishermen, who receive for them about 10 cents a dozen.

A comparatively small quantity of soft crabs is taken at Rehoboth by the fishermen of Lewes, who dispose of them at the latter place. Lewes also receives a few soft crabs from Angola.

Farther south, in the towns situated on Indian River, the crab fishery assumes greater importance. At Millsborough a few of the wealthy farmers and fishermen own each a number of crab-skiffs and dip-nets, which are supplied to the men and boys whenever they desire to go crabbing, with the agreement that they shall sell their catch to the owner of the outfit at a fixed price, which is usually 12 cents a dozen. The local dealer receives the crabs, packs them in boxes holding 10 or 20 pounds each, and ships them to New York and Philadelphia. About seven-eighths of the shipments go to New York and one-eighth to Philadelphia, as shown by the books of the railroad agent at Millsborough. From the same source we learn that the season of 1880 began May 4, when 1 box of crabs was shipped, and ended September 23, when 15 boxes (the catch of several days) were sent to New York. The largest number of boxes shipped from Millsborough in one day was 108 on May 20, and the largest number for a given period was from May 18 to 28, during which time the average daily shipment was 85¼ boxes.

The following tables give the monthly shipments of crabs from Millsborough and Dagsborough:

MILLSBOROUGH.

May	1,340 boxes, averaging 20 pounds each.
June	1,077 boxes, averaging 20 pounds each.
July	703 boxes, averaging 20 pounds each.
August	236 boxes, averaging 20 pounds each.
September	55 boxes, averaging 20 pounds each.

Total, 3,461 boxes, equaling 69,220 pounds, or about 138,440 crabs by count.

DAGSBOROUGH.

May	1,253 boxes, averaging 10 pounds each.
June	1,044 boxes, averaging 10 pounds each.
July	720 boxes, averaging 10 pounds each.
August	257 boxes, averaging 10 pounds each.
September	122 boxes, averaging 10 pounds each.

Total, 3,396 boxes, equaling 33,960 pounds, or about 67,920 crabs by count.

A large quantity of soft crabs is eaten by the inhabitants along Indian River, and some are sold to the summer visitors at Rehoboth Beach. Opinions differ in regard to the percentage of crabs shipped from this section, but judging from the best information obtainable, it is, perhaps, safe to estimate that from three-fourths to seven-eighths of the catch is sent to New York and Philadelphia, while the remainder is disposed of locally.

At Indian River the average daily catch per man is said to be about three dozen crabs, and the average season's catch about two thousand crabs, worth to the fishermen about 1 cent each. The prices received by the fishermen at Dover for soft crabs is 18 cents a dozen, and for hard crabs 80 cents a hundred; at Lewes the soft crabs bring 25 cents a dozen, and the hard crabs 10 cents a dozen.

VIRGINIA AND MARYLAND.—Blue crabs are very abundant on the coasts of Maryland and Virginia, and in Chesapeake Bay, where they are captured in large quantities to supply neighboring and northern markets and the canneries at Hampton, Va., and Oxford, Md. During the summer these crabs occur in all favorable shallow water localities, and are especially abundant in different depths of water in Hampton Roads. In the winter they lie buried in the bottom, though not

necessarily at great depths, as they are often taken by means of oyster tongs; but during this season their flesh is generally regarded as soft and watery. The crab season extends more or less continuously from March to November, beginning earlier at some places than at others. Soft crabs are generally preferred for ordinary use; they are regarded as the greater delicacy, and the demand for them greatly exceeding the supply, they sell at a much higher price than the hard crabs, but only the latter kind is used at the canneries.

The fishery is carried on by means of trot-lines and crab-nets, but the crabs are also taken incidentally in fish seines, sometimes in immense numbers, to the great annoyance of the fishermen, and in oyster tongs. The latter appliance is regularly used in the winter months by a few crabbers in Lynnhaven Bay and other brackish waters. The trot-lines employed on the Virginia coast are from 600 to 700 feet long, with the lateral lines 18 inches to 2 feet long and 18 inches apart. In Hampton Roads the crabbers who fish for the canneries use trot-lines, of which the main line consists of 600 feet of one-half inch manilla rope, the lateral lines being of much smaller size, 2 feet long and placed at intervals of 18 inches. Beef tripe is used as bait. The ends of the lines are furnished with anchors and buoys, and each one is attended by a single man in a small skiff. About seventy-five men with these trot-lines and boats are in the employ of the Hampton canneries. In hot weather the lines must be overhauled daily to replace the missing baits, but in cold weather two baitings a week are sufficient. Large boats are sent out to collect the crabs from the fishermen and carry them to the canneries several times a day. In other localities sting-ray flaps are sometimes used as bait.

Fishing is carried on for the canneries every week-day during the season, in depths of 6 to 14 feet of water, in the immediate vicinity of Hampton. The average daily catch per man is from sixty to seventy-five dozen, but catches of two hundred and fifty dozen, equal to 10 barrels in bulk, have been recorded for the same length of time. The mild winter of 1879–'80 caused the crabs to be more abundant in the following spring, but during cold winters many die and are cast upon the beaches by the waves. In 1880 the first spawners were seen by the first of March, but they do not usually appear until April. The height of the spawning season is from May to August, although many spawners are seen as late as November.

Although the larger part of the crabs caught on the Virginia coast, or, more strictly speaking, at the mouth of Chesapeake Bay, are for the use of the Hampton canneries, a great many are also used fresh along the shores where they are taken, and considerable quantities are sent to the northern markets and to the interior towns of Virginia. Boats come into Hampton Roads and the surrounding region from Baltimore to catch and buy crabs for the markets of that city, and other regular shipments are made to the same place. From the first of May to the middle of June, New York receives nearly all of her supplies of soft crabs from the Virginia coast and Chesapeake Bay, but after the middle of June or the first of July the weather becomes too warm to ship them without great loss. Outside of the canneries, therefore, the principal crab industry of the Virginia coast is of only about three months' duration, from March or April to July. The canning business, however, continues until November. Soft crabs are packed for shipment in boxes with seaweeds, but hard crabs are sent in barrels. Crisfield, Md., on the Chesapeake, does a very large trade in crabs, which are shipped to Philadelphia and Baltimore. About one hundred and fifty men are engaged in this industry in the neighborhood of that place during the crabbing season.

Blue crabs are extensively used as bait for nearly all kinds of fish at the mouth of Chesapeake Bay and on the outer coast of Virginia. Soft crabs are preferred, but hard crabs are used when the former are not obtainable.

NORTH CAROLINA.—Blue crabs are very abundant on this coast, where they often receive the

name of channel crabs, but they are not much in demand as food. In the summer they inhabit the sounds and inlets as well as the outer shores, and in the winter bed in the bottom of the channels and also in deep water. The season lasts from May until November, during which time the crabs may be captured in large numbers with little trouble.

About Beaufort and Morehead City, the fishermen take them in immense numbers in their drag-nets while fishing for sea-trout, mullet, and other fish, and consider them a great annoyance, as it is difficult to remove them from the nets. They kill nearly all that are captured in this way by a blow from a stick carried along for the purpose, and then throw them away, or use them as a manure. A few are kept for food, but none are sold, beyond an occasional barrel-full, mostly soft-shelled, which are sent to some of the larger inland towns. A few soft crabs are also sent to northern markets, but most of the crabs sold in this vicinity are gathered by negro children, who take them on the ebb tide in the little pools of water left on the shore. The price is from 15 to 20 cents per dozen. The fishery for this crab promises to become of great importance when a ready market for the catch has been established. Great inducements are held out by this region for the establishment of crab canneries, similar to those of Hampton, Va. The trot-line employed on the Virginia coast has not yet been introduced here. The total quantity of crabs used in this vicinity (Beaufort and Morehead City), or sent from there in 1875, was about 2,500 dozen, valued at 15 cents a dozen, or $375 for the entire catch.

A small quantity of crabs is secured about Wilmington for use in that city and for shipment to interior towns of North Carolina and South Carolina. They are sent either alive in baskets or after being boiled in brine.

But few men on this coast engage regularly in crab catching, and most of the crabs sold are taken by the fishermen or by colored children. Shrimps and prawns constitute the favorite baits for hook and line fishing on the North Carolina coast, but in their absence crabs are substituted in part. They are said to answer for nearly all species of fish.

SOUTH CAROLINA.—The sea-crabs, as the *Callinectes* are called on this coast, are found in abundance during the warmer part of the year, in the harbors, in the shallow waters at the mouths of creeks and rivers, and on the salt marshes, where many individuals are sometimes left exposed at low tide. They might generally be taken during nearly every month of the year, but are secured for market principally in the spring and early summer. Soft crabs are found on the sandy and muddy flats at low tide.

Crab fishing as an industry is carried on only in the vicinity of Charleston, where the fishery usually begins about the last of February and continues until the middle of May. After open winters, however, it often commences several weeks earlier. The crabs are usually taken by means of trot-lines, 75 to 100 yards long, baited generally with beef entrails at intervals of 18 inches to 2 feet. Scoop-nets are used in connection with the trot-lines, and crabs are also taken incidentally in fish seines. During the first few weeks of the season the number secured is comparatively small, 150 to 200 being a fair day's catch for a boat containing two men. Later in the season they become more abundant, the average daily catch per boat of two men reaching 400 to 600. The best fishing-grounds for hard crabs are about the rocky bottoms of the outer harbor, in the vicinity of Forts Sumter and Pinckney, though the crabs are also fairly abundant nearly everywhere along the shore. About eight boats, with ten men and six boys, are engaged in crabbing during the season. The first part of the season the fishermen sell their catch of hard crabs at $1 a hundred from the boat, but later the price falls to 60 cents a hundred. The retail price is 25 cents per dozen. The trade is largely controlled by colored people, who buy the crabs directly from the fishermen, and after boiling them and scraping the spawn from the females, place them on

trays and vend them through the streets of Charleston. Up to a recent date soft crabs were thrown away as worthless, but they are now better appreciated, although they are not yet as favorably regarded as they are farther north.

Mr. R. E. Earll states that about two-thirds of the catch during his visit to Charleston in March, 1880, were females, with large bunches of eggs attached. These eggs were still quite immature, indicating that they would not probably hatch before April or May. Hundreds of thousands of eggs were destroyed with every dozen crabs brought to market.

The crabs caught about Charleston are mostly sold in that city, but some are also sent to interior cities, the principal inland markets being Columbia, S. C., and Augusta and Atlanta, Ga. For shipment to these places they are packed in boxes and small barrels. The demand for crabs on this coast is not equal to the supply, and there are at present no inducements to increase the fishery. The quantity and value of crabs disposed of for food on the South Carolina coast during 1880 is estimated as follows: Hard crabs, 9,000; soft crabs, 1,500; value, $775.

The sea-crab is used as bait for the drumfish (*Pogonias chromis*) and for all other species of fish for which shrimps are employed, when the latter are not obtainable.

GEORGIA.—The sea-crab is very abundant on the Georgia coast, where it enters the river mouths during the summer. The season extends from March to November. The fishing appliances consist of scoop-nets, hooks and lines, and baited hoop-nets. The latter is a twine net, fastened to a barrel hoop, with a weight in the center, and to the upper side of which is tied a piece of bait, generally consisting of fresh beef. This net is lowered to the bottom, and the crab, attracted by the bait, crawls on it and is quickly hauled to the surface. Fish lines with hooks are also commonly used, and a man in a boat or on a wharf can handle several of them. While the soft-shell crabs are generally preferred for food, the hard crabs are much more extensively used on account of their greater abundance. In some localities, however, hard crabs are given the preference.

Georgia is too far distant from New York City to compete with the more northern States in sending crabs to that market, and most of the catch is consumed in the former State and in Alabama. Large quantities are used along the coast and in Savannah, and thousands are sent to the inland towns. They are packed in ice for shipment to some extent. As a bait this crab is used for the drumfish, bass, and other species.

The business of catching and selling crabs gives employment to several hundred men. Crabbing is also indulged in as a pastime by summer visitors on the sea-shore. The yearly catch is stated to be very large. In Savannah crabs are mostly hawked through the streets by negroes.

EASTERN FLORIDA.—Blue crabs abound upon the Atlantic coast of Florida from Georgia to the Keys. In the summer they are found in the shallow waters near shore and in the bays, rivers, and creeks. In the winter they mainly retire to deeper water, where they are sometimes captured in the early spring. During mild winters, however, they remain in nearly the same places which they frequent in the summer. The crab season is mainly from March to December. Although very large quantities of crabs can be easily procured, they have as yet given rise to no regular industry, and are merely taken for home consumption in the towns along the coast. A few dozen, however, are occasionally sent away on special orders. These are boiled in brine and then packed in crates or boxes. Soft crabs are rare and are regarded as a luxury; the hard crabs are therefore almost the only ones used for food. They are captured by means of scoop-nets, hoop-nets, and trot-lines. The blue crabs are sometimes used as bait for the drumfish, bass, and other species of fish.

THE GULF COAST.—The blue crab is very common along the entire Gulf coast, being much more abundant than the stone crab (*Menippe mercenaria*). In the summer these crabs are found

in the bays and estuaries, and often in fresh-water rivers and lakes having direct communication with salt water. At the approach of cold weather they retire into deeper water and remain more or less dormant until the first warm days or settled mild weather of the spring. Their first move in the spring (about April) is to the grass-covered shoals, where they are said to feed largely upon the spawn of fishes occurring there. All through the summer and until about November, they inhabit the shallow waters near the shore, acting as scavengers upon decomposed fish and other animal matter, and also devouring large quantities of small fish and fish spawn. At high tide they approach nearer the shore than at low tide, the young being the most venturesome, and spending the period of high tide at the very water's edge, hiding under patches of sea-weed, behind and under logs and roots of trees and in the sand. They swim easily and rapidly at the surface at times, and are very swift in their movements on the bottom. While shedding they remain hidden in the sand or mud of the bottom or among sea-weeds.

As they are so commonly distributed and so abundant, nearly every one living upon the shore can obtain whatever supplies he wants for the mere trouble of capturing them, and they are therefore considered as having no commercial value outside of the larger cities. In fact, there is no regularly established trade in crabs upon the Gulf coast, excepting in connection with New Orleans and Galveston. The former city receives its supplies mainly from the marshes and lakes of the Louisiana coast. Crabs are, however, used as food along the entire Gulf coast, and, to a considerable extent, in the larger towns and villages. Those living directly upon the shore supply their own wants, but the larger places are supplied by boys and negroes, who catch the crabs and peddle them through the streets. The business is an irregular one, and no account of the sales is kept.

Soft crabs bring a much higher price than the hard crabs, and are preferred when they can be obtained; but they are rarely taken in any quantity, and the sales are mostly of hard crabs. According to a New Orleans correspondent, most of the soft crabs sent to that city come from the coast lakes of Louisiana.

The crab season extends more or less continuously throughout the year, unless the winter be a very severe one; but soft crabs are obtainable only from March until October. In the early spring, before they come into shoal water, they are caught by being trolled from the deeper water, by a bait of meat tied to the end of a long string. Each fisherman handles several of these strings. Later in the season they are readily dipped out with a scoop-net from along the shore. Large numbers are also taken in fish seines, but they are then regarded as an annoyance and seldom retained as food. The crab fishery to supply the New Orleans markets is carried on along the shores of the outer islands and in the marshes and lakes of the Louisiana coast. The crabs are picked up in the hands or by scoop-nets from the outer edge of the beaches and from among the marsh grass. Another method of capture is with trot-lines, the main line being stretched along the beach at the water's edge, and the lateral lines thrown outward as far as they will reach. One of these lines occupies the attention of two men.

About Pensacola, according to Mr. Silas Stearns, "the catching of crabs is classed among the sports. On warm summer evenings parties often set out for secluded portions of the bay shore, where they pursue the crabs with torches and jigs or dip-nets, until tired. A hot midnight supper, made up largely of the fish and crabs taken, terminates the fun."

Hard crabs are sent to the New Orleans market alive in baskets containing about 5 dozens each. They are sold to the marketmen at 50 cents a basket. Soft crabs bring from 10 to 15 cents each. No ice is used in the packing.

Many crabs are taken about Galveston, Tex., for use in that city, and some are sent to the interior towns of Texas and adjoining States. It is predicted that in the course of a few years an

extensive business in shipping crabs from the Gulf coast to interior towns of the Southern States will be built up, and the abundance of material for such a trade appears to favor success.

On the Louisiana coast about one hundred men are regularly engaged in taking hard crabs, and about as many more for soft crabs in their season. The average weekly catch of soft crabs is about 300 dozens, and of hard crabs about 250 baskets. More could be taken if there was a demand for them. At Galveston about twelve men are engaged regularly in crabbing, and others occasionally.

Crabs as well as shrimps are extensively used as bait on the Gulf coast, and are said to answer for nearly all kinds of hook and line fishing. Soft crabs and young hard crabs are preferred. Among the species of fish for which they are employed are the redfish and sea trout.

5. CRAB CANNING.

CANNERIES AT HAMPTON, VA.—The crab industry of Hampton, Va., is of considerable importance, and consists mainly in the canning of hard crabs (*Callinectes hastatus*) caught in the vicinity. Two establishments there are now engaged in this enterprise—McMenamin & Co., located on Hampton Creek, and T. T. Bryce, located on the Normal School grounds.

ORIGIN OF THE CANNING INDUSTRY.—The canning of hard crabs originated in this vicinity, with Mr. James McMenamin a year or two prior to 1878. Aware of the financial success attained by the lobster canneries of New England, he conceived the idea of utilizing the crabs living in such immense numbers in the shallow waters about Norfolk, Va., where he was then located, and which he was convinced could be prepared at much less cost than the lobsters. A correspondence with lobster canners at the North as to their methods of preparation having proved unsatisfactory, Mr. McMenamin began a series of experiments which lasted some time and resulted in his beginning actual operations March 10, 1878. In the fall of that year a few of his goods were placed on the market. Hampton, Va., offering superior advantages to Norfolk, Mr. McMenamin removed to the former place in April, 1879, and began work on a larger scale. Crabs were found to be more abundant and were more easily obtained about Hampton, and meeting with a ready sale, Mr. McMenamin has been induced to increase his works still further during 1880.

SEASON.—The crab season begins in the vicinity of Hampton about the 1st of April, and continues through May. In June and July so large a quantity of the crabs are found with spawn, in which condition they are not considered fit for canning, that but little is done in this line during those months. The work begins again, however, in August, and is continued through September and October, closing about the 1st of November.

METHOD OF CANNING.—When the large boats which go out to collect the crabs from the fishermen arrive at the canneries, the dead crabs and spawners are rejected. The remainder are loaded into cars of open slat-work, which are rolled on a tram-way to a wooden steamer, capable of holding about two hundred and fifty dozens, in which they are placed. About 60 pounds of steam is then turned on, and the crabs are allowed to cook sufficiently and until they become red. After the cooking the car is rolled out from the steamer, and the contents shoveled into baskets for the "strippers," who remove the outer shells, viscera, and small claws. The crabs are then thoroughly washed and passed to the "pickers," who consist entirely of women and children. The tables at which they work are circular in shape, with a round central opening large enough to pass the refuse from the crabs as it is thrown away. The table is otherwise divided into eight equal compartments by partitions radiating from the central hole to the circumference. Each of the pickers stands in front of a compartment of a table, there being, therefore, eight to each table. They work rapidly, and the meats of the bodies, as they are removed, are more or less divided up and placed in a pan. The claws are crushed with the handle of the knife employed in the work, and the meats

taken from them. The price paid for this work ranges from 2 to 3 cents per pound for the meats, which are weighed in pound lots, an examination being made to see that no shells remain among them. For each lot weighed the picker receives a ticket or due-bill, redeemable on the following Saturday night. The best pickers usually prepare about 25 pounds of meats a day, but the average quantity is only about 16 pounds each. The refuse or hard parts left after removing the meats are thrown through the opening in the center of the table into a sheet-iron barrel, which, as often as it is filled, is dumped into a scow to be carried off and sold as a fertilizer to farmers in the vicinity. The shells, as the upper part of the carapax is generally called, and which were first removed by the strippers, are cleaned and sold for making deviled crabs.

The meats go from the weighers to the fillers, who put them into cans of two sizes, 1 pound and 2 pounds, a fraction more being added to allow for waste. The quantity of meat in a 1-pound can is said to be equal to thirty-eight crabs. They then pass to the sealer and finally to the bath, after which they are vented, resealed, bathed again, and labeled.

In order that the crabs may keep well in the cans, it is necessary that they be properly cooked, and considerable skill is required to accomplish this in all cases. A great deal of trouble has been experienced, in this particular, especially with regard to canned lobsters, and large quantities of goods have occasionally spoiled in the cans without any apparent reason. It has generally been traced, however, to insufficient or imperfect cooking, and success seems to depend entirely on doing this one thing well. The method pursued at Hampton has been described to us as follows: As above stated, the crabs are first thoroughly steamed as they are brought in alive, and experience alone can dictate the length of time this process should continue. The first bathing of the cans after they are sealed, continues for about half an hour, the cans remaining in boiling water for that length of time. The cans are vented after this bathing, and at once resealed, and then bathed for a second time for perhaps two hours, more or less. The process may be shortened, however, by the use of a chemical bath, consisting merely of a strong solution of chloride of calcium in water, in the proportion of about 100 pounds of the salt to a barrel of water.

SHIPPING.—For shipment two dozen cans are packed in a case, and the cases (of 2-pound cans) are sold to jobbers at the rate of $280 per dozen. A case of shells goes with each case of cans, eight shells being allowed to a can. The trade is largely in the South and West, but considerable quantities are also exported to European and other foreign countries, and an attempt is being made to build up a large export trade. The packing house of T. T. Bryce also cans oysters and vegetables in their season.

CANNERY AT OXFORD, MD.—A crab cannery has been recently established at Oxford, Md., where about one hundred and seventy men are employed. The number of crabs used daily is said to be from twelve thousand to fifteen thousand, but we have been unable to obtain a detailed account of the industry.

Statistics of the two crab-canning establishments at Hampton, Va., for 1879.

Amount of capital invested in buildings, equipment, &c.	$5,000
Number of crabs used during the year	6,000,000
Value of the crabs at fishermen's prices	$10,000
Number of cans produced, at the rate of 2 pounds to the can	84,000
Gross receipts from sales	$16,800
Enhancement in value of crabs during canning	$6,800
Number of hands employed, of which the greater number are women	226
Wages earned by the men, per month	$18 to $50
Wages earned by the women,* per month	$7 to $8
Prices paid for crabs, per dozen	1c. to 3c.
Prices paid pickers per pound of meat	2c. to 3c.

* Very skillful workwomen as pickers sometimes make from $3 to $3.50 per week.

6. STATISTICAL RECAPITULATION OF THE BLUE-CRAB FISHERY IN 1880.

The quantity and value of blue crabs (Callinectes hastatus) taken and sold on the Atlantic and Gulf Coasts of the United States during 1880.

State.	Quantity.	Value (at the fishermen's prices).
	Pounds.	
New York	1,624,583	$69,234
New Jersey	1,470,300	162,612
Delaware	125,680	2,413
Virginia	2,130,200	32,088
Maryland	1,666,667	46,850
North Carolina	11,200	450
South Carolina	42,000	750
Georgia	7,200	125
Louisiana	288,000	7,200
Texas	36,000	900
Total	7,410,830	322,622
Enhancement in value of crabs, in canning, in the State of Virginia		6,800
Total value of the crabs as they enter into consumption		329,422

THE MINOR CRAB FISHERIES.

7. THE FIDDLER CRAB, OYSTER CRAB, STONE CRAB, AND OTHER MINOR SPECIES.

THE FIDDLER CRABS.—The three species of fiddler crabs (*Gelasimus pugnax*, *G. pugilator*, and *G. minax*), which occur abundantly along the eastern and southern coasts of the United States, from southern New England to Mexico, preferring salt and brackish-water marshes, muddy and sandy flats, and sheltered beaches, are occasionally used as bait, and are also, in a few localities, regarded as edible. On the southern New England coast, they are esteemed as bait for the tautog and other species of fish, and in the vicinity of Charleston, S. C., for the sheepshead. They are rarely eaten, but are said to be sometimes used in making soups. One species, which lives in the Lower Mississippi River, is stated to have occasioned some damage to the levees, into which it constructs its burrows, along with a species of crayfish.

THE OYSTER CRAB.—The little oyster crab (*Pinnotheres ostreum*, Say), so familiar to all consumers of fresh oysters, is, notwithstanding its small size, of some economic importance. It occurs more or less abundantly in nearly all supplies of oysters, and is generally eaten along with the bivalve, with which it is associated as a messmate. In the canneries and restaurants, where large numbers of oysters are constantly being opened, the crabs are frequently saved apart and either sold fresh or pickled for the trade. The pickling of these crabs, in some localities, as in Fulton market, New York, assumes the character of a regular business, and they are put up in glass jars like pickled oysters. Prepared in this manner, they are often offered for sale in the larger cities, and especially in New York. The difficulty of collecting together so many small creatures renders their cost somewhat high.

The oyster crab has long been famous as a tempting morsel, and its original describer, Say, remarks concerning it, as long ago as 1817, that, "where the fresh oyster is opened in considerable numbers, the crabs are often collected and served apart for the palate of the luxurious." It is the female alone that is eaten, the male never living, so far as is known, within the oyster shells, but occurring occasionally as a free-swimmer at the surface of the sea. The male also has a thicker shell than the female, and would not, therefore, be regarded as equally palatable.

A closely related species, called the mussel crab (*Pinnotheres maculatus*), lives as a messmate

within the shells of the edible mussel (*Mytilus edulis*) and the smooth scallop (*Pecten tenuicostatus*), and were either of those mollusks extensively used as food with us, as the former is in Europe, the little crab would probably be classed as edible. It is frequently very abundant. When dredging off the mouth of Narragansett Bay, Rhode Island, in 1880, the Fish Commission steamer discovered numerous beds of the smooth scallop, from a bushel of which fully half a pint of crabs was obtained. The same crab was also found abundantly, in 1881 and 1882, in the mussels which form extensive beds on some of the muddy bottoms of Vineyard Sound, Massachusetts.

A third species of *Pinnotheres* occurs on the Pacific coast of the United States, in the shells of the California mussel (*Mytilus californianus*) and of another large mollusk (*Pachydesma*), and is said to be eaten.

THE ROCK CRAB.—Both the rock crab (*Cancer irroratus*, Say) and the Jonah crab (*Cancer borealis*, Stimp.) are very abundant on the New England coast, the former being widely distributed and the latter somewhat local in its occurrence. They are both considered very good eating, but are not much appreciated by the inhabitants of the coast along which they live, and are not, therefore, commonly sought for as articles of food. One reason why they are not more extensively used is probably the fact that their distribution is co-extensive with that of the lobster, which is everywhere much more highly esteemed. The rock crab, the more abundant of the two species, also seldom averages large in size. Neither of the species is marketed in the soft shell condition, and soft-shell crabs of the genus *Cancer* are seldom found upon the shores. The vicinity of Point Shirley, on the north side of the entrance to Boston Harbor, is the only locality where either of these species is regularly fished for. The species found there is the rock crab, and the entire catch is sent to the Boston markets. At numerous other places along the New England coast, the rock and Jonah crabs are taken occasionally in small quantities for home consumption and for use as bait. We have heard of their being used as food at Newburyport, Gloucester, New Bedford, Newport, and Stonington. At all of these places, excepting Newport, *Cancer irroratus* is probably the only species obtained in sufficient quantities. At Newport, however, *Cancer borealis* may be seen in the markets, though never abundantly, during the summer months. In that city it is said to be preferred by many to the blue crab, though both species are eaten. The trade is small and mainly limited to supplying the summer visitors. These crabs are quite common in and about Narragansett Bay, and are sometimes caught at low-water mark, but more often in slight depths of water near shore, in lobster pots and nets.

As cold weather sets in, both species of *Cancer* retire to deeper water, and are more difficult to obtain. The only appliances of capture used regularly in the crab fishery of New England are scoop-nets and the old style of baited hoop-nets. Incidentally crabs are taken in seines and lobster pots and on trawl lines set for fish. The rock crab and possibly also the Jonah crab are employed as bait for the cod, tautog, bass, and other species of fish.

The rock crab (*Cancer irroratus*) is the only species of crab brought direct to the Boston market. Only about four thousand by count are sold annually in Boston, all, or nearly all, of these passing through the hands of two or three dealers in Quincy market. They are brought almost solely from Point Shirley, and sell in the market at the rate of $2.50 per one hundred. The yearly sales, therefore, amount to only about $100.

Most of the blue crabs sold in Boston pass through the New York markets. From 3,000 to 5,000 dozens are handled every year.

The sales of rock and Jonah crabs on the New England coast in 1880 did not apparently exceed a total of $200.

THE MUD CRABS.—Four species of mud crabs, of which the largest is the *Panopeus Herbstii*,

Edwards, occur upon our eastern coast, inhabiting muddy bottoms principally, and seeking shelter under stones or among algæ, and also occurring upon oyster beds. They are occasionally used as bait, though only to a limited extent.

THE STONE CRAB.—The stone crab (*Menippe mercenarius*, Gibbes) ranges from North Carolina to Texas, or, at least, throughout that section of coast the name "stone crab" is applied by the inhabitants to one or more species of crabs, but whether in all cases to the same species or not, can only be determined by a more thorough examination than has yet been made. On the southern Atlantic coast, however, there appears to be no doubt that the stone crab is everywhere the *Menippe mercenarius*. It is a much stouter form than the *Callinectes*, or blue crab, and of a more solid build, with the outer covering or shell much thicker and harder. The body is also very much smaller in proportion to the size of the claws, which are greatly developed. The average adult individuals, in the vicinity of Charleston, S. C., measure about 4½ inches across the carapax, 3 inches in length, and 1½ to 2 inches in thickness. The claws, when folded against the front of the body, measure 7 inches from elbow to elbow.

The stone crab of the Atlantic coast lives in holes in the mud, along the borders of creeks and estuaries, and in the crevices between fragments of any solid materials that may occur near their haunts, such as ballast thrown overboard from vessels, rocks in place, and the stone-work of breakwaters. It is not nearly as abundant as the blue crab, but by many is preferred as food to the latter species. The large claws furnish most of the edible meat which they contain, and which is said to be more lobster-like in texture and flavor than is the case with *Callinectes*. The stone crabs are forcibly pulled from their holes, which are generally just large enough for them to enter with their claws folded. The crabber inserts an arm into the hole, which sometimes reaches down nearly 2 feet, and seizing the occupant by the elbow of the nearest claw draws him out as quickly as possible, and then drops him before he has time to use his free claw. Once out of his hole he is readily secured with the hands. These crabs usually offer stout resistance to being dragged from their abodes, by firmly pressing their powerful claws against the sides. If the mud in which they live be soft, a large quantity is pulled out with them, but if, on the contrary, it is so compact and hard as to withstand the pressure brought to bear upon it in the struggle, the crab must be taken out piecemeal.

Stone crabs are seldom if ever found in the soft-shell condition, and the market supplies therefore consist entirely of the hard crabs. Being less abundant than the blue-crabs and much more difficult to capture, they are far less commonly seen in the markets, and also bring a higher price. They are but rarely sent away from the sea-coast. The season corresponds more or less with that of the blue crab, but they are supposed to occur in about the same situations throughout the entire year. They are too valuable for food to be used for bait.

At Beaufort and Morehead City, N. C., where stone crabs are moderately abundant, they are sought for at intervals during the summer by five or six men. The catch for the season of 1879 was about three hundred dozens, which sold at the rate of 25 cents a dozen, amounting in all to $75. About one-half of this amount was shipped to New Berne, Raleigh, and Goldsborough, the remainder having been used locally. A correspondent at Morehead City states that the average weight of the stone crab in that vicinity is about 10 ounces, although they attain a weight of 15 to 16 ounces at times. They live the entire year in holes on the grassy shoals, where the water is from 6 inches to 2 feet deep at low tide. They are taken at all seasons, excepting in cold weather, as the crabbers must wade for them.

At Charleston, S. C., a great many stone crabs are brought to market, but no one engages regularly in their capture.

On the Georgia coast the stone crab is said to attain an average weight of about 1 pound; but specimens are occasionally found weighing as much as a pound and a half. They live in communities in all depths down to 6 fathoms, on hard bottoms, consisting mainly of mud and shells. They seldom wander a great distance away from their holes. The usual method of capture is the same as that above described, but they are also sometimes dug out of their holes, or caught incidentally on hooks set for the drumfish.

About Fernandina, Fla., the stone crab is found upon oyster beds and among rocks.

The stone crab is said to range along the entire Gulf coast, but to be most abundant on the western and southern coasts of Florida. It lives in the cavities of rocks and in deep holes dug in the sand. The inhabitants of the Florida coast, where it occurs, commonly look to it for a considerable share of their food, and esteem it very highly. It is captured in the same way as upon the Atlantic coast. To the westward of Florida it is much less abundant, averages smaller in size, and is seldom taken for food.

THE GREEN CRAB.—The green crab (*Carcinus mænas*, Leach), which is readily distinguished from all our other east coast shore species by its bright green color, varied with spots and blotches of yellow, has only a limited range on our coast, from Cape Cod to New Jersey, but is one of the most common of all the European crabs. In Vineyard Sound, Buzzard's Bay, and Long Island Sound, where it often goes by the name of "Joe Rocker," it is sometimes very abundant on rocky or peaty shores near high-water mark, and is highly regarded as a bait for the tautog. In the two former localities it is said to have formerly been much more abundant than at present, and to have been collected in much larger quantities by the fishermen for bait.

In some of the European countries where it occurs, it is extensively employed for food and bait. On the English coast, according to White, "its predaceous habits inflict much injury on the salmon fisher. Trout and mackerel are often reduced to a skeleton in a very short time, and salmon are often rendered unfit for market by an unseemly scar, the results of its attacks. They are sometimes used as bait, especially while soft shell."

THE LADY CRAB.—The lady crab, sand crab, or squeaker crab (*Platyonichus ocellatus*, Latr.), as it is variously designated on different parts of the coast, occurs on most sandy shores from Cape Cod to Mexico, and being predaceous in its habits and feeding largely upon dead fishes and other animal matter, does efficient service as a scavenger. It is occasionally brought to the New York markets in the winter time, and is said to command a high price when in the soft-shell condition. It is also eaten at New Orleans, from which place we have received specimens purchased in the markets, but the extent of the supply is unknown to us. Along portions of the Atlantic and Gulf coasts, it may possibly be sold in connection with the blue crab, with which it corresponds in range and to some extent in habits. It is smaller than the blue crab, but equally abundant, and is said to be of good flavor.

Along the southern New England coast, and probably elsewhere, it is frequently employed as bait for the tautog and other species of fish.

THE SPIDER CRABS.—The spider crabs (*Libinia emarginata*, Leach, and *Libinia dubia*, Edwards) range from Casco Bay, Maine, to Mexico, living principally on muddy, but also to some extent on sandy, bottoms in shallow water. They are occasionally used for bait, especially on the New Jersey coast, but we have never heard of their being used for food.

THE SAND BUG.—The sand bug, bait bug, or beach bug (*Hippa talpoida*, Say), which is related to the hermit crabs, though differing from them considerably in general appearance, burrows in the sandy shores of our Atlantic coast from Cape Cod to the Gulf of Mexico. On the coast of Southern New England it is only locally abundant, occurring very plentifully in some localities

and being more rare or even entirely wanting in others. From New Jersey southward it is more common and it appears to be used for bait wherever it can be collected in sufficient quantities. It is reported as a common bait on the New Jersey coast.

THE HERMIT CRABS.—The three species of hermit crabs which occur most abundantly near shore on our Atlantic coast, and are therefore most available as bait, are the following: *Eupagurus Bernhardus*, which ranges from Cape Cod northward, in all depths from low water to 50 fathoms and deeper; *Eupagurus pollicaris*, ranging from Massachusetts to Florida, and inhabiting the rocky and shelly bottoms of the sounds and bays and oyster beds; and *Eupagurus longicarpus*, which, though smaller than either of the above species, is more easily obtained, living as it does on muddy and sandy shores from between tide-marks to a depth of 10 fathoms; it ranges from Massachusetts Bay to the Gulf of Mexico. The hermit-crabs do not appear to have found favor as yet among our fishermen as a bait, but in England the *Eupagurus Bernhardus* is so used to some extent. They are sufficiently abundant to supply a limited demand at least, and at some future time will probably be utilized.

THE HORSESHOE CRAB FISHERY.

8. THE COMMERCIAL IMPORTANCE OF THE HORSESHOE CRAB.

RELATIONS.—This curious marine form, the *Limulus Polyphemus* of naturalists, although not regarded as a true Crustacean by many authors, will probably retain its association, in the minds of most people, with the true crabs, near which it was formerly classified, and we may, therefore, be pardoned for discussing it in this connection, from an economic standpoint.

QUALITIES AND USES.—The horseshoe crab has never grown into favor as an article of food for man, and by many who have eaten it, we are told that the flavor of its flesh is decidedly inferior. Either from this or from other causes, there has sprung up nearly everywhere a strong prejudice against its use for food, although we are informed that in some localities it is occasionally eaten. A few correspondents, however, have gone so far as to rate its flesh even above that of the lobster, a taste which it is difficult to account for. The principal uses to which the horseshoe crab is put, are as food for poultry and swine, as a bait for catching eels, and as a fertilizer, becoming of much commercial importance only in the latter connection.

EXTENT AND CHARACTER OF THE FISHERY; MASSACHUSETTS.—The practice of feeding these crabs to poultry and swine seems to prevail along many portions of the coast where they abound. At Wellfleet, on Cape Cod, Mass., the farmers or fishermen take them on the flats with improvised spears, and, throwing them into two-wheeled carts, haul them back to their houses, where they use them for this purpose. When fed to the swine they are cut up, but for the chickens the upper part of the plastron or shell is simply removed, so as to expose the soft parts. It is during the spawning season, or in June and July at this place, that they are taken on the shore, and the large number of eggs which the females then contain adds to their edible qualities. The flavor of the animals fed with the horseshoe crabs is said not to be greatly improved thereby.

NEW YORK.—In Great South Bay, on the southern side of Long Island, horseshoe crabs are very extensively used for baiting eel-pots and feeding chickens and hogs, and the farmers pay from 50 to 75 cents a hundred for them. Eelers pay 2 cents each for females, but do not buy the males. The season for them is May and June, when they crawl upon the beaches to spawn. They are picked up on the shores by hand at night, and speared with an iron pike in the daytime. A man can easily load a small boat with the crabs at a single low tide, during the height of the season. Probably about ten thousand are caught in this vicinity each year. In Peconic Bay, Long

Island, horseshoe-crabs are much used as bait for eels during May, when they are very abundant, and for the same purpose they are frequently utilized at many other places farther south along the Atlantic coast. We also understand that they are *occasionally employed as a bait for bluefish* and weakfish.

NEW JERSEY AND DELAWARE.—It is in Southern New Jersey and Delaware, however, that these sluggish crabs are most sought for, and during the limited season in which they can be conveniently obtained, enormous quantities are collected mainly for fertilizing purposes. At the time of writing, two factories, at least, in this region are engaged in pulverizing the crabs for market, and many farmers living upon the coast collect them and grind them up on their own account. The spawning season, during which the horseshoe crab visits the shores of southern New Jersey in immense numbers, continues through most of May and June, but during the remainder of the year they live for the most part away from the shore, where they could be obtained only with difficulty and by the use of special appliances. A comparatively small number of individuals, however, remain in the shallow waters during the entire summer. The crabbing season is, therefore, of short duration, lasting not longer than six or eight weeks at the most, and in fact, for only about twelve or fifteen days of this period are the crabs sufficiently abundant to render the business of capturing them at all profitable. They approach the shores to spawn in the greatest numbers during the spring tides corresponding to the new and full moons of May and June, and on the Delaware Bay side of New Jersey, where the fishery is most extensive (being in fact almost entirely limited to this part of New Jersey), a westerly wind is said to favor their approach while an easterly wind exerts a contrary influence. They crawl up the beaches with the flood tide and leave soon after the ebb, the males and females coming invariably together and generally in pairs, the males riding upon the backs of the females. The eggs are deposited in small holes in the sand, between tides, after which they are impregnated by the males, and the crabs desert the beach, not to return again in any numbers until the next spring.

CRAB-CATCHERS.—There are no professional catchers of horseshoe crabs, but during the season of their abundance every one so inclined engages in their capture. Nearly all of the farmers along the shores, together with their help, generally participate, and either sell their catch to the factories or prepare it themselves.

METHODS OF CATCHING HORSESHOE CRABS.—The crabs are so sluggish in their movements and crawl so far up the beaches that they are easily taken in the hands, and this is the usual method of capture in most places, although some prefer to spear them with pitchforks. They are usually gathered at night, and only about two hours of each night can be profitably spent in taking them.

In the vicinity of Dyer's Creek, however, large numbers of crabs are taken in pound-nets, constructed specially for their capture. These nets were introduced in 1870, and in 1880 nine of them were in use in this region. The leader is about 50 fathoms long, and there are two wings, each 25 fathoms in length. The pound proper, or bowl, is divided into two compartments, the first being intended for the king crabs, and the second, which is connected with the first by a funnel shaped opening too small to admit the crabs, is designed for fish. The lower part of the pound is made of stakes, embedded in the mud and extending a foot or more above it. To these stakes the netting is attached, the object being to keep it above the crabs, which would otherwise destroy it.

METHOD OF PREPARING THE CRABS FOR FERTILIZING PURPOSES.—The common method of treating the crabs is to first stack them up in piles and allow them to putrefy and become more or less completely dried, after which they are either ground up by the factories or broken up into small fragments by the farmers, who sometimes use their thrashing machines for this purpose.

At the factories they are heaped up in bins and allowed to remain from one to two months, after which they are roughly torn to pieces and thoroughly dried in a metal cylinder over a furnace. They are then ground up finely in a mill, and the product, called "cancerine," is generally composted with muck, lime, or other suitable material. It is also frequently used pure, especially by the farmers, who prepare their own supplies. It is highly recommended as a fertilizer for grain, and is also extensively employed by the fruit growers of Southern New Jersey and Delaware. The chemical composition of cancerine is given further on.

STATISTICS.—On account of the irregular manner in which the horseshoe crab industry is conducted, it has been impossible to obtain complete statistics as to its extent and value. A few figures obtained from some of the regions where it is carried on will, however, serve to give some idea of its importance.

In the neighborhood of Dennysville, Cape May County, New Jersey, about a hundred men engage in crabbing during the season, and make about $2 a day each. Within 15 miles of the town about 1,000,000 crabs were obtained last season (1879). Near Woodbury, N. J., about the same number of men are similarly occupied during the season, and take from 1,500,000 to 2,000,000 crabs yearly. Four dollars a ton, containing about 1,000 live (or fresh) crabs, is paid for them at the factories. At Goshen, N. J., about one hundred men were also engaged, and they take 500,000 or 600,000 in a season. At Fishing Creek the catch is much smaller, amounting to only a little over 100,000 each season.

STEAM MILLS FOR PRODUCING THE FERTILIZER.—Ten years ago there were three steam mills in the immediate vicinity of Dennysville for producing the crab fertilizer. Now, on account of the diminished supply of crabs, their number has been reduced to one, which uses up about 800,000 crabs a year. A great many crabs, however, are sent from Southern New Jersey to the Commercial Fertilizer Company's mill at Wilmington, Del., where they are extensively prepared.

DELAWARE.—On the Delaware State side of the bay the season for taking horseshoe crabs is the month of May, when about fifty men engage almost exclusively in the business. The crabs are principally taken between Mahone's and Mispillion Creeks, and are most abundant during about four or five days, at the full and change of the moon, in the night time. The fishermen work with scows built for the purpose, and which are about 16 feet long and 10 to 12 feet broad. Their capacity is about 300 bushels each. In the scows the crabs are carried to some convenient locality, where they are thrown upon the beach and allowed to dry. They are then sent to the factory at Wilmington. About 900 tons of these crabs, equal to about 900,000 individuals when fresh, are taken by the fishermen each season. The dried crabs weigh about one-third as much as the fresh. The prices paid to catchers is $3 per thousand fresh, or $10 per ton dried.

DECREASE.—According to the statements of many of our informants, horseshoe crabs are becoming constantly less abundant in Delaware Bay, owing to the practice of capturing, so far as possible, every individual that comes upon the shore.

ACCOUNT OF THE INDUSTRY BY THE STATE GEOLOGIST OF NEW JERSEY.—The following interesting remarks on the horseshoe crab industry of Southern New Jersey, extracted from the report of the State geologist of New Jersey for 1868, add many important facts regarding the value of this product:

"The Delaware Bay shore is remarkable for the immense numbers of this animal (the *Limulus Polyphemus* of the naturalists) which frequent it. At the season for depositing their eggs, which is in the latter part of May and in June, they come on shore in almost incredible numbers. The whole strand for many miles is covered with them, sometimes two or three deep. Thomas P. Hughes, of Town Bank, said that on his shore of 100 rods he could get 100,000 in a week; 750,000 have

been taken on about half a mile of the strand; and one year 1,200,000 were taken on about a mile. They deposit their eggs and then leave the shore entirely until the same season next year. But little, if anything, is known of their habits or localities during the interval. The number of eggs is very great. They are so thick along the shore that they can be shoveled up and collected by the wagon load. Great numbers are thus gathered and carried away to feed chickens. When they hatch, the sand is fairly alive with the little creatures. A year or two since a vessel took in a load of sand on the shore, and in two or three days so many of these young king crabs appeared in it that they were obliged to throw the whole overboard.

"The king crab is common on our whole Atlantic shore, and is taken by farmers in quantity, though it is not so remarkably abundant as in Delaware Bay.

"Hogs eat the crabs with great avidity, and it is the common practice all along our shores to gather them for that purpose in the proper season. It is common also to gather them into pens and allow them to putrefy and form a kind of compound to be used as manure. Other persons have composted them for the same purpose. For the raising of wheat they have been very successfully used. On land which would not grow wheat at all up to that time, crops of 20, 25, and even 30 bushels to the acre have been raised by the use of these crabs composted with earth. It has been thought by some that they injure the ground for the succeeding crops of corn or grass, and that they promote the growth of sorrel. Many persons, however, have continued their use for years in succession with success. William J. Bate, of Fishing Creek, uses them every year, and with the best effects, in compost on early potatoes. A remarkably fine and thrifty young orchard of his has been manured principally with crabs in their raw state. Mr. Springer, of Dyer's Creek, has used them for a number of years, composting them with sawdust, coal-pit bottoms, muck, and barnyard manure. With a compost of 7,000 crabs, twenty loads of muck, two coal bottoms, seven or eight loads of old hay, and manure applied on 6 acres of sandy loam, he raised 151½ bushels of wheat. On another field, where the crop succeeding that manured with crabs did not look thrifty, he sowed a light dressing of quick lime. The crop immediately began to improve, and turned out to be an excellent one. Levi Corson, of Dyer's Creek, has an acre and a half of sandy loam on which he has raised all the corn and wheat needed for the use of his family for the last fifteen years. He has it in two fields, and raises corn in one and wheat in the other every year, giving each field a two years' rotation. Occasionally he has plowed in the wheat stubble and raised a crop of buckwheat, thus getting three crops from the same ground in two years. The straw and stalks have all been taken off the field, and the only manure that has been applied has been a compost of 2,000 crabs with eight or nine loads of sods from the fence corners, each year. His corn crop has been at the rate of from 30 to 50 bushels an acre. The compost was all put on the wheat, no manure being used on the corn. The sorrel grew very rank in the corn, but by the diligent use of the hoe it was kept down. His first crop of wheat on 90 rods of ground was 16 bushels, weighing 65 pounds to the bushel, and his wheat has usually yielded at the rate of from 25 to 30 bushels an acre. He finally stopped gathering crabs and used lime, but his crops were not as heavy as before. He thought they were falling off while using crabs, but his neighbors said they had not fallen off more than was due to the variation in seasons.

"It is presumed these cases are sufficient to show the value of this manure. In regard to the methods of applying crabs there is room for much improvement. Allowing them to lie in piles and decompose by themselves is very wasteful, and the composts which are usually made have by far too small a quantity of absorbent material added, as is evident from the escape of the gases from the heaps, as well as from the results of experience in making composts in other localities. The crabs when alive weigh 3 or 4 pounds, and when thoroughly dried they average nearly, if not quite,

a pound each. To save all the gases which will escape from them in the course of their decay, not less than five times their weight of muck, sods, loam, or other absorbent material should be used; and a much larger quantity would not be injurious.

"The abundance of these crabs has suggested the plan of grinding them for use as a concentrated manure, and Messrs. Ingham & Beesley have erected a mill at Goshen for this purpose. They dry the crabs and grind them as fine as possible. Thus prepared, they are put up in bags and sold under the name of cancerine. Its price is $25 a ton at the works, and from 150 to 250 tons are made by them yearly. Another factory, at West Creek, makes an equal amount. It is applied on wheat, at the rate of 800 pounds per acre, and is fully equal to half its weight of guano, which would cost $18. The whole supply of it is not equal to the demand.

ANALYSIS OF CANCERINE.

Water	9.321
Organic matter	70.867
Lime	4.358
Phosphoric acid	2.714
Sulphuric acid	5.170
Alkaline salts	3.687
Sand	3.883
Total	100.000

Ammonia 10.75 per cent.

"The specimen analyzed was sent to me by Mr. Ingham. It appears to be pure crab. The ammonia was determined by an ultimate analysis. It does not exist in the cancerine ready formed, but the nitrogen from which ammonia is generated is in it, and, in accordance with the common practice of chemists, the amount of ammonia which the nitrogen will produce is calculated.

"Another specimen of the crab shells, unmixed with other matter, and only dried in the air, gave 10.78 per cent. of ammonia. Two other specimens of the cancerine gave 9.22 and 9.77 per cent. of ammonia. The phosphoric acid of the last two was 3.87 and 4.24 per cent.

"The establishment of this manufacture has been the subject of much interest. The increasing use of concentrated manures, the continued reports of their early exhaustion, and their enhanced price have drawn the attention of the public to other sources of supply, and every honest attempt to meet this want should meet with public encouragement. The agricultural value of the cancerine and its price compared with the Peruvian guano may be estimated. The following table gives the highest, lowest, and the average composition of thirty-two well authenticated specimens of Peruvian guano. It is copied from Morton's Cyclopedia of Agriculture:

	Highest percentage.	Lowest percentage.	Average percentage.
Water	22.68	8.88	13.09
Organic matter and salts of ammonia	58.82	37.78	53.61
Sand	2.95	1.17	1.54
Earthy phosphates	34.45	19.46	24.12
Alkaline salts	13.48	.61	8.78
Ammonia yielded by 100 parts	18.94	15.98	17.41

"Professor Way, an eminent agricultural chemist in England, and some in our own country, have computed the value of guano from the amount of ammonia and phosphates or phosphoric acid it contains, considering the other ingredients as of little comparative value. The phosphates are allowed by them to be worth about one-eighth and phosphoric acid one-fourth as much as ammonia. Taking these valuations as the basis of calculation, the ammonia and one-eighth of

the phosphates of the Peruvian guano amount to 20.42, or are equivalent to that percentage of ammonia; the ammonia and one-fourth of the phosphoric acid in the cancerine are in the same way equivalent to 11.43 per cent. of ammonia; and the values of the two will be as the numbers 20.42 and 11.43; or when guano is worth $60 per ton, as it is now, the cancerine is worth $33.58. * * *

"The amount of the material (cancerine) which can be produced annually is not yet known. There is so little knowledge of the habits of the king crab that no judgment can be formed as to the effect that will be produced on a coming year's supply by the destruction of great numbers of those which come to the shore to lay their eggs. If the number is not materially diminished, the manufacture could be extended so as to produce many thousands of tons every year."

Table showing the extent and value of the horseshoe crab fishery of New Jersey and Delaware for 1880.

State.	Number of crabs taken.	Estimated weight in pounds.	Value to the fishermen.
New Jersey	3,400,000	6,800,000	$13,600
Delaware	900,000	1,800,000	2,700
Total	4,300,000	8,600,000	16,300

(b.) THE CRAB FISHERIES OF THE PACIFIC COAST.

9. CRAB FISHERIES OF THE PACIFIC STATES AND TERRITORIES, CALIFORNIA TO ALASKA.

CALIFORNIA TO WASHINGTON TERRITORY.—There are six species of crabs living upon the Pacific coast of the United States south of British Columbia which are regarded as edible. They are as follows: The common crab (*Cancer magister*); the red crab (*Cancer productus*); the rock crab (*Cancer antennarius*); the kelp crab (*Epialtus productus*); the yellow shore crab (*Heterograpsus oregonensis*), and the purple shore crab (*Heterograpsus nudus*). Of these, however, only the common crab (*Cancer magister*) is extensively taken as food for the San Francisco markets. Both the red crab and the rock crab are said to be nearly, if not quite, as palatable as the common crab, but the fishery for them has been neglected, mainly for the reason that the latter species is the most abundant, averages much larger in size, and inhabits those localities and depths which are most resorted to by the fishermen. The yellow and purple shore crabs are much smaller than the other four species, and are eaten only by the Chinese. The kelp crab is eaten by the Indians, and probably also by the white inhabitants of the regions where it abounds.

Although the *Cancer magister* ranges from Sitka, Alaska, to Magdalena Bay, Lower California, San Francisco appears to be the only place where it is regularly marketed, the supplies coming mainly from the sandy beaches of the San Francisco side of the bay of the same name, and especially to the south of the Golden Gate, between the city and the sea. These crabs are caught in immense numbers, together with the red crab, the rock crab, and many shallow-water species of fish, in seines, and in crab-nets, baited with fish and offal. The red crabs and rock crabs so taken are not sent to market, but are thrown back into the sea or left on the shore to die. These two species, however, live mainly upon the more rocky shores of the northern side of the Golden Gate, where but little fishing is done, and the indifference shown regarding them is largely attributable to this fact. Notwithstanding the great numbers of the common crab which are constantly being taken, and the reckless manner in which the catch is wasted by most crab-catchers, the supply has not yet perceptibly diminished. Much fewer crabs are brought to market in winter than in summer. Three or four good sized crabs sell in the markets at retail for 25 cents. There

is no export trade in crabs. The annual sales of crabs in the San Francisco markets have been reckoned at about 300,000 by count, weighing on an average about 1 pound each, and netting the fishermen about $15,000.

The yellow and purple shore crabs, when eaten by the Chinese, are generally spitted and cooked over their open fires.

The large red rock crab (*Echidnoceros setimanus*) of the Farallone Islands is occasionally carried to the San Francisco markets and offered for sale as a curiosity. Formerly it brought asr high a price as $10 apiece, but now its value is much less. So far as we are aware, it is no regarded as edible.

For the above information regarding the Californian crabs, we are chiefly indebted to Mr. W. N. Lockington, of San Francisco.

ALASKA.—According to Mr. Henry Elliott, several large species of crabs found on the coast of Alaska are eaten by the natives. Among these are species of *Chionœcetes* and *Hyas*. With reference to the former, Mr. Elliott states that along by the last of May or first of June of each year, great numbers of the females of *Chionœcetes* enter the village lagoon at Saint Paul's Island, evidently to spawn. They work in on the flood tide and are captured by the natives in their boats, who lean over the gunwales and pick them up in their hands as they are running in. This appearance of the crabs lasts about three weeks. They are singularly uniform in size, and will average about 10 inches in spread over all, the body alone measuring from 3 to 4 inches. The flavor of *Chionœcetes* is said to be exceedingly rich and agreeable. There is no trade in crabs in Alaska.

(c)—STATISTICAL RECAPITULATION.

10. STATISTICS OF THE CRAB FISHERIES OF THE UNITED STATES FOR 1880.

EASTERN AND SOUTHERN COASTS.

Name of species.	Estimated weight.	Value to the fishermen.
	Pounds.	
Blue crab, *Callinectes hastatus*	7,410,830	$322,622
Stone crab, *Menippe mercenarius*	12,000	450
Rock and Jonah crabs, *Cancer irroratus* and *borealis*	4,000	200
Horseshoe crab, *Limulus Polyphemus*	8,600,000	16,300
Total for the Eastern and Southern United States	16,026,830	339,572

PACIFIC COAST.

Common crab, *Cancer magister*	300,000	$15,000
Total for the entire United States	16,326,830	354,572

2.—THE LOBSTER FISHERY.

I. GENERAL REVIEW.

Among the marine invertebrates of the American coast, the lobster is second only to the oyster as an article of trade. No other crustacean along the region of its occurrence is utilized to any extent, either for food or bait, excepting at the South, where the blue crab fishery slightly overlaps that for the lobster. Two other species of crabs (*Cancer irroratus* and *Cancer borealis*), related to the edible crab of Great Britain, inhabit the same range of coast, but they are both

comparatively small, not generally abundant, and have never grown into favor for the table, although they are marketed to a slight extent in some places, and are occasionally used as bait.

The lobster probably formed an important element in the food supply of the New England colonists, and its abundance, size, and good qualities are often mentioned in the early records. As a distinct industry, however, the lobster fishery does not date back much, if any, beyond the present century, and until about 1840 it was mostly limited to a few sections of the coast. Since the latter date it has rapidly developed, and the area of the fishing-grounds has been enlarged to the *utmost extent. The introduction of the canning process and the improvements made in the* methods of shipping fresh fish have been most instrumental in promoting the growth of the fishery, which now, however, seems to have passed the period of its greatest production, if recent accounts, respecting a falling off in supplies, are to be relied upon.

In Section I of this report (Natural History of Aquatic Animals), Part 5, a brief popular account of the natural history of the lobster has been given as an introduction to the present report upon the fishery. That account deals mainly with the questions of distribution, habits, size, development, and shedding, all of which have a direct bearing upon the industry, especially as regards its protection and its increase by artificial means.

In the preparation of this, the first extensive official, report upon the lobster fishery of our country, many difficulties were encountered, and the results are not as complete and satisfactory as they might have been, had we possessed more data respecting previous years to serve as a basis for the work and as a means of comparison with the present fishery. The materials we have used were derived from several sources. The greater part was obtained by the special agents detailed to investigate the coast fisheries of the New England and Middle States, and much valuable information was secured by correspondence with lobster fishermen and dealers in all the principal districts. The author has also been able to personally inspect the fisheries in several important localities, and has had frequent interviews with many of the prominent dealers in the larger markets. A few reliable publications on the subject have also been largely drawn upon. The special agents for the coast of Maine were Mr. R. E. Earll and Capt. J. W. Collins, and despite the fact that their duties covered all the sea fisheries of that important State, the returns made on the lobster fishery and the statistics of the same were exceedingly complete. It is but just to Mr. Earll to state that it was his original intention to prepare the report on the lobster industry of Maine himself, and his notes were made with a view to that end; but other duties interfering, his field-notes were confided to my care. The statistics for Maine were, however, computed by him. Mr. W. A. Wilcox, Mr. A. Howard Clark, and Mr. Frederick W. True made the investigations for Massachusetts; and Mr. Earll and Mr. Fred. Mather, those for New York and New Jersey. The account of the fisheries of New Hampshire, Rhode Island, and Connecticut has been derived principally from correspondence, but in part also from personal interviews.

VALUE AND USES OF LOBSTERS.—Lobsters are among the most highly esteemed of the sea products of our Atlantic coast, and are everywhere in great demand for food. They are shipped long distances alive, and the canned preparations are carried to all parts of the world. On the sea coasts where they occur, except in the vicinity of large towns and cities, they are not generally much, if any, more expensive than the common fish of the same region, and they are, therefore, quite extensively eaten by all classes, and many of the fishermen and others also catch them for their own use. Away from the sea-shore, and even in many of the larger markets located near good fishing-grounds, the prices are generally much higher, placing this class of food beyond the reach of the poorer people, and often raising it to the rank of a luxury.

Lobsters also form an excellent bait for many of the species of fish taken with hook and line.

The soft shelled and smaller individuals are preferred, but in most places lobsters are now too valuable or too rare to be used very extensively as bait. Some of the lobster fishermen, who also engage in hook and line fishing, use the under sized, soft, or otherwise unmarketable ones for this purpose, and a few traps are also often left down out of season for the taking of bait lobsters only. Amateur fishing clubs, such as that at Cuttyhunk Island, Massachusetts, frequently depend largely upon lobsters for bait, and keep traps set for taking them, the smaller ones only being used and the larger ones sold. On the northern part of the New England coast, as far south as Cape Cod, lobster bait is favorably regarded for cod, hake, haddock, and sea perch; and south of Cape Cod, for cod, tautog, striped bass, sea-bass, scup, and bluefish. Old fishermen state that when rock cod refuse to bite at a bait of soft-shell lobsters, they cannot be taken with any means. On the coast of Maine, lobsters have sometimes been ground up and scattered upon the surface of the water to attract schools of mackerel, and in the same region they are occasionally fed to eels confined in ponds. For the latter purpose they are ground or broken into small fragments, and placed in small cars, pierced with holes, through which the eels can pass in and out at will. They are also used as bait in cunner traps at Cape Ann, Massachusetts.

Considerable difference of opinion exists as to what constitutes the best lobsters for eating. In most sea-port towns of the lobster region it will be observed that the inhabitants, as well as the fishermen, select the smaller lobsters for their own use, while the larger ones are shipped away to the markets and inland cities, where small lobsters find no sale. The fact that these latter places demand only large lobsters, and pay well for them, is probably one of the principal reasons why the smaller ones are mainly used at home, being, in reality, a cheaper grade. However, there is no question but that a preference generally exists for small lobsters along the sea-coast. In most markets there is no call for lobsters measuring less than about 10 inches in length, and frequently the larger they are the more readily they are disposed of. The run of lobsters at different seasons naturally influences the character of the demand, and in Boston the summer supplies average larger in size than the winter, so that the people have become accustomed to demand larger lobsters in summer than they can obtain in winter. It is natural to suppose that the lobster, like many other animals, would be most desirable as food before it had attained too large a size, but to what extent the flesh of the young and old differs does not appear to be known. The very small ones, however, would not be economical to use, from the small amount of meat they contain.

It has been stated that one sex is sometimes preferred to the other, but the only possible difference that could exist between the sexes would be with respect to the mature ovaries or "sweet bread" of the females. Capt. N. E. Atwood, in a paper published some fifteen years ago, relates that at that time male lobsters were preferred in Boston and female lobsters in New York. His paper was written in support of the statement that nine-tenths of the lobsters caught about Cape Cod, whence the New York supplies were mainly obtained, were females, while the same proportion from the "North shore," tributary to Boston, were males. This question has been more fully discussed in connection with the natural history.

Unlike the common blue crab, soft-shell lobsters are not generally regarded as edible, their flesh being described as thin and watery. They are, however, occasionally eaten, and are considered to form an excellent bait. It is customary in most regions to throw them overboard as soon as they are taken, unless they are in demand as bait, but even the slight handling to which they are subjected in removing them from the traps is said generally to injure them beyond recovery, unless the shell is somewhat hardened. Salt-water ponds or parks have sometimes been used for storing soft lobsters awaiting the hardening of their shells, but this practice is not common.

2. THE FISHING GROUNDS AND FISHING SEASON.

EXTENT AND CHARACTER OF THE GROUNDS.

LOCATION OF THE GROUNDS.—The distribution of lobsters and the depletion of many of the inshore fishing-grounds have been described in Section I of this report. The most southern grounds for lobsters on the coast are a few small banks or spots located off Atlantic City and Long Branch, which are mainly resorted to by the boat fishermen, and the yearly catch is not large. New York Bay and the waters about Hell Gate furnished a limited fishery at one time, but lobsters have been nearly exterminated there by overfishing and the pollution from factories. They occur and are fished for to a moderate extent on the western part of the Connecticut coast, but toward the eastward become much more abundant and afford a profitable fishery, especially in Block Island Sound and about the eastern end of Long Island. The fisheries of Rhode Island are carried on in some parts of Narragansett Bay and in moderate depths of water off the outer coast. The outer Elizabeth Islands, the region about Gay Head, and some localities in Vineyard Sound, Massachusetts, have yielded good fishing for many years, but probably the best grounds on the Massachusetts coast were originally those about the outer end of Cape Cod, in the vicinity of Provincetown. The history of this region is fully described elsewhere. Good lobster fishing is obtained in many portions of Massachusetts Bay as far north as Cape Ann, but the sandy shores from there to about Biddeford Pool, Maine, are much less prolific than the regions both to the south and north, and comparatively little fishing is done. The coast of Maine furnishes the principal lobster fishery of the United States, and good grounds are scattered all the way from Biddeford Pool to near Calais. The lobster production of Maine greatly exceeds in amount and value that of all the other States combined.

It is difficult to estimate the comparative value of the grounds on different sections of the Maine coast, but some are much more extensive and productive than others. The middle portion of the coast, including the Waldoboro, Belfast, and Castine districts, gave the largest results in 1880, and the fishery was more extensive and valuable in the eastern districts than in the western; but these facts do not necessarily indicate the location of the best grounds.

EXTENT OF THE GROUNDS.—As warm weather advances in the spring, the lobsters approach nearer the land and remain in comparatively shallow water until late in the fall. In the summer months they may often be found close to shore, and, in favorable localities, sometimes come within reach of a dip-net or gaff. During the earlier period of the fishery, especially on the coast of Maine, but also in Massachusetts, it was not unusual for large numbers to be taken with these simple appliances, and the shore fishery gave employment to many boys. At present, however, they are seldom seen in such localities. During the winter the lobsters live in deeper water, not necessarily at a great distance from land, but often in the deep and wide mouths of rivers and bays, which are common on the coast of Maine, and they also remain in the deeper parts of Massachusetts Bay, Vineyard Sound, and Long Island Sound.

The location of the fishing-grounds, therefore, changes somewhat at different seasons, being nearer the shore in summer and farther off in winter, and there is of course a corresponding change in the depth. The winter fishery is much more difficult than that of the spring, summer, and fall, and is not engaged in to a very great extent. In the Sheepscot River of Maine, which is quite deep, lobsters are caught as far up as Wiscasset Bridge, the traps being shifted out in the winter towards the middle of the river, not far from the summer grounds. With reference to

some regions, it has been stated that during mild winters, lobsters occasionally remain in depths as slight as 5 to 10 fathoms. The greater part of the summer lobster fishery of Maine is carried on in the passage ways and bays among the many islands and promontories that border the coast, while in the winter the traps are transferred to the waters outside. At Eastport, Me., from April 1 to the middle of May, lobsters are mostly taken outside of the island of Campobello, beginning in depths of 20 to 25 fathoms. As the season advances, the traps are gradually shifted into shallower water, and about the middle of May the fishermen begin upon the so-called inshore grounds, which extend from Lubec, Me., to near Saint John, New Brunswick. During the summer the pots are usually set in depths of 3 to 10 fathoms. In the western part of Maine, as near Biddeford Pool, the winter, or rather the early spring, fishery is sometimes carried into depths of 40 or 50 fathoms, while the summer fishery is conducted in very shallow water. In 1879, at Swan's Island, Castine, Me., some of the fishermen set their traps upon the eel-grass, where they were left partly exposed at low tide.

Lobsters occur all about the island of Vinal Haven, and no locality seems to vary much from the others. In the early spring they are taken somewhat off shore, but not far, in depths of 15 to 25 fathoms, but as the spring advances they move inshore, and during the summer and fall are found in all the coves, creeks, and inlets, good fishing being frequently obtained in water so shallow that the traps are exposed at low tide. The fishermen are rarely obliged to go more than a mile off shore at any season. The fishermen on the west side of Pemaquid fish in the waters of John's Bay and the Damariscotta River, shifting into deeper water in winter, while those on the east side and about Friendship find lobsters well up among the islands and coves between Saint George and Pemaquid, in spring, summer, and fall, but rather far out in winter, the best winter fishing-grounds being beyond the outer islands and headlands. While lobster fishing may be carried on in all depths down to 50 fathoms, it is probable that the greater part of all the lobsters taken on the coast of Maine come from depths of 2 to 30 fathoms.

On the coast of New Hampshire, the principal grounds are all within depths of 8 to 10 fathoms. Off Gloucester, Mass., the traps are set in depths of 5 to 10 fathoms in the summer and 15 to 20 fathoms in the winter, and off Boston in depths of 1 to 8 fathoms in the summer and 12 to 16 fathoms in the winter or early spring. Captain Webb, of Milk Island, Cape Ann, states that his traps are placed in a depth of 14 fathoms in April, and are gradually shifted inwards as the water becomes warmer, the summer grounds being in 2½ fathoms. At that place the lobsters sometimes suddenly change their ground in time of storm, and Captain Webb relates that he has greatly increased his catch by moving his traps into deeper water when the signal at Thatcher's Island announced a high wind from certain directions, which produced a strong undertow.

The grounds off Provincetown, Mass., are bounded on the outer side by a belt of mud, which begins in a depth of 18 to 20 fathoms; at Yarmouth Port they sometimes fish in a depth of half a fathom, while in Vineyard Sound the grounds extend from 3 to 15 fathoms, and off Gay Head from 3 to 25 fathoms. On the coast of Rhode Island lobsters are taken in depths of 3 to 20 fathoms, and off Block Island and in Long Island Sound, in depths of 1 to 60 fathoms. The deeper places last mentioned are in Block Island Sound off Fisher's Island, being, in fact, deep holes which are frequented mainly by the Noank fishermen during cold weather.

On the New Jersey coast, lobster fishing is carried on only between Sandy Hook and Atlantic City, in depths of 5 to 11 fathoms, and is mainly limited to a few small fishing banks off Long Branch and Atlantic City.

CHARACTER OF THE BOTTOM.—Lobsters are fished for mainly on sandy, gravelly, and rocky bottoms, but are also said to inhabit muddy regions, especially in the winter. At Provincetown,

Cape Cod, the sandy belt bordering the shore extends out to a depth of 18 to 20 fathoms, where it is succeeded by soft mud. The fishermen there never go beyond the limits of the sand, though many of the lobsters are supposed to retreat to the mud as cold weather approaches. South of Massachusetts Bay, and even for some distance to the north of Cape Ann, the lobster grounds are mainly characterized by sandy and gravelly bottoms, though with the frequent occurrence of large loose stones. On the coast of Maine, and in some portions of Massachusetts Bay, lobsters are very common about the many rocky ledges, which afford them great protection. It is difficult, however, to set the traps where the bottom is very uneven, and comparatively smooth bottoms are preferred by the fishermen. In the winter some fishing is done upon the mud.

THE FISHING SEASON.

GENERAL ACCOUNT.—Lobsters may be found at all seasons of the year on most parts of the New England coast, though in deeper water in the winter than in the summer. The fishing season, however, generally lasts only a few months, its duration being influenced by one cause or another. The stormy weather of winter frequently prevents the fishermen from visiting the grounds for a month or more at a time; in some places the market smacks run for only a short period, when the demands are greatest and lobsters most abundant; and the laws of some States limit the length of the season as a means of protection. In many regions the men engage in lobstering only when other fisheries, which are more profitable to them, cannot be carried on. Stormy weather is frequently selected as the time for making and repairing gear and boats and in preparing for the next season. Some of the lobster fishermen are farmers and miners, who spend a part of the year in one pursuit and the remainder in the other, and the canning season of the coast of Maine regulates the fishery to a large extent in the waters of that State. In a few localities, lobster fishing is engaged in by only the very young or old men who are not hardy enough to enter upon the more active fisheries, and who tend their traps only in pleasant weather. The term "lobster season," as used by the fishermen, does not therefore signify the entire period during which lobsters may be taken, but only that portion of it in which fishing is regularly carried on.

COAST OF MAINE.—On the coast of Maine, prior to 1879, lobster canning was permitted at any time of year, but in consequence of the character and abundance of supplies at those seasons, it was mainly carried on between April 1 and August 1, and again between about the 10th or middle of September and the 1st of December, the length of each season varying somewhat, however, according to circumstances. The fishery and canning industry were then closely interdependent, and the latter was continued whenever supplies were sufficiently abundant. Since 1878 the State laws have limited canning to the four months from April 1 to August 1, and only during that period can lobsters of all sizes be taken and disposed of. This free license has practically established the principal lobster season between those limits, but lobsters are frequently not abundant in convenient depths before the middle of April, and are often not considered fit for taking after the middle of July. Outside of the above limits only lobsters exceeding 10½ inches in length could be trapped, but there was a sufficient demand for market supplies to continue the fall and winter fishery to a certain extent. In 1883 a close time was established which prohibited fishing from August 15 to November 15, but in 1885 this close season was reduced so as to extend only from August 15 to October 1. May and June are generally regarded as the best lobster months, although the fall fishery is often nearly if not quite as good.

On some sections of the Maine coast, the canneries are the only convenient markets for lobsters, and the fishery continues actively only so long as the canneries remain open. At some places, as in the vicinity of Bath, but few men fish for lobsters during the summer, while quite a number engage

in the fishery from November to April or May, with a break of about two months during the coldest part of the winter. In the region about Saint George's Island, the fishery lasts during the entire year, with the usual winter intermission. In the coldest months it is not alone the severity of the weather that interferes with the fishery, but the ice often makes around the cars moored near the shore to such an extent as to destroy the lobsters stored in them. Some fishermen who haul their pots in cold weather keep the lobsters in the cuddy of their boats near the stove until they reach land. The well-smacks do not begin to run until about the 1st or middle of March, and cease running about the 1st of December; many do not make as long a season as this in the lobster trade, and but few continue active from the middle of July to the middle of September.

The above remarks indicate the principal causes that influence the duration of the lobster season on the coast of Maine, and account for its variability. In the coast review of this industry, the question is more fully discussed in connection with each district.

NEW HAMPSHIRE AND MASSACHUSETTS.—On the coast of New Hampshire, the season generally continues only about four months, or from April 1 to August 1, the best fishing being obtained in May. At Cape Ann, Mass., fishing begins in March or April, and lasts until about the 1st of November, but not much is done during the summer. The spring fishery is the best. In Massachusetts Bay, the deep-water fishery is kept up during most of the year, with a short intermission in the winter; the shallow-water fishery begins in March or April, and continues until near December. Lobsters are abundant in Boston Harbor from about the middle of April until December, and are fished for during most of that period. The lobster season about Cape Cod extends from April 1 to November 1, the fishery off Provincetown continuing from May to October, with best results in July and August. At Truro it continues from April to September, and at Chatham from June to November. On the southern coast of Massachusetts, including Vineyard Sound, Buzzard's Bay, and the region about Gay Head, the season also extends from April to November, May and June being regarded as the best months in some localities, and July and August in others.

RHODE ISLAND TO NEW JERSEY.—In Rhode Island the principal season is from May to October, but during the mild winters of 1879 and 1880 some fishing was also done. The best months are July and August. In Long Island Sound the fishery continues from March to December, with a small winter fishery at the eastern end. Most of the fishing is done between April and September or October. The season for New Jersey lasts about five months, or from May 1 to the last of September. A few traps are set both earlier in the spring and later in the fall.

BEST TIME OF DAY FOR FISHING.—It is the prevalent opinion among fishermen that lobsters take the bait more readily at night than during the day, and it is considered most profitable to keep the traps set over night. It is probable, however, that the tides influence them somewhat, especially in shallow water, by causing them to move back and forth over the grounds where the traps are set. The customary method of fishing, however, precludes observation in this direction. The traps are usually visited early in the morning, or as early as the tide serves; and after the lobsters have been removed they are rebaited, if necessary, and left for another twenty-four hours. Sometimes, however, in seasons of great plenty, the traps are hauled twice a day. A correspondent at North Haven, Me., writes that "when we bait our traps in the afternoon and allow them to remain over night, the catch is better than when we bait them in the morning and haul at night." Another informant states that the best time for catching lobsters is on the flood tide, whether it occurs at night or during the day.

3. APPARATUS AND METHODS OF THE FISHERY.

THE FISHING APPLIANCES.

THE LOBSTER TRAPS.—Only two or three different kinds of appliances for taking lobsters have ever come into extensive use in this country, and at the present time the fishermen of all the more important lobster districts have quite universally settled upon the funnel traps as being the most convenient and remunerative. The so-called hoop-pot was, we believe, the earliest contrivance for catching lobsters, and it is even now used to a slight extent on some parts of the coast; but with the majority of fishermen, especially where the influence of competition has been felt, it has long given way to a closed trap, which permits each fisherman to cover much more ground than formerly, with considerably less labor. In early times, when lobsters were of more frequent occurrence on the shore, especially on the Maine coast, some lobster fishing in a small way was carried on by means of dip-nets and gaffs.

HOOP POTS.—The hoop pot, which was formerly in common use in many places when lobsters were more abundant than at present, is very simple in its construction. As used at Provincetown, Mass., fifteen to twenty years ago and earlier, it consisted of a hoop or ring, of about one-half inch round iron, from 2½ to 3 or more feet in diameter. To this hoop was attached a shallow net bag as a bottom, while two wooden half hoops were bent above it, crossing at right angles in the center, about 12 to 15 inches above the plane of the hoop. The bait was suspended from the point of crossing of the two wooden hoops, and the line for raising and lowering the pot was attached at the same place. This style of trap required constant watching, and had to be hauled at frequent intervals. It could not be left for a long time, as in the case of the lath or closed pot, at least, not with profit to the owner, for the lobster, as soon as he had finished his repast, could retire at pleasure.

Capt. N. E. Atwood, of Provincetown, describes the method of using these pots as follows: "The fisherman would go out perhaps at midnight, anchor his boat near the shore on the edge of the fishing-grounds, and put over his pots, of which he would have about six. At short intervals he would haul them in and remove whatever lobsters they might contain. If lobsters were abundant he would be kept busy hauling his pots all the time. By the time he had run through his series of pots once and had pegged the claws of all the lobsters, he would have to begin over again, and thus the night would be spent and he would arrive home about 8 or 9 o'clock in the morning, with 100 or 200 lobsters, more or less. Of late years lobsters have not come here in sufficient abundance for this style of pot, and it has been abandoned."

At Truro, Cape Cod, where this same kind of pot was also formerly used, the wooden hoops for the attachment of the bait and rope were replaced by several short cords, fastened to the ring at regular intervals and brought together in the center above.

Prior to the introduction of the lath pot, hoop pots were extensively employed all along the coast. At that time the relative number of lobsters was much greater, and they entered the pots more freely. Many more were then taken to a pot per day than now, and a fisherman could afford to devote his time to constantly tending his pots while they were set. They were generally set during the night or early morning, as lobsters were supposed to feed more at that time than during the day, and they were hauled about every ten or fifteen minutes or half hour. Although the hoop pots have almost entirely gone out of use, we have heard of their being occasionally employed at different points along the New England coast. They are still used to a slight extent in the crab fishery of the Southern States.

CLOSED OR FUNNEL TRAPS.—These are made of several different shapes and materials, though alike in principle, and possess this great advantage over the hoop pots, that when the lobsters once enter them they can seldom escape. They do not require to be visited oftener than once a day, or at the pleasure of the fisherman, who can, therefore, handle a large number at a time. On the Maine coast as many as eighty to one hundred are sometimes set by a single fisherman, and few fishermen there consider their outfit complete with less than fifty or sixty. These traps are generally made with a flat bottom and semi-circular sides and top, one or both ends having a funnel-shaped entrance, but are occasionally rectangular. They are nearly always constructed of narrow strips of wood, with funnels of twine netting, but on some sections of the coast they are entirely covered with netting.

LATH POTS.—The term "lath pot" is almost universally employed to designate the common forms of closed lobster traps, whether semi-cylindrical or rectangular in shape, providing they are constructed of laths or of any narrow strips of wood. Other names by which they are known to the fishermen are "box-traps," "house-pots," "stick-pots," and "lath-coops."

The semi-cylindrical lath pots are generally constructed as follows: They range in length from 2½ to 4 feet, the latter length, which is the full size of the laths, being the commoner, and the shorter ones being seldom used on the coast of Maine. With the 4-foot pots the width is about 2 feet and the height 18 inches. Other proportions of width and height also occur. The framework of the bottom consists of three strips of wood, either spruce, hemlock, or pine (the first mentioned being the most durable), a little longer than the width of the pot, about 2¾ inches wide and 1 inch thick. In the ends of each of these strips a hole is bored to receive the ends of a small branch of pliable wood, which is bent into a regular semi-circular curve. These hoops are made of branches of spruce or hemlock, or of hard wood saplings, such as maple, birch, or ash, generally retaining the bark. Three of these similar frames, straight below and curved above, constitute the frame-work of each pot, one to stand at each end and one in the center. The narrow strips of wood, generally ordinary house laths of spruce or pine, which form the covering, are nailed lengthwise to them, with interspaces between about equal to the width of the laths. On the bottom the laths are sometimes nailed on the outside and sometimes on the inside of the cross-pieces. The door is formed by three or four of the laths running the entire length, either near the base on one side, or near the top. The door is hinged on by means of small leather strips, and is fastened by a single wooden button in the center, or by two buttons, one at each end. The openings into the pot, which in the case of those 4 feet long are two in number, one at each end, are generally knit of coarse twine and have a mesh between three-fourths of an inch and 1 inch square. They are funnel shaped, with one side shorter than the other, and at the larger end have the same diameter as the framework. The smaller and inner end measures about 6 inches in diameter, and is held open by means of a wire ring or wooden hoop. The funnels are fastened by the larger ends to the end frames of the pot, with the shorter side uppermost, so that when they are in place they lead obliquely upwards into the pot instead of horizontally. The inner ends are secured in position by means of one or two cords extending to the center frame. The funnels are about 11 or 12 inches deep, and therefore extend about half way to the center of the pot. They taper rapidly and form a strongly inclined plane, up which the lobsters must climb in their search for the bait. A two-strand tanned manila twine is most commonly employed for making the funnels. Cotton is also used, but is more expensive and less durable. The smaller pots have a funnel at one end only.

The bait holder is generally a sort of spearhead of wood or iron, with one large barb, and stands upright from the middle of the center frame; it is from 8 to 12 inches long. The pots are

weighted by means of stones or bricks lashed on the inside at the center or on both sides. Two bricks furnish the requisite weight for each pot.

These lobster pots are set both on single warps and in trawls of 8 or 10 to 30 or 40 pots. On rocky bottoms they are almost always used in the former way, and frequently also on smooth bottoms, especially where lobsters are somewhat scarce, for at every hauling they are shifted more or less from place to place. The distance apart at which the pots are set depends upon the character of the bottom and the abundance of lobsters. There is less uniformity in this respect when they are set singly than when arranged on trawls. By the latter method they are placed all the way from 10 to 50 fathoms apart and rarely nearer than 20 fathoms. The line by which they are lowered and hauled up, and which also serves as a buoy line, is fastened to one of the end frames of the bottom or sill, as it is called, at the intersection of the hoop. The buoy and trawl lines consist of six to nine thread manila cord, which may be purchased tarred or otherwise, the fishermen frequently preferring to prepare their own lines with coal tar.

The buoys generally consist of a tapering piece of cedar or spruce, wedge shaped or nearly spindle shaped, and measuring 18 inches, more or less, in length. They are occasionally painted in distinctive colors, in order that each fisherman may recognize his own, but are generally simply boiled in coal tar to prevent their becoming water logged. Another common style of buoy consists of a small keg surmounted by a flag, in order that it may be seen at a greater distance.

In the construction of the ordinary kind of pot, one bunch of laths will answer for about three pots. The cost of these pots on different parts of the coast varies from 75 cents to $1 each.

The rectangular lath pots differ from the semi-cylindrical simply in being square above instead of rounded, and they are generally of smaller size. They are not employed on the coast of Maine, but are used to some extent in Rhode Island and Connecticut.

At Rockport and elsewhere on the coast of Maine, the fishermen occasionally construct an enlarged form of the common round-top pot, with room for twice the quantity of lobsters. This style of pot, originated at Harpswell, Me., in 1879. A sample furnished the United States National Museum from Rockport differs from the common pot above described, in having a length of 7½ feet, five supporting frames at equal distances apart, instead of three, and two additional funnels, one funnel being attached to each of the frames excepting the center one, and all pointing inward. The lobsters must pass through two funnels before reaching the bait, and their chances of escape are thereby much lessened.

On some portions of the coast wooden funnels replace the net ones, though the latter are probably preferable. The wooden funnels are constructed of laths, converging inward from the rim of the pot to form a small squarish opening, about the size of that in the net funnels.

There is another style of pot, but rarely used, in which the essential feature is a trap-door on which the lobster must climb in order to reach the bait, and which suddenly gives way, precipitating him into a secure inclosure. We have not, however, been able to obtain details of its construction.

Complaints are occasionally made by the fishermen that, especially during certain seasons, their pots are badly eaten by "worms," either the ship-worm (*Teredo*) or one of the species of small boring crustaceans. A correspondent at Truro, Cape Cod, says they are subject to their attacks more particularly during September, when the pests are most destructive, often reducing the pots to mere fragments.

NET POTS.—The lath pot has been partly superseded on the New Jersey coast by another style of closed pot, introduced about 1872, by Mr. Charles Wooley, of Seabright, and called the net pot. The latter is constructed entirely of netting, supported upon three hoops as a frame-work.

It has a length of about 5 feet, and is about 2 feet across, that being the diameter of the hoops. The hoops are placed at equal distances apart, and facing one another in such a manner that one hoop supports each end, and the third hoop supports the middle of the pot. One end, constituting the entrance to the pot, is furnished with a funnel leading inward, as in the lath pot, and the second or central hoop also supports a funnel pointing in the same direction. The hinder end of the pot is covered with netting, having a central opening, which can be opened or completely closed by means of a puckering string. The bait is suspended from the central hoop at the mouth of the inner funnel. The lobster enticed into the pot by the bait generally finds its way into the last compartment, where escape is very difficult. It is then easily removed through the opening at the hinder end of the pot. These pots cost about $1.50 apiece.

THE ENGLISH POTS OR CREELS.—In Great Britain, according to Mr. Frank Buckland, "the fishery for crabs and lobsters is conducted in every part of the Kingdom in the same manner. Traps made of wicker-work, or of a wicker frame covered with netting, and usually known as 'pots' or 'creels,' are almost universally used. The pot is baited with some fish, fresh fish being preferred for crabs and stinking fish for lobsters, and sunk in from 3 fathom to 45 fathom water. The crabs or lobsters enter the pot in search of the food through a hole or pipe 4½ to 5 inches in diameter. * * * In some places as many as one hundred creels, in others as few as twenty, are carried by a single boat."

"Creels * * * have only recently been introduced into some places. The fishermen used to fish with a much more primitive and less efficacious engine. An iron ring had a small net attached to it in the shape of a purse. The net was baited and let down. The fishermen constantly examined the ring to see if there were any fish on it, and the pressure of the water upon the ring while it was being drawn up for examination prevented any lobsters or crabs which happened to have been attracted by the bait from escaping."

APPLIANCES USED IN NORWAY.—Prof. Axel Bœck gives the following account of the appliances used for catching lobsters on the coast of Norway:

"Formerly the lobster was caught on our sea-coasts exclusively with tongs. These tongs were made of wood, and had about the same shape as the common oyster-poles, being only somewhat longer, generally 2 fathoms. Such an implement was exhibited at the Bergen Exposition of 1865, and an illustration of it is given in the report. As these tongs were not very long, lobsters could not be caught at any great depth—only at a depth of little more than a fathom—and this sort of fishing was carried on during the early morning hours. But as lobsters taken with these tongs often got hurt, and died two or three days afterwards, because they cannot stand any pressure, this implement was not suited for those that were to be exported; and the Dutch, after the peace of Westphalia, when the lobster fisheries began to assume larger dimensions, endeavored to induce the fishermen to use other and better implements. Although baskets, through the influence of the Dutch, had thus become common in the neighborhood of Stavanger since 1717, tongs have been frequently used even in our century, and are perhaps in some places used to this day. Kryger, in his report on Ous, in the 'Budstikken' (a periodical) for 1820, mentions that lobsters were caught there with tongs for home consumption. Farther north tongs seem to have been the common implements for catching lobsters at a much later period; for, in the quinquennial report of the governor of the Romsdal district for 1840–'44, it is said that 'lobsters are taken with tongs, baskets not being thought to answer the purpose.' Lobsters were caught with tongs by small boys from ten to fourteen years of age, early in the morning, in calm weather, and, if successful, one night might yield an income of $2.25. Another very simple implement for catching lobsters is spoken of in the 'Budstikken' by Strøm, who says that lobsters are taken with a hook fastened

to a pole, which hook is inserted in the belly, the softest part of the lobster. With this instrument, it cannot be taken at any great depth, and only when the sea is calm so that the bottom can be seen. Lobsters caught in this manner cannot be exported, as they could not stand the journey. The implements which I am going to at once describe, and which have almost entirely supplanted the simpler ones, are used by enticing the lobster with bait into a trap, out of which it cannot escape. The simplest of these traps is seldom used with us, although, according to Oetker, it seems to be in common use near Heligoland. It consists of a very thick iron ring, to which a net is fastened, so as to form a deep bag below. The bait is placed at the bottom of the bag, and it is lowered and taken up by means of a long line, which, when the bag is at the bottom, reaches up to the surface. To this line a piece of wood is fastened, which floats on the water and shows the location of the trap. If this instrument has been lying at the bottom for half an hour in a place where lobsters are known to abound, a sudden jerk is given to the line, so as to cause the lobster to fall in the bag, and it is rapidly pulled up. (The most successful time of the day for catching lobsters is generally in the morning, and also between 11.30 a. m. and 3.30 p. m. With this instrument, which the English call 'plumpers,' and the Germans 'Fallenkörber,' lobsters are taken in deep places.) With us the commonest implements for catching lobsters are baskets ('*Tejner*'). It seems certain that the Dutch first introduced them for catching lobsters; but they may have been used long before that, *e. g.*, for eels, as the name is Scandinavian, and is derived from '*tiin*,' *i. e.*, the long and tough roots of the juniper tree. After 1713, a beginning was made in plaiting them of willow branches. Where these materials could not be readily obtained, they were, as Pontoppidan related in 1753, made of hoops, which were kept apart by pieces of wood. All round these nets are fastened, and at each end there is a long, narrow, trough-shaped entrance, out of which the lobster cannot escape. On the one side there is a trap-door, which can be closed with a peg, and to another pin sticking in the basket the bait is fastened, while under the basket there are large stones to make it sink rapidly. To one of the uppermost pieces of wood a pair of tongs is fastened, furnished at the end with a piece of wood to indicate the location of the basket. Such are still in common use all along our coast. Still earlier, in 1746, the famous naturalist, Carl Linné, described similar baskets, which he saw in use on the coast of Bohuslen, in his 'West-Göta Resa,' p. 191. These were 2 yards long, 1 yard broad, and 1 yard high, resembling a half cylinder, with entrances on both sides; such are still used and could be seen at the Bergen Exposition. At this same exposition a basket was exhibited, differing somewhat from these in its shape; it was plaited of branches, and was shaped like a hemisphere, with an entrance at the top."

THE FISHING BOATS AND SMACKS.

About the same class of boats is employed in the lobster as in the other fisheries on the corresponding portions of the coast; but the variety of boats used in the former fishery is, necessarily, not so great as in the latter. The lobster boats may be conveniently divided into two classes; first, the smaller boats, with or without sails, used by the fishermen in tending their pots, and, secondly, the smacks acting as carriers to the different markets. The term smack is generally limited to boats above 5 tons measurement, which, according to law, must register at the custom-house. They are built either with or without wells, the former being used to carry lobsters alive to more distant fresh markets, and the latter to near markets, such as the canneries on the coast of Maine. The larger of the fishing boats are also usually called dry smacks, having no wells, and likewise frequently carry to near markets. The well smacks run mainly between the lobster grounds and the large distributing centers, such as Portland, Boston, and New York. Many of them,

however, engage directly in the fishery, setting their own pots, transferring the lobsters when caught to their wells, and, as soon as a full cargo has been secured, proceeding to market.

The fishing boats are generally small sail-boats, of sloop or cat rig, but row-boats are very commonly used on the inshore grounds. The principal kinds of lobster fishing boats are as follows:

THE MUSCONGUS BAY LOBSTER BOATS.—These are small square-sterned sloops, open in the after part, but with a cuddy forward. They are all built with center boards, and some are lap-streak while others are "set work." Around the after part of the standing room a seat is arranged; the ballast is floored over, and two little bunks and a stove generally help to furnish the cuddy. The length of these boats varies from 16 to 26 feet, and their width from 6 to 9 feet. Some of the larger ones measure nearly or quite 5 tons. They are good sailers and well adapted to the purposes for which they are intended—the lobster and shore cod fisheries. When used for lobstering they are managed by a single man, but in the hook and line fishery the crew generally consists of two.

When engaged in the winter lobster fishery, which frequently takes them a long distance from home, it is often necessary to keep the lobsters from freezing by means of the small stove in the cuddy. Upon the return the lobsters are transferred to floating cars, where they await shipments.

One of these boats, measuring 18 feet long, costs $80 to build, and one of 25 feet in length, $200. They are constructed principally at Bristol, Bremen, and Friendship, Me., and are mostly sold to parties in the vicinity of those places, but a few have found their way as far west as Cape Ann and Cape Cod, Massachusetts.

THE MATINICUS BOAT, which is employed in the lobster as well as the cod, herring, and mackerel fisheries about Matinicus Island, Maine, resembles, in a general way, both the Reach boat and the Muscongus Bay boat. It is sharp forward, round bilged, square-sterned, lap-streak, with center-board, wash-boards, and generally two thwarts. The bowsprit and mast are adjustable; an average length is 22 feet; width amidships, 7 feet; width at the stern, 3½ feet. These boats are always provided with oars and thole-pins, and can thus be rowed as well as sailed, though the latter method is generally preferred with a fair wind. They are fast sailers and perfectly safe.

THE CONNECTICUT LOBSTER BOATS are center-board sloops, ranging in length from 20 to 25 feet over all, and in width of beam from 6 to 9 feet. They are shallow, with a flat bottom, sharp bow, and wide heart-shaped stern. The shape of the hull is similar to that of the ordinary center-board cat-boats of New England. In the middle of the boat there is an elliptical open space, called the cockpit, about 12 feet long by 7 feet wide, in the clear; outside of the cockpit, the boat is decked over, forming a cuddy forward for the accommodation of the crew and storage of supplies; around the after part of the pit a seat is arranged. The bottom of the cockpit is floored over about 1 foot above the keelson, and on either side of the center-board is built a small box-like well about 3½ feet long, 1½ feet high, and 1 foot or more in width, in which the lobsters are kept alive. The draught of these boats is about 2 to 4 feet. They are used in lobstering in Long Island Sound, more especially on the Connecticut shore, about Noank and New London.

THE MAINE REACH BOATS, which are extensively used in the coast fisheries of Maine, are also, to some extent, employed in lobstering. They range in length from 10 to 18 feet, but the most common length is about 14 feet. They are sharp at the bow, round bilged, keeled, clinker or lap-streak, and have a square, heart, or V-shaped stern, with two or three thwarts, according to their size; they are as a rule entirely open, fore and aft, rarely having any wash-boards. They

are well adapted both for rowing and sailing, and all but the smallest usually carry one or more sprit-sails.

THE MARTHA'S VINEYARD CAT-BOATS.—These boats, which are extensively employed in the lobster fisheries of southern New England, have a sharp bow, round, flat bottom, broad beam, and square heart-shaped stern, with center-board. They range in length from 15 to 30 feet, and carry, as a rule, one gaff and boom sail of very large size. The mast is placed nearly in the eyes of the boat.

Some of the boats are nearly decked over, leaving only a small open space or cockpit in the after part; others, however, are more open, with the cockpit occupying nearly the entire boat. The cuddy is, therefore, sometimes so small as to answer only for storage, and again it may be large enough to serve as sleeping quarters for the men. Boats of this model occasionally measure as much as 5 tons.

THE PROVIDENCE RIVER CAT-BOATS, employed in the lobster and hook and line fisheries of southern New England, are sharp-bowed, round-bilged, deep-keeled, lap-streak boats, with square heart-shaped stern, and measure from 14 to 20 feet in length. One of these boats, measuring 20 feet in length over all, has an extreme breadth of 7 feet 8 inches, and a width at stern of 5 feet; the draught of water is about 2 feet 9 inches aft. They are open above, though having washboards, and are provided with a small well amidships for keeping lobsters and fish alive, while at the sides of the well are small, dry compartments, with covers, for the storage of lobsters when necessary. They carry one mast with a single large sail.

THE "TWO-SAIL" LOBSTER BOATS OF MAINE AND MASSACHUSETTS resemble, in the shape and construction of the hull, the Providence River cat-boats, but differ from them mainly in the arrangement of their sails, which are two in number, a foresail and a mainsail. The latter is about two-thirds the size of the former, and is provided with a boom, while the former is a lug-sail, having no boom. This is a common style of lobster boat on the coasts of Maine and Massachusetts.

Another form of these boats, which is also extensively used, retains the same arrangement of sails, but differs in the construction of the hull, which is more shapely, and resembles in miniature the celebrated sharp fishing schooners employed in the off-shore fisheries. The forward and after parts of the boat are also decked over, and wide washboards run along the sides, so as to leave an oval-shaped open space in the center, which is divided into two compartments, the forward one for fish and ballast, the after one for the fishermen.

These boats are provided with the means of rowing in calm weather. They vary in length from 16 to 20 feet on top, and are employed in the shore as well as the lobster fisheries. When lobstering they are usually managed by one man, who generally removes the main mast and leaves only the foresail set while hauling his pots.

THE DOUBLE-ENDER OR PEAPOD.—This is a small canoe-shaped boat, generally arranged for rowing only, although occasionally furnished with a sprit-sail and center-board. It has been introduced only recently into the region where it is used, and is said to have originated at North Haven, Me., about 1870. It is now very extensively employed in the lobster fishery of the coast of Maine, especially by the fishermen of the islands in Penobscot Bay. These boats are mainly built lap-streak, but a few are "set work." Both ends are exactly alike; the sides are rounded and the bottom is flat, being, however, only 4 or 5 inches wide in the center, and tapering toward each end, at the same time bending slightly upwards, so as to make the boat shallower at the ends than in the middle. This kind of bottom is called a "rocker bottom," and this style of boat rows easily in either direction, is safe, and can be quickly turned over; it is also capable of carrying quite a load. An average boat of this pattern measures about 15½ feet long, 4½ feet broad, and 1½ feet deep.

THE CAPE ROSEWAY WHERRY employed in the lobster and inshore fisheries of Penobscot Bay, Maine, especially in the vicinity of Castine, is a lap-streak boat with sharp bow, round bilge, narrow, flat bottom, and very narrow heart-shaped stern. It ranges in length from 12 to 18 feet, is entirely open, and seldom provided with sails.

THE DORY.—This well known style of small boat, in such common use among the fishermen of New England, is much used in the lobster fisheries, either as a tender to the smacks or alone, by fishermen who set their traps close inshore.

THE FISHING SMACKS.—The carrying smacks are described further on in connection with the account of the lobster markets. In 1880 forty-five registered smacks (between 5 and 20 tons measurement), of the class called dry smacks, were engaged both in fishing and in carrying to neighboring ports. These are additional to the fishing boats above described, and are apportioned to the several States as follows: Maine 8, Massachusetts 9, Rhode Island 5, Connecticut 22, New York 1.

THE LOBSTER CARS, AND METHODS OF HANDLING LIVE LOBSTERS.

CONSTRUCTION OF THE CARS.—The live cars used for the temporary storage of lobsters are plain wooden boxes, with open seams or numerous small holes, to permit of the free circulation of water. The buoyancy of the wood of which they are constructed keeps them at the surface of the water, though with little more than the upper side exposed, and with large cars it is sometimes necessary to attach a few empty casks to give them greater buoyancy. They are moored to wharves or stakes, or anchored in shallow water near shore.

The usual form of live car, such as is commonly employed by the fresh lobster dealers in most sea-port towns, is an oblong, rectangular box, the size and capacity varying according to the requirements of the trade. In New York these cars average 12 feet in length, 8 feet in breadth, and about 3 feet in depth. The frame-work consists of five rectangular frames, set upright and at regular distances apart. To these are nailed the boards forming the top, bottom, sides, and ends, and which are about 1 inch thick and generally not more than 6 inches wide. Interspaces of 1½ to 2 inches are left between the boards, excepting on the top, where the boards are placed closer together. There are no interior partitions. The opening into the car is on the upper side, and is made very large, extending from one end to the other, so as to occupy the center half of the top. It is covered with four doors, arranged in pairs, each pair extending from the end to the center frame. These doors are hinged, or held in place by means of a cleat and staple only. At Fulton market, New York City, about forty-eight such cars, with an average capacity of 600 lobsters each, are in use.

Many of the cars used by the Boston dealers are much larger than the above. In connection with the Boston lobster markets, about fifteen cars are employed, with capacities ranging from 5,000 to 10,000 lobsters each. A car suitable for holding 10,000 lobsters measures 40 feet long, 12 feet wide, and 5 feet deep.

LOBSTER CARS AT EASTPORT.—At Eastport, Me., and elsewhere along the Maine coast, the dealers' cars are generally of large size and divided into compartments, to accommodate the large or market lobsters and the small or canning lobsters separately. One of the cars which we have examined at Eastport is about 25 feet long, 16 feet wide, and 5 feet deep inside, and has a capacity of 20 tons of lobsters. It is divided into six equal compartments, three lengthwise and two crosswise. The compartments opposite one another are connected by openings large enough for the lobsters to crawl through, and the car might therefore be said to contain only three double compartments. A large door opens into each. This car was moored alongside of a wharf, a long

spar lashed lengthwise to the car serving as a fender between them. The car was also given greater buoyancy by having three empty casks lashed to each end. Another style of dealers' car at Eastport measures about 20 feet long, 14 feet wide, and 4 feet deep, and is divided into three simple compartments, with a door to each.

METHOD OF HANDLING LIVE LOBSTERS AT EASTPORT.—When a smack arrives with lobsters, it runs up to the outer side of the car and ties to it. The doors on the outer line of compartments are then opened, and the men standing in the smack (which is always in that vicinity a dry smack), pick up the lobsters in their hands, measure them at a glance, and throw the larger ones, those measuring above 10½ inches, into the end compartments, and those under that size into the center compartment. The principal lobster trade of Eastport consists at present in the shipping of live lobsters in barrels to Boston. On each shipping day the lobsters are hoisted upon the wharf by means of a basket and tackle, and transferred to the barrels. The small lobsters are allowed to accumulate in the center compartment until a sufficient quantity has been obtained to warrant boiling and canning them. One of the objects in having an inner series of compartments is said to be that the more active lobsters generally crawl through from the outer compartments, leaving the less hardy ones behind; the latter can then be used first for shipment, and the others retained for a longer time, if need be.

LOBSTER CARS ELSEWHERE.—At Wood's Holl, Mass., the dealers' cars measure about 15 feet long by 6 feet wide. At South Harpswell, Me., they measure 10 feet long by 7 feet wide and 2½ feet deep.

THE FISHERMEN'S CARS.—The fishermen's cars generally resemble those of the dealers, in construction, but are made of smaller size. Old leaky boats, especially dories, furnished with a cover, are also frequently employed on many parts of the coast. If the open seams do not afford a sufficient circulation of water, numerous holes are bored through the bottom and sides. At Eastport, Me., the fishermen's cars have a capacity of 2 or 3 tons each; at Wood's Holl, Mass., they are about 6 feet long by 4 feet wide or slightly larger. At No Man's Land, Massachusetts, the cars are made of three shapes, and are moored to stakes, just off the beach, in front of the town, on the northern side of the island; they swing with the tide. As this area is much exposed to heavy seas during some months, the majority of the cars are constructed with special reference to breaking the force of the waves that may beat upon them. For this purpose, the top and bottom are made to converge towards one or both ends, which latter are, therefore, narrow and elongate. The body of the car is, however, rectangular, with the door on top, and is constructed like the ordinary pattern, which is also employed to some extent at this place, but is usually made of smaller size than the others. About thirty cars, being an average of about two cars to a man, are in use at No Man's Land. They average in size about 10 feet by 5 feet by 2½ feet deep, and have a capacity of 1,000 lobsters each. In the summer, however, it is not considered safe to put more than 500 or 600 lobsters into each at a time. They are emptied once or twice a week into well smacks running to New York. Outside of the lobster season they are hauled upon the beach.

REASON FOR USING LOBSTER CARS.—The process of freezing now so commonly resorted to for the preservation of fresh fish cannot be applied in the case of lobsters, and they must be kept in stock and shipped either alive or boiled. The use of ice in shipping live lobsters in barrels in the summer is not to freeze them, but to reduce their temperature presumably to nearly that of the water from which they have been taken, and great care must exercised in the packing to prevent the water from the melting ice coming in contact with the gills.

Lobsters generally ship best alive, and are almost always transported in that condition. The use of live cars by both the fishermen and dealers is therefore a necessity, resulting from the many

delays incident to making sales and shipments, and as long as the temperature and purity of the water remain favorable, lobsters may be kept alive in the cars for an indefinite length of time, providing they are not too much crowded. Fishermen who have to depend upon the smacks for disposing of their catch are seldom visited by them more than once or twice a week, and where they carry their own catch to market they can seldom afford to do so until a full load has accumulated. The wholesale dealers must also keep a surplus on hand to meet unexpected sales, and delays in receiving supplies.

Some of the fishermen and dealers also claim that they always retain the lobsters in the cars for at least two or three days after they are caught, in order that they may have time to rid themselves of the stale bait which would otherwise impart an unpleasant flavor to the flesh.

Entirely submerged lobster-cars are used in Norway, and in these the lobsters are said to have greater tenacity of life, but the objections raised against them by the fishermen in this country are, the extra labor required to lift the cars to the surface every time that lobsters are added and removed; and the voracity of the eels which readily attack and destroy great quantities of lobsters when they are confined upon the bottom.

While lobsters will often attack one another with their claws when piled in the dry smacks, unless their claws are so pegged as to hold them closed, they seldom do so in the cars, and the practice of pegging the claws, once in vogue among the fishermen, has been almost entirely abandoned.

THE BAIT USED IN THE LOBSTER FISHERY.

CHARACTER AND KINDS OF BAIT.—For baiting the lobster traps it is customary to make use of the commoner species of fish, which can be easily and cheaply obtained and are of little or no commercial value. Meat is, however, occasionally employed.

The opinion is prevalent among fishermen that lobsters are best attracted by fresh bait, and that old or stale bait, or such as has remained in the traps a considerable length of time, is less apt to tempt them. On the other hand, a few old lobstermen affirm that they use whatever fish happen to be at hand, whether fresh or old, and that they have never noticed any difference in the amount of their catch, which could be attributed to this cause. A very reliable informant at Provincetown, Mass., states that "old stale bait, having a strong smell, forms decidedly the best bait for lobsters." This man had followed the lobster fishery for many years, and had been one of the most successful of his time. Other fishermen expressed the same opinion. Along with fresh bait we must also class salted bait, which in some regions is very successfully used, at least during certain seasons.

With reference to the English species, Mr. Frank Buckland states that "neither crabs nor lobsters will go into the pots unless there is some scent in the fish bait. The crabs are very particular as to diet; they will not eat stale fish. Lobsters will eat any kind of bait, even dried fish or stock fish; they will even take a stinking bait."

The chief essential of a good bait is said to be a bright or attractive color, white being preferable, combined, if possible, with a strong odor. Oily fish like the menhaden possess this last qualification in a high degree, and the menhaden, where it can be obtained, is very favorably regarded. Cod heads, stripped of their skin, are sometimes employed successfully, as from their white color they appear to attract the lobsters, although retaining little or no edible portions. In attaching the bait in the traps, it is customary to arrange it with the bright side facing outwards, in order that it may be seen at a greater distance.

Lobsters appear to take the bait more readily at some seasons than at others. A correspond-

ent at North Haven, Me., writes that in the winter and early spring, when the water is cold, they eat but little, and must, therefore, be fished for with the best of bait, while in the late summer and fall they will take most anything placed in the traps. Salt herring is consequently much used in that section in the fall, but in the spring it is considered very poor bait. This opinion does not hold good for other districts even close at hand, for at Isle au Haut large quantities of herring are kept salted in barrels over winter for use in the spring lobster fishery.

MANNER OF CATCHING BAIT.—As above stated, the bait generally used consists of the more common and less esteemed fish of the region in which the traps are set. On the coast of Maine flounders, sculpins, herring, and fish heads are almost universally employed. Flounders and sculpins are abundant almost everywhere, in shallow water, and enter the inlets and coves in summer. Having no commercial value they serve well for this pupose. They are ordinarily taken by the lobstermen themselves, but herring are obtained from the weirs and are used both fresh and salted, though generally in the latter state. They are often brought from a distance. Fish heads of several species (cod, haddock, &c.) are commonly employed in regions where boat fishing is carried on during the lobster season. At Small Point, near Bath, Me., fish heads are used altogether. Some of the lobstermen, who are also boat fishermen, save the heads of the fish in cleaning their catch to use as bait. In some localities, as in the neighborhood of Mount Desert, Me., the lobstermen frequently assist the boat fishermen to dress their fish, taking the heads in payment.

Flounders and sculpins are caught by means of spears, seines, fyke-nets, and hooks and lines. In spearing it is essential that the water should be smooth, in order that the fish may be seen upon the bottom.

When the surface is roughened by a breeze, as often happens, the fishermen are obliged to resort to artificial means to overcome this difficulty, and in many places when in search of bait, each one carries along with him in his boat a bottle of fish oil, with a swab made by tying a rag to the end of a stick. Upon reaching the bait grounds he dips the swab into the bottle, and drawing it out, scatters the oil over the water, producing a "slick," which enables him to see the bottom as readily as though the water were calm. This simple device often permits him to obtain bait, when he could not secure it otherwise.

At Isle au Haut, Maine, when oil is used to render the surface smooth, it is not only thrown with a swab, but having provided himself with a bucket partly filled with blubber, the fisherman lands on a weather shore just as the tide begins to flow, and spreads the blubber very thinly on the rockweed for a considerable distance along the shore, and from low-water mark to some distance above it. It follows that when the tide flows, the slick made by the particles of oil in the blubber is driven from the shore by the wind, and the fisherman has smooth water continuously, enabling him to fish over a large area without stopping to throw oil. This is a decided improvement on the method first described, but is not always practicable, owing to the state of the wind. In some places, as at Bristol, Me., a "dark-water spear," as it is called, is occasionally used in the late winter and early spring (February and March) for taking flounders. It consists of a wooden head 14 to 24 inches long, attached crosswise to the end of a pole, 16 to 20 feet in length. The head or cross-piece is set along the outer side with a row of barbed spear points, about 6 inches long and 2 inches apart. At low water the fisherman goes out in his boat with one of these spears to some muddy place where the depths are slight and where flounders are supposed to occur, and by thrusting the spear down here and there into the muddy bottom, he is quite certain to obtain a supply.

At Bremen and Friendship, Me., many flounders are caught in fyke-nets, set in the coves

into which the flounders swim at high water. At low water the nets are left dry and the fishermen go out and secure their catch.

At Isle au Haut the nets used to catch flounders and sculpins measure 20 to 30 fathoms in length, 2½ fathoms deep, and have a 4-inch mesh. They are set mostly on the edge of the bar, where the water is about 3 or 4 feet deep, at low tide, and are generally set across the tide, in the following manner: Two stakes are driven into the flats at distances apart corresponding with the length of the net, and guy-lines, 10 to 15 fathoms long, are fastened to their tops by one end, the other end being attached to the extremities of the net, which are on the deep-water side of the stakes. The net is held on the outer side by lines fastened to killicks. This arrangement allows the top of the net to rise and fall with the tide, the lower part, being heavily weighted, always keeping on the bottom. The lower margin of the net being quite stationary, it follows that when the ebb tide sweeps across it, it forms a bight or curve, causing a large part of the net to lie spread out on the bottom; when the fish begin to move off from the bar on the ebb tide, they meet with this obstruction, and such as are not meshed settle down upon that portion of the net which lies upon the bottom; when the fishermen haul the net, at low tide, they pick up the bottom as well as the top, and by careful manipulation gather all the fish into one place, in a sort of bag, resembling a purse-seine. The net with its load is hauled into the boat, and the former is then disengaged. This method of fishing has recently come into practice, and not quite one-fourth of the fishermen have yet obtained the nets.

Flounders and sculpins are not as abundant now as formerly in many places, although there does not appear to be any immediate danger of the supply becoming exhausted. The use of fish heads in large quantities during the fishing season somewhat relieves the drain upon this important source of bait.

About some of the islands off Bristol, Me., where flounders are scarce, but where cunners abound, the latter species takes the place of the former as lobster bait. For securing the cunners a box-shaped lath pot, about 2 feet high, 18 inches square, and open above, is used. It is ballasted, baited with herring or some other kind of fish, and lowered to the bottom. It is usually hauled every five minutes, and by drawing it up quickly the cunners which have been attracted into it by the sight of the bait are prevented from escaping. By this method of fishing sufficient material for the baiting of the traps is obtained in a comparatively short time.

In addition to the above-mentioned species, many other kinds of fish are occasionally used for bait, when they can be easily obtained. A correspondent at North Haven writes that the heads and livers of sheep are also sometimes put to the same use.

QUANTITY OF BAIT USED IN MAINE.—The quantity of bait consumed in the lobster fishery is very great. At Bristol, Me., each lobsterman setting sixty pots uses about half a barrel of bait every time he hauls his pots, which, in fair weather, is once a day. In the neighborhood of George's Island, Maine, half a barrel of bait, on an average, is used for every fifty traps, baiting every other day, when the weather is favorable and the traps hauled daily. At Jonesport, Me., the average amount of bait used by each boat or set of traps during the season is estimated as follows: Herring, 17 barrels; sculpins, 10 barrels; flounders, 7 barrels; total, 34 barrels.

The total amount of flounders, sculpins, and herring used for lobster bait on the Maine coast in 1880 far exceeded 30,000 barrels, of which about 10,000 barrels were of flounders, 16,000 of sculpins, and 4,000 of herring. No estimate has been made as to the quantity of other fish and fish heads used for the same purpose. Herring are employed more commonly along the eastern part of Maine than along the western part. At Jonesport, 12,000 barrels of herring were consumed in 1879, and about 10,000 barrels of flounders and sculpins.

KINDS OF BAIT USED, NEW HAMPSHIRE TO NEW YORK.—On the New Hampshire coast many kinds of fish, including flounders and cod, are employed as lobster bait. The variety of fish used for the same purpose on the coast of Massachusetts is equally great, the fishermen taking those kinds which are supposed to answer best, and which at the same time are most easily and cheaply obtained. About Cape Ann flounders and sculpins are commonly employed in the summer, and cod heads and halibut heads in the spring. Fish heads are also much used about Cape Cod. In Vineyard Sound and Buzzard's Bay menhaden are considered to make the best bait, but in the same region flounders, dogfish, and other species are also employed. Throughout Long Island Sound menhaden are most commonly used as bait, but in the absence of menhaden the fishermen resort to other forms having little or no commercial value, such as flounders, skates, dogfish, &c.

THE METHODS OF FISHING.

MANNER OF SETTING AND HAULING THE TRAPS.—The boats used by the lobster fishermen are, as described elsewhere, of different sizes and of several different rigs, some having sails and others not. The pots are set both singly and in trawls. Originally they were always set in the former way, which is the simpler, but as the fishermen came to use a greater number of pots, they found it more convenient to arrange them on lines, which could be hauled continuously from one end to the other. The setting of the pots trawl-fashion, therefore, enables each fisherman to handle a considerably larger gang with less trouble and in much shorter time. The character of the bottom greatly influences the method of handling the pots, as does also the abundance of lobsters. It is difficult to use the pots in trawls on rocky bottoms as the lines are liable to be cut on the rocks, and the pots themselves become caught. As a rule, therefore, the pots are set on single warps on rough bottoms. On smooth bottoms they can always be handled more conveniently and rapidly attached in trawls, and in regions of this character this is the customary method of setting them. Where lobsters are not very abundant, however, the fishermen regard it as more advantageous to change the location of the pots a little every time they are hauled, and to do this they must be set singly. The drift of the boat by the tide, while each pot is being hauled up, baited and lowered, is considered to alter the ground sufficiently for this purpose. In hauling a trawl of pots some of the pots always remain on the bottom, acting like an anchor to retain the boat in about the same position.

The operation of hauling the pots set singly from a sail-boat is thus described by a correspondent at Bristol, Me.:

"As the fishermen have their pots set on single warps, unlike the fishermen to the westward of here, they keep their boats under sail while hauling. The pots are set in rows. In winter the inner pots will be somewhere near some of the outer islands or ledges, the line of pots extending off shore. The boats are sloop-rigged, and when the inner end of the row of buoys is reached, the fisherman hauls down his jib, eases off the main sheet, and shooting up alongside of the buoy, catches hold of it with a gaff and hauls the pot, while the boat lies to, drifting slowly to leeward. After the pot is thrown over again, he rights the helm, the boat easily fills away under her mainsail, and he goes to the next buoy and so on to the end. When the weather is very cold the lobsters are put in the cuddy to prevent their freezing until the boat arrives home."

Another correspondent, at Vinal Haven, Me., states that "both trawl and single buoy lines are used in that vicinity, the latter method generally having the preference, as the pots may thereby be scattered more where the lobsters are scarce, and the fishermen claim that by shifting them a little every time they are hauled, they fish better. As a rule, the pots are hauled in a row-boat, the cases of hauling with sail-boats being rare. A peculiar style of row-boat, called a 'pea-pod' or 'double-ender,' is used quite extensively in this fishery hereabouts."

The manner of setting and hauling the lobster pots in the vicinity of Bath, Me., is described as follows:

"At first the pots were set on single warps or buoy lines, but now the style of setting them trawl-fashion is almost universal. This method was introduced about 1865. It enables one man to handle a large gang of pots, and his boat is prevented from drifting much by the pots which remain upon the bottom. The old fashioned way of setting them on single lines required two men in the boat, one to hold the boat with the oars, the other to haul the pots and remove the lobsters; when one pot was emptied and thrown overboard, they pulled for the next, and so on. At present the fisherman rows out, takes hold of his buoy at the end of the trawl, and continues to haul without intermission until he finishes the job. In winter, however, two men go in each boat. The windy weather and the distances they go from the shore in winter often gives them hard pulls, and even when under sail in fresh squally weather it needs two men to handle the boat. For these reasons, two men are required, more as a matter of safety than from the difficulty of the work, for as soon as the good weather begins in the spring those that continue to fish go singly."

NUMBER OF TRAPS USED.—The number of pots used by each fisherman, or by each boat, sometimes including two fishermen, varies greatly on different parts of the coast, ranging all the way from ten to one hundred, and in some places as many as one hundred and twenty-five are said to be handled by a single person. There seems to be no rule regulating this matter, but the average is greater on the coast of Maine than elsewhere. The fishermen claim that they are obliged to set a greater number now than formerly in order to obtain the same catch. Many of the fishermen keep a surplus on hand, in order to replace those damaged or lost during storms. In the coast review of the lobster fishery, the average number of pots used on each section of the coast is indicated.

TIME OF VISITING THE TRAPS.—The traps are generally hauled once a day, beginning early in the morning or about sunrise. In some places during seasons of great plenty, they are visited twice each day, early in the morning and again towards evening. A Gloucester correspondent states that it is customary in that vicinity to visit the pots in the morning during the winter and spring, and in the morning and evening during the summer. It sometimes happens on exposed sections of a coast that stormy weather interferes with the hauling of the pots for several days at a time, and they can be visited only during pleasant weather.

All fishermen do not hold to the custom of visiting their pots at a certain hour in the morning, but haul them at any time during the day when it is most convenient or when the weather is most favorable. In strong tidal regions the state of the tide has frequently to be considered, and the pots can often be visited only at or about slack water, low tide being preferred.

The hauling of the pots consumes but a small portion of the day, and the remainder is spent in procuring bait and making repairs, or in other occupations.

OTHER METHODS OF CAPTURING LOBSTERS.—Lobsters are frequently caught in seines which are being hauled for fish, but we have never heard of seines being employed exclusively for lobsters on any part of our coast. Another kind of net which answers for catching lobsters upon smooth bottoms in shallow water is the beam-trawl, an appliance used by the Fish Commission in its sea-coast explorations. Having a wide scope and quickly entrapping whatever animals lie in its course, it frequently brings up from rich lobster bottoms such catches as would gladden the heart of any lobster fisherman. Fishing for lobsters with nets of this character would, however, probably never be permitted upon our coast, where the much more humble lobster pot has already proved so destructive in many localities.

4. THE FISHERMEN.

NUMBER OF FISHERMEN.—In the Coast Review the number of lobster fishermen is given for each district of the coast. Following is the summation by States: Maine, 1,843; New Hampshire, 44; Massachusetts, 595; Rhode Island, 129; Connecticut, 148; New York, 32; New Jersey, 28; total, 2,819.

OCCUPATIONS OF THE FISHERMEN.—As the lobster fishery is seldom carried on for more than a few months of the year, most lobster fishermen have other occupations in which they engage outside of the lobster season. In fact, for a large number of these men, lobstering is not the chief pursuit, and it is not unusual for this fishery to be carried on conjointly with some other. The resources of the region in which he lives greatly influence the lobsterman in his choice of occupation, as must also his natural tastes and early training. Very many of the lobstermen of the coast of Maine belong to the class of so-called "boat-fishermen," who engage chiefly in hand-line fishing for cod and haddock, and set lobster pots during a longer or shorter period, dependent upon the abundance of lobsters. By some, a portion of the day is occupied in hauling the pots and procuring bait, and the remainder in hand-line fishing or in tending the herring weirs or nets. At the close of the lobster season not a few join the Banks fishermen, the menhaden steamers or coasting vessels, while many remain on shore, turning their attention to farming or working in the quarries or mines, if such exist near at hand. The making and repairing of gear consumes much time just before the opening of the lobster season, and this work is generally done by the lobstermen themselves, often assisted by their families, the women frequently attaining great proficiency in knitting the twine funnels. If occupied in fishing during the entire year, work upon the lobster gear must be confined to stormy weather.

The following extracts from correspondence respecting the Maine lobster fishery will serve to illustrate the diverse occupations of the lobster fishermen:

At Cutler, in the Machias district, there are several men engaged in lobstering, who like the average lobster fishermen of that part of the coast, farm and fish for lobsters at the same time, selling their catch to smacks. Two-thirds of the lobstermen of Gouldsborough follow boat fishing after July, and the other one-third engage in various pursuits, such as farming, coasting, mining, &c. Seven-eighths of the lobstermen of Jonesport farm a little for their own use. After the lobster season a majority do a small amount of boat fishing; some ship on coasters during the winter, and many dig clams.

At North Haven, when herring are abundant, many of the men keep several herring nets set while lobstering, and take the fish from the nets before hauling the pots. During the fall mackerel season, it is customary to fish for mackerel in the latter part of the day, after hauling the pots and procuring bait.

At Vinal Haven most of the regular lobster fishermen do little else out of the lobster season than prepare their gear and boats for the spring fishery. Some cultivate small gardens and raise some stock; others engage in other kinds of fishing to a slight extent or work in the quarries. A large percentage of the professional boat fishermen engage exclusively in lobstering for several months of the year.

The boat fishermen of Bristol constitute the larger part of those engaged in the lobster fishery, but there are a number of men who own lobster boats and pots, and who ship in the shore and Bank fishing vessels or in the menhaden steamers, beginning to fish for lobsters in the fall, about October. A few follow this occupation all winter, but the majority omit from December to February or March.

Some of the lobster fishermen of Small Point raise a little produce; in the winter they engage in cutting and storing ice, and during the fishing season they leave off lobstering for days, and even weeks at a time, to catch mackerel when the latter are abundant near shore. At such times the pots are left down and hauled whenever an opportunity offers.

But few men engage in lobstering at Little Deer Island, and these handle only a small number of pots each. They spend about half of their time in tending the pots and the remainder mostly in digging clams.

The boat fishermen of the vicinity of Isle au Haut make a specialty almost of fishing for lobsters during a longer or shorter season. When mackerel are plentiful they fish for them quite generally, and the same is true with respect to cod and hake, the fishermen engaging for the time being in whatever fishery pays them best. No fishing is done in the winter, but that season is devoted to fixing the gear or spent in idleness, no other occupations being offered by these islands.

MANNER OF TENDING THE TRAPS.—The greater part of the lobstermen own their gear and fish singly. Frequently, however, they go in pairs, one to manage the boat while the other hauls the pots. The pots are more easily handled by a single person when set in trawls than when set on single warps. When working in pairs they may own the gear in common, or it may belong to one, who employs the other either at stated wages or on shares. In some cases the pots are tended entirely by hired help.

MANNER OF DISPOSING OF THE CATCH.—The manner in which the fishermen dispose of their catch varies greatly on different parts of the coast, depending upon their distance from the markets and their facilities for reaching them. On the coast of Maine large numbers of the lobstermen are located near the canneries to which the small lobsters are directly carried. Those suitable for the fresh markets are retained for the market smacks, which make regular trips along the coast, or are disposed of to dealers in the neighboring towns who ship, by smacks and steamers or railroad, such as are not needed to supply the local demands. Dry smacks visit the fishermen who are located too far from the canneries to reach them in their own boats. These remarks, excepting such as refer to the cannery supplies, apply to the entire coast.

EARNINGS OF THE FISHERMEN.—The earnings of the lobster fishermen upon our coast afford, at the most, but a meager living, and, according to all accounts, they have been gradually falling off during the past fifteen to twenty years. At Provincetown, Mass., we find a striking, though extreme, illustration of the decline in the profits of lobster fishing, consonant with the decrease in the abundance of lobsters, which has forced all the able-bodied men of that locality into other branches of fishery or other occupations. Elsewhere the decrease has generally been less marked, though none the less apparent. In this industry as in all others, the more energetic men using the best appliances are, as a rule, the most successful, while the older and less active ones make but small profits. Below we give a summation of the gross earnings of lobstermen for many portions of the coast, based upon the fishery census returns of 1880. In this connection it should be remembered that the lobster season continues actively for only about three or four months of the year in the principal districts, and the earnings stated are for lobster fishing only. To ascertain the actual profits in this one line, allowance must, however, be made for the cost and repair of traps, boats, and other appliances.

At Eastport, Me., the average earnings per man were from $25 to $30 a month; at Jonesport, about $150 for the canning season of four months, or from April to August; Gouldsborough, $30 a month; Rockport, $40 a month by the best fishermen; North Haven, $20 to $25 a month; Portland, $1.50 a day. According to Mr. R. E. Earll, who carefully studied the subject, the average daily stock or earnings per man in the different lobster districts of the coast of Maine in 1880

ranged from 75 cents to $1.25 for the spring and summer season of four months, April 1 to August 1, but in some instances it was as low as 60 cents and occasionally as high as $2. The lobstermen of Isle au Haut, who fish during nine months, or from March to December, stocked on an average about $300 for the entire period; those who continue for five months, March to August, stocked about $200; and those, finally, who fish from the middle of September to December 1, a period of two and one-half months, stocked about $75. At Vinal Haven the earnings for the full season of two and one-half months was about $85, and at Deer Isle for the same season about $150.

On the coast of New Hampshire the earnings ranged from $25 to $50 a month; and on the coast of Massachusetts they were estimated as follows: Gloucester, $50 to $75 a month, or about $200 for the season, some of the men hiring out at the rate of $35 to $40 a month; Provincetown, about $75 for the season of three months; Truro, $50 for the same season, and between Hyannis and New Bedford, $100 to $300 for the same season, in good years. In Rhode Island the earnings were about $400 for a season of five or six months; at Stonington, Conn., about $1.50 a day; New London, $25 to $30 a month; South Norwalk, $2 to $5 a day; New Haven, $8 to $14 a week.

5. THE FRESH LOBSTER MARKETS.

GENERAL REVIEW.—The demand for lobsters generally exceeds the supply, and the fishermen seldom have difficulty in disposing of their catch. For convenience, the lobster markets may be divided into three classes, the canneries, the towns and smaller cities located along the coast in the lobster region, and the large distributing centers for supplying the inland trade. The canneries are entirely confined to the coast of Maine and are fully described elsewhere. They generally receive only the smaller sizes of lobsters, such as are below the limit of 10 or 10½ inches in length, and which may be purchased at considerably reduced prices. The local demand takes whatever is brought in by the fishermen, in some places small lobsters, in others large ones being preferred. Custom, however, prescribes for the principal markets or distributing centers lobsters above a length of 10 or 10½ inches, which, from the fact that these are the only ones bought by the well smacks, have earned for them among fishermen the name of "smack lobsters." On the coast of Maine, as a rule, the smaller lobsters are sold to the canneries and the larger ones to the smacks, while either size indifferently is disposed of to the local trade. In other States, where the law prescribes the minimum size of lobsters that can be marketed, small lobsters are supposed to be thrown back into the water and only the larger ones sold.

Lobsters are carried to market in fishing boats and smacks, and by steamers and railroads. Wherever markets, whether large or small, are located very near the fishing grounds the fishermen of the vicinity generally bring in their catch in their own boats. Two of the largest distributing centers, Portland and Boston, are closely surrounded by rich lobster grounds, and both receive many supplies brought in from the neighboring traps in fishing boats. A limited trade of the same character once existed at New York, when the bay of New York furnished a small fishery, but that has long since ceased. Fishing boats and dry smacks supply the canneries of the coast of Maine and the small distributing centers scattered along the entire New England coast. From the latter and from the fishermen themselves, the larger part of the market supplies intended for the western trade is carried by well smacks to Portland, Boston, and New York. Steamers and railroads now transport to the same markets from many stations favorably located a large amount of fresh lobsters packed in barrels. The inland distribution of lobsters is made mostly by railroad.

THE PRINCIPAL MARKETS.—There are three principal markets or distributing centers for

fresh lobsters in this country, viz., Portland, Boston, and New York, in which are handled nearly four-fifths of all the fresh lobsters sold, and about two-fifths of all the lobsters taken and disposed of by the fishermen for all purposes. Portland derives its supplies entirely from the coast of Maine, and principally from between Portland and Mount Desert. In 1880, sixteen well smacks were engaged in carrying to this place, in addition to the fishing boats of the vicinity, and some lobsters were also received in barrels. Trade is most active between March and the middle of July. About 1,900,000 pounds of lobsters, valued at $70,000 fishermen's prices, and at $90,000 market prices, were received in 1880. Besides supplying many inland towns throughout the neighboring States and Canada, Portland made very large shipments to Boston and New York.

Boston receives lobsters from the entire coast to the eastward, including Nova Scotia, and from the coast of Massachusetts as far south as Chatham, Cape Cod. Most of the supplies come in well smacks, but thousands of barrels are received every year by railroad and steamer, and very many are brought in by the fishermen of the vicinity. The greatest number is received in April and May, and the smallest number about February. Very large quantities are received from Portland by railroad, where they are transferred from the well smacks, without passing through the Portland markets. The quantity of lobsters handled in the Boston market in 1880 was over 2,400,000 by count, or over 3,600,000 pounds, valued at $133,000 fishermen's prices, and $169,000 market prices. Lobsters are shipped from Boston both fresh and boiled, principally to New England towns and New York City, but also to the Middle and a few Western States, Chicago being about the western limit of fresh distribution.

Of the supplies received at New York City, from one-half to three-fourths come in barrels, principally from Boston and other markets in Southern New England, and the remainder in smacks. The receipts for 1880 amounted to about 2,500,000 pounds, worth $125,000 fishermen's prices and $175,000 wholesale market prices. Supplies are obtained from the entire lobster producing coast, including New Jersey, and trade continues throughout the entire year, but is most active during July, August, and September. During winter, lobsters are received in barrels only, and the same method of carrying prevails to a greater or less extent during the remainder of the year.

THE SMALLER MARKETS.—Of the smaller markets along the coast little need be said in this connection, as they are all described as fully as the data permitted in the coast review of the lobster fishery. Some of these markets are of considerable importance as distributing centers for neighboring sections of country, but nearly all are more or less tributary to the three larger markets above mentioned, which control the main part of the fresh trade. There are scarcely any lobster markets on the coast of Maine outside of Portland and the several canneries, as the fresh lobster trade is almost exclusively controlled by the market smacks, which buy for the most part directly of the fishermen. Eastport is an exception to this rule, and nearly all of the lobsters shipped from the Passamaquoddy district pass through the hands of a few dealers. In the winter time, however, when the well smacks are not running, lobsters are packed in barrels at a few other stations for shipment westward.

In New Hampshire, Portsmouth is the principal market. In Massachusetts, there are several active markets, like Gloucester and New Bedford, but the former sends nearly all its lobsters to Boston and the latter many to New York. Newport, R. I., and Stonington, Noank, New London, and New Haven, Conn., each do a considerable trade in lobsters, those not needed for local consumption or for supplying neighboring towns being shipped to New York. The local trade in many places is, however, very large, and for the southern New England markets probably exceeds their trade with New York. Noank is one of the most important sources of supply for

New York on the southern coast of New England, and also makes large shipments to New London and Norwich.

METHODS OF CARRYING LOBSTERS.—Reference has been made above to the methods of carrying lobsters. The well smacks at one time controlled the lobster trade, and on many portions of the coast to-day the fishermen are entirely dependent upon them for the disposition of their catch. They probably still carry the larger part of the fresh lobsters marketed. They make regular visits along certain sections of the coast, each smack generally resorting to the same district during the season, though often going elsewhere if the supply proves insufficient. Some engage both in fishing and carrying, and others in carrying only, and a large proportion remain in the lobster trade only during the principal season. The New York smacks visit the coast of Maine and the vicinity of Martha's Vineyard and Block Island. The Connecticut smacks seldom go beyond the southern coast of New England, and are principally fishermen. The Massachusetts smacks are all fishermen, and remain upon the coast of that State; while nearly all the Maine smacks are carriers merely, the well smacks running principally from the Maine coast to Portland and Boston, and the dry smacks to the canneries. The carrying capacity of the smacks varies greatly, dependent upon their tonnage. The smacks that supply Portland measure from 14 to 32 tons each, and carry from 2,000 to 8,000 lobsters at a trip. They are gone from one to two weeks, according to the weather and abundance of supplies. A New York sloop smack of 42 tons has a carrying capacity of about 20,000 pounds, or between 13,000 and 15,000 lobsters by count. It can carry this amount, however, only during cold weather, and in the summer makes but half fares. During the summer it buys of about ten men at Deer Isle, Me., tending in all 800 pots, and makes a trip about every two weeks. The remainder of the season it makes weekly trips from Cuttyhunk, Mass.

THE LOSS IN CARRYING.—The loss in carrying lobsters in the well smacks is stated to be comparatively slight, during the summer not averaging more than 200 or 300 in a cargo of 5,000, and in cold weather not over 100. It is said that the losses are not due to overcrowding, but to the occasional injuries which the lobsters inflict on one another.

THE USE OF CARS.—The lobster fishermen are all supplied with cars in which they preserve the lobsters taken, awaiting the smacks or an opportunity to carry them in their own boats to the nearest markets. These cars are of small size, but the dealers have much larger ones, according to the extent of their trade.

LIVE AND BOILED LOBSTERS.—Live lobsters are preferred for shipment, and but little boiling for the trade is now done in any of the larger markets outside of Boston. Nearly all the boiled lobsters sold in New York come from Boston, 5 to 10 per cent. of the lobsters received from the latter place being boiled. The Boston boiled lobsters have obtained a good reputation in New York, and are generally preferred to those boiled elsewhere. The demands of the retail trade in New York are, however, mainly for fresh lobsters, and the same is true in most of the other cities. Boiled lobsters are shipped both in barrels and boxes. During warm weather ice is used on the lobsters shipped in barrels, but in the colder months it is dispensed with. Live lobsters ship better than boiled ones in the summer, if freely iced.

MANNER OF BOILING LOBSTERS.—The old style of "set" boilers or "farmer's" boilers, being large iron kettles of various sizes up to a capacity of about 60 gallons, were formerly in quite general use for boiling lobsters for the trade. Even now the same kind of boilers are extensively employed by the smaller dealers all along the coast. In the principal markets, especially Portland, Boston, and New York, however, new and improved methods have been adopted by the larger dealers, whereby the process of boiling is greatly facilitated.

The boilers at the Boston establishments which we have examined are rectangular wooden tanks or vats of about 60 gallons capacity, lined with zinc and furnished with a cover. Heat is applied by the introduction of steam through a series of perforated pipes arranged in the bottom of the tank. The steam is generated in an ordinary boiler standing close at hand. The lobsters are not thrown directly into the vat, as the operation of removing them after cooking would in such an event be an exceedingly tedious one; but an iron framework basket of rather slender bars is made to fit the tank loosely, and is lowered and raised by means of a small derrick placed over the tank. This frame, which holds about 300 pounds, is filled with lobsters at the edge of the wharf from the floating cars, and is then carried to the tank and lowered into it, after the water it contains has reached the desired temperature, that of boiling. The water is first supplied to the tank, which is filled to about one-half or two-thirds its capacity; about a peck of salt is added, and then the steam is turned on. The same water suffices for several successive boilings, about two quarts of salt being added each time. The lobsters are allowed to remain in about half an hour, or until the proper red color indicates they are sufficiently cooked. With as little delay as possible after cooking, they are packed in barrels or boxes for shipment or are sold to the local retail markets. The barrels are usually covered with tea-matting or sacking.

MANNER OF SELLING LOBSTERS.—Lobsters are sold both by weight and count, the latter method being probably the more common one among the fishermen, who generally have no means of weighing their catch. In some places they are also disposed of by the barrel. The canneries on the coast of Maine usually purchase of the fishermen by weight, though in some instances, as at South Harpswell, where the lobsters offered them average closely upon 1 pound each, they buy by weight or count, indifferently. The smacks that visit the fishing-grounds and buy directly from the fishermen purchase almost universally by count, taking only those above a certain size which are salable in the fresh markets. Lobsters shipped in barrels are generally sold by weight.

In the fresh markets, wholesale and retail, both methods of selling are recognized, one method prevailing in some places and the other elsewhere, this matter having apparently been regulated by long custom in each place. In the eastern part of the lobster region, however, the prevalent custom is by count, while to the westward it is by the pound. In the larger markets of Portland, Gloucester, and Boston, sales are mostly made according to the former method, and in those of New Bedford, Newport, New London, New Haven, and New York, by the latter. When selling by count in the retail markets the price is regulated by the size of the lobsters.

6. THE METHODS OF SHIPPING; PRICES.

THE SMACKS.—The well smacks used as lobster carriers are, for the most part, remnants of the former large fleet of fishermen which, before the custom of icing fish came into common practice, were obliged to carry their fish alive to market, and many of them are quite old. These vessels have been fully described elsewhere in the fishery report, and we need, therefore, only refer briefly to their connection with the lobster trade.

Prior to 1860, when lobster canneries were less numerous than now, and the greater part of all the lobsters caught on the coast of Maine were carried fresh to western markets, the well smacks were of much greater importance than at present, and many more were required to dispose of the catch. Even now the larger share of the fresh lobsters carried to Boston and New York from distant fishing-grounds are transported in well smacks, which are destined to remain for some time an important factor in the lobster industry.

Within a few years it has been demonstrated that lobsters can be carried long distances alive, packed in barrels with ice, and at those fishing stations having direct communication

with the markets, either by rail or steamer, this method of transporting lobsters has become quite common. This traffic has greatly interfered with the business of the well smacks, but the majority of fishing districts will probably never have the advantages of steam communication with outside markets. Well smacks have not visited Eastport, Me., for some years back, as lobsters can be sent from there by steamer, in ice, much more quickly and profitably than in sailing vessels. As opposed to this, we may cite the case of No Man's Land and Gay Head, Martha's Vineyard, which localities must depend for some time entirely upon the smacks.

The total number of lobster smacks above 5 tons measurement owned upon the coast of the United States between Eastport, Me., and New York, is one hundred and two. Of these, thirty-six are well smacks and twenty-one dry smacks, employed in the carrying trade only, and forty-five are dry smacks engaged both in fishing and in carrying to neighboring ports. Seventy-one of all these smacks are schooner rigged, and thirty-one sloop rigged. In measurement they range from 5.77 to 45.35 tons each, in the number of the crew from two to seven men, and in value from $50 to $3,800 each. The combined measurement of the entire fleet is 1,862.43 tons, the total value $89,925, and the combined crews three hundred and thirty-two. Some of these smacks are very old, several having been built between 1830 and 1840. Not all of the vessels classed as lobster smacks engage exclusively in the lobster trade, but about one-half participate in other fisheries during certain seasons. Fifty-eight of the smacks are owned in Maine, twenty-nine being well smacks, twenty-one dry smacks, and eight fishing smacks. The well smacks carry to Portland, Boston, and New York, and the dry smacks to the canneries and other markets near at hand. Nine smacks, all of which engage in fishing, are owned in Massachusetts, and five smacks of the same character belong to Rhode Island. Connecticut has twenty-two fishing smacks and two well smacks, and New York one fishing smack and five well smacks. As on the coast of Maine, the well smacks of Connecticut and New York carry to the larger markets, especially New York, and the fishing smacks to near localities, but many of the latter class fishing in Long Island Sound carry directly to New York.

The dry smacks run much smaller in size than the well smacks, the largest one registered being of 20 tons measurement only. Many of these of the fishing class have been described in connection with the appliances and methods of capture.

Full statistical tables respecting the smacks are given in the account of each district and State in the Coast Review.

SHIPPING IN BARRELS.—The practice of shipping fresh lobsters in barrels from the fishing stations to the larger markets has recently come into vogue in several places along the coast and has proved very successful. It requires somewhat rapid transportation, as by railroad or steamer, but, where possible, offers greater conveniences than the well smacks. Nearly all the shipments of fresh lobsters from Eastport, Me., the most distant fishing station of our coast, are made in barrels. Flour barrels which hold from 135 to 140 pounds, or about fifty-five lobsters, by count, are usually selected. A small hole is first bored in the bottom of the barrel to afford drainage. The lobsters are brought in from the cars in large baskets and emptied upon a table, at which there may be one or more packers, each filling a separate barrel. The packer seizes the lobster by the carapax with his right hand; with his left hand bends the tail up under the body, and quickly deposits it in the barrel with the back uppermost. The lobsters are stowed snugly together, so that they cannot move from the position in which they are first placed, rapid packing being necessary to accomplish this. A piece of ice weighing from 10 to 15 pounds is placed on top, and the barrel is covered over with a piece of sacking, which is secured by passing the upper hoop of the barrel over it. The packers often wear coarse woolen mittens to protect their hands from the spines of the lobsters. In cold

weather the ice is dispensed with. In taking the lobsters from the cars for packing in barrels, they are dipped up with large scoop-nets, rapidly examined to ascertain if they have enough life to stand the journey, and are above the legal limit in size, 10½ inches, and then with a quick movement tossed into the basket or back into the car, as the case may warrant.

The barreled lobsters are shipped from Eastport to Boston by steamer, the length of the trip being from twenty-four to thirty hours, but if properly packed they will live at least forty-eight hours in this way. As soon as they reach Boston they are transferred to cars or boiled. The regular steamers from Eastport leave there during the summer about noon of every other day, and it is customary to pack the lobsters in the morning of each steamer day, in order that they may start in good condition. But few are shipped at the end of the week.

Other stations along the coasts of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut, having railroad or steamboat facilities, have taken advantage of this new and rapid method of transportation.

SHIPPING FRESH LOBSTERS TO EUROPE.—In 1877, Messrs. John Marston & Sons, of Portland, Me., made a successful shipment of fresh lobsters to Liverpool, England, in the Allan Line steamer Sardinia. Notwithstanding the great demand in Europe for American canned lobsters, it is not probable that an extensive trade in fresh lobsters will ever arise, owing to the great trouble and expense of shipping them, though the Messrs. Marston think that in time many will be sent in that way. The above consignment was cared for in the following manner: The lobsters, two hundred and fifty in number, were placed on the main deck in a large tank, 20 feet long by 8 feet wide and 3 feet deep, and constantly supplied with fresh sea-water through six faucets by means of a donkey engine, a waste pipe preventing any overflow. Fifty died during the trip and the balance were sold at from 60 to 75 cents per pound.

THE PRICES.

CANNING LOBSTERS.—The prices paid for lobsters at the canneries in Maine were, in 1880, nearly uniform for the entire coast, having been about $1 per hundredweight. At Eastport they ranged from 80 cents to 90 cents per hundredweight when taken directly from the fishermen's cars, or $1 delivered at the canneries. Since 1880, however, prices have increased considerably at Eastport, consequent upon the increased competition in the fresh lobster trade. The prices for 1882 were $1.30 at the traps, and $1.50 delivered at the canneries.

MARKET LOBSTERS.—The "smack" or market lobsters, which are those above 10½ inches in length, and which, in 1880, were estimated to average nearly 2 pounds each in weight for the entire Maine coast, bring to the fishermen much higher prices, varying with the season and abundance, from 3 to 5 cents each by count. Prices are higher in the spring than in the summer. At Saint George's Island, Maine, the prices ranged, in 1880, from 4 to 5 cents each by count, from the beginning of the season to the middle of April, and after that time fell off to 3 cents. At Portland, the average prices were 4 to 5 cents each for large lobsters, and only 1 cent each for all under 10½ inches long. At Eastport, the dealers received about 3 cents per pound for lobsters shipped to Boston in barrels.

On the New Hampshire coast, the larger lobsters brought from 4 to 7 cents each, and the smaller three-fourths of a cent to 2 cents each, the average price being about 5 cents.

On the southern coast of New England, the smacks generally pay the fishermen about 6 cents each for all lobsters above 10½ inches in length, the season usually continuing from May to October. In the vicinity of Vineyard Sound, Massachusetts, the wholesale prices were 8 cents per pound, the retail 6 cents, but the smacks are charged 6 cents each by count. At New Bedford,

Mass., and New London, Conn., the customary price was 4 cents per pound. In Rhode Island, it ranged from 3 to 4 cents per pound for lobsters over 10 inches long, half price being charged for all under that size. In that State the prices advanced half a cent per pound from 1879 to 1880. On the New Jersey coast the fishermen received about 3½ cents per pound.

MARKET PRICES.—The dealers' prices in the three largest markets of the coast were about as follows, in 1880: Portland, about 7 cents each by count; Boston, about the same; New York, 6 cents per pound from May to December, 8 cents per pound during December and January, and 12½ cents per pound from February to May. The retail prices in New York for the same year and seasons in the order given above were 10, 12½, and 15 cents, respectively. During the summer of 1882, on account of the unusual demand, lobsters were sold at wholesale in New York at prices ranging all the way from 6 to 25 cents per pound.

The retail prices are usually much higher than the wholesale, even in many sea-coast towns located in rich lobster districts, being often nearly double. Boiled lobsters also bring a higher price than live ones.

7. THE CANNING INDUSTRY.

EXTENT AND CHARACTER OF THE INDUSTRY, HISTORY, &C.

REVIEW.—The lobster canning industry of the United States, with that of the British Provinces owned or controlled by American capital, is of great importance, and from the introduction of the lobster canning process at Eastport, Me., about 1842, dates the beginning of the extensive canning interests of the United States in all its branches. About two-fifths ($289,000) of the entire capital ($713,000) invested in the lobster fishery in the United States is directly applied to the canning interests, and of the products of the fishery as they enter into consumption about one-third of the entire value comes from the canneries.

Lobster canning in the States is confined exclusively to Maine, in which, in 1880, there were twenty-three canneries in operation. The capital stock of these canneries is mostly owned in Portland and Boston by five companies. The same companies also own or operate over forty canneries in the British Provinces. Portland interests in both the Maine and provincial canneries are greater than those of any other place in either Maine or the British Provinces, representing or controlling sixteen canneries in the former and thirty-one in the latter. A number of the Maine canneries are owned by the persons who run them, but most of these are operated in the interests of the Portland and Boston firms.

The products of the provincial canneries are shipped almost wholly direct to Europe, the duty of 18 cents per dozen cans (nominally on the tin) interfering with their importation into the United States. About one-half of the total amount canned in Maine is also exported to Europe, the balance going mainly to the Western and Southern States. The majority of the canneries of Maine do not limit operations to the canning of lobsters, but fish, clams, meats, fruit, and vegetables are also prepared. Many of the details respecting the Maine canneries are given in the coast review of the fishery.

HISTORICAL NOTICE.—It has been possible to prepare but a brief notice of the origin and progress of lobster canning in the United States, but, although the statements obtained regarding its early history were somewhat conflicting, it is believed that the following account is essentially correct:

Lobster canning was first attempted in the United States at Eastport, Me., shortly after 1840, and was made successful in 1843, the methods finally employed having been borrowed from Scotland, which country is said to have learned the process from France. For the successful

introduction of the process into the United States we are indebted to Mr. Charles Mitchell, now of Charlestown, Mass., a practical canner of Scotland, who had learned his trade of John Moir & Son, of Aberdeen, the first Scotch firm, it is claimed, to put up hermetically sealed preparations of meat, game, and salmon, their enterprise dating back to 1824.

Mr. U. S. Treat, a native of Maine, appears, however, to have been most active and influential in starting the enterprise and in introducing canned goods into the markets of the United States. Mr. Treat was, at an early period, engaged in the preparation of smoked salmon on the Penobscot River, and in 1839 removed to Calais, Me., where he continued in the same business. About 1840, he associated with him a Mr. Noble, of Calais, and a Mr. Holliday, a native of Scotland, who had also been employed in the salmon fisheries of the Penobscot River, under the firm name of Treat, Noble & Holliday. This firm moved to Eastport in 1842, for the purpose of starting the manufacture of hermetically sealed goods, and began experiments with lobsters, salmon, and haddock. Their capital was limited, their appliances crude, and many discouraging difficulties were encountered. The quality of the cans furnished them was poor, causing them often to burst while in the bath, and the proper methods of bathing and of expelling the air from the cans were not understood. The experiments were continued for two years with varying success, and in secret, no outsiders being allowed to enter their bathing room. Though fairly successful in some of their results, they could not always depend upon their goods keeping well.

In 1843 they secured the services of Mr. Charles Mitchell, who was then residing at Halifax, and who was not only well acquainted with the methods of bathing practiced in his own country, but also a practical tinsmith. He had been employed in the canning of hermetically sealed goods in Scotland for ten years, and came over to Halifax in 1841, where he continued for two years in the same occupation, exporting his goods to England. After Mr. Mitchell's arrival at Eastport, no further difficulty was experienced in the bathing or other preparation of the lobsters, and a desirable grade of goods was put up, but they found no sale, as canned preparations were comparatively unknown in the markets of the United States. Mr. Treat visited each of the larger cities with samples of the goods, and endeavored to establish agencies for them, but he was generally obliged to send on consignment, as few firms were willing to take the responsibility of buying on their own account. A patent was also applied for, but the claim was not pressed, and the patent never received.

In 1845, or perhaps earlier, Mr. Treat withdrew from the partnership, and the firm became Mitchell & Noble, with W. K. Lewis as agent. In 1846, Mr. Treat purchased the island between Eastport and Lubec, which has since gone by his name. On one side of the island he constructed a large herring weir, and in connection with it extensive smoke-houses. He did nothing, however, in the canning line for three years, and in 1849 leased his wharf to Mr. Henry Evans, of New York, whom he assisted in the canning of several kinds of fish. In 1852 he began again on his own account and on an extensive scale, and continued canning for eight or ten years, putting up lobsters, salmon, halibut, and vegetables. His New York agents were Wells, Miller, Provose & Co., and he also shipped to California from 1854 to 1856. In 1855 he first introduced the method of pressing herring for pomace and oil, and this branch of his business was kept up until 1873.

A Mr. Samuel Rumrey, of West Lubec, obtained employment in the Eastport cannery of Treat, Noble & Holliday soon after the process of canning had been made successful, and shortly after learning its secrets, he hired out to W. K. Lewis & Brother, of Boston, under whom he established a lobster cannery at Portland, Me. A few years later Mr. Rumrey left Portland and started another cannery at South Harpswell, in connection with Mr. Burnham, of the present firm of Burnham & Morrill.

About 1847, Mitchell & Noble sold their Eastport cannery to George K. Underwood & Co., of Boston, the contract stipulating that Mr. Mitchell should continue with the latter firm to superintend their works. This establishment was soon afterwards removed to a more western point on the coast of Maine. Mr. J. W. Jones began canning in 1856.

Since the first attempts made in Eastport, the business of preparing hermetically sealed goods has rapidly increased, and at the present time comprehends many kinds of fish, meats, fruits, and vegetables. In 1850 there were only three canneries in the United States, but now the number is very great, and they are scattered through all parts of the country. After the importance of the process of canning became known, several parties attempted to cover it with patents, but without success, although much money was used for that purpose.

In 1843 the 1-pound cans of lobsters sold at 5 cents each, and 3½ pounds live weight were required to make a 1-pound can. No lobsters under 2 pounds in weight were used.

About 1870 the capitalists of the United States interested in the lobster canning industry began to establish canneries on the coasts of the British Provinces. This movement was owing partly to the fact that a scarcity of lobsters was noticeable on portions of the Maine coast, and partly to the increased foreign demand for canned goods, which exceeded the production of the older canneries. At present the United States capital invested in provincial canneries exceeds that invested on the coast of Maine.

Concerning the period from about 1850 to date, sufficient data have not been collected to furnish a connected history of the progress of lobster canning.

NUMBER AND LOCATION OF THE CANNERIES.—In 1880 there were, as already stated, twenty-three canneries on the coast of Maine, and over forty in the British Provinces controlled by United States capital. The Maine canneries are as follows: In the Passamaquoddy district there are four canneries, all located at Eastport, and in 1880 they were putting up nothing but lobsters, though two or three engaged also in the fresh lobster trade. The total capital invested was $12,500. The oldest of the existing canneries was established in 1870. Machias district also had four canneries, located at Jonesboro', Jonesport, Cape Split, and Millbridge, and with a cash capital of $39,598. The Jonesport cannery engaged in the preparation of canned mackerel and clams in the proper season, but the other canneries were limited entirely to lobsters. In Frenchman's Bay district there were three canneries, one at Prospect Harbor, Gouldsboro'; one at Hammond's Cove, South Gouldsboro'; and one at South West Harbor, Mount Desert, with a capital of $55,150. The first mentioned factory canned lobsters only; the Hammond's Cove, lobsters and clams; and that at South West Harbor, lobsters, clams, mackerel, salmon, clam-chowder, and fish-chowder. There were five canneries in Castine district—one each in Brooklyn; Burnt Cove, Deer Isle; Green's Landing, Deer Isle; Oceanville, Deer Isle; and Castine—with a capital of $61,400. All the canneries, excepting that at Brooklyn, put up mackerel, and those at Green's Landing and Castine included clams also among their products. Belfast district had three canneries, located in Camden, North Haven, and Carver's Harbor, Vinal Haven, with a total capital of $31,925. Mackerel as well as lobsters were put up at all these canneries. There is one cannery in the Waldoboro' district, located at Port Clyde, South Saint George, where both lobsters and mackerel are canned; one at Booth Bay, in the Wiscasset district, canning lobsters, mackerel, and clams; and one each at South Harpswell and South Freeport, in the Portland and Falmouth district. The South Harpswell cannery prepared only lobsters in 1880, and the South Freeport, lobsters, clams, and mackerel. The combined capital of these four canneries was $36,661. The entire cash capital invested in the canneries of Maine, in 1880, was $289,834, making an average

capital for each cannery of about $12,500. The cost of the buildings and fixtures at each of the canneries ranged from $1,000 to about $4,000, the average cost being about $2,800.

The canneries of the maritime provinces owned or controlled by capitalists of the United States are scattered along a wide stretch of coast, being mostly located as follows: Nova Scotia—Grand Manan, Shelburne, Clarke's Harbor, Chester, Harrigan Cove, Carriboo, Little River, Petpiswick, Mary Joseph, Crow Harbor, Liscomb, Sonora, Brule, Beckerton, Wood's Harbor; Cape Breton—Arichat, Discouse; Prince Edward's Island—New London; New Brunswick—Shediac, New Mills, Bay Chaleur; Magdalen Islands; Newfoundland—Placentia and Buren. The capital is owned almost entirely in Portland and Boston, but we have received statistics of only seventeen of the canneries, which are owned in Portland. The combined cash capital of these is about $214,000, or an average of about $12,500 to each.

In addition to the cannery buildings, the several Portland firms have factories in that city for the manufacture of the tin cans and wooden cases, to supply their Maine canneries, and warehouses for the storage of the finished products.

PRODUCTS OF THE CANNERIES.—Many of the lobster canneries engage in the preparation of other kinds of canned goods, especially outside of the lobster season, these including fish, shell fish, fruits, berries, corn, &c. In the investigations, however, no account was taken of other than the sea products, which were mainly lobsters, mackerel, and clams. In Eastern Maine, however, several of the lobster canneries have become interested in the sardine industry since 1880. Of the twenty-three canneries in Maine, in 1880, ten prepared lobsters only; six, lobsters and mackerel; one, lobsters and clams; and six, lobsters, mackerel, and clams; one of the last also put up salmon, fish-chowder, and clam-chowder.

Several different preparations of lobsters are made, the standard and by far the most common grade, to which nearly all the canneries are limited, being that in which, after boiling, the lobster meat is simply picked from the shells and put in cans. "Deviled lobsters" in one-half pound cans, and "German flats" are prepared by one or more canneries, the former having been first put up in 1871 by the cannery at South West Harbor. In 1879, at the suggestion of London dealers, the South West Harbor cannery began to prepare lobsters in the shell for the export trade, for this purpose using two sizes, measuring 12 and 14 inches respectively. They are boiled, the tail bent under the body, and then packed in cylindrical tin cans, 12 and 14 inches long. They are put into the cans dry, bathed afterwards, and vented in the usual manner. These lobsters are used principally for garnishing dishes for the table.

The mackerel canning season occurs in the fall, following the lobster. As the fish have to be delivered at the works, the fishery is mainly limited to the boat fishermen of the vicinity of the canneries, at such times as the schools approach close to the shore. Occasionally, however, the fish are kept in pickle over night. The prices paid to the fishermen in 1880 averaged about $1 per cwt. The clam season varies in length on different parts of the coast. At Jonesport, in 1879, it continued through twelve weeks of December, January, and March, while at South Freeport it extended from October 1 to December 10. The clams are dug by residents near the canneries, who are paid from 25 to 35 cents a bushel; one bushel of clams in the shell is required to fill a dozen cans. During the clam season the canneries are generally run with a greatly reduced force.

THE CANNING SEASON.—Prior to 1879 there were two canning seasons for lobsters every year. The first generally began early in April, and extended to about July 1 or August 1; the second continued from about September 10 to the 1st of November or December. The length of the seasons depended greatly, however, on the state of the weather, the abundance of supplies, and the

condition of the market, the spring season often not beginning until the middle of April or the 1st of May. May and June were considered by most canners to be the best months for their business, probably because the weather was then most favorable for fishing. Mr. J. W. Jones, however, regarded the fall season as generally equal to the spring. All of the canneries did not participate in the fall fishery. The Maine lobster law that came into force in 1879 limits the operations of the canneries, so far as concern lobsters, to the four months from April 1 to August 1, but the season often does not begin until toward the middle or last of April, and frequently closes by the middle of July. April is often a stormy month, and fishing is more or less interfered with, often practically limiting the canning season to the three latter months. A law passed in 1885 does not permit canning after July 15. Nova Scotia also has a law, dating from 1879, which limits the canning of lobsters to the same months as on the coast of Maine.

After the lobster season is over, other branches of canning are sometimes taken up by the canneries, as elsewhere explained; many also make their cans and cases during the winter, but a large number lie idle for several months.

THE LOBSTER FISHERY IN RELATION TO CANNING.

CHARACTER OF THE SUPPLIES.—When lobster canning was first started at Eastport, the lobsters were said to have ranged in weight from about 3 to 10 pounds; after three or four years' time, however, the average weight was reduced to about 2 pounds, and for a considerable period no lobsters weighing less than 2 pounds each were considered fit for canning. At present even the maximum weight is much less for the entire coast, and most of the supplies consist of the smaller lobsters that are not suitable for the fresh markets. In many places these are called cullings, and they range in weight from about three-fourths of a pound to 1½ pounds each, the average weight in most localities being reckoned at about 1 pound; in others, from seventy-five to ninety lobsters by count are required to make a hundred-weight. Mr. J. W. Jones estimated the average weight of lobsters taken for all purposes within the canning districts, in 1879, as follows: Maine, 1½ pounds; Nova Scotia, 2 pounds; Straits of Northumberland and Bay of Chaleur, 2½ pounds; Magdalen Islands, 3 pounds. The opinion prevails at many of the canneries that lobsters are still as abundant as ever, though they have been constantly decreasing in size.

There is a great loss in weight in the preparation of canned lobsters, which is said to vary somewhat with the season. One hundred pounds of live lobsters yield from 17 to 25 pounds of canned goods, the average being about 22 pounds. Mr. J. W. Jones states that in May 4½ pounds of live lobsters will produce 1 pound of meat, but that in August 6 pounds live weight are necessary to make the same amount.

SOURCE OF SUPPLIES.—The canning lobsters are generally obtained in the neighborhood of the canneries where they are used, though supplies are frequently brought in from quite an extended area, as explained in the Coast Review. It is estimated that on an average about fifty or sixty fishermen, using from fifty to seventy-five traps each, are required to supply each of the canneries during the height of the season, though in some places the number is much less. The lobsters are brought to the canneries in the boats of the fishermen, or by small dry smacks sent out to collect them. These smacks have been elsewhere described; many of them measure less than 5 tons, but some are large enough to register, and a few exceed 15 tons. In 1879 one small steamer was employed in carrying lobsters to the Castine factory. Some of the smacks are owned by the canneries and others by the smackmen, and are valued all the way from $125 to $1,500 each, the average valuation being about $350. The average number of smacks running to each

factory is about two or three, with an average crew of two men each. The crew sometimes consists of one or two boys in addition to the captain, and occasionally there is but one smackman.

The manner of employing the smacks or crews varies somewhat at the different canneries. In some places the smacks are engaged for the season, at from $50 to $100 per month, in such cases the captain hiring all his help. In others they are paid by weight for all the lobsters brought in, at an average price of about 12 cents per cwt., or by count. Where the smacks are owned by the canneries, the latter may hire the entire crew or only the captain, who looks out for his help; and may pay regular wages, a certain price by weight or count, or a percentage on the lobsters carried. The wages of the chief smackmen range from $25 to $75 a month.

THE PRICES PAID FOR LOBSTERS.—The prices paid the fishermen for canning lobsters, in 1880, ranged from 65 cents to $1.50 per hundred pounds, varying somewhat on different parts of the coast and at different seasons, but averaging about $1. In some places the average was as high as $1.15 per cwt., and in others, where the lobsters averaged nearly one pound each, they were bought indifferently by weight or count, provided the fisherman would sell in the same way throughout the season, the price being $1 per cwt. or per one hundred lobsters. In a few localities they were purchased entirely by count.

THE QUANTITY OF LOBSTERS USED: NUMBER OF FISHERMEN.—It is reckoned that, in 1880, 9,494,284 pounds of lobsters, valued at $94,943 to the fishermen, were used at the Maine canneries. The number of fishermen supplying the canneries was not far from 1,200, but nearly, if not quite, all of these were also interested in selling to the market smacks, and the latter trade yielded much greater profits.

THE METHOD OF PREPARATION AND DETAILS OF CANNING.

THE PROCESS OF CANNING.—At some of the canneries it is customary to keep the lobsters in live-cars a day or more before canning, but at others they are used at once or as soon as a sufficient quantity is on hand. They are first boiled in a large vat or kettle, from ten to twenty minutes, after which they are heaped on large tables, usually with the backs up, care being taken to have the bodies more or less straightened out. The boiling is frequently done in the afternoon, in order that the lobsters may have sufficient time to cool during the night. Early the next morning the men designated as "breakers" commence to break off the "tails" and claws from the bodies, throwing the latter away, for the reason that, though the carapax contains some good meat, it is difficult to extract and clean it. The sweet-bread, however, when it is found, is taken from the bodies and generally put in the tops of the cans. The claws are then split by the "crackers," using a small hatchet or cleaver, which opens them so that the meat can be readily taken out. The meat is now punched out from the tail by means of a small "thole" pin, or other suitable pointed implement, but formerly the tail was split in a similar manner to the claws. The picking of the meat from the claws, the washing, and the filling of the cans is generally done by girls. The meat is thoroughly washed in water, the cans filled and weighed to insure their containing the required quantity, and then covered and cleaned, after which they go to the sealers, who solder the covers down. The bathing comes next, and is the most difficult part of the process. The cans are put into boiling water and kept there for about two hours, though the time appears to vary at different canneries from one hour to two and one-half hours. They are then taken out and vented, a small hole being punched in the cover to release the air, after which they are sealed again and bathed for two and one-half to three hours longer. "Running the bath" is the term generally applied to taking the lobsters from the first bath and venting. After the final bathing the

cans are allowed to cool over night, are tested to insure their being tight, and are then scoured, painted, and labeled. In packing them in the cases, each can is wrapped in brown paper.

One cannery, that at Oceanville, has used steam for cooking the lobsters, instead of boiling them in water. The lobsters are steamed about thirty-five minutes, but it appears to dry the meat too much, and in 1879 it was proposed to abandon that process.

HELP.—The help employed at the canneries consists of men, girls, and boys, whose labor is well systematized. The men attend to the heavier kinds of work and to those details which require the greatest skill, while the picking out and washing of the meat, the filling, weighing, scouring, painting and labeling of the cans is generally done by the girls. Great dexterity is often attained in the different branches of the business, and experienced hands work with astonishing rapidity. In the larger canneries, where the methods of work are most perfect, the help is classified more or less in the following manner: Superintendent or foreman, boilers, crackers, breakers, sealers, bathmen, tail pickers or shellers, arm-pickers, fillers, crowders, weighers, coverers, can-wipers, boxers, &c. In most of the canneries, however, but few of these designations are commonly used, and in the smaller ones the same persons may perform several kinds of work. Next under the superintendent or foreman, the sealers are supposed to be the most skillful of the help employed, and they generally have to make the cans as well as seal them. The boilers, breakers, crackers, and bathmen are generally all men and sometimes also the tail-pickers and weighers.

A few examples will serve to illustrate the character and amount of help employed at the larger canneries. At the Oceanville cannery, in 1880, eleven men and sixteen girls were employed. Of men there were one superintendent, one boiler, six breakers and crackers, two sealers, and one bathman; and of girls, five arm-pickers, four tail-pickers, three fillers, one crowder, one weigher, one can-wiper, and one coverer. The cans were painted, labeled, and put in the cases by girls, while the nailing and stenciling of the boxes was done by the sealers. At the Carver's Harbor cannery there were eighteen men and sixteen girls; the men consisting of a superintendent, one foreman, two boilers, one bathman, four crackers, two breakers, two tail-shellers, one weigher, three sealers, and one boxer. At the Boothbay cannery fifteen men and ten girls were employed. Of men, there were, in addition to the superintendent, boiler, and bathman, two crackers, two breakers, three sealers, two tail-shellers and three arm-pickers; of girls, one weigher and one coverer, and an average of five men and girls engaged in picking arms, two men in shelling tails, and two girls cleaning.

The average number of hands at each of the Maine factories owned in Portland was estimated as follows, for 1880: The Portland Packing Company, twenty to twenty-five girls and boys and eleven men, while fifty men were employed for four months making cans for all their factories; Burnham & Morrill, twelve girls and boys and eleven men; J. W. Jones, twenty-five hands, of which one-half are girls and boys. The number employed at the several canneries varies somewhat at different seasons. The help is mostly obtained in the neighborhood of the canneries, but some of the more skillful hands, such as the sealers, come from Portland or elsewhere. The men generally begin their labors somewhat earlier in the morning than the girls, as they have to prepare or lay out the work.

WAGES.—The men are paid much higher wages than the girls and boys, and the rates vary at the different canneries and somewhat with the seasons. The girls receive from $3 to $4 a week, their wages being more uniform than those of the men, who are paid from $6 to $15 a week, excepting the superintendent. The sealers or solderers have from $9 to $15 a week; the weighers and boxers, about $10.50; the boilers and bathmen from $7.50 to $10; the crackers, breakers, and tail-shellers, from $6 to $9.

CANS.—The cans used for the ordinary grade of canned lobsters are made in two sizes, the one to hold one pound of meat, the other two pounds. They are cylindrical in shape, the one-pound cans measuring 4½ inches in height and 3 inches in diameter, and the two-pound cans having the same height, but a diameter of 3½ inches.

The majority of the cans used at the factories owned by Portland capitalists are made in Portland during the winter, the tinsmiths who make them being sent to the canneries during the canning season to serve as sealers. Other canners usually have their cans made at the factories during the winter, by some of the men who are also employed during the lobster season. A few of the factories buy their cans, and some take contracts to put up the lobsters at a certain price per dozen cans, the cans and cases being furnished by the capitalists. Mr. J. W. Jones employed twenty men in Portland during four months of the winter to make cans for his factories, and Messrs. Burnham & Morrill kept about ten men at the same work for three months. The latter made on an average about five gross of cans per day, and received wages ranging from $10 to $12 a week. The cans for the South Harpswell factory are made at that place, and those for North Haven and Deer Isle are made at North Haven. At South Harpswell four men and one boy are employed, and at North Haven six men during four months; they are paid at the rate of 45 cents per gross. Eight gross could be made a day, but they are allowed to make but four gross. At Boothbay, where cans are made, about two thousand are put together as a day's work after the tin has been cut.

The weight of the tin cans appears to vary somewhat at different places, but averages for the one-pound cans about 3½ ounces. At Oceanville the filled cans were made to weigh 14½ ounces, and at Green's Landing 16 ounces.

CASES.—The shipping cases are made partly at Portland and partly at the canneries, the same as the cans. If made at the canneries, the shooks are generally received from Portland or from the mills at some other place. They are constructed chiefly of pine, but sometimes of spruce, and hold four dozen one-pound cans or two dozen two-pound cans of the ordinary grade.

THE REFUSE.—The refuse of the canneries, generally called chum or scrap, and consisting of the shells and such soft portions of the lobster as are not fit for canning, is often disposed of for fertilizing purposes, and is favorably regarded as a manure for hay and some other crops. It is also fed to hogs and poultry, but is said to give a reddish color and an unpleasant taste to the eggs of the latter. Mr. J. Winslow Jones states that in May, 1878, he sent twenty-four young pigs to his Boothbay factory, where they were fed almost exclusively on chum during the summer and fall, and thrived well. It was estimated that forty hogs could have been kept on the refuse of this one factory, and that by a short feeding of corn for about six weeks in the fall, they would range in weight from 150 to 400 pounds, or average about 250 pounds each.

When sold for fertilizing or other purposes the chum brings but a nominal price, and it is probably more frequently given away for the hauling. At many canneries it is dumped into the water, there being no demand for it. In some places, in 1880, the refuse of the entire season was sold for $10; in others it brought 25 cents a ton, or $1 a cord, and sometimes even as high as 50 cents a wagon load. At South Harpswell it was thrown into a scow furnished by farmers of the neighborhood, who obtained seventy-five such loads in 1880. About 175 tons were shipped to Portland for fertilizing purposes, in 1880, from the Boothbay factory. At Eastport the scrap was sold at 5 cents a barrel to the Red Beach Plaster Company, who dried it and ground it with plaster. Two thousand barrels were sold to them in 1879, and 1,500 barrels in 1880. For use on crops of hay it is also generally ground.

THE AMOUNT OF PRODUCTION, STATISTICS, ETC.

In 1880 about 2,600,000 pounds of canned lobsters, valued at $238,000, were put up on the coast of Maine. These included 1,542,696 one-pound cans, 148,704 two-pound cans, and 139,801 of other brands. The cost of the live lobsters used in their preparation was about $95,000, showing an enhancement in value by the process of canning of $143,000. In the enumeration of the help and of the wages paid at the canneries it was found impossible to make an exact calculation for the lobster industry because of the other interests involved, but it can be roughly stated from the combined statistics that the total number of persons employed was nearly eight hundred, and the amount paid them while engaged in the preparation of canned lobsters was between $50,000 and $60,000.

At one of the canneries the cost in labor of putting up one dozen one-pound cans was calculated to be from 28 cents to 30 cents, which for the 2,000,000 pounds produced would make the total cost about $50,000.

The cans cost in tin and labor 25 to 30 cents per dozen, and about one-third of the total cost of production of canned lobsters was expended in the labor of preparing them in the canneries. Where the goods were put up by contract, 90 cents per dozen was paid, the capitalists furnishing the cans. The selling prices, per dozen, for one-pound cans, during the past three years were as follows: 1878, $1.60; 1879, $1.45; 1880, $1.45. In 1880 two-pound cans brought $2.35 per dozen.

About one-half of the canned goods was exported to Europe, and a large part of the remainder was shipped to the Western and Southwestern States. Nearly all the canned lobsters produced were handled by the Portland and Boston firms already referred to, and which were as follows: In Portland—the Portland Packing Company, Burnham & Morrill, J. W. Jones & Co. In Boston—George K. Underwood & Co., W. K. Lewis & Brother. The Portland firms owned four or five small vessels, which were used in carrying the cans and cases to the factories and in transporting the canned goods to the Portland warehouses. Some of the canned goods were shipped by steamer, and New York received a few supplies direct.

No account of the total production of canned lobsters on the coast of Maine during past years is at hand for comparison with the figures herewith presented, but the fact of a very great falling off in the production from year to year is well known, and can be proved by the statistics of small sections. It is stated that the total production of 1880 was greatly exceeded ten years ago by that of a few canneries, and one of the principal reasons given for the transfer of capital to the British Provinces was the decrease of supplies on the coast of Maine. The question of decrease has been elsewhere discussed, and it is but fair to assume that the canneries have suffered in common with other branches of the industry. The increased traffic in fresh lobsters at some places, as at Eastport, has greatly interfered with the canning interests, and the canneries at that place are now run merely for the purpose of using up the small lobsters that could not be marketed otherwise. The decreased production since 1878 has been very largely due to the shortening of the canning season by the State law that came into force in 1879.

Further statistics of the canning industry are given in connection with the Coast Review of this fishery.

8. HISTORY OF THE LOBSTER FISHERY; DECREASE; PROTECTIVE LAWS.

GENERAL REVIEW.

One of the most important questions that entered into the present investigation of the lobster fishery was that respecting the relative abundance of lobsters as compared with former years. This question is of such extreme interest to so many of our sea-coast inhabitants, and so many different views have been expressed regarding it, some in support, and others again in refutation, of an alleged decrease in supplies, that an effort was made to obtain as complete data on the subject as was possible with the imperfect means at the disposal of those engaged in the investigations. The results were not entirely satisfactory nor conclusive for the entire region, but may be regarded rather as affording materials and suggestions for more elaborate studies in the future.

The manner of conducting the inquiries has been described elsewhere. It was impossible, from the lack of sufficient funds, to place many or large investigating parties in the field, and each of these was burdened with a score of other subjects, all of at least equal importance to the lobster fishery, and many of greater; that they should have accomplished as much in this line as they did, is a matter of congratulation. From places not visited by the field parties, much information was secured by correspondence.

It is not difficult to ascertain the facts respecting the details of an industry of this sort, its character, the methods of conducting it, its statistics, &c.; but when an attempt is made to determine its exact status, with reference to the supply, it seems impossible to obtain any reliable data, or at least to properly sift the worthless from the good. This difficulty is the greater when, as in the present case, we have no previously written history of the industry, and are dependent for the most part on traditions, or on the memory or judgment of individuals belonging to several classes—fishermen, dealers, and canners—which are somewhat at variance with one another in their immediate interests. Prejudice and a natural aptitude for exaggeration are also more or less characteristic of fishermen as of numerous other classes of persons, and without wrong intent many misleading statements are often made.

The weight of the evidence collected, however, leads to the conclusion that there has been a decrease in the abundance of lobsters within comparatively recent years, and in some localities this decrease has certainly been great enough to entirely change the standing of the fishery and render its pursuit unprofitable to the fishermen. Similar conclusions have been arrived at in Norway and Great Britain, the two most important lobster-producing countries of Europe, and strong efforts have been made for some time, at least in the former country, to arrest the decrease by a system of protection. Abstracts of reports bearing upon those two regions are given further on.

The idea of a serious falling off in the abundance of lobsters on our own coast is not of recent origin. Protective laws, covering limited areas, were enacted over half a century ago, and every State in the lobster region, excepting one whose fishery is of slight importance, has restricted the lobster fishery within its own waters by more or less stringent regulations. Probably no stronger argument in favor of a decrease could be adduced than this realization by one State after another of a perceptible change in the amount of its supplies, the failure of which would bring suffering upon many of its citizens. That there has been a great decrease in some districts, is admitted by all who are acquainted with the subject, but that this decrease has been general and serious enough to cause alarm, is not, in the judgment of many, sufficiently proved by facts, but the probabilities certainly favor such a view.

The decrease has been most marked in those regions which have been fished the longest, and especially in the shallow water areas near the coast, which are easy of access and which have been subjected to incessant drains. Numerous instances of this depletion of shallow-water grounds are

authenticated by the strongest evidence; yet it is claimed by many that the markets are constantly supplied with nearly, if not quite, as large quantities of lobsters as ever, and this fact is considered by them as entirely refuting the arguments in support of a universal and serious decrease. Unfortunately the statistics that are obtained of most industries are not of a character to make them of much value in the case of the lobster fishery, even if such statistics were extant. The increased quantity of lobsters now coming from any one region is only obtained through the agency of a greater number of fishermen, using a larger number of improved traps, while the average catch per man or trap may be much less than formerly. In respect to this it is often argued that a return to the former state of the fishery would bring about the same condition of affairs as originally existed; and the fact that the catch of each man or trap is now relatively less than it has been in regions where the number engaged in the fishery has increased, is certainly not a fair argument in favor of decrease. But there are other and more positive evidences of decrease, many of which are discussed further on, and the statements of persons thoroughly acquainted with the subject appear to furnish conclusive proof that the market supplies from our own coast have been constantly diminishing from year to year.

The marked decrease in the average size of the lobsters brought to market, as described in Section I, Part V, of this report, should probably also be regarded as an indication of decrease in abundance; and the wholesale slaughter of females with eggs, which has always been going on, would naturally have tended to diminish the supply. Not being truly migratory in their habits, but remaining on about the same grounds, as is supposed, year after year, coming into shallow water in the spring and retiring into deeper water near at hand in the fall, it is the commonly accepted opinion that the schools do not generally receive many accessions from other regions; and thus arises the possibility of any one region being readily depleted by overfishing. With migratory fishes the case is different, but the two have often been compared.

An illustration of the rapidity with which the lobsters of a small area may be caught up, is furnished by a salt-water inlet on the coast of Maine, in which lobsters were at one time very abundant. The basin opened directly into the sea, and was large enough to afford a remunerative fishery to several lobstermen. Two years' time was sufficient to reduce the supply of lobsters to such an extent that fishing became unprofitable. After an interval of about five years they became again abundant, and the supply was once more exhausted. Had this inlet not been so situated that it readily received accessions from without, it is probable that it would have required a much longer time to become replenished.

On a much larger scale has been the depletion of the once noted grounds about Cape Cod, Massachusetts, which at one time furnished nearly all the lobsters consumed in New York. In the early part of the century, this fishery was entirely in the hands of fishermen from other States, principally Connecticut, who came to Cape Cod with their smacks, and after catching a load carried it to New York or Boston. As early as 1812 the citizens of Provincetown realized the danger of exhausting the grounds about their town, and succeeded in having a protective law passed by the State legislature. More or less stringent regulations respecting the lobster fishery of Cape Cod have been in force from that time down to date, and they have probably done good service in prolonging the fishery, but the period of its prosperity has long since ceased, as continued overfishing has so exhausted the grounds, on almost every portion of Cape Cod, that they are no longer profitable even to the few men who still set their traps there. From the sketch of this region given further on, it will be seen that the decrease has not been a temporary one, although an entire rest for a long period of time might possibly allow it to recover more or less of its former abundant supplies. As it is, no large catches are now made and but few lobsters are carried away from the cape.

The immediate vicinity of Provincetown has suffered most in this respect, but scarcely more than any part of the coast from that town to Boston on the north side and to New Bedford on the south. A delay in the publication of this report enables the writer to add a note for the southern portion of this region, covering the period down to July, 1885. Vineyard Sound proper and the vicinity of Wood's Holl have afforded poor catches for a number of years, but the region about Gay Head and No Man's Land has continued to attract the lobstermen down to the present time. Each succeeding year, however, the lobsters have appeared to be less plentiful, and during the spring months and June of 1885 scarcely anything has been done. The fishermen are discouraged, and are forced to attribute the scarcity to overfishing, the possibility of which many of them have all along denied.

In the waters of Rhode Island and Connecticut a large decrease of lobsters is reported by many of the fishermen, and the increased catch for the few years preceding 1880 was only obtained by the use of a much larger number of traps than was employed formerly. Although the fishery in those States was begun very many years ago, it is only within comparatively recent times that it has been extensively carried on.

On the coast of Maine the evidences of decrease are very strong, especially as regards the shallower areas; but the rapid extension of the grounds into comparatively deep water, with the consequent increase or constancy in catch for a time, has made the actual decrease less apparent. The rocky bottoms of the coast of Maine are also supposed to afford the lobsters greater protection than the sandy ones to the south, and in many places the traps cannot be set so closely together; neither is it probable that the lobsters in such localities move about as much in search of food.

The greatest decrease has occurred within the past fifteen to twenty years, or since the establishment of numerous canneries and of the perfected methods of transporting fresh lobsters to all parts of the country. The demand being so much greater than the supply, there are no restrictions on the amount of the catch, beyond those imposed by the State laws or resulting from the scarcity of lobsters. Fish are among the greatest enemies of lobsters, and cod are known to consume enormous quantities, but nature has provided against their extinction by such means, and it is man alone who has disturbed the balance.

There are some fluctuations in the supply of lobsters in certain localities from time to time, and a year of scarcity may be followed by one of comparative abundance. Such changes must be carefully considered in connection with the question of decrease, as they are exceedingly misleading, and observations upon the subject are not of much value unless they have been continued for a number of years.

In submitting the material contained in the following pages, respecting the abundance of lobsters and the subject of protection, the writer has endeavored to state the evidence presented without prejudice or undue comment. As previously remarked, it was not within the power of those charged with the fishery investigations of 1880 to summon witnesses, even if they had had the time for it, and nothing was obtained except from willing contributors. One member of the party that conducted the investigations on the coast of Maine was not convinced that the decrease was as great or serious in that State as the accounts appeared to indicate. Opposed to him, however, is a mass of evidence from many reliable sources, which has been accumulating for several years. The only satisfactory way of determining the question would be to institute a thorough and careful investigation of the entire lobster region under the authority of the National Government or of the several States, and the lobster interests are of sufficient importance to justify such action. Such an investigation has recently been made of the coasts of Great Britain, and an abstract from the report of the commissioners is quoted on a following page. In Norway

the lobster fishery has also been carefully studied and its condition is well known. We commend the report of Prof. A. Boeck, on its history and prospects, from which we have largely quoted, to the attention of lobstermen in this country, as much valuable information, quite applicable to our own coast, may be obtained from it.

The question of how to protect the fishery is one most difficult of solution, and from the statements given by the fishermen and others, it will be seen that a great variety of opinions exists regarding it. None of the State laws now in force have been effective in stopping the decrease, although they may have retarded it more or less, and in any investigation it will be found more perplexing to decide upon proper laws than to establish the fact of a decrease.

It was found difficult to collect the data for a complete history of the lobster fishery, but many of the more interesting facts regarding its origin and progress are given in the following brief sketch:

HISTORICAL SKETCH OF THE FISHERY.

MAINE; GENERAL REVIEW.—On the coast of Maine the lobster fishery began about 1840, in the western part of the State, and gradually extended eastward, reaching the Penobscot Bay region about 1848 or 1850 and Eastport about 1855. At that time, and previously, lobsters were very abundant in all favorable localities close inshore during the summer months, and could be gaffed out at low tide from their favorite haunts under the shelter of rocks and seaweeds. This method of capture was resorted to mainly by boys, who could generally obtain a mess in a short time and with little trouble. It gave rise, however, to no regular fishery. In those early days lobsters were also more frequently reported from the fishing-grounds lying at short distances off the coast, where the depths of water are from 25 to 30 fathoms. They would seize the bait on the hooks of the fishermen or become entangled in their lines, and were often brought to the surface.

The regular fishery began with the use of hoop-net pots, which were generally of very rude construction. They were mostly made of the wooden hoops of hogsheads, measuring from 3 to 3½ feet in diameter, and with two wooden half hoops crossed above for the attachment of the bait and buoy-line. The bag usually had a depth of 18 to 24 inches. Contrary to what might be supposed, these open traps would often secure as many as four or five lobsters at a time. As a rule, two lobstermen went in each boat and used from twenty-five to fifty pots to the boat, setting them singly and marking their location with buoys, as is done with lath-pots. These pots were generally hauled twice a day, morning and evening.

The facility with which the lobsters escaped from the hoop-net pots led to their disuse as soon as the lath pots began to be introduced, and within a very few years from the time they were first employed, they had almost disappeared from the coast. The change, though rapid, was not at once completed, for a fisherman could not afford to give up his entire gang of old pots for new ones in the course of a single year, and so, for a short period, many of the fishermen were using some of each kind. The lath pots which superseded the hoop-net pots were essentially the same in construction as those now used on the coast of Maine, and each pair of fishermen handled between twenty-five and fifty.

Competition, rivalry, and the supposed decrease in abundance of lobsters, caused the fishermen to gradually increase the number of traps used by each, and the increased number of men who entered into the fishery from year to year also tended to the same results. Up to the time of the introduction of the method of setting the pots trawl fashion, the custom of fishing in pairs remained in vogue. It was supposed that two men were absolutely necessary to the work, one to handle the boat and keep it in position while the other hauled the pots.

Lobster pots were first set on trawls about the year 1865, several different persons laying

claim to the invention. The precise locality where trawls were first used is not known, but it was somewhere between Harpswell and Friendship, and probably at Georgetown. This innovation was in reality the result of competition, arising from the desire of one man to do the work previously performed by two. Experience also soon taught them that by the use of trawls, one man might set even more pots than had formerly been handled by two men. Each man would set his entire gang of pots in one or two strings where lobsters were abundant, but in a greater number where they were less plentiful. Since about 1870, the use of trawls in the lobster fishery has been decreasing, due to the fact that the lobstermen have discovered that they can often obtain a better catch by scattering their pots over a greater area, and shifting them a little every time they are hauled. Does not this fact indicate at least some falling off in the abundance of lobsters?

The following interesting facts regarding the early lobster fishery of Maine are furnished by Capt. Elisha M. Oakes, of Vinal Haven: In 1841, Captain Oakes began to carry lobsters from Curdy's Harbor and Horse Island Harbor, Harpswell, to Mr. Eben Weeks, at East Boston. He was then running a well smack, named the Swampscott, of 41 tons, old measurement. The season extended from the 1st of March until about the 4th of July, after which time lobsters were supposed to be unfit for eating; the black lobsters, or shedders, were even considered poisonous. During this season of four months, Captain Oakes made ten trips, carrying in all 35,000 lobsters, by count. He continued in this trade about six years, taking the combined catch of about five or six fishermen. At this same period the smack Hulda B. Hall, 50 tons, of New London, Conn., Captain Chapell, was carrying lobsters from Cape Porpoise, Maine, Gloucester, Ipswich Bay, and occasionally Provincetown, Mass., to Boston, making fifteen trips in the course of the season of four months, and taking about 3,500 lobsters each trip. Captain Chapell was supplied with lobsters by four men at Cape Porpoise, and by the same number at both Gloucester and Ipswich Bay. For four months following the close of the lobster season on the coast of Maine, or from July 4 until November, Captain Chapell ran his smack with lobsters to New York, obtaining the most of his supplies at Provincetown.

In 1847, Captain Oakes purchased the smack Josephine, with which he began running to Johnson & Young's establishment, at Boston, in 1848, buying a portion of his lobsters in the Penobscot Bay region, where this fishery had just been started. The quantity of lobsters carried by him that year was 40,000. The prices paid to the fishermen for smack lobsters was as follows: During March, 3 cents each; April, 2½ cents; May and June, 2 cents. In 1850 he began to obtain supplies from the Muscle Ridges, leaving Harpswell entirely, on account of the small size of the lobsters then being caught there. At this time the average weight of the lobsters marketed was about 3 pounds, and all under 10½ inches in length were rejected. The traps were made of the same size as at present, but were constructed of round oak sticks, and with four hoops or bows to support the upper frame-work. A string of bait, consisting mainly of flounders and sculpins, was tied into each trap. About fifty traps were used by each fisherman, and they were hauled once a day. The warps or buoy lines, by which the traps were lowered and hauled, were cut in 12-fathom lengths.

THE MUSCLE RIDGES, ME.—Captain Oakes states that lobsters were so abundant at the Muscle Ridges, at this period, that four men could fully supply him with lobsters every trip he made. In the course of ten days each man would obtain between 1,200 and 1,500 marketable lobsters. In Captain Oakes's opinion, the Muscle Ridges have furnished the most extensive lobster fishery of the Maine coast. He ran to this locality until 1874.

Capt. S. S. Davis, of South Saint George, informs us that about 1864, when he first began

buying lobsters at the Muscle Ridges, three men, tending forty to fifty pots each, caught all the count lobsters he could carry to market in his smack. He could load 5,000 lobsters at a time, and averaged a trip in seven to nine days. This traffic continued for six or seven years. In 1879 Captain Davis bought from fifteen men in the same locality, and at times was obliged to buy also of others in order to make up a load.

SOUTH HARPSWELL, ME.—Between 1850 and 1855, at South Harpswell, the fishermen were accustomed to go out two in a boat, each boat setting from fifty to seventy-five traps, and obtaining a daily average of from 400 to 500 lobsters of marketable size. All lobsters weighing less than 2 pounds were thrown away, and the remainder were sold to the canneries at an average price of 3 cents each in the spring, and 2 cents each in the fall, the canneries agreeing to take only those above 2 pounds weight. The fishing season lasted from March until May, and again from September until about the middle of November. When the factories were closed, the fishermen sold to the smacks running to New York and Boston, scarcely any of the lobsters being disposed of to Portland parties. The smacks paid about the same prices as the canneries, beginning in the early spring at 3½ to 4 cents, and falling later as low as 1½ cents, when the lobsters had become more abundant. Frequently, when the markets were dull, the fishermen, after culling out all lobsters under 2 pounds in weight, would bring the remainder to the smacks, where about one-third more in number would be rejected, only the larger individuals being bought. This would happen only late in a season, or during a very dull market. Marketable lobsters then averaged about 3½ pounds each.

BOOTHBAY, ME.—Mr. Emerson McKown, of Southport, says that in 1856 lobsters were found very plentifully and of large size about the islands of Boothbay Harbor. He was then fourteen years old, and engaged in the lobster fishery, setting his pots close to the shore, in from 8 to 11 fathoms of water. In the course of two and one-half months (March 1 to May 15) he could easily make $100. In those days the lobsters were sold entirely to the smacks, which carried them to New York. The season lasted six months, from March until the last of May, in the spring, and from about the 1st of September until December, in the fall. During this season one man, tending fifty pots, could make $500, and frequently made more. The price paid by the smacks was 2 to 2½ cents each. As the number of lobstermen increased in this region, the lobsters began to decrease both in abundance and size. By 1869 they had so diminished in numbers that the average income per man for the season of six months was not above $175. This caused the fishermen to try further out from land, and in deeper water, and the fishery is now largely carried on in depths of 25 to 35 fathoms, although in the summer the lobsters approach nearer to the land.

At all points along the coast, from Cape Small Point to Pemaquid Point, the fishermen are agreed in saying that formerly lobsters were very abundant and of large size, and that overfishing has reduced them both in size and in numbers. They are quite unanimous in the opinion that if the present State law is continued, it will be better for the fishermen.

MATINICUS, ME.—Lobster fishing was introduced at Matinicus Island in 1868.

NORTH HAVEN, ME.—At North Haven the fishing began in 1848, but during that year there was only one man setting traps. The number of lobstermen has, however, rapidly increased since then up to the present time. At first the entire catch was sold to Boston smacks, at the rate of 2 to 2½ cents each. The largest and smallest lobsters were not taken by the smacks, the former because they were considered not to be able to survive the long trip. Connecticut smacks followed soon after the Boston smacks, and later on large quantities of lobsters were shipped annually to New York. In 1856 or 1857, canning operations were begun on this island, but they were continued only two years at that time.

DEER ISLE, ME.—Lobster fishing began at Deer Isle in 1852, the men of that locality being first induced to fish for lobsters by smackmen from Portland and Boston. The first cannery in the district was established at Oceanville a short time prior to 1860. The lobster-pots were first set on trawls in 1864, and for some years this method of handling them was continued to a large extent, but it has since been abandoned. The use of nets for catching flounders and sculpins for bait began in 1874. The lobster fishery was started at Isle au Haute about 1855, or about three years later than at Deer Isle.

SWAN'S ISLAND, ME.—The fishery for lobsters was begun at Swan's Island, according to Mr. David Smith, by four men from Gloucester, Mass., who employed others to assist them. They made only one trip, however, but the inhabitants of the island at once took up the fishery, and ten men engaged in it up to 1855. Then came an interval of inactivity, which continued three or four years. In 1860, eight or ten men were again lobstering, and setting from thirty to forty pots each.

EASTPORT, ME.—The process of canning lobsters was introduced at Eastport, in 1842, but at that time lobsters were not known to occur in that vicinity in sufficient abundance to induce the people to fish for them. Smacks were, therefore, sent far to the westward for supplies, stopping at the different fishing stations along the coast. In 1855 they first began to fish extensively for lobsters about Eastport, and from that date until about 1865, the fishery continued to develop, reaching its height about the latter year. Since 1865, however, it has greatly fallen off on the American side of this district, although it has proportionally increased among the British Islands of the vicinity. The canning interests gave an increased impetus to the fishery about 1872. Formerly the greater part of the catch was sold to the canneries, but since the great demand for fresh lobsters in Boston and New York has reached this most distant point of our coast, the largest and best lobsters have all been shipped westward.

PROVINCETOWN, MASS.—A complete history of the industries of Provincetown, Mass., would afford an exceedingly interesting chapter regarding the origin, development, and subsequent decline of one of the most important fisheries of the New England coast, the once famous lobster fishery of Cape Cod, which for a series of years furnished New York City with nearly all of its supplies. Unfortunately, however, our record is very fragmentary, though interesting as far as it goes.

The following account of the lobster laws and regulations of the town, to 1850, was prepared by Mr. Frederick W. True:

A description of Provincetown in 1802 contains the following statement: "Lobsters of an excellent quality are obtained in great abundance on both sides of Long Point. Five vessels are constantly employed in catching them, and carrying them to the market of New York. Two smacks go with them to the Boston market. Several barrels are pickled and sent to the former place."*

Lobster fisheries were carried on without restriction until the year 1812, when the citizens of the town, entertaining fears that the constant encroachments of their neighbors would speedily effect the extermination of the species, prevailed upon the legislature to pass an act "to prevent the destruction of the lobster fishery in the town of Provincetown in the county of Barnstable, and to preserve and regulate the same in the waters and shores of said town." This act provides that "it shall not be lawful for any person living without the jurisdiction of this Commonwealth to take

* A Description of Provincetown, in the County of Barnstable, September, 1802. Coll. Massachusetts Historical Society, viii, 1802, pp. 198-200.

any lobsters within the waters and shores of the town of Provincetown for the purpose of carrying away from said waters in smacks and vessels owned without said Commonwealth, without first obtaining a permit in writing from the selectmen," and imposes a penalty for offenses. It also provides for the appointment of a number of fish wardens, whose duty shall be to prosecute all offenses against the act. This law, however, did not meet all the requirements of the case, and this fishery was frequently the subject of legislation in later years.

After the passage of the law in 1812, restricting the lobster fishery, many subordinate regulations were made from year to year at the town meetings. In 1815 it was voted that "the fish warden take no notice of a lobster fisherman for lobsters, without they take them upon their own risk," and that the town "defend the fish warden in the lawful discharge of the duties of his office." This latter clause was probably added because the fishermen from New York and other distant points were slow in recognizing the authority of the warden, and attempted to resist him. In the same year it was voted that "Benj. E. Atkins be fish warden for the town the year ensuing, and have $10 on a hundred for his fees," and that "he pay what money he collects into the town treasury once in three months, except his fees." In 1820 the fees of the warden were increased, and he received "18 per cent. on the amount of the same for his trouble, or $18 on a hundred dollars." It appears that the duties of the warden were not sufficiently well marked out in the State law of 1812, and consequently, in 1824, the citizens passed a law defining them more precisely. At the same time Elisha Freeman, jr., was voted in as "collector of lobster money," and the rate of compensation was reduced to 8 per cent. The law referred to provides that it is the duty of the collector of lobster money "to board every smack or vessel within the limits of Provincetown, agreeable to the laws of this Commonwealth, once in every twenty-four hours, and at such times as his judgment dictates the most proper. If the collector shall find that any smack or vessel thus visited hath taken a part of a load at or in any other place or waters than Provincetown, the said collector is authorized by the vote of the town of Provincetown, March 1, 1824, to charge a sufficient sum to be equal to $1 for every hundred lobsters which said smack or vessel shall or can carry, and every such smack or vessel which shall take her whole load in and from the waters of Provincetown shall pay 1 cent for every lobster. If, through the negligence of said collector, any smack or vessel does abscond, not having accounted for the lobsters on board from the waters of Provincetown, then said collector shall account with the treasurer of said town for said load."* It soon became apparent, however, that this method of obtaining the dues was defective in many respects and made the position of collector a very laborious one. Hence, two years later, in 1826, the town passed another law, according to the provisions of which, every smack or vessel taking lobsters at Provincetown should pay 50 cents for each ton burden, which money "must be specie or Boston money at the time the permits are given, which must be before commencing to take said lobsters."

In 1850 the lobster fishery again came under discussion, and it was voted in town meeting that the selectmen should be instructed "not to charge the citizens of this town any fee or charge whatever for taking lobsters from the waters under the jurisdiction of the town."

The following notes on the lobster fishery of Provincetown were furnished by Captain N. E. Atwood, in 1880:

"I remember that, as early as 1815, smacks belonging to New London, and other Connecticut ports, were fishing here for lobsters, which they carried to New York. They continued to visit this place for many years thereafter, the crews themselves catching the lobsters. Our own fish-

* Town Records.

ermen did not engage in lobstering, as nearly all the lobsters found in these waters were females, which had no sale in the Boston markets. In 1847 I employed some of our fishermen to catch me two loads, which I carried to New York. The next year they engaged regularly in the fishery, and I carried 25,000 lobsters to Boston and New York. Two years later the Connecticut smacks discontinued fishing and bought of our lobstermen. This new fishery gave employment to a great many men during the summer. Lobsters were very abundant, and continued to be so until about fifteen years ago, since when they have rapidly decreased in numbers from year to year until now they are nearly all gone. All of our fishermen in those earlier times used the so-called hoop-pots. Fifteen to twenty years ago, and before then, the fisherman would go out perhaps at midnight, anchor his boat near the shore, on the edge of the ground, and put over his pots, some half dozen in number. From time to time he would haul them up and empty them of their contents. If lobsters were abundant, it would keep him busy all the time, and he would return to town by 8 or 9 o'clock in the morning with perhaps one or two hundred in number. The price for many years was 2 cents each. The hoop-pots have since been abandoned for the more economical ones made of laths. At present the lobster fishery is carried on only by old men who cannot engage in harder kinds of work. In 1880 only eight men were thus engaged, and they made an average stock of about $60 each."

During the cholera season of 1849, according to Captain Atwood, the sale of lobsters in New York and Boston was entirely discontinued, and the fishery was interrupted, buyers breaking off from their contracts.

NORTH TRURO, MASS.—Prior to ten years ago (or before 1870), many New London smacks came to this vicinity for lobsters. At that time the hoop-net pots were still in general use, the fishermen of the vicinity using only as many as they could manage from their small boats, hauling them continuously. The smackmen, however, set a great many in all directions, marking their positions with buoys. About 1860 it was not uncommon for a boat-load to be sold at the rate of a cent apiece. Lobsters are very scarce at present.

BOSTON, MASS.—According to Capt. E. M. Oakes, the first regular lobster dealer in Boston was a Mr. Benjamin Simpson, who kept a restaurant in the basement of a house at the south end. He used to go out in the harbor, in a little boat, and catch them in the vicinity of Castle Fort, and then peddle them about the city. In the course of three or four years a Mr. Newcomb also went into the business, hiring men to catch the lobsters, which he carried up to the city in a small smack, of 10 tons (o. m.), called the Roxana. The lobsters were boiled and peddled through the streets by venders, who received about 25 per cent. on their sales. Boston began using lobsters through the entire summer, fall, and winter, in 1855, Mr. Martin M. Johnson having been the first man to continue their sale beyond the spring and early summer. He was also very instrumental in starting, at about the same time, the important lobster trade between Boston and New York. In 1856 several Boston firms bought lobsters during the entire year, making a few shipments to New York.

An item in the Boston Journal, in 1857, states that there were at that time only three lobster-boiling establishments in Boston. During March, April, May, and June, 200,000 lobsters were boiled there. The quantity of lobsters brought in during the year 1856 was about 1,200,000, by count, worth $60,000 to the fishermen, and $84,000 to the retail trade. Two hundred men were then catching for the Boston market. The lobsters came mainly from the region of Cohasset, and were carried in fifteen smacks, each with a crew of five men, and seven additional men to tend the pots. There was a dory to each man, and they handled fifty pots apiece. "The man in the dory rows among his traps, takes out the lobsters, pushes a wooden plug into the joint of

each claw, to guard against their belligerent acts, rebaits the trap, and sets it again." Instances of lobsters measuring 3 feet long, and weighing 35 pounds each, are mentioned.

SALEM, MASS.—The same journal also states that there were three boiling houses in Salem, for which forty-two men and eighteen boys were employed in procuring supplies. The average daily catch for one thousand traps was 3,000 lobsters, worth 3 cents each to the fishermen. The total catch for Salem, in 1856, was estimated at 150,000 lobsters.

The Barnstable Patriot, for August 4, 1857, referring to the lobster trade of Salem, says: "Mr. D. B. Davis, since March 1, last, has boiled at his establishment 320,000 lobsters, costing $30 per thousand, at fishermen's prices. Other establishments in Salem are boiling large numbers."

SWAMPSCOTT, MASS.—According to the Gloucester Telegraph of October 26, 1870, the trapping of lobsters was first practiced at Swampscott by Ebenezer Thorndike, in 1808.

LYNN, MASS.—The former abundance of lobsters about Lynn is noticed by Lewis and Newhall, in their history of Lynn, in a note written by Mr. Wood in 1663, as follows: "The Bay which lyeth before the Towne, at a lowe spring tyde, will be all flatts for two miles together; upon which is great store of Muscle Banckes, and Clam Banckes, and Lobsters amongst the rockes and grassie holes."

THE ELIZABETH ISLANDS AND VINEYARD SOUND, MASS.—The following item refers to the Elizabeth Islands region in 1807.* "The fishes are the same as those of the vicinity; but lobsters, which are scarce at Martha's Vineyard, are caught in great abundance at all the Elizabeth Islands."

Mr. Frank M. Cottle, of West Tisbury, Martha's Vineyard, says that twenty years ago there was but one vessel engaged in the lobster fishery on that part of the coast, while now there are a dozen. Then the business was not regarded as of any value, and but few men entered it at all. Within the past fifteen years, however, it has rapidly improved, and now there are some sixty men or more in that vicinity who depend upon it almost wholly, during the season.

Mr. Vinal N. Edwards, of Wood's Holl, states that the lobster fishery began in that vicinity as early as 1840.

RHODE ISLAND.—The lobster fishery in this State is of long standing, and is said to have been begun by the early settlers, but we have not been able to obtain any details regarding its growth. The number of lobstermen has greatly increased during the past twenty years, and they now use, on an average, twice as many traps apiece as at that time.

CONNECTICUT.—The lobster interests of this State date back to the early part of the present century, and certainly to before 1810. The lobster fishery within the waters of the State was never very extensive, however, until comparatively recent times, but the Connecticut lobstermen have long been active in the pursuit of their vocation on the coast of Massachusetts, and especially about Cape Cod, as already explained. The important lobster trade which existed for so many years between Cape Cod and New York City, was largely due to their enterprise.

NEW YORK.—The following extract regarding the lobster industry of New York City, in 1853, has come to our notice:

"The annual trade in lobsters and crabs amounts to about $8,000, four fifths of which is for lobsters. Crabs are more generally used for bait than for eating, and there is only one stand that deals in them to any extent. Lobsters come chiefly from Cape Cod and Massachusetts Bay; some from New York Bay. Formerly lobster fishing was more extensively pursued by New York fishermen, but it has turned out to be so unprofitable that it has been almost entirely abandoned. An attempt was made some years ago to revive it, but it was given up as a losing speculation."

NEW JERSEY.—According to the statements of the fishermen of Long Branch and Sea

* Coll. Mass. Hist. Society, Vol. III, second series, page 79.

Bright, the lobster fishery was extensively carried on as early as 1860, the catch being sold to carters for their local trade. The business gradually declined, however, until, in 1870, it was almost wholly abandoned. About 1872 it began to revive, and it has continued to increase in importance up to date.

THE PRESENT RELATIVE ABUNDANCE OF LOBSTERS AS COMPARED WITH THAT OF FORMER YEARS, ACCORDING TO THE STATEMENTS OF FISHERMEN AND OTHERS.

EASTPORT, ME.—Mr. Thomas Holmes, who has been in the fresh lobster and canning business for over ten years, is very firm in his conviction that lobsters are steadily decreasing in abundance from year to year, and that stringent laws are required to protect the fishery. Many more small lobsters are now brought in than formerly, and four times as many traps are required to obtain the same catch. The decrease has been most marked in the several rivers of the region and in the coves and bays that border them. Formerly a large part of the fishing was done in the Pembroke and Calais Rivers, in the former river to within two miles of the town of Pembroke and in the latter as far as Robbinston and Doshe's Island. These rivers were once famous fishing grounds, but now very few lobsters are taken above their mouths. Broad Cove, back of Eastport, was also a rich locality, though now yielding but a small quantity. The lobsters from the Pembroke River averaged very large, and catches were often made in which but few individuals weighed less than 4 or 5 pounds. Lobsters are more abundant this year (1882) than they were in 1880 and 1881. Mr. Holmes roughly estimates the decrease for the past ten years as about two-thirds. He is in favor of a more stringent law, prohibiting the taking of any lobsters under 10½ inches in length. This would for a time affect the interests of the fishermen, who would be unable to dispose of their small lobsters to the canneries, but the fresh lobster trade would not be disturbed, and the former abundance of large lobsters would in time be restored. The canning interests would thereby be seriously interfered with, but no money is now being made in the canning business at Eastport.

Mr. Frederick Holmes thinks there has been little or no decrease, though he admits that many more fishermen in the vicinity are now supplying the markets. His practical experience dates back but a few years.

Mr. William Martin is of the opinion that there has not been a very perceptible, if any, decrease in the abundance of lobsters, though they now run smaller in size.

Mr. George R. Ray, from careful computations based upon the books of Messrs. Pike & Faben, canners, estimates the average catch per boat in the vicinity of Eastport, for the season of 1879 (April 20 to August 1), at 3,939 pounds, the lobsters averaging one pound each. These are important figures for future reference, but we have no data with respect to former years with which to compare them.

MACHIAS, ME.—It may be said that Machias Bay is a very good fishing ground, the statements of several persons warranting the belief that the average daily catch falls but little, if any, short of two lobsters to a pot. A statement is made by Mr. O. S. Church, of Cutler, that one of the boats fishing from that place in 1879 was paid by an Eastport firm for 6 tons of lobsters (about 11,000, by count), being the catch for one season.

JONESPORT, ME.—Lobsters are not abundant enough for the use of trawls, although Mr. G. W. Smith claims that there has been no apparent decrease in abundance during the past ten years. They do, however, run smaller now than formerly. The average season's catch per boat in 1880 was stated by one informant to be about 9,250 lobsters, and by another 10,000 lobsters.

GOULDSBORO', ME.—Mr. J. M. Williams states that lobsters are less abundant than for-

merly. A large daily catch for one man now is 400 lobsters; twenty years ago it was 800 to 1,000 lobsters. The average daily stock at present is said to be about 200 lobsters.

OCEANVILLE, DEER ISLE, ME.—"Lobsters are very small, scarce, and high. This season will finish them. Three years at the most will close up every lobster factory in the State, if something is not done to protect them. The State law amounts to no protection whatever."*

SWAN'S ISLAND, CASTINE, ME.—In 1855 they used to obtain 200 to 250 lobsters daily from forty pots, the smack-lobsters averaging 3 to 3½ pounds each. In 1879 the average catch to forty pots was 75 lobsters, the smack-lobsters averaging 2 pounds each.

ROCKPORT, ME.—Capt. John D. Piper states that lobsters are very much less abundant than formerly.

NORTH HAVEN, ME.—Mr. N. D. Wooster considers that 400 pounds of lobsters is a large daily catch for one man now, while twenty years ago, with the same amount of gear, he could obtain as many as 1,500 pounds in a day.

MUSCLE RIDGES, ME.—Captain Davis, of South Saint George, states that about 1864, when he began buying lobsters at the Muscle Ridges, three men, tending forty to fifty pots each, caught all the count lobsters he could carry to market in his smack. He averaged a trip in seven to nine days, carrying about 5,000 lobsters in number each trip. These three men would catch lobsters as fast as he could market them, and this state of affairs continued for six or seven years, the lobsters during this time averaging about 2½ pounds each, or a trifle more. At present (1879) Captain Davis takes lobsters in the same locality regularly from fifteen men, tending sixty pots each, and at times has to buy of others in order to make up a load. The lobsters carried by him now average about 2 pounds each.

BOOTHBAY, ME.—The growth of the lobster fishery and the decrease of lobsters in this locality have been discussed above in the historical sketch. The summer lobster fishery of this region is now of comparatively little importance. In some places, as in Boothbay Harbor, a few men continue to catch lobsters through the summer. The greater part of the fishermen, however, stop lobstering in May, or perhaps earlier.

BATH, ME.—Mr. R. E. Earll reports, upon the authority of numerous persons, that, notwithstanding the increased amount of gear at present used by the fishermen, and the additional risks and hardships to which they are subjected, they now find the business far from remunerative; but as most of them have their gear, and can fit out with little expense, they are induced to engage in this fishery during the winter season, as it offers, in many places, the only chance of making a living. At present $75 is considered a fair average profit to a man for the winter season, November to April.

WESTPORT POINT, ME.—Mr. Giles R. Gifford says that lobsters are less abundant now than they were in former years.

GEORGETOWN, ME.—One correspondent stated that he had hauled fifty pots for ten lobsters, and thinks one to a trap is a fair average at present, of all sizes. He spent the entire time from September, 1878, to May, 1879, fishing sixty pots, and made only $160, which is, however, much better than most fishermen do in this region.

SMALL POINT, ME.—Lobsters have grown very scarce during late years, and a large share of those taken are unfit for market. The fishery is now carried on by only a few men.

PORTLAND, ME.—Mr. A. L. Johnson writes: "A good catch per day to a man tending fifty pots would number one hundred lobsters; twenty years ago it would have reached four hundred."

* Report of Boston Fish Bureau, Monday, May 8, 1882.

J. Marsten & Sons state that, "A large catch per trap now is five lobsters; twenty years ago it was twenty lobsters."

The information obtained by Mr. R. E. Earll, in 1880, lead to the following conclusions: A fair average catch to a pot per day is one marketable and three small lobsters. Formerly the catch was much larger; twenty to twenty-five years ago the average was about seven lobsters to a pot, averaging in weight from 4 to 6 pounds each. A fair average weight now for marketable lobsters is about 2 pounds.

BIDDEFORD POOL, ME.—The opinion is universal among the lobstermen of this region that lobsters have greatly decreased in abundance and size during the present generation. It is probable that lobsters were among the products of the early fisheries at this place, which began in the first part of the seventeenth century; but as a distinct and separate industry, the lobster fishery is said to date back only about thirty years. "At that time," according to Mr. D. B. Le Gallee, of Biddeford Pool, "there were only two or three men, with about thirty traps each, fishing during the summer to supply the local trade, and tending their traps twice weekly. This fishery continued until about eight years ago, never employing more than eight or ten men at a time, the same men engaging in the trawl-line fishery in the winter. But lobsters became scarce near shore and the men were induced to begin a winter fishery. There have been, since then, as many as thirty men and five smacks, of about 20 tons each, engaged in the winter fishery, and forty men with two thousand traps, in the summer fishery." With reference to the injurious effects resulting from the right to sell small lobsters, Mr. Le Gallee justly remarks: "There is no factory located at this place, but smacks come here in the summer to supply the factories farther north. They pay on an average 1½ cents each for lobsters, which five or six months later would bring from 4 to 7 cents each, thereby causing much injury to the fishermen. Likewise, the months when the law is not in force are the only ones when soft lobsters are caught in abundance, and at these times the small lobsters are also the most plentiful. Thereby the destruction of the lobster is greatly furthered by the existing laws."

The average daily catch per trap at present is said to be about two lobsters, which is considered to be one-third the average catch of twenty years ago. As to the decrease in size, it is said that in 1876, only sixty-five lobsters, on an average, were required to fill a barrel, while now eighty are necessary. Fifty dollars per month is regarded as fair earnings for a lobster fisherman.

WELLS, ME.—Lobsters have not been abundant in this locality for several years past.

YORK, ME.—The catch has greatly fallen off in late years, and lobsters have also become reduced in size.

NEW HAMPSHIRE.—Mr. Richard Fowler, of Seabrook, states that lobsters are now small and scarce. Mr. A. C. Locke, of Rye, writes as follows: "A large catch now would be one hundred lobsters to a haul; twenty years ago it was two hundred to a haul. The decrease during the past twenty years has been one-half."

"The catch of lobsters thus far in New Hampshire has been only about two-thirds that of last season at the same time. The scarcity of lobsters puzzles the oldest fishermen and seems to be wholly unaccountable."*

GLOUCESTER, MASS.—In former times the fishermen made as high as $500 in a season, but now their season's stock seldom exceeds $200. Nearly all the fishermen consulted in the Gloucester district claim that there has been a marked decrease in the abundance of lobsters during the past twenty years, amounting in the estimation of some, to about 75 per cent. Capt. Epes W.

* Cape Ann Advertiser, June 23, 1871.

Merchant states that "in 1818 a man could wade off at low water, at Bass Rocks, Cape Ann, and catch any quantity of lobsters with a common gaff."

Capt. S. J. Martin says: "One man now, with fifty pots, won't catch over one hundred large lobsters a day; twenty years ago, with fifty pots, he would catch four hundred lobsters.

Mr. D. N. Mahlman is of the opinion that "a large catch for a man now per day would not be over twenty-five lobsters. Twenty years ago it was one hundred."

MARBLEHEAD, MASS.—Many of the lobster fishermen affirm that lobsters have greatly decreased in abundance during the past few years.

BOSTON, MASS.—The fishermen all report a considerable decrease in the abundance and size of lobsters, which they say has been going on steadily from year to year. The cause assigned is overfishing.

Mr. James A. Young says: "For one man, with eighty traps, a large catch now would be three hundred lobsters daily. One man twenty years ago, with thirty traps, would catch the same number, but twice the weight."

Mr. J. W. Marston states: "Present catch, one hundred and seventy-five lobsters of marketable size. Twenty years ago, with the same number of traps, the catch would probably have been double."

According to Mr. G. L. Sampson, of Point Shirley, "one hundred a day of marketable size would be a large catch for a man, while twenty years ago only seventy-five of marketable size would be taken; but we set more pots now than then."

Mr. Charles E. Gove, of Nahant, states that "fewer lobsters are caught about here now than was ever known before."

SCITUATE, MASS.—According to Mr. William Bates, the present catch is about two hundred a day; twenty years ago it was four hundred.

PLYMOUTH, MASS.—"A writer in the Boston Transcript says that 'the strange changes in the amount of yearly production of lobsters is very puzzling to fishermen. In Plymouth Bay they used to find good-sized lobsters very plenty, while now the production both inside and upon the coast is very much diminished, both in size and numbers. They attribute it partly to the raking of the rocky bottom for Irish moss, which is now carried on to a great extent. By this means the young lobsters are uncovered and often destroyed, as they need the refuge of the moss both for growth and safety.'"*

Information from the fishermen corroborate the above statement, the lobster fishery at one time having been very extensive.

BARNSTABLE DISTRICT, MASS.—This district, including all of Cape Cod as far south as Falmouth and Wood's Holl, was at one time the most important one upon our coast as regards the lobster fishery, but now it is among the least productive. The history and decline of this fishery, especially about Provincetown, has been quite fully treated of in the foregoing historical sketch and in the coast review, but we present below a few additional statements from fishermen and dealers.

PROVINCETOWN, MASS.—Captain Bowley writes as follows: "For many years lobsters were very plentiful about Provincetown, and men could anchor in the harbor and catch three hundred or four hundred a day. Thousands were let out of the cars because they would not bring a cent apiece. Now (1879) seventy or eighty pots can be hauled without obtaining more than eight or ten lobsters daily. The lobster fishermen cannot gain a livelihood by selling their catch at 7 cents apiece."

* Forest and Stream, vol. iv, 1875.

NORTH TRURO, MASS.—"It is unusual to get forty lobsters in a day (forty-five traps), but fifteen are often taken."

YARMOUTH PORT, MASS.—Mr. Benjamin Lovell states that "twenty years ago, with half the number of pots, you could catch 5,000 in a week. This season (1880) only about 5,000 have been caught in all."

WOOD'S HOLL, MASS.—According to Mr. V. N. Edwards, "we use ten times as many pots now as formerly, and do not catch as many lobsters."

EDGARTOWN DISTRICT, MASS.—A full account of the history of lobster fishing in this district is given in the Coast Review, further on. The principal lobster grounds are in Vineyard Sound, and off Gay Head, No Man's Land, and Cuttyhunk. The fishery began in the vicinity of Gay Head about 1860, but has attained its present proportions only within a few years. It is an interesting fact that, within this period, lobsters have steadily decreased in size and abundance in the upper part of Vineyard Sound, while there has been a proportionate increase in numbers, and the size has remained constant farther out. This apparent change is evidently due to the more recent development of the outer fishery, as the inner grounds became depleted.*

Mr. F. M. Cottle, of West Tisbury, writes that "the catch is now less, because of the 10½-inch law. There would be no difference, providing the same traps were used without restriction."

Mr. D. Vincent, of Chilmark, states: "We probably catch about two-thirds as many as when we first began."

NEW BEDFORD, MASS.—Mr. A. G. Mayhew says that "the catch is now less than formerly. Twenty years ago a man would average four hundred lobsters a day; now the average is two hundred a day."

RHODE ISLAND.—Mr. Christian Francis, an intelligent lobster fisherman of Narragansett Bay, states that the season of 1880 was the best he ever experienced in the lobster fishery, although the seasons of 1878 and 1879 were not far behind in the extent of the catch. This increased production resulted from the use of a greater number of pots, as Mr. Francis affirms that there has been a marked decrease in the abundance of lobsters during the past six years. The testimony of many other fishermen was to the same effect, but very few thought that relief could be gained by the enactment of protective laws. At this same period (1880), when the inquiries regarding the lobster industry were being made, the fishermen complained that their fishery was being destroyed by the visits of fishermen from other States, who set more pots than they did, and covered the most of their ground. Since then stringent laws have been passed by the legislature of the State, forbidding the capture of lobsters in the public waters belonging to the State, by fishermen of other States, and also prohibiting the capture and sale of lobsters under 10 inches in length.

Mr. J. M. K. Southwick, of Newport, states that there is no doubt but fewer lobsters are taken to a pot now than formerly. He based his conclusions on the statements of many fishermen of the vicinity.

Dr. Horatio R. Storer, of Newport, has written as follows: "My neighbors here (I live in the midst of the fishermen) are exercised because crews come here from other States, and remain for months at a time, in the spring for lobsters and in the winter for cod, and they think that the lobsters are rapidly decreasing, perhaps, in part, from their own stupidity, for they often break to pieces the small ones to prevent their entering the pots and stealing the bait."

CONNECTICUT.—Most of the lobstermen of Connecticut agree that there has been a decrease in the abundance of lobsters during the past few years, and that the greatly increased catch has been realized only through the use of a much greater number of pots, the number of fishermen

* For more recent information respecting this region see page 696.

having also increased at the same time. The decrease is variously stated to have amounted to from one-third to one-half within the past five years. The majority of the fishermen are, however, opposed to the law limiting the fishery. One section of the law, that prohibiting the capture and sale of lobsters with spawn from the 1st to the 15th of July, is especially ridiculed by the fishermen, who claim that during that period not one lobster in a thousand will be found with spawn.

STONINGTON, CONN.—Mr. Franklin Noyes writes: "Present catch per man about 50 pounds a day; twenty years ago, about 200 pounds a day."

NOANK, CONN.—Mr. J. H. Latham states: "I think more are now carried to market than ten years ago, but there are ten pots now where there was but one ten years ago." Another correspondent at the same place states that the average daily catch is now about 500 lobsters against 150 twenty years ago; but the gear is much better now.

NEW LONDON, CONN.—Mr. George P. Harris states that lobsters have decreased about one-third.

SOUTH NORWALK, CONN.—Mr. Francis Burritt says sixty pots should catch 100 lobsters now; five years ago, 200 would be taken.

NEW HAVEN, CONN.—Mr. William Fuller writes: "It would be hard to tell what was a large catch twenty years ago, for they were so abundant; but now 300 pounds a day is a good catch for one man. Sometimes a string of a dozen or twenty pots will be hauled and not get half a dozen marketable lobsters; perhaps the next day there may be from fifty to one hundred."

Mr. H. S. Merwin, of Merwin's Point, states that twenty years ago the catch was much larger than now.

NEW YORK.—According to Mr. Eugene G. Blackford, of Fulton market, lobsters were once abundant in New York Bay and Hell Gate, but now they are virtually extinct. The causes are stated to have been both overfishing and the pollution of the waters by neighboring factories.

NEW JERSEY.—From this State there is a reported decrease in size, but lobsters are supposed to be nearly as abundant there now as formerly. The fishery, however, is of slight importance.

THE BRITISH COAST PROVINCES.—Although the lobster fishery of Nova Scotia, as a regular industry, is of more recent origin than that of New England, there had already been, prior to 1880, numerous complaints of a falling off in the supply. According to some writers the decrease was so marked as to seriously threaten the interests of the canneries, and the matter was taken in hand by the Dominion commissioner of fisheries. In 1879 a law was enacted imposing a close time from August of that year to April, 1880. We have received some correspondence respecting the abundance of lobsters on the coast of Nova Scotia, but as it refers to only a few localities, it seems best not to include it here.

In New Brunswick and Newfoundland, the same subject has been under discussion during the past two or three years, with a view of ascertaining the best means of preventing any injury to this industry by overfishing, and great interest has been displayed in the matter by both legislators and fishermen.

THE DECREASE OF LOBSTERS ON THE COAST OF EUROPE.

NORWAY; REPORT BY AXEL BOECK.—In a very interesting paper on the Norwegian lobster fishery and its history, by Axel Boeck, published in 1868 and 1869,* that author gives a detailed account of its gradual growth from earliest times, of the early recognized decrease of supplies,

* Om det norske Hummerfiske og dets Historie of Axel Boeck; in Tidsskrift for Fiskeri, 3 die Aargangs, Kjobenhavn, pp. 28–43, 1868, pp. 145–189, 1869.

and of the important measures taken to protect this important food product. Every part of this lengthy historical sketch contains facts worthy of consideration in connection with our own fishery, but want of space forbids our reproducing here more than that portion bearing upon the period from 1820 to the date of publication of the report. This, however, is the part of most value for our consideration, as it contains conclusive evidence of the possible decrease in the abundance of lobsters, which many of our fishermen have been led to deny, and also discusses the probable causes of such decrease, and the effects of legislation in preventing it and in renewing the supply.

Professor Boeck's report is as follows:

"The number of lobsters exported in 1821 and 1822 amounted to over a million a year, and increased still more during the following years, although it was not so large in 1823 and 1824, on account of the unfavorable weather. From 1825 to 1830 the average number of lobsters exported annually was 1,268,000, and in 1827 and 1828 the highest number was reached, viz., 1,500,000. These large numbers, however, were caused not so much by the fisheries being just as productive, or more so, in the old lobster stations, but by the circumstance that new English companies, seeing the great profit to be derived from this trade, commenced to export lobsters from places from which they had never been exported before. Thus, lobsters began to be exported in 1828 from the district of Tönsberg, and from Söndmör in 1826, and during the two following years from Molde and Christianssund. The exports from Stavanger and Egernsund meanwhile decreased very much, having been reduced to 67,000 per annum in the latter place in 1827, when the exports from the whole of Norway amounted to 1,429,703. After 1830 the exports began to decrease even in the new districts, so that the annual average quantity of lobsters exported during the five years 1831–'35 was only 640,000. The only places that kept the lobster trade alive were the new districts, while all the old ones decreased rapidly, some of them to such a degree that according to the governors' reports the lobster trade must be considered almost extinct in 1835.

"When the attention of the fishermen was directed to this decrease of the lobsters in the old districts, people began to be afraid that the poor fishermen would entirely lose this means of earning a living; and it was supposed that the decrease was chiefly due to the fisheries being carried on during the spawning season of the lobster. In 1830 Mr. T. Lundsgaard, member of the Storthing (Norwegian Parliament), therefore made the motion to pass a law forbidding the catching or exporting of lobsters from June 15 to October 1. The committee which had this matter in charge proposed that the motion should be laid on the table, because Mr. Lundsgaard had not produced any information which might enable the committee to judge with certainty to what extent this dreaded decrease of the fisheries really existed, and whether the evil could be remedied by the measures that were proposed. The committee likewise thought that such a measure would be too great an encroachment on the rights of many places on the coast, taking away from these regions their only source of income. The Government, however, thought that the matter was of great importance; and as the report of the committee showed that only want of information had prevented any action being taken, it requested those districts in which the lobster fisheries were carried on, to have the matter examined by the local officers and other competent men, and to send in a report stating whether it would be useful to pass a law on the subject; and, if so, to state the objections to Mr. Lundsgaard's proposition. All the reports which reached the Government in answer to this request agreed that the lobsters had decreased in size, but some supposed that the great masses of spring herring coming near the coast might have had an influence on it, or that this decrease in the size of the lobsters might be caused by their young ones being disturbed by the cutting of seaweeds for manure; others advised not to pass any law against exporting lobsters

from June 15 to October 1, fearing that the exports to England might thereby be hindered, as the companies would naturally not consider the lobster trade profitable unless it was steady; and the fishermen would lose their income during the time when exportation was forbidden, or they would evade the law, continuing to fish and keeping the lobsters till exportation was again permitted. Others again raised objections based on their knowledge of the natural history of the lobster, considering it doubtful whether the lobster spawned and shed its shell during the time indicated, and even if it were the case, that the time was too long. Reports from other districts, such as Stavanger, said that such a law was unnecessary, as no fishing was, anyway, going on during that time. These objections to such a protective law could not have much influence, especially those founded on the natural history of the lobster, for they could not be proved. But even the fear of an entire stoppage of the lobster trade would be causeless, as such an event would be much more injurious to England, whose inhabitants had accustomed themselves to this luxury, than to Norway, which received but little money for her lobsters. From other sides it was said, in favor of the law, that such a protection would be useful, as the lobster very easily dies during the season when it spawns and sheds it shell, although this season is not the same everywhere. Those who might suffer from limiting the fishing season would be fully compensated for this, by the greater number of lobsters that would be taken during the season when fishing was permitted; and the fishermen should, at any rate, during summer devote their attention more to working their small farms and to the herring fisheries. The Government found that the whole matter was not yet sufficiently clear to say with certainty whether such a prohibition of lobster fishing during the season when the lobster spawns and sheds its shell, would prove generally useful. The districts where lobster fishing was carried on were, therefore, requested to have those fisheries thoroughly examined for several years by competent men, and then again send in reports as to whether such a prohibition would be useful. It was likewise requested that an opinion should be given regarding a proposition made by some people in the district of Nedernees and Raabygdelagen, to divide the coast into small districts, where lobster fishing should be alternately protected, so that if a district had enjoyed the privilege of fishing for three years, fishing should there be forbidden during the three following years. The reports coming in, in answer to this request, contained a very extensive prohibitory law, recommended by the above-mentioned district, suggesting that fishing should be prohibited from March 1 to October 1, and advising that no lobsters measuring less than 8 inches should be caught; the length of time when fishing was to be prohibited should be three years in each district. Another district only wanted to have fishing prohibited from July 1 to November 1, but was not in favor of alternating the time between the districts. The Stavanger district reported that as fishing was going on there only in April, May, and June, no law would be required, and none would be desirable, especially if it were to forbid fishing during the month of June, when the weather was favorable and the fishermen had most time for it. The lobster did not spawn on that coast till August and September. It was also thought that the number of lobsters had not diminished, but that they now staid deeper in the water, finding enough food in the roe left by the herrings; alternating protection was not thought advisable. The report from the South Bergen district was essentially the same, and the Romsdal report said that lobsters were only caught from the end of May till the end of July. As there were, moreover, many different opinions regarding the time when the lobster spawns and sheds its shell, the Government resolved to get the opinion of scientists on this point, and requested Professor Rathke, Prof. C. Boeck, and Professor Sars (at that time a clergyman) to make a report on the nature of the lobster. Professor Rathke in his report said that, in his opinion, the pairing season of the lobster was over before midsummer, and that the shedding of the shell took place later, but he thought at the same

time that the mass of lobsters that came near the coast during the spawning season was so large that the comparatively inconsiderable number that were caught would scarcely be noticed. He also thought that it would be so difficult to enforce the law, that it would be more injurious than useful. Professor Sars thought that a thorough investigation of the spawning process of the lobster would be the only safe basis of any law; but this process was still very much enveloped in obscurity. He supposed, however, that fishing could be carried on till the eggs came out of the ovary, and were fastened under the tail, which took place in June, and fishing should consequently be prohibited from June 1 till September 15. He did not think that the number of lobsters had decreased, but that it only seemed so, because nowadays more people were engaged in fishing, and fewer lobsters consequently fell to the share of each fisherman. He thought, however, that the lobsters had diminished in size. In a later report he expressed his opinion that lobster fishing should be prohibited from June till the middle of September. Prof. C. Boeck gave in his report, in the first place, a description of the lobster's mode of life, and a criticism of the reports on the condition of the lobster fisheries, sent by the governor. He showed from statistics that a decrease in the number of lobsters was both possible and probable, on account of the increased fisheries during the past years. The lobster is a coast animal, and only stays where it can easily get a sufficient supply of food, therefore near the coast, and only as far from it as sea-weeds are found, among which it finds the animals that constitute its food. Even if it wanders about, it does not go far, moving in winter into a greater depth, and during summer into the shallow water near the coast. It then swims about on the surface of the water, but never goes very far, its structure not being adapted for longer journeys. The fact of the matter is, therefore, that a certain number of lobsters belong to a certain extent of coast, which, by propagating freely, may increase if they have sufficient food, or decrease from a natural mortality or too much fishing; and in this latter case, the losses cannot easily be made up by lobsters coming in from the adjoining districts. There can, consequently, be no doubt that the lobster can, on a given stretch of coast, be exterminated by continued persecutions, or its number, at least, be diminished to such a degree as to make lobster fishing unprofitable. Such an event would occur all the sooner if the coast in question be not favorable to its increase. From the reports which had come in, it seemed that certain places were less favorable to their propagation, or possible immigration from adjoining districts, than others, and from such districts the complaints concerning the decrease in the number of lobsters had come. In other places the bottom of the sea along the coast was a convenient place of sojourn for the lobsters, and the number caught was but a small part of those that lived and were born there. In such places the fisheries would be productive and steady. But even there continued exhaustive fishing would diminish their number, especially if there should be an unfavorable year for the growth and development of the lobster. Prof. C. Boeck considered it, therefore, not only desirable, but even necessary for the even maintenance of the fisheries, that there should be certain limitations, so that lobsters should not be caught to such a degree as to make an entire stoppage of the fisheries for a period of time necessary. He believed that the proposed law, in obedience to which lobsters should only be caught at certain seasons of the year, would not fully answer the purpose, especially as no fishing was going on during the proposed time of prohibition in those districts from which there were the loudest complaints of the decrease of the lobsters. He thought, on the other hand, that a law prescribing that only lobsters of a given minimum size should be exported and sold, would keep the fisheries in an even condition. Regarding the size of the lobsters that were to be offered for sale, sold, and exported, he thought that, even if it could not be definitely settled at what age and what size a lobster was capable of spawning, it could, to some extent, be ascertained from an analogical comparison with the river crawfish. This is supposed to

be fully developed sexually in its third year, when it is 4 inches long, but it may attain an age of twenty years and a length of 6 inches. He, therefore, supposed that the lobster becomes capable of spawning when it is three years old and has reached a length of about 8 inches, while lobsters measuring less are seldom found to have any roe. In order, therefore, that the lobster before being caught may not only reach the size when it may be considered fully grown, but might also be supposed to have contributed something toward the propagation of the species, a minimum size of a little more than 8 inches should be agreed upon, for lobsters which might be caught and exported. Possibly 8 inches might be sufficient, as the English generally do not buy any from the fishermen which do not have this size.

"In consequence of this report, the ministry petitioned His Majesty to recommend to the next Storthing the passage of a law forbidding the offer for sale and the sale of lobsters that did not measure 8 inches in length, inclusive of the head and tail.

"The following royal proposition for a law limiting lobster fishing was thereupon published November 5, 1838:

"'We, Carl Johan, &c., make known, &c.:

"'§ 1. That it shall be forbidden in this kingdom to offer for sale or sell lobsters which do not have a minimum length of 8 inches, inclusive of the head and tail. For every lobster offered for sale or sold which shall not have this length, a fine of 24 cents shall be paid, half of which shall go to the police or custom-house officer, or any other person denouncing the offender, and the other half to the poor. All cases of this kind are to be brought before the police courts.

"'§ 2. Lobsters which do not have the above-mentioned length, shall not be exported.'

"The Storthing committee which had to consider this matter hesitated to recommend to the Storthing the passage of this law, basing their objections on several reports from the lobster districts and on Professor Rathke's report. Their chief objection, however, was that the fishermen would consider such a law as limiting their liberty, and, not being able to understand its utility, would thereby only be encouraged to follow the dictates of selfishness and transgress the law. It was, moreover, thought that it would be difficult to exercise any sufficient control, and that the trade would be injured thereby. The law was therefore not passed. This was the fourth time that a moderate proposition had been made to protect the lobster in order to avoid the total ruin of the fisheries. In the *first* proposal, by Judge Lom, it had been suggested that the lobster should be protected at certain seasons of the year, when it spawns or sheds its shell, and likewise that those lobsters should be protected that had not reached a certain length. In the *second*, by Mr. Gjertsen, only a certain annual season of protection was suggested; as was also done in the *third*, by Mr. Lundsgaard. The *fourth*, or Government proposal, only suggested that lobsters below a certain size should not be caught.

"It was not long before there were again numerous complaints of the decrease in the number of lobsters, which, according to the testimony of impartial men, was owing to lobsters being caught at a time when they spawn and shed their shell. Before anything further was done in the matter, a fishery commission that had been appointed made a proposal regarding the lobster fisheries which must be mentioned here. In 1840 the Government appointed a commission to revise the fishery laws. The following were members of this commission: Judge Landmark, Consul Meltzer, Messrs. Tangen and Moses, merchants, Rev. (now Professor) Sars, and Chief Pilot Monsen. One passage of the law proposed by this commission reads as follows: 'On their own property, as far as 10 fathoms from the coast at low water, the owners shall have the exclusive privilege to catch all small fish, lobsters, and oysters, but any one may catch lobsters outside of unimproved land bounding the sea without regard to the distance from the coast.'

"In this proposition, which, however, never became a law, the old idea is revived that the lobster fisheries, properly speaking, belong to the land-owners, which, in spite of the decree of 1728, had formed the subject of discussion all through the last century. Even if this proposition had become a law, it would not have exercised any great influence on the lobster fisheries, which are almost exclusively carried on along unimproved coasts which can scarcely ever be subjected to cultivation. No new law regarding the protection of lobsters was introduced in the next Storthing, but in 1845, when the Storthing had assembled, the department of finance and customs received a letter from the agent of the English lobster company in Stavanger, that another English company intended to continue the lobster fisheries, which, in that district, usually cease toward the end of June, during July, August, and September, hoping thereby to gain over the lobster fisheries, and thus to destroy the trade of the other company. As this agent was afraid that fishing during those months would ruin the lobster fisheries in this district for several years to come, he urged the department to introduce the royal proposition of a law in the Storthing, forbidding lobster fishing from June 15 to October 15. The department requested the governor to give his opinion on the subject. He stated, as he had done on a former occasion, that such a law would be unnecessary, as the lobster is not fit to eat during those summer months, and none could therefore be exported. During this and the following years lobsters were, nevertheless, caught and exported during those months, as the two companies vied with each other, each endeavoring to secure the trade. The price of lobsters rose considerably, and all those that were caught were bought up, even during the season when they spawn and shed their shell, although every one saw what injury was being done, and although the mortality among the lobsters was great, and the consequent loss considerable. All this soon bore its fruit, but few lobsters being caught in 1847 in those places where in 1845 fishing had been going on till the end of August, while the fisheries were productive in those places where they had ceased in July. All were now agreed that it was injurious to catch lobsters during the season of the year when they spawn and shed their shell, which, in the districts in question, was supposed to take place in August and September, and it became evident that such continued fishing would in a short time drive the lobsters entirely from the coast. To prevent such a misfortune the governor at last resolved to request the department to issue a provisional regulation, forbidding lobster fishing during the months of August and September. The department, however, again considered it necessary to get reports from the lobster districts and from the agents of the English lobster companies. Some of these reports declared that lobster fishing should be forbidden from the middle of July till the middle of October; others that there should be no fishing during August and September. The agent of an English lobster company in Jarlsberg and Laurvig, however, advised against any prohibition of the lobster fisheries, saying that such a prohibition during the summer months would cause the English lobster companies to stop this trade, ice hindering the fisheries in winter and spring, and storms those in the latter part of autumn, so that the fisheries commenced gradually in May and lasted till the end of September. They are most productive in July, August, and September. The decrease of the lobster fisheries he ascribed not to the summer fisheries, which were said to diminish the number of lobsters, but to the circumstance that the people of the district devote their attention more to the profitable mackerel fisheries. The governor was of the same opinion. A totally different opinion, however, was entertained by other competent and trustworthy persons in Laurvig and the neighborhood, who, from information obtained by the lobster fishers of that district, judged that such a prohibition of fishing from the middle of July till the middle or end of September would have a favorable influence on the preservation of the lobsters. The governor of the Lister and Mandal districts showed in his report, by examples from the years of war, that the more the lob-

sters are protected the more will they increase in number; and their decrease since 1830 was almost unanimously ascribed to the summer fisheries, which are going on at a time when the lobsters spawn, although the spawning does not occur at the same time in every place. Such a prohibitory law would therefore be of great importance for the lobster-fisheries. It was true that, on the other hand, the trade would be somewhat inconvenienced by such a law, the prices would fall, and it would be necessary to modify the time when fishing should be prohibited, according to different local circumstances. The reports that came in from the other districts likewise favored the prohibition of fishing during the months of July, August, and September, some even advising an extension of this time from May till October. Another agent of an English lobster company, however, warned against any interference by law with this trade, particularly on account of the fishermen, who would not be able to earn their living during a great part of the year. The decrease of the fisheries was, in his opinion, chiefly caused by the fact that fewer men were employed in them, the increase of navigation and the rich herring and mackerel fisheries employing so many men. He supposed, moreover, that a law prohibiting the catching of lobsters during a certain period would not prove beneficial to the lobster trade, but that an undoubtedly more productive fishery during the months when fishing would be allowed would have a very injurious effect on the market. The Bergen Board of Trade were of opinion that such a prohibition, if it did not extend to the months of May, June, and July, would not disturb the fisheries in the Bergen district, which are chiefly carried on during these months, but that it would not be advisible to forbid fishing during these months. If it was absolutely necessary to pass some law for the preservation of the lobster, they would advise the Government to take up the old proposition not to catch and sell lobsters measuring less than 8 inches. The governor of the North Bergen district considered it desirable that the lobsters should be protected from the middle of July till the middle of September. In Romsdal, however, no prohibition was desired between June 15 and September 15, since fishing was going on during this very period. As so many different opinions had come from the different parts of the country, and as it seemed desirable to hear the opinion of several naturalists, Professor Rasch was requested by the Government to prepare a law for the preservation of the lobster, giving the full reasons for such a law. In his report to the department he first of all gave his view regarding the pairing season, and then regarding the time which elapses between the pairing and the emission of the eggs from the ovary. He found that the pairing season of the lobster extended over a long period of time, viz, from the time it first sheds its shell in September till April or May, but that the embryo does not develop till the heat of summer sets in, no matter whether the spawning has taken place in autumn, winter, or spring. Most of them have their eggs hatched in July and August, and the young lobsters leave their mother from the middle of August to the middle of September.

"He had found, moreover, that the lobster was capable of propagating before it had reached a length of 8 inches. He would therefore propose—

"SEC. 1. His Majesty may take measures for protecting the lobsters during a continuous period of two to three months annually in every district of the Kingdom, at the request of the respective governors.

"SEC. 2. The season of protection shall in every case embrace the whole month of August.

"SEC. 3. The protection may extend both to males and females, or only to the latter.

"SEC. 4. Whoever catches lobsters, or offers them for sale, during the close season, in the district or districts where there is such a law, shall pay a fine of 24 cents for every lobster which is caught or offered for sale contrary to the law.

"SEC. 5. In the district or districts where the protection extends only to the female lobsters,

a fine of 24 cents apiece shall be paid by every one who, during the season of protection, allows female lobsters to be caught and offered for sale, or in any way trades in such.

"SEC. 6. The same fine shall be imposed on lobster dealers or their agents if they receive and ship lobsters caught during the close season, in accordance with the law in force in the district in which the lobster station is located.

"SEC. 7. The sums realized by these fines go half to the person who denounces the transgressor, and the other half to the poor fund of the respective district. All such cases must be brought before the police court.

"Professor Rasch has given his reasons for the provisions of the above law as follows:

"'Although there are frequent complaints that general game and fishing laws are not suited to all the districts of this large country, where the different degrees of latitude and local circumstances produce great differences with regard to the pairing season, the periodical arrival, &c., of the same races of animals, he had in most cases found fewer differences than one in general might be led to suppose. He proposed section 1, so that every district should have the season of protection best suited to its circumstances.'

"Regarding section 2 he says:

"'As in his opinion it seemed sufficiently proved that the most prolific hatching season occurs in the month of August, even in the most northerly portions of the country where lobster fishing is carried on, he thought that, in all cases, this month should be included in the season of protection.'

"Regarding section 3, he thought that the strictness of the protection might be relaxed a little in those districts where the summer fisheries, on account of peculiar circumstances, cannot be entirely stopped without immediate loss to the poor coast population. He thought, moreover, that by protecting only the female lobsters, the purpose of the law with regard to the preservation of the species will be just as fully answered as by protecting both sexes during the same period of time. The objection may be raised that it will be difficult to distinguish between a female without outside roe and a male; but the difference of sex is so great that a fisherman may be able to tell it at the first glance. Nor would he only protect those lobsters which have outside roe, as this may easily be scraped off. Irregularities of the normal sexual relations will be of very little importance, as most of the females which have been protected will be caught by the fishermen when the season of protection is over, as they go but a short distance from the place where they stay. The objection made to the law, that it would force the fishermen to return the products of the sea to it, he considers to be of great importance, but he hoped that they would see what a great risk they ran by unlawful fishing, and be convinced that protection will in the long run benefit their trade.

"From the above it will be seen that, with the exception of the governors of Jarlsberg and Laurvig, and two of the lobster-agents, all local authorities and competent men were in favor of the opinion that the decrease in the number of lobsters noticed during the last few years, had been caused by too extensive fishing during that part of summer when the lobster spawns, and had considered a law prohibiting lobster fishing during a certain period of summer and autumn as the only effective means of protecting this important animal. But others, we see, wished to have the protection extended from June or May till October; others only from July to September; and others, again, only to August and September. Both in Sweden and Heligoland there are laws prohibiting the catching and selling of lobsters from July 1 till September 15, and in Scotland it is forbidden, under a penalty of £5 each, to catch lobsters from June 1 till September 1; and in England no lobster is allowed to be sold which measures less than 8 inches. The Gov-

ernment also considered that protection during the season of the year when the hatching is chiefly going on would answer the purpose, and that it could be more easily maintained than a law prohibiting the fishing and selling of lobsters below a certain size. As the young are chiefly hatched during the month of August, but also during July and September, the Government thought that August should be included in every close season, while it should be left to the local authorities, with royal approbation, to extend this legal season of protection to July and September, in accordance with the local circumstances of every district. By adopting these measures, the trade would not be restricted to any serious extent. This was also granted by the commissioners of the English lobster companies, and, as far as the fishermen are affected, they can easily find work in nearly every part of the Kingdom during August, while, on the other hand, the protection of lobsters during a certain period will make the fisheries all the more productive during the months when fishing is allowed. With regard to the other objections to limiting the fisheries during the summer months, viz, that in the districts of Romsdal, Jarlsberg, and Laurvig, they are only carried on from the beginning of spring or summer till some time in the fall, the Government remarked that this could scarcely be caused by any special arrangements of the lobsters on these parts of the coast, but is a natural consequence of the circumstance that the fishermen in the district of Romsdal during spring and autumn are employed in the great fisheries, while in the districts of Jarlsberg and Laurvig this is caused by the natural hindrances of ice and storms during spring and autumn. But especially in these districts a law prohibiting fishing during the month of August could not limit this trade very much, compared with the beneficial consequences which such a law would have. The Government thought that the prohibition should extend both to male and female lobsters, which opinion was finally also shared by Rasch. The Government also proposed that the law forbidding the export of lobsters should extend the time when export was not allowed eight days beyond the end of the close season, so as to enable the fishermen to fish up to the very commencement of the close season.

"On January 26, 1848, the King signed the following proposition for a law for the protection of lobsters, to be laid before the Storthing during its next session:

"'We, Oscar, &c., make known:

"'For some time complaints have been made that the number of lobsters on the coasts of the Kingdom has decreased considerably, especially since the year 1830. Competent men have been consulted as to the possible causes of this phenomenon, as likewise as to the means by which the lobster might be preserved, and a royal proposition for a law forbidding the catching or export of lobsters measuring less than 8 inches in length was laid before the Storthing, but was not passed. Renewed complaints of the great decrease in the number of lobsters have recently come from several parts of the country, petitions have been sent in asking that the catching of lobsters at certain seasons of the year might be forbidden, and from the information received on this point it has been considered absolutely necessary, for the preservation of the lobster, to fix by law a certain season of protection for this marine animal.

"'His Majesty would therefore invite the attention of the Storthing of the Kingdom of Norway to this subject, and ask them to pass a law regarding the protection of lobsters, in accordance with the accompanying draft:

"'*Draft of a law regarding the protection of lobsters.*

"'1. It shall be forbidden to catch or sell lobsters during the month of August.

"'2. In accordance with a request made by the respective local authorities, the above-mentioned period may be extended in the different districts by the King, but it shall in no place last longer than from July 1 to September 30.

"'3. The fishing or selling of lobsters during a period when it is forbidden in accordance with sections 1 and 2 is punished with a fine of 24 cents for every lobster caught or offered for sale contrary to law.

"'4. All cases arising from transgressions of the regulations contained in sections 1 and 2 must be brought before the police courts. If any one is accused of such transgression, the chief of police in the district shall get his declaration whether he is willing to pay the fines. If he is willing and does not possess the necessary amount of money, it shall be levied on his property. If, on the other hand, the accused denies his guilt, or refuses to pay, the above-mentioned officer shall have the matter investigated and settled. The fines shall be divided between the informer and the local poor-fund.

"'5. During the period when, in accordance with sections 1 and 2, it is forbidden to catch or offer for sale lobsters, as well as during eight days following the end of this period, it shall likewise be forbidden to ship lobsters to foreign parts. Attempted or actual transgressions of this article shall be punished in the same manner as provided in the law of September 20, 1845, regarding attempted or actual smuggling.

"'6. This law shall take effect January 1, 1849.'

"In the committee to which the royal proposition was assigned for consideration, the first two articles were changed, so as to make the season of protection stricter. In the royal proposition the local authorities could under special circumstances propose that the season of protection be extended to the months before and after August; but the committee were of the opinion that the law should be enforced during a longer period, but in special cases the local authorities might propose that it should be limited to the month of August, to such a degree had public opinion changed in favor of such protective law.

"When the matter was discussed in the Storthing April 29, 1848, not a voice was raised against a protective law, but the discussion was chiefly as to whether the law should be adopted in its stricter form as recommended by the committee, or as proposed by the Government. The law was finally adopted in the form recommended by the committee, modified by an amendment that the season of protection should last from July 15 to the end of September. The first portion of section 5 was also changed so as to read as follows: 'Eight days after the beginning of the period during which, in accordance with sections 1 and 2, it is forbidden to catch lobsters or offer them for sale till eight days after the end of this period, it shall be likewise forbidden to ship lobsters to foreign parts.' As for the rest, the law was passed in the shape recommended by the committee; a motion to change the above-mentioned eight days to twelve days or three weeks being lost, as likewise another motion that the law should not come in force till January 1, 1850.

"The law, which was adopted in the same shape by both houses of the Storthing, and was sanctioned by the King, came to read as follows:

"'1. It shall be forbidden to catch or offer for sale lobsters during the period from July 15 till the end of September.

"'2. In accordance with a request from the respective local authorities, this period may be limited in different districts by the King; but the season of prohibition must in every case embrace the whole month of August."

3 and 4 are precisely as in the royal proposition.

"'5. From eight days after the beginning of the period during which, in accordance with 1 and 2, it is forbidden to catch lobsters or offer them for sale, till eight days after the end of this period, it shall likewise be forbidden to export lobsters to foreign parts.

"'6. This law shall come into force January 1, 1849.'

"By this law, which forbids all fishing during two and a half months, the yield of the fisheries was of course somewhat diminished during the first years following its passage, till the protected young could reach the necessary size. Thus fewer were exported in 1849 and 1850 than during the preceding years, so that, while from 1846 to 1848 about 600,000 were exported, the number had fallen off to 408,310 in 1849 and 427,600 in 1850. This decrease, however, is not merely owing to the circumstance that the number which were usually caught during the close months remained in the sea, but likewise to the fact that the English joint stock company which carried on the exportation from the districts of Jarlsberg and Laurvig, began to pay a lower price for the lobsters, so that the fishermen resolved no longer to catch any even during those months when they were permitted to do so. While from this district there were from 1846 to 1848 on an average about 26,000 exported every year, only 7,960 were exported in 1849, 1,664 in 1850, and none at all during the following years; but, in 1855, 14,470 were again exported, chiefly to Copenhagen. Since 1850 the lobster trade has steadily increased, and the governors, in their quinquennial reports on the economical condition of their respective districts, state that protection seems to have produced this result.

"In the district of Stavanger the exports rose from 1850, when they amounted to 120,653, to 204,803 in 1854; in the South Bergen district it is also stated that the fisheries have increased. Of the following years the least productive was 1858, when the exports from the whole Kingdom only amounted to 553,238, on account of unfavorable weather during the whole fishing season; but in 1860 the number had again risen to 1,333,037, and kept tolerably steady during the following years, so that the exports during these years were about the same as during the years 1825–'30, when they were at their highest, only to decrease very rapidly during the following years. In 1860 the exports rose to 1,000,000, and increased constantly, till in 1865 they very nearly reached 2,000,000, viz, 1,956,276.

"The complaints regarding the protective law have now ceased, since the Government has, in several districts, limited it by royal decrees, and in many places the people are rather inclined to extend the season of protection than to limit it, as in the district of Stavanger, where two years ago public opinion was in favor of prohibiting all fishing during autumn and winter, as it was thought that thereby the spring and summer fisheries would become all the more productive. As a general rule, no lobsters are exported from there in autumn and winter, except when some new English companies want to get into the lobster trade, and therefore buy the lobsters at a higher price than is usually paid, so as to ruin their rivals. Then all the lobsters that can be obtained are generally bought during autumn, as was the case in 1845 and 1846, and to some extent in 1864 and 1865. During the last-mentioned year such a large quantity of lobsters was caught, on account of the unusually calm weather, that the Englishmen who had urged the fishermen to fish could not take more than one-third of all that had been caught, and the rest died, without being of use to any one. One reason why the fishermen wish to see this autumn fishing forbidden by law is, that even if they were unanimous as to its injurious character, all of them would, though unwillingly, take part in it, (if a small number of fishermen moved by covetousness were to catch lobsters, and there was a chance of selling them at that season. They would suppose that those lobsters which they might otherwise get in the spring would now be caught by others in the autumn, resulting in great injury to their trade.

NORWAY: REPORT OF G. VON YHLEN.—The following extract respecting the decrease of lobsters on certain portions of the Norwegian coast is from a report of more recent date than the above:

"It cannot be denied that the lobster fishery is gradually decreasing, whether the size or the number of lobsters caught be considered.

"It is irrefutably a necessity that the time of prohibition should be extended in the fall, when conjugation generally takes place; and also that the minimum size of lobsters allowed to be caught should be so determined that their first spawning be protected.

"The English Parliament has lately resolved that 8 inches shall be the minimum size, and it would also be well to adopt that as a law with us."*

NORWAY: REPORT OF PROF. G. O. SARS.—Prof. G. O. Sars, one of the best informed of Norwegian authorities on the sea fisheries and a naturalist of the highest standing, whose opinion is worthy of careful consideration, has published the following views respecting the best methods of protecting the lobster industry:

"The principle which has been followed in framing laws for the better protection of the lobster is the same which forms the basis of all similar protective laws, viz, a desire to let the propagating of the lobster go on as undisturbedly as possible. If one considers what an enormous quantity of roe an adult female lobster carries under her tail, and also that all this roe becomes impregnated, and that, consequently, every egg develops into a lobster, it is very natural to suppose that if only a sufficient number of female lobsters could hatch their young undisturbedly, ample compensation would be made for the number of grown lobsters caught every year. It was also very natural to suppose that the decrease in the quantity of lobsters, which had been observed in various places, was caused by catching grown female lobsters during the hatching season. With other fisheries the use of certain fishing implements has proved hurtful to the fish; but the implements employed in lobster fishing are of such a kind as to preclude this possibility.

"On general principles, the above-mentioned view seems to be entirely justified and logical. There is no doubt but that if the lobster is left undisturbed during the hatching season a number of young will be produced large enough to compensate, under favorable circumstances, for all the lobsters that are caught. It is, therefore, only right that the lobster should be, as far as possible, protected during the hatching season. It is, likewise, possible that indiscriminate fishing during the hatching season will hinder the increase of the lobsters. It must be remembered, however, that there are many other disturbing causes. I have already, on another occasion, shown that the young lobster, during the earliest period of its life, is exposed to many dangers, and that probably a large number perish, on account of unfavorable influences during their development. If, therefore, in spite of protective measures, a decrease in the quantity of lobsters has been observed in various places, it must not be supposed that the only cause of it is lack of protection or too short a season of protection. The season of protection is, in my opinion, correct on the whole, and if I now consider it best to set it a little earlier, viz, to begin the 1st of July, I do this from another reason, that is, out of regard for the shedding of the lobster, which begins during the first days of this month. The lobster is, at that time, entirely unfit for transportation, and may die even in the boxes. I believe that if the lobster is thoroughly protected during the months of July and August, there will be some guarantee at least that a sufficient number of young ones will be produced to make up for all losses occasioned by the lobster fisheries during the other months of the year.

"But no laws and no protective measures can change the unfavorable physical conditions which have caused a decrease of lobsters on certain portions of our coast. The only means to be employed under such circumstances is the artificial raising of lobsters. I shall have occasion to return to this point, and merely to avoid misconception, will say here that I consider a reasonably arranged protection of the lobster not only desirable but also necessary; but the protective measures should be somewhat uniform in the different districts. At any rate, on that portion of the

* Report on the Sea Fisheries of the Län of Göteborg and Bohus in the year 1877, by Gerhard van Thien.

coast which I visited, I found but very little difference both with regard to the time of hatching and the time of shedding. Thus, there is no reason for having a different season of protection in these districts. But as memorials have been sent to the Department of the Interior from several places, asking for an extension of the protective season, it will probably be best, in order to avoid dissatisfaction, to leave it to each community to extend the protective season wherever there is a very general demand for it. But I must say that if protection is to answer its purpose, it will be necessary for the different districts to organize a system of superintendence, so that the laws may be strictly carried out. As matters now stand, there is—and I speak from personal observation—as much fishing going on on our southern coast during the season of protection as at other seasons. Where the protective season lasts only a month, those lobsters which have been caught when fishing is prohibited are generally kept in large boxes until the protective season is passed, when they are brought to market. But many of these closely packed lobsters die in the boxes, and those which are left are so lean and miserable that they are of little or no value, and are necessarily thrown away." *

GREAT BRITAIN.—The fishery commissioners of England, in the years 1875 and 1876, made a thorough inspection of the crab and lobster fisheries of the English and Scottish coasts. All the principal fishing stations were visited, and from personal observations and the testimony of fishermen and dealers a very elaborate report, embodying every detail of their investigations, was prepared and published in 1877.† The conclusions at which they arrived regarding the state of the fishery and the suggestions made for its improvement, are contained in the following extract from their report:

"In a great many cases it is not very easy to conclude whether the fishery is falling off or not. The increase in price is certainly in almost every case greater than the decrease in the supply. The take in many cases is not so large as it used to be, but in nearly every place it is more valuable. The increased price and the greater facilities which railways have afforded for bringing the fish to market, have attracted more fishermen to the pursuit, and have induced them to follow the crabs and lobsters into much deeper water than formerly. It is no easy matter, therefore, to compare the results of the fishing now with those which were experienced fifty or twenty-five years ago. The take now is divided among a greater number of fishermen. The area of the fishery has been greatly extended. On the whole, however, we believe that we are in the right in concluding that in small fisheries, or fisheries in confined areas, there has been in every case a marked decrease of fish; while in large and exposed fisheries there has been no decrease whatever. Take, for example, the fisheries off the Land's End, the Lizard, and the Start. All these fisheries comprise large areas of sea bottom, all of them are in exposed situations, and the powers of man have been hitherto incapable of exhausting them. But there are other fisheries in an exactly opposite position. A description will be found, for instance, in the evidence which we received at Wembury, relating to a small fishery off the Eddystone Rocks. The fishery is contained in a few acres, and, though the situation is exposed, the area is so small that the fishermen have been able to exhaust it. The same conclusion is true of the fisheries which are situated in confined bays, such, for instance, as that at Falmouth. The fishermen there, exposed to no bad weather, are able to pursue the fishery at every season of the year. High prices have induced them to increase the efficiency of their gear, and the gradual decay of the fishery, which overfishing has occasioned, has compelled them to fish harder and harder to earn a livelihood. The fishermen in

* Reports made to the Department of the Interior, of Investigations of the Salt-Water Fisheries of Norway during the years 1874–1877, by Prof. G. O. Sars.

† Reports on the Crab and Lobster Fisheries of England and Wales, by Frank Buckland and Spencer Walpole, Esqrs., * * * of Scotland, by Frank Buckland and Spencer Walpole, Esqrs., &c. London, 1877.

these cases are themselves conscious of the loss which they are themselves producing. But without the aid of Parliament they are unable to enforce the regulations which in their judgment would restore the fishery.

"As regards the lobster fishery, three suggestions have been made to us for its improvement, viz: the institution of a gauge; the enactment of a close season; and the prohibition of the sale of berried lobsters; but the suggestion which has found most universal favor is the institution of a gauge. In Cornwall and Devonshire, in Yorkshire and Northumberland, the fishermen have almost without exception suggested that no lobster should be sold under a length of about 8 inches. The same recommendation was made to us by the great fish merchants who are established at Hamble, and by the great salesmen in Billingsgate Market. * * * On the northeast coast of England it was suggested to us that no lobster should be taken under 4 inches in the barrel (carapax). In the rest of England the almost unanimous recommendation was that no lobster should be taken under 8 inches in length. These two recommendations are practically very similar. A lobster 4 inches long in the barrel is usually more than 8 inches in length; but, as it is always undesirable to interfere with local customs, we see no reason why both gauges should not be inserted in any act of Parliament that may be passed. It would then be illegal to sell any lobster which did not measure either 8 inches in length or 4 inches in the barrel.

"If the gauge be adopted, it is in our judgment essential that it should apply to all the fish markets. The only practicable means of enforcing a gauge is to enforce it in the markets, and the gauge must therefore apply to all lobsters sold in those markets, wherever they may be taken. The only practical difficulty in enforcing the gauge arises from the large importation of Norwegian lobsters, and we think it would be unwise to attempt any legislation without considering the effect which it might have on this trade. * * *

"It will be seen from the foregoing remarks that an 8-inch gauge has already been proposed in Norway. Of the two merchants engaged in the Norway trade, whom we had the advantage of examining, Mr. Fisher, of Billingsgate, was of opinion that an 8-inch gauge would interfere with the Norwegian fishery, but that a 7½-inch gauge would be desirable. Captain Harnden, of Hamble, on the contrary, concluded that an 8-inch gauge would ultimately be beneficial to it. With Captain Harnden's evidence before us, we think that Parliament may fairly enact that, with one exception, no lobster shall in future be sold in this country under 8 inches in length.

"The exception which, we fear, must be made to this rule applies to Bognor. Lobsters of a very small size are taken in large numbers off Bognor, and the application of an 8-inch gauge to Bognor would destroy the fishery for lobsters at that place. The fishermen at Bognor desire the institution of a 6½-inch gauge; we have, ourselves, little doubt that a 7-inch gauge would be large enough for the Bognor fishery. If, however, the Bognor fishermen are allowed to take 7-inch lobsters, their sale should be confined within the limits of the county of Sussex. * * *

"Two other recommendations have in some places been made to us for the improvement of the lobster fishery. It has been suggested to us that a close season should be instituted, and it has also been suggested that the sale of berried lobsters should be prohibited. A universal close season is impracticable, because the season which would suit one part of the coast would be quite inapplicable to other parts. In a great many places the storms of winter afford by themselves a sufficient close season. On the coast of Cornwall, again, the pilchard fishery practically entails a close season. * * * On the east coast of England, again, the herring season affords a natural close time. * * * A close season is, then, for all intents and purposes, already established in some places. In others, no close season is necessary, on account of the extent and situation of the fishery. No universal close season need, therefore, be imposed by act of Parliament. * * *

"We are also unable to indorse the other recommendation which has been made to us, viz, that the sale of berried lobsters should be prohibited. In the first place, if it were illegal to take berried lobsters, it would not pay the fishermen in many cases to pursue the lobster fishery. In the next place, the lobster when berried is in the very best possible condition for food, and it would be as illogical, therefore, to prohibit its capture as to prohibit the taking of full herrings. In the third place, if its capture were illegal, Mr. Scovell's evidence at Hamble shows that the fishermen would probably remove the berries. * * *

"We recommend, therefore, the institution of a gauge as the only remedy universally applicable for the improvement of our lobster fisheries."

OPINIONS OF THE FISHERMEN AND OTHERS RESPECTING PROTECTIVE LAWS.

INTRODUCTION.—In the circulars sent out respecting the lobster fishery, and in personal interviews on the subject, the opinion of each person was asked as to whether he was satisfied with the existing laws, and if not, in what manner he would desire to have them changed. Comparatively few replies were obtained, and these may not be regarded as of much value; but it has been thought best to insert them here. The names of most of the correspondents have been omitted, and with reference to a few localities the opinions as here stated are drawn up from the statements of several individuals.

Three classes of individuals are interested in the lobster fishery on the coast of Maine—the fishermen, the fresh-lobster dealers, and the canners—and each regarding the fishery from a somewhat different standpoint, according to individual interests, it is not strange that opinions as to the present and future needs of this industry should be somewhat at variance. It is the fishermen's interest to make as large captures and sales as possible; the fresh dealers cater to a trade that demands only lobsters above a certain size (about 10½ or 11 inches), while the canners use all that are large enough to pay them for the handling, although those that are suited for the fresh markets are generally too expensive to put into cans. Elsewhere on the coast the influence of the canneries is not felt and the problem involved in the preparation of suitable protective laws is much simpler.

Many of those directly interested in the lobster fishery, even though conscious of an apparent decrease, are opposed either to legislation or to any change in existing laws, and this is especially true of the coast of Maine. The objection generally raised by the fishermen to laws governing the size of marketable lobsters is that it is difficult either to measure or weigh the lobsters as they are taken from the traps, and that unscrupulous fishermen would kill those taken under a standard size in order to prevent their entering the traps a second time. When spawning lobsters are caught, the same fishermen, it is argued, could easily remove the eggs, and in this manner evade the law. To most persons, a close time presents the simplest method of protecting the industry; but a close time to serve the most good should come at that season of the year when the fishery is most profitable for the fishermen.

GOULDSBORO', ME.—A correspondent writes: "I think there should be no lobsters caught in July and August."

ROCKPORT, ME.—Mr. John D. Piper writes as follows: "My reasons for expressing a belief that the law should be so changed as to restrict the taking of lobsters to thrifty marketable lobsters of not less than 10½ inches in length, are that the factories use lobsters of from 3 to 7 inches in size, and these are taken in shoal water where they are feeding in large quantities. Could these small growing lobsters be protected until they are 10½ inches, the increase of the catch would be wonderful. I would prohibit the canning of soft-shell lobsters because it is an imposition upon

the consumer, and in the end will injure the reputation of the canned lobster as an article of food. The soft-shelled lobster, if protected, would soon grow to be a good fish worth catching, while it is of little or no value if used when soft."

NORTH HAVEN, ME.—"It is my opinion that the sale of lobsters under 8½ or 9 inches should never have been permitted, and that it should be prohibited in the future. The canneries and well smacks should be governed by the same restrictions."

GEORGE'S ISLAND, ME.—The fishermen almost universally approve of the present law forbidding the sale of small lobsters, except from April to August, for canning purposes, and a large majority would favor a modification of the law, so that no small lobsters could be saved for any purpose. They argue, and with some force, that the canning of the small ones during the summer practically destroys the good results intended by the law, as very many are caught up at such times, and comparatively few remain to attain the adult size. They claim that many lobsters measuring only 6 inches in length and weighing but ½ pound are caught for canning at an average price of only half a cent each, while, if saved, they would in two years at the most be of good marketable size, and would bring from four to ten times as much. The destruction of small lobsters is quite extensive in the vicinity of Muscle Ridges.

WESTPORT, ME.—"It would be as well if the prescribed length was 10 inches instead of 10½ inches."

GEORGETOWN, ME.—At this place the fishermen strongly favor the law and would prefer an extension of its provisions so that no small lobsters could be sold at any time.

PORTLAND, ME.—The Maine law that went into effect August 1, 1879, is heartily approved by the fresh-lobster dealers, and they are eager in their demands for an extension of the protection to young lobsters, so that at no period could any lobsters be saved or sold smaller than 10½ inches in length. They claim that the canneries now have all the time they would naturally require for canning and that they are destroying the fisheries by buying up enormous quantities of the small lobsters which are virtually of no value, or, at the most, supply but very little meat, while if left in the water for another season they would attain a good size, and a much smaller number would then furnish as much meat as is now obtained from the vast number of small ones. They claim to have learned by experience that there is absolute necessity for stringent legislation, as the fishery is being rapidly destroyed.

The canneries, on the other hand, considering the question from their point of view, while acknowledging the necessity of protection and manifesting a strong sympathy with the law as it now stands, would oppose any measure tending to further restrict the time during which small lobsters might be canned. They claim that the present law affords the lobsters ample time for growth, and that with the laws rigidly enforced the fishery will prosper. Their interests suffer for the time being by the close season, and this year (1880) they will not put up over two-thirds as many cans as last. They think, however, that in time, with the resulting increase in size, they will be able to obtain as many as formerly. They would oppose the throwing out of small and seed lobsters during the canning season, on the ground that it would require much time to examine each lobster and would cause general dissatisfaction among the fishermen, who, in their shortsightedness, are thinking only of present necessities and would work in every possible way against the interests of those canners who were strict in enforcing such laws and in favor of those who might be disposed to slight them.

BIDDEFORD POOL, ME.—"The existing law in this State is a mere farce, so far as protecting the lobster fishery is concerned. It benefits the canneries to the injury of the fishermen, and will result in the extinction of the lobster. Although there are no canneries in this place, smacks

come here in the summer to procure supplies for those in other localities. They pay on an average 1½ cents apiece for lobsters, which five or six months later would bring 4 to 7 cents apiece. The months during which the law is not in force are the only ones in which soft lobsters are caught to any extent, and this is also the season when small lobsters are the most plentiful, thereby furthering the general destruction. In my opinion the Massachusetts law is the most beneficial to the fishery."

"There should be a law to protect the small and soft lobsters the entire year."

RYE, N. H.—"I would be satisfied with the existing law if it were enforced, but it is not; therefore, the lobsters are not at all protected. I think it would be better if all lobsters with spawn were thrown back into the water; but it would be useless for me to do so, when others would catch them, pull off the spawn, and thus evade the law. A provision to that effect would therefore, I think, be of no value."

Mr. A. C. Locke states that "the law of New Hampshire, as it now stands, is but a dead letter; it gives us the right to catch all lobsters over 10½ inches long, at all times of the year, and I venture to predict that at the end of ten years, under the present law, a new one will be necessary, giving us the right to catch all lobsters above 8 inches long, if any such are left. We are catching them too fast, and at the present rate of decrease we shall soon have to seek other employment. We are taking every lobster just as soon as it becomes large enough to spawn, and if the spawning season could be accurately determined all fishing should be prohibited during that time. At other seasons all lobsters with spawn should be returned to the water."

SEABROOK, N. H.—"It should be permitted to catch small lobsters, but egg lobsters should always be thrown back into the water."

GLOUCESTER, MASS.—"All spawn lobsters should be thrown overboard, and a fine of $50 be imposed for non-conformity to the law."

BOSTON, MASS.—Mr. S. M. Johnson gives his opinion as follows: "In regard to laws that exist at the present time, I think they can only be considered a step in the right direction. Their lack of uniformity is their most objectionable aspect. What is needed is a uniform United States law with a limit of 11 inches, and until we have this or one as effective we must suffer a waste, the extent of which we have hardly begun to realize."

PROVINCETOWN, MASS.—Capt. N. E. Atwood states that "the law of this State prohibits the capture and sale of lobsters less than 10½ inches long. This does not in any way affect the fishery of this vicinity, as very few lobsters as small as 10½ inches are found about here. A fisherman will not catch a dozen such during the entire season."

YARMOUTHPORT, MASS.—"It would be much better to throw back all spawning lobsters and permit the capture of all salable sizes."

WOOD'S HOLL, MASS.—Mr. V. N. Edwards says: "The law now forbids the sale of all lobsters under 9½ inches long, but does not prevent any one from destroying all he pleases. All the lobstermen of this place agree in believing that the best law would be one forbidding the sale or destruction of all lobsters with eggs."

WEST TISBURY, MARTHA'S VINEYARD.—Mr. Frank M. Cottle writes as follows: "There is but one law governing the trapping of lobsters and that is what we call the ten-and-a-half law. This law is made to protect young lobsters, but it does not do it, for we catch more from 9½ to 10½ inches in length than any other, and as we cannot tell by eye-measure alone the exact length, they are put into cars until measured for market, and then what are not dead are thrown away, so that the destruction is the same and the benefit minus. For less than 9½ inches we can measure by the eye in nine cases out of ten and throw them, as we do, into the sea from the pots. Therefore if the

law read 9½ instead of 10½ it might do some good, and the lobstermen be better satisfied. In my opinion the law can be of but little protection any way, for the cod destroys more young lobsters and paper-shells or 'shadows' in one day than all the lobstermen on this coast in a week if they marketed all sizes. This I know for a certainty. From careful observation I have caught one hundred cod in one day that I know had the amount of one thousand lobsters and 'shadows' in their entrails."

NEW BEDFORD, MASS.—"All lobsters under 10½ inches in length should be thrown back into the water."

NEWPORT, RHODE ISLAND.—The lobster fishermen of Narragansett Bay set but few pots apiece. They complain that fishermen come from other States and set about 50 pots each, covering very much of the ground and absorbing a large share of the business. A few of the lobstermen of Newport, who have been consulted, suggested that the number of pots to be used by each man might be restricted to ten or twelve, but none of them seemed to have a clear idea of what measures would best protect their interests. They did not consider that legislation could afford them much relief, but would not actively oppose it, should an attempt be made to pass restrictive laws. Since receiving the above information the first lobster law of Rhode Island, given on a following page, has been enacted.

NOANK, CONNECTICUT.—"The lobster law, so far as it prohibits the sale or destruction of lobsters with spawn from the 1st to the 15th of July of each year, has no effect upon the fishery at this place, as not one lobster in a thousand is found with spawn during that period."

ACTION OF THE BOSTON ANGLERS' ASSOCIATION, IN 1874.—The following report, prepared by the Anglers' Association of Boston, in January, 1874, previous to the enactment of the present State laws, is of sufficient interest to be reproduced here:

"The committee appointed to take into consideration the subject of the protection of the lobster, most respectfully submit the following report:

"From the information the committee have been able to obtain, it appears to them that it is time to take some step to stop the wholesale destruction of the lobster that is now going on. From the information obtained from the lobster dealers in this city, it appears that unless something is done, and that very soon, the lobsters in Massachusetts Bay will become, if not entirely extinct, so small that they will not be of any use for food. It appears to be the opinion of the dealers that we have met, that the taking of the lobster could be better regulated by the size *rather than by weight, for the reason that it will be much easier for the fishermen to measure* than to weigh; also for the reason that the lobster shrinks in boiling; therefore it would be very difficult to tell whether it weighed 2 pounds before boiling or not. A lobster that measures 11 inches from the head to the tail will weigh from 1½ to 2 pounds. On Saturday last the committee paid a visit to Johnson & Young, lobster dealers on Warren Bridge. They met there a number of gentlemen who were engaged in the lobster trade. From them a great deal of information was obtained. We saw there twenty-six lobsters brought into the office, and out of the twenty-six there were but fourteen that would measure 11 inches and upwards, twelve of them being under 11 inches long. We were told that was a fair sample of the size of the lobsters now brought to market. There was also present a gentleman from Portland, Me. (Mr. Marston), who is engaged in the lobster trade, and whose views coincide with the Boston dealers. He said the lobster fishing on the coast of Maine was used up—in fact, it had got to be so poor that the canning had about all been removed to the New Brunswick coast. He said they tried last year to get a law passed to protect the lobster, but all they could do was to get a law to prohibit the taking them with spawn. That for various reasons did not amount to anything. It was his opinion that a law

regulating the size of those offered for sale was what was wanted, and it appears to be the general wish of those whom we have met that some law might be made to prohibit the exposing for sale of any lobster not of a certain length.

"We therefore recommend that a committee be appointed to take charge of the matter, and to appear before the legislature or some committee thereof, to use their best efforts to have such a law passed as may seem best to them to prevent the taking or offering for sale, or being in possession of, any lobsters less than 11 inches in length.

"We also recommend that the president of this association be requested to correspond with the fish commissioners of the State of Maine upon the subject."

VIEWS OF MR. S. M. JOHNSON, OF BOSTON.—A few years later Mr. S. M. Johnson, of Boston, discussed the subject of protection in an address before the American Fish-Cultural Association, from which we abstract the following:

"This, like all questions having for their object the best method for economizing and preserving our supply of sea food, has become not only of great interest, but of great importance; and the discussion of such topics is looked upon with increasing interest from year to year, as the necessity for a law in relation to them becomes more apparent. With these facts in view, I esteem it a privilege to accept the invitation of this association to consider briefly the causes of a very apparent decrease in the size of lobsters offered for sale in our markets.

"The first question seems to be, What relation the supply bears to the demand, and the ability of the former to meet the latter, in the future as well as the present.

"In looking for a reasonable solution of this problem, an inquiry concerning the means taken to provide the supply now, as compared with those taken in former years, might properly be prefaced by a statement of the fact that not as many lobsters are consumed now as formerly. A few years ago fifty or sixty traps per man were considered a good number, while at the present time from seventy-five to ninety are used, and even with this addition it requires twice the number of men to catch the same amount of lobsters. These facts seem to show the danger of depletion in our efforts to keep up the supply, even if size and quality are disregarded.

"It may be fairly estimated that from 28,000,000 to 30,000,000 of lobsters are taken annually off the coast of New Eng land, aggregating in weight not far from 15,000 tons. These figures may be considered only important here when taken in connection with the ability of the source of supply to furnish this amount without endangering its perpetuity. This calamity, however, I think most likely to ensue unless some proper restrictions are enforced, limiting this continual drain. When we compare the lobsters seen in the market to-day with those of former years, the danger becomes still more evident; and if this decrease in size goes on, the industry will, in a short time, become of little or no importance.

"The reply to the oft-repeated question, Why do we not get larger lobsters? must be, We catch them faster than they can grow; the smaller the lobsters we retain, the smaller will they become in the future, and, as a natural consequence, if we continue indiscriminate fishing, practical extermination must follow. This ground I am anxious to maintain, and wish to have some remedy applied to obviate the evil, still, however, permitting a partial supply. * * *

"From actual observation I have found that a lobster measuring 10½ inches in length will, after shedding, have increased to 12 inches; but if we make the comparison in weight, it may be better understood. For instance, a lobster of 10½ inches will weigh 1¼ pounds, while one of 12 inches, on an average, 2½ pounds, or double its former weight, which will add to its market value in the same proportion, or 100 per cent. Now, if a lobster sheds its shell once a year, which is approximately true, I think, it shows that by establishing a reasonable standard of length (which must not

be so high that it would prohibit fishing, neither so low that a sufficient age for reproduction may not have been attained) we may in time get back that which we have so foolishly sacrificed.

"Lobsters of a less length than 10¼ inches have been found bearing eggs, but by careful observation and inquiry I have found the exceptions to be very rare. Therefore this standard could not be safely fixed under that length, but should, on the contrary, be as much above it as possible still not so high at first as to cause hardship to the fishermen, while from time to time an advancement might be made as the supply of the required length increased and more nearly met the demand.

"Having pointed out the necessity of such a law, and indicated the best modes of its application, it only remains to be shown how it may be made effective.

"I think it is an established fact that protective measures can only be carried out in the open market, where the possession of unlawful fish or game is *prima facie* evidence of guilt. Such a law has been in full force in Massachusetts since 1874, but the possibility of finding a market outside the State has been a barrier to the best results; and just so long as there is any place where lobsters may be indiscriminately sold, we cannot justly judge of its efficiency. I am fully aware that in advocating a measure of this kind opposition will arise, which must be met and answered in the most tolerant spirit; for fancied rights of individuals are not always in accordance with the reasonable demands of the public good.

"The first opponents of the law for the protection of lobsters in Massachusetts were the fishermen, whose testimony at the same time was the best evidence given of the necessity of such a law. These, however, after a trial of one year, not only became reconciled to it, but even its strongest advocates, and realize year by year more fully the wisdom of the measure they so bitterly opposed.

"There has been one circumstance noticed which I think quite significant, viz, that the first year the law went into effect one-fourth of the whole number caught were obliged to be thrown back on account of their insufficient size, which proportion has gradually diminished until at present scarcely more than one in ten is discarded. The State of Maine, which possesses the largest lobster-producing grounds on the coast, has from time to time passed laws for the protection of the lobster fishery, but has had a powerful and important interest in opposition to a limit which no other State has, the size being of less importance for canning purposes than for other consumption. This year, however, a law has been enacted by which the canners are obliged to confine their operations to four months of the year, while for the remaining eight months a limit of 10½ inches is required, and, I think, may be looked upon as a great step in advance of any law previously passed. This movement was made by the fishermen in the form of petitions to the legislature, numerously signed, and from one end of the State to the other. Maine, New Hampshire, Massachusetts, and Connecticut each have laws practically corresponding to each other, while New York, without a law which might so much assist in protecting the other States, only helps on an illegal and wasteful practice."

A committee from the Fish-Cultural Association, consisting of the president, Mr. Roosevelt, Mr. E. G. Blackford, and F. Mather, was appointed to draft some additions and amendments to the New York game law. They met, and among other things recommended that the 10¼-inch limit on lobsters be added, which is now before the legislature. By this co-operation the market is closed, without which the laws of the lobster-producing States were inoperative.

STATEMENT OF MR. J. WINSLOW JONES, OF PORTLAND, ME.—In a letter dated December 22, 1880, Mr. J. W. Jones, one of the largest canners on the coasts of Maine and the British Provinces, gives the following opinion regarding the protection of the lobster fishery:

"In relation to the duty on lobsters, although I am packing in the provinces, I want the duty

to remain. Were it not for the duty, our fishermen could not live and compete with the provinces. I think we now get as many lobsters as ever, only the size is very small. I think there should be more stringent enforcement of the law, and when we are not allowed to pack, fishermen should not be allowed to take for the market. I think the fisheries should be regulated by the General Government, not by State law. There is too much private interest in the making and enforcement of the law. They do the thing much better in the provinces, where the fisheries are regulated by the General Government. There should also be protection to packers; the fishing ground should be divided up so that one factory would not be competing with another on prices, making competition so close that neither the packers nor the fishermen have an interest in protecting the grounds where they fish, and this cannot be properly done unless there is an interest in protecting the fish. In some places in the British provinces the ground is divided up and apportioned out to the factories that pack lobsters, and no party can put out a salmon net without a lease from government, *and they will not grant a permit to interfere with one already placed.* I have petitioned the General Government of Canada to have all the fishing ground apportioned to the factories. I have a letter to-day saying they are bringing the matter before Parliament, and I think the law will pass."

STATEMENT OF MR. GEORGE BURNHAM, JR.*—"The packing of lobsters as early as 1845 shows none of the trouble experienced at the present time—viz, small light-meated fish. At that date all lobsters under 3 pounds in weight were doubled and counted as one; all such lobsters as are now packed (then called snappers) were then thrown away; in fact, we never used to catch many, as the large lobsters took possession of the traps, driving out the small ones.

"In the fall of 1854 I went to South Saint George, on the coast of Maine, to pack lobsters, and sent a smack to Deer Isle, where the fishermen used hand nets, and 1,200 lobsters then caught filled the smack's well. It would take of the lobsters we now catch from 7,000 to 8,000 to fill the same well.

"The only remedy in my mind to preserve the lobsters is to have a close time—they should not be caught between the first day of August and the first day of March for market or canning.

"The Massachusetts law is a good law if it could be carried out, but fishermen set their traps for lobsters, and there is only one in five that is large enough to be marketable. Do the fishermen throw the small ones overboard to again crawl into their traps and eat their bait, or do they take them ashore and boil them for the hens and other purposes, or destroy them in some other way? I am quite certain that the small lobsters once caught never again get the chance to eat bait from a trap. Therefore I am convinced that the close time is the only sure way of preserving the lobster fisheries."

THE STATE LAWS RESPECTING THE LOBSTER FISHERY.

Following are the laws of the several New England States and New York, relative to the lobster fisheries, corrected to March 1, 1885. New Jersey has no lobster law, her fishery not *being of sufficient importance to demand legislation.*

Maine.

Chapter 69 of the public laws, passed in 1879.

"SECTION 1. No person or corporation shall can or preserve any lobsters within the limits of this State, from the first day of August to the first day of April following, under a penalty of five dollars for every lobster so canned or preserved, and a further penalty of three hundred dollars for each and every day on which such canning or preserving is done by said person or corporation from the said first day of August to the said first day of April following.

"SEC. 2. No lobster of less size than ten and one-half inches in length, measuring from one

* Of the canning firm of Burnham & Morrell, of Portland, Me., November 24, 1880.

extreme of the body extended to the other, exclusive of feelers and claws, shall be sold or exposed for sale from the first day of August to the first day of April following, under a penalty of five dollars for each and every lobster so sold or exposed for sale.

"SEC. 3. The penalties under this act may be recovered by indictment or action of debt one-half thereof to go to the person making the complaint or bringing the action, and one-half to the use of the town in which the offense is committed.

"SEC. 4. All acts and parts of acts inconsistent with this act are hereby repealed."

The above law was replaced in 1883 by the following, approved February 21:

Chapter 138 of the public laws, passed in 1883.

"SECTION 1. There shall be a close time for lobsters from the fifteenth day of August to the fifteenth day of November in each year, during which close time no lobsters shall be fished for, taken, caught, killed, bought, sold, exposed for sale, or in possession in cars, pounds, or otherwise, under a penalty of fifty dollars for the offense, and one dollar for each and every lobster so taken, caught, killed, bought, sold, exposed for sale, or in possession as aforesaid.

"SEC. 2. It shall be unlawful to fish for, catch, buy, sell, expose for sale, or possess for canning purposes or otherwise, between the first day of April and the first day of August, of each year, any female lobster in spawn or with eggs attached, or any young lobster less than nine inches in length, measuring from head to tail exclusive of claws or feelers; and when caught they shall be liberated alive, at the risk and cost of the party taking said lobsters, under a penalty of one dollar for each and every lobster so caught, bought, sold, exposed for sale, in possession or not so liberated.

"SEC. 3. The penalties imposed by this act may be recovered in the manner provided by section twenty-six, of chapter seventy-five of the public laws of eighteen hundred and seventy-eight."

In February, 1885, the lobster laws of Maine were again amended, to read as follows:

Chapter 275 of the public laws, passed in 1885.

"SECTION 1. There shall be a close time for lobsters between the fifteenth day of August and the first day of October, during which no lobsters shall be fished for, taken, caught, killed, bought, sold, exposed for sale, or in possession, in cars, pounds, or otherwise, under a penalty of fifty dollars for the offense, and one dollar for every lobster so taken, caught, killed, bought, sold, exposed for sale, or in possession as aforesaid: Provided, however, that the provisions of this section shall not apply to any person taking lobsters not less than ten and one-half inches in length for the sole use and consumption of himself and family.

"SEC. 2. No person or corporation shall can or preserve any lobsters between the fifteenth day of July and the first day of the following April, under a penalty of five dollars for every lobster so canned or preserved, and a further penalty of three hundred dollars for each day on which such unlawful canning or preserving is done.

"SEC. 3. It is unlawful to fish for, catch, buy, sell, expose for sale, or possess, between the first day of October and the fifteenth day of the following August, any female lobster in spawn or with eggs attached, or any young lobster less than ten and one-half inches in length, measuring from head to tail extended, exclusive of claws or feelers, and such lobsters when caught shall be liberated alive, at the risk and cost of the party taking them, under a penalty of one dollar for each lobster so caught, bought, sold, exposed for sale, or in possession not so liberated: Provided, however, that from the first day of April to the fifteenth day of July it shall be lawful to fish for, catch, buy, sell, expose for sale, or possess for canning and all other purposes any lobsters not less than nine inches in length, measured as aforesaid, but not including female lobsters in spawn or with eggs attached."

New Hampshire.

Fish and game laws, chapter 4.

"SECTION 16. No person shall catch, preserve, sell, or expose for sale within the limits of the State of New Hampshire, any lobster between the fifteenth day of August and the fifteenth day of October of each year; and from the said fifteenth day of October to the fifteenth day of August next following of each year no lobster shall be caught, preserved, sold, or exposed for sale, under ten and one-half inches in length, measuring from one extreme of the body to the other, exclusive of claws or feelers, nor shall any female lobster be killed or destroyed while carrying her spawn or hatching her young; and any person violating any provision of this section shall be punished by a fine of ten dollars for every lobster so caught, used, sold, or exposed for sale, as aforesaid."

Massachusetts.

Chapter 91, public statutes.

"SECTION 81. Whoever, from the twentieth day of June to the twentieth day of September, takes a lobster shall be punished for each offense by fine of not less than ten nor more than one hundred dollars, or by imprisonment in the house of correction for not less than one nor more than three months; but a person catching a lobster when lawfully fishing, and immediately returning it alive to the waters from which it was taken, shall not be subject to such penalty.

"SEC. 82. Whoever, from the twentieth day of June to the twentieth day of September buys, sells, or has in his possession, a lobster taken in this Commonwealth shall forfeit for each offense not less than ten nor more than fifty dollars.

"SEC. 83. The mayor and aldermen of every city, the selectmen of every town, and all police officers and constables, shall cause the provisions of the two preceding sections to be enforced in their respective cities and towns.

"SEC. 84. Whoever sells or offers for sale, or has in his possession with intent to sell, either directly or indirectly, a lobster less than ten and one-half inches in length, measuring from one extreme of the body extended to the other, exclusive of claws or feelers, shall forfeit five dollars *for every such lobster; and, in all prosecutions under this section the possession of any lobster* not of the required length shall be *prima facie* evidence to convict.

"SEC. 85. All forfeitures under the four preceding sections shall be paid, one-half to the *person making the complaint and one-half to the city or town where the offense was committed.*"

"SEC. 88. If, within the harbors, streams, or waters of any place on the sea-coast which adopts this section, or has adopted the corresponding sections of earlier statutes, any person living without the State takes, for the purpose of carrying thence, any lobsters, tautog, bass, blue fish, or scuppaug, or if any person living within this State takes and carries away from any such place any such fish or lobsters in vessels or smacks of more than fifteen tons' burden, he shall forfeit for each offense a sum not exceeding twenty dollars, and all the fish and lobsters so taken.

"SEC. 89. No person shall take lobsters within the waters and shores of the town of Provincetown for the purpose of carrying them from said waters in a vessel or smack of more than fifteen tons' burden, or for the purpose of putting the same on board of such vessel or smack to be transported to any place unless a permit is first obtained therefor from the selectmen of said town, who may grant the same for such sum to be paid to the use of the town as they shall deem proper.

"SEC. 90. Whoever violates the provisions of the *preceding section shall forfeit ten dollars* for each offense; and if the number of lobsters so unlawfully taken or found on board of any such vessel or smack exceeds one hundred lobsters, he shall in addition forfeit a further sum of ten

dollars for every hundred lobsters so taken or found over the first hundred, and in that proportion for any smaller number.

"SEC. 91. For the purposes of the two preceding sections, the waters and shores of Provincetown shall be deemed to be as follows, namely, beginning at Race Point, one-half mile from the shore, and thence running by said shore to the end of Long Point, which forms the harbor of Provincetown, and from the end of Long Point one-half mile and including the harbor within the town of Provincetown.

"SEC. 92. Whoever, between the first day of April and the first day of July inclusive, takes more than one hundred pounds per week of lobsters, tautog, bass, or scuppaug in the bays, harbors, ponds, rivers, or creeks of the waters of Buzzard's Bay, within one mile from the shore and within the jurisdiction of the towns of Sandwich and Wareham, shall forfeit a sum not exceeding fifty dollars, to be recovered in an action of tort by the selectmen or any legal voter of Sandwich or Wareham, for the use of the party suing therefor."

Chapter 98, public statutes.

The following amendments to sections 81 and 82 of the above laws went into effect March 21, 1882.

"SECTION 1. Section eighty-one of chapter ninety-one of the public statutes is hereby amended to read as follows:

"SEC. 81. Whoever, during the month of July in any year catches or takes from any of the waters of this Commonwealth any female lobster bearing eggs shall be punished for each offense by a fine of not less than ten nor more than one hundred dollars, or by imprisonment in the house of correction for not less than one nor more than three months; but a person catching or taking any such lobster during said month of July and immediately returning it alive to the waters from which it was taken shall not be subject to such penalty.

"SEC. 2. Section eighty-two of chapter ninety-one of the public statutes is hereby amended to read as follows:

"SEC. 82. Whoever, during the month of July in any year, sells or has in his possession with intent to sell, any female lobster bearing eggs, taken in this Commonwealth, shall forfeit for each offense a sum of not less than ten nor more than fifty dollars.

"SEC. 3. This act shall take effect upon its passage."

Chapter 212, section 1, of the acts of 1884, amends section 84 of the public statutes to read as follows:

"Whoever sells, or offers for sale or has in his possession a lobster less than ten and one-half inches in length measuring from one extreme of the body extended to the other, exclusive of claws or feelers, shall forfeit ten dollars for every such lobster; and the possession of any lobster not of the required length shall be *prima facie* evidence to convict."

Rhode Island.

Chapter 147, article XVIII, public statutes of Rhode Island, revision of 1882.

"SECTION 8. Every person not at the time an inhabitant of this State who shall set or keep or cause to be set or kept, within any of the public waters of the State, any pots or nets for the catching of lobsters, shall forfeit twenty dollars for each offense, one-half thereof to the use of the complainant and one-half thereof to the use of the State.

"SEC. 9. Every person who shall lift or raise any pot or net set for the catching of lobsters, without the permission of the owner thereof, shall forfeit ten dollars.

"SEC. 10. Every person who shall sell or offer for sale or have in his possession with intent to sell any lobsters less than ten inches in length, measuring from one extreme of the body to the other, exclusive of claws and feelers, shall forfeit for every such lobster five dollars, one-half thereof to the use of the complainant and one-half thereof to the use of the town where the offense is committed; and every person who shall take or trap any such lobsters shall immediately return the same to the waters from whence they are taken, and every person failing so to do shall forfeit for every such lobster five dollars, one-half thereof to the use of the complainant and one-half thereof to the use of the town where the offense is committed.

"SEC. 25. Every person living without the State who shall take any lobsters, tautaug, bass, or other fish, within the harbors, rivers, or waters of this State, for the purpose of carrying them thence in vessels or smacks, shall be fined ten dollars for every offense, and shall forfeit all the fish or lobsters so taken."

Connecticut.

Revised statutes of 1875, Title 16, Chap. IV, Article 1, Section 27.

"Every person who shall take, sell, or have in his possession with intent to sell, or destroy, any lobsters less than ten inches long, measuring from the head to the end of the tail, exclusive of claws and feelers, shall be fined not less than seven nor more than fifty dollars, half to be paid to him who shall sue therefor, and half to the town in which the offense is committed, or be imprisoned not exceeding thirty days, or both."

Chapter 11 of the session laws of 1875.

"Every person who shall take, sell, or have in his possession, with intent to sell or destroy, any lobsters less than eight inches long, measuring from the head to the end of the tail, exclusive of claws and feelers, or any female lobster with the ova or spawn attached, shall be fined not less than ten, nor more than fifty dollars, half to be paid to him who shall sue therefor, and half to the town in which the offense is committed, or be imprisoned not exceeding thirty days, or both; and all acts inconsistent with this act are hereby repealed."

Chapter 76 of the session laws of 1878.

"Every person who shall at any time take, sell, or have in his possession, with intent to sell or destroy, any lobsters less than six inches long, measuring from the head to the end of the tail, exclusive of claws and feelers, or any female lobsters with the ova or spawn attached, between the first and fifteenth days of July (inclusive) in each year, shall be fined not less than ten nor more than fifty dollars, half to be paid to him who shall sue therefor, and half to the town in which the offense is committed, or be imprisoned not exceeding thirty days, or both. And all acts or parts of acts inconsistent herewith are hereby repealed."

New York.

Chapter 282. AN ACT for the preservation of lobsters, passed May 13, 1880.

"SECTION 1. Whoever shall sell, or offer for sale, or have in possession with intent to sell, any lobster less than ten and one-half inches in length, measurement to be taken from one extremity of the body to the other, exclusive of claws or feelers, shall, for every such offense, be subject to a fine of five dollars; and in all prosecutions under this act the possession of any lobster not of the length herein prescribed shall be *prima facie* evidence to convict.

"SEC. 2. All forfeitures accruing under this act shall be paid one-half to the person making the complaint and one-half to the city or town where the offense was committed.

"SEC. 3. This act shall take effect on the first of June, eighteen hundred and eighty."

Abstract of the State laws.

MAINE.—Law of 1879: prohibits the canning and preserving of lobsters and the capture and sale of individuals under 10½ inches long, between August 1 and April 1. No restrictions placed upon the fishery between April 1 and August 1.

Revision of 1883: makes a close time from August 15 to November 15, and prohibits the capture and sale of females with spawn and lobsters under 9 inches long, from April 1 to August 1.

Revision of 1885: close time from August 15 to October 1, except for personal use of fishermen. Prohibits canning from July 15 to April 1, the capture of females with spawn from October 1 to August 15, and of lobsters under 10½ inches long from October 1 to April 1. The taking of all lobsters over 9 inches long, excepting females with spawn, is permitted during the canning season.

NEW HAMPSHIRE.—In force since 1881: close time from August 15 to October 15, and a limit of 10½ inches in length remainder of year. Destruction of females with spawn prohibited during entire year.

MASSACHUSETTS.—In force since 1880: close time from June 20 to September 20, and a limit of 10½ inches in length during remainder of year; capture and sale of females with eggs prohibited during July. Also several laws of local application.

Revision of 1882: capture and sale of females with spawn prohibited during July.

RHODE ISLAND.—Law of 1882: no lobsters less than 10 inches long can be caught and sold. The privileges of fishing are restricted to residents of the State.

CONNECTICUT.—Law of 1878: the capture of lobsters less than 6 inches in length is prohibited during the entire year and of females with spawn from July 1 to July 15.

NEW YORK.—Law of 1880: prohibits the sale and capture of lobsters less than 10½ inches in length.

9. THE CULTIVATION AND TRANSPLANTING OF LOBSTERS.

CULTIVATION.—The artificial breeding of lobsters has been rarely attempted either in this country or in Europe, and in no instance are we aware of its having been productive of satisfactory practical results. There are so many difficulties to overcome in an undertaking of this character, and the breeding habits of lobsters are yet so imperfectly understood, that it is not surprising greater progress has not been made in materially aiding the increase in supplies by artificial culture, as in the case of the oyster and of many of our true fishes. That further study and persistent efforts may yet afford us the means of accomplishing so desirable an object is very probable and is sincerely to be hoped for, in view of the apparent great decrease in the abundance of lobsters on many portions of our Atlantic coast.*

NORWAY.—The same problem has taxed the ingenuity of European fish-culturists in those countries where the European lobster is an important article of trade, and especially has this been the case in Norway, where a marked decrease in the supplies of that species has been evident for some time. The most noteworthy of the Norwegian experiments began in 1873, but of their final results we have been unable to obtain any definite information. The following account was published in 1875:

"Several men in the district of Stavanger, viz, Mr. Lorange, a civil engineer, Mr. Olsen, a teacher, and two merchants, Messrs. Andr. Hansen and H. Hansen, in 1873, united with a view to

* For recent experiments in lobster culture by the United States Fish Commission, which have been partially successful, see the following reports: Notes on Lobster Culture (Experiments by the United States Fish Commission in 1885). By Richard Rathbun. Bulletin United States Fish Commission, Vol. VI, p. 17, 1886.

Hatching, rearing, and transplanting lobsters (Experiments at Wood's Holl Station). By John A. Ryder. Science, Vol. VII, No. 175 (June 11, 1886), pp. 517–519.

making experiments whether it would not be possible to protect the tender young of the lobster by hatching them in boxes or small basins, where they could find a place of refuge till they were so far developed as to take care of themselves. As these first experiments seemed to augur well, they received at their request, aid from the Royal Society for the Promotion of the Industries of Norway (Kgl. Selskab for Norges Vel.) to enable them to continue their experiments in 1874.

"For this purpose, they inclosed a sheet of water by building a strong wall at each end of a sound, between two small islands in the Veafjord, not far from Kopervig. This sheet of water was about 300 feet long and 30 feet broad; its bottom consisted partly of rough gravel and partly of rocks stretching along one of the sides, and its average depth was about 5 feet. Five hatching boxes were then procured, of which one was placed in the inclosed water, three at Aakrehavn, and one at Kopervig. These boxes were made of cork, and were 5 feet long and 2 feet deep. Both at the bottom and at the sides there was an opening of one-half inch between the boards, which was covered with strips of fine wire-gauze. The boxes at Aakrehavn were, moreover, furnished with a light roof, which, without excluding the light, prevented the boxes from being filled with fresh water during heavy rains. Only one of these three boxes was used for hatching; the two other ones being used for receiving the young ones as their number became too large for the hatching-boxes, and for making experiments whether the young lobster can be kept outside an inclosed sheet of water, which it might be difficult to procure in some places. Twenty-two female lobsters, having roe, were bought, of which three were placed in the inclosed sheet of water and nineteen in the boxes, not all at the same time, however, but by degrees, just as it was possible to procure spawning lobsters.

"Professor Rasch, president of the section for fisheries in the Royal Society for Furthering the Industries of Norway, made a report to the society on the hatching experiments, accompanied by prepared specimens, showing the development of the young lobster on each day of the first week after the hatching, and during the fourth week. In this report he says that, in his opinion, the experiments have been made carefully and skillfully, and that thereby several facts regarding the natural history of the lobster have been made known, which hitherto were either entirely unknown or not sufficiently proved by experiments. These facts are—

"*a.* That the young lobsters swimming near the surface of the water are killed by violent rain, which was successfully avoided by having the above-mentioned light roofs over the boxes;

"*b.* That the older of the young lobsters, when their claws are developed, in their boxes attack and eat the younger ones which stay near the surface; the possibility of doing this was diminished by having holes in the sides of the boxes large enough to let the larger of the young ones which stay deeper under the water slip out easily;

"*c.* That the female lobsters which have roe under the back part of their body in June will have done hatching in September;

"*d.* That the hatching from beginning to end occupies a period of about three weeks;

"*e.* That the summer-hatching does not begin at the same time every year (in 1873 it began on the 4th of July, and in 1874 between the 17th and 26th of the same month), which undoubtedly depends on the higher and lower temperature of water;

"*f.* That the newly-hatched young of the lobster keep closely together near the surface of the water, and because but little skilled in swimming become an easy prey to their enemies; and,

"*g.* That the young lobsters begin to go toward the bottom when about three to four weeks old, and that there they soon assume their retrograde motion.

"It was also shown that when the young lobsters have so far developed as to seek the bot-

tom, they can escape their enemies with comparative ease, partly on account of their quicker motions and partly by hiding between the stones.

"These experiments have, therefore, not only thrown considerable light on the natural history of the lobster, but they have also given practical hints how it may be possible to further the lobster fisheries by adopting regulations for their protection, and by establishing in suitable localities hatching-places where the young can be protected during the first stages of their development. To keep the young lobsters in inclosed sheets of water till they are large enough to become salable will scarcely pay.

"One of our largest exporters of lobsters on the western coast has tried to keep large quantities of grown lobsters in an inclosed sheet of water, feeding them and waiting for the time when it would be most profitable to ship them; but it soon became evident that the expenses were too great.

"These experiments will be continued during the present year with the aid of the Royal Society for Furthering the Industries of Norway."*

The celebrated Norwegian naturalist, Prof. G. O. Sars, who has devoted much time to the study of the European lobster, visited the above locality in 1875, and reported very favorably upon the experiments being made there. Concerning them he writes as follows:

"There is another point which I must briefly mention, viz, the artificial raising of lobsters. I have in another place expressed my opinion that this is a subject which possibly in the future may prove a very important aid to our lobster fisheries. The exceedingly simple manner in which the artificial raising of lobsters can be carried on seems to encourage people in different places to make experiments in this direction. Mr. Hansen, a merchant of Akrevig, assisted by Mr. Olsen, superintendent of schools at Kobbervig, has already made several experiments, which, on the whole, have proved successful. During my journey of last summer I visited the place and examined the hatching apparatus, which had already produced a large number of young lobsters. Mr. Hansen has determined to make a kind of lobster park, where the young lobsters, after their metamorphosis is completed, may live and develop. I consider these experiments of great importance, and would like to see Mr. Hansen receive sufficient aid from the Government to enable him to carry them on on a larger scale and in a practical manner."†

PARKING IN THE UNITED STATES.—In the United States, the best results have been obtained in connection with the so-called "parking" of lobsters—that is to say, their protection in large, inclosed natural basins, primarily for the purpose of perfecting them for market, and of retaining conveniently at hand, at all seasons, a large reserve stock for supplying the market demands. In these parks the young lobsters taken by the fishermen are allowed to attain the adult size, the soft-shelled individuals to become hardened, and injuries to be repaired. It is needless to state that under such natural conditions, the breeding habits must continue more or less normal and large quantities of spawn be hatched. That much of the spat thus obtained grows into full-sized lobsters and adds very materially to the population of the park, is a question which has not been satisfactorily settled. If lobsters can be profitably raised from spawn in parks of this character, their usefulness cannot be doubted, and the matter of artificial breeding might become comparatively simple. As elsewhere discussed, however, the question of profit and loss is one for serious consideration to the lobster breeder, and if every lobster he raises costs him

* Om Forsog med Kunstig Udklaekning af Hummer, Ny Raekke of Tidsskrift for Fiskeri, 2 = Aargang, pp. 184-188, 1875.

† Indberetninger til Departmentet for det Indre fra Prof. Dr. G. O. Sars, om de af ham i Aarene 1874-1877 anstillede Undersögelser vedkommende Saltvands-fiskerierne. Christiania. 1878.

more than its market value, his experiments must be counted a failure from a practical standpoint.

Lobster parks have been established in Europe as well as this country, but here only a few have been attempted. Two parks on the New England coast have been brought specially to our notice. The first, started in 1872, on the coast of Massachusetts, was described as follows, in the Boston Journal of Commerce for 1873:

"The attempt to cultivate lobsters for the market was begun about a year ago; and though no very great results have yet been obtained, the experiment presents every indication of ultimate success. A space of some 30 acres of flats having been inclosed by an embankment, the proprietor of the place conceived the plan of hiring the use of the inclosed water for a lobster pond. The place was originally an arm of the sea, and had a deep channel in the center, so that sufficient depth of water was secured. On building the dike an arched way was made in it, so that the tide could flow out and in at all times. The opening being small, the tide only rises and falls about 3 feet inside. This keeps the inside water deep at all times, and at the same time prevents it from becoming foul.

"During July and August last summer, 40,000 lobsters, of every age and condition, were let loose in the pond. Many of them were in the soft-shell state, and many were unsalable on account of a lost claw or other mutilation. Food, in the shape of refuse from the fish market, was freely supplied them; and a gate was put up at the entrance to prevent their escape into the sea. Nothing in particular happened for several months; and the enterprising owner arranged nets for eels and other fish, which he caught in the pond in large quantities during the fall and winter.

"When the ice had covered the pond, holes were cut and the lobster traps were put down. Good sizable hard-shell lobsters were at once caught, and two things were proved: first, the water was deep and pure enough to keep the fish alive, and secondly, the fish were healthy, for they had taken their hardened shells, in the usual manner, and new claws had grown in the place of those lost. In the spring, eels, perch, and a great many other kinds of fish were taken from the pond in liberal quantities, and now that the spawning season is well advanced, the farm has reached its final and most critical stage. Some 15,000 good, marketable lobsters have been taken out and sold. Every one was a male fish, as the female fish were all returned to the water for breeding purposes. The spawn is now on its last stage and in a few weeks, if all goes well, some millions of young lobsters will swarm in the pond. The eggs are already so far advanced that the young fry can be seen through the transparent shells, and only one thing will prevent them from coming to maturity. The question is, Can the young lobsters defend themselves from the fish in the pond? It is impossible to keep other fish out, and the lobsters must take their chances. Everything is favorable so far. The bottom is stony and gravelly. There are plenty of hiding places, such as the young fish seek to hide in, and the water is always deep and fresh.

"The proprietor is a keen, far-sighted man, well educated, and thoroughly in love with his business. He has entire confidence in the success of his venture, and will make it succeed if anybody can. From a personal inspection of the lobster farm, we are inclined to think the project destined to prove a financial success. The fish already sold are of excellent quality, and have won a good name in the market. The number of lobsters that can live in the pond is practically countless. If one-eighth of the young fish live, a couple of years will see the place stocked with millions of salable lobsters. The expense is small—the rent, the food (which may be obtained for the asking), and the labor of catching and preparing for market being the whole of it. The experiment is a very important one. If it succeeds it will introduce an entirely new system of lobster fishing, and do much to prevent the destruction of the natural supply. Nor is this all, for

the same pond can be made to yield perch, flounders, eels, smelts, and other fish in great quantities at no additional expense."

About 1879 or 1880, another similar park of about the same size as that above described was established on the coast of Maine, by one of the large wholesale firms dealing in lobsters. The place is a small inclosed bay with a narrow entrance, through which the passage of all objects above a very small size is prevented by a screen of wire netting. A few years ago this bay always contained an abundance of lobsters during the summer, and was much resorted to by fishermen. Overfishing, however, had nearly exhausted the supply and made trapping in the basin unprofitable, although it had not deprived it of its natural advantages, which have been recently recognized by those who are now in possession of its privileges. It contains an abundance of plant and animal food, and toward the center has a sufficient depth of water, with a soft bottom, for the protection of lobsters during cold weather. Into this park large quantities of soft-shelled lobsters, of lobsters minus one or both claws, as well as of young individuals under the legal size of 10 or 10½ inches, have been placed for growth and repair, and it is claimed that the results have been satisfactory. No food has been supplied them beyond what the park naturally contains. At the beginning of cold weather, the lobsters retire to the deeper parts of the park, and at times, when the water has been clear and calm, they have been observed almost completely buried in the mud, with only their feelers, eyes, and a small portion of the front of the body exposed.

While the owners of the park express great satisfaction at the results thus far obtained, they are not content to rest their experiment at this point, but are endeavoring to solve the problem of artificial breeding on a practical scale. They state that many of the lobsters first put into the pond were females with spawn, and claim that the young then hatched have grown and greatly increased its population. Since then, spawning females have been purposely added to the stock from time to time, and at the last accounts young lobsters of various sizes were said to be exceedingly abundant. In an experiment of this kind a considerable lapse of time is required to test its merits, but the present outlook is very encouraging.

THE POSSIBLE SUCCESS OF LOBSTER CULTURE.—There is little reason to doubt the practicability of lobster culture, but whether it can be made a paying business or not can only be determined by experiment. A vital question for consideration in connection with it is that of cost, and especially the first cost in establishing suitable breeding stations with the necessary outfit, and ample basins for conducting the work on a sufficiently extensive scale to make its results noticeable in an increased supply of lobsters. It seems scarcely possible that private enterprise alone could ever successfully carry on such an undertaking which, at the outset, requires the employment of much skilled labor, and must meet with many perplexing and unlooked-for delays. The success which has attended the breeding of so many of our marine and fresh-water products, through the co-operation of the National and State governments, might better determine the proper course to pursue, and we earnestly hope that the attention of the authorities will soon be directed toward this end. Before actual breeding operations are begun, there are many important problems to be solved in respect to the natural history of lobsters, and these must be intrusted to the painstaking skill of expert naturalists especially qualified for the work. The breeding habits, rate of growth, and enemies should be carefully investigated, as also the best means of caring for the young, the age at which they should be liberated from confinement, and the best method of distributing them to different portions of the coast. All of these questions must arise in any systematic attempt at lobster culture, and upon their proper treatment future success will depend.

TRANSPLANTING.—It is an interesting question as to whether lobsters can be made to live

and thrive in other regions than those in which they properly belong. The transportation of live lobsters over long distances has been successfully accomplished, but their acclimatization in strange waters is a more difficult problem still awaiting solution. Several species of true fishes, and also the common soft clam (*Mya arenaria*), belonging to the eastern side of the continent, have been introduced into the Pacific and its tributaries, and Pacific forms are now living on the Atlantic slope, making it appear reasonable to suppose that the lobster is capable of transplantation, providing it is introduced into a region where the water possesses a similar density and temperature to that of its natural habitat. Such conditions possibly exist on certain portions of the western coast, but no investigations have yet been made to determine the fact. The successful introduction of lobsters into that region would prove of great benefit, and it has already been attempted, though without permanent results so far as known.

TRANSPLANTING TO CALIFORNIA.—On page 686 we have referred to the carrying of live lobsters to Europe for the purposes of trade, and will here give a brief account of the experiments of Mr. Livingston Stone in transporting them across the continent. Three trials were made by this gentleman, on behalf of the State of California, with the assistance and co-operation of the United States Fish Commission, in 1873, in 1874, and finally in 1879, the last one only having been successful.

First attempt.—On the 3d of June, 1873, the first shipment was made in an aquarium car specially fitted up for the purpose, and which was to run through to California without change. Several species of fish were also included in the stock. The lobsters numbered one hundred and sixty-two, and were obtained from Massachusetts Bay and Wood's Holl, Massachusetts. They were contained in six large cases, the water in which was retained as nearly as possible at a temperature of between 34° and 36° F. The lobsters began to die early in the journey, but an unfortunate accident near Omaha, which precipitated the car into a river, brought the experiment to an untimely end.

Second attempt.—In June of the following year the second shipment was made. It consisted of one hundred and fifty lobsters, of which a portion were carried in wooden cases and the remainder in a large salt-water tank. The boxes were "without covers, and divided by partitions into twelve apartments. The surface extent of these apartments was just enough to admit one lobster lying within it—smaller than was well for them. The depth of the apartments was about 6 inches, and the bottoms were bored with an auger-hole to allow drainage. A handful of straw was put in each apartment and a lobster laid upon it, then sponges dripping with salt water were placed above and around it until quite concealed from sight and from dry air by this stratum of wet sponges." At the start, all of the lobsters were packed in boxes in this manner, but after two or three days sixty were transferred to the large salt-water tank containing striped bass and other salt-water fish. Air was forced into the tank continuously, but the following day all suddenly died, it was supposed, from the cover of the tank having fallen and interfered with the circulation. The lobsters in the cases were treated in the following manner:

"There were twelve of these boxes, each containing twelve above-described apartments, placed in the aquarium car, one upon another, in two piles of six boxes each, against the side of the car. In going over the lobsters twice a day, the boxes were taken down and the sponges were removed from the lobsters one at a time and squeezed over the animal, which, if alive, will respond to it by blinking its eyes and stretching its claws, perhaps moving its body a little. The sponges were then dipped into a pailful of sea water and wetted again, and were carefully arranged as before about the lobster. Pieces of ice which another person had been breaking up meanwhile were strewn over each box, among the compartments and sponges, to keep cool the water in the

sponges and the moisture in the straw and around the lobster. It was slow work, and the lobsters were too much exposed during the operations. Often, after the boxes were piled up again, pailfuls of salt-water were poured over the whole. During the first two or three days only a few were found dead when they were repacked." After the fourth or fifth day the mortality increased and from one-third to one-half the number were often found dead at each time of repacking. On the fifth day the straw was removed from the boxes, and the lobsters were packed entirely with sponges. Numerous devices were improvised to diminish the death rate, but all were unavailing. Two lobsters were left at Ogden, Utah, to be deposited in Salt Lake, and on leaving there but eight live lobsters remained, of these only four reached San Francisco, and they were put into the sea at Oakland wharf, June 12, nine days after they had been taken from the Atlantic Ocean.*

Third attempt.—The final and successful trip was made in June, 1879, the shipment consisting of lobsters, striped bass, black bass, and eels. They were carried in large salt-water tanks. The following account is extracted from a report by Mr. Livingston Stone:

"The first difficulty to be encountered [in transporting marine animals], viz, the tendency of the ocean water to become foul in the tanks *en route*, was overcome, as above mentioned, by letting the water stand long enough to clear itself of animal life.

"The second difficulty of keeping the water cold in the tanks without introducing ice into it, I resolved to meet by using a variety of coolers formed by the mixture of melting ice and salt. I tried three methods of using the freezing mixtures: (1) Putting the ice and salt in large stone jugs in the tanks; (2) The regular ice-cream-freezer plan of putting the freezing mixture in a vessel surrounding another vessel containing the water to be cooled; (3) Filling a large earthen drain tile with the freezing mixture and keeping it in a reserve tank of water from which the water, when cool enough, could be exchanged with the warmer water in the lobster tanks.

"All three varieties worked very well, and were employed for nearly the whole trip, the ice-cream-freezer method, however, being found to work the best in actual practice.

"After completing my preparatory arrangements for the care of the lobsters in transit, I procured some lobsters of Messrs. Johnson [of Boston], and in order to test the efficacy of my plans, I subjected the lobsters for a fortnight, as nearly as practicable, to the very conditions which they would encounter on the journey, and for this purpose I kept men watching them and dipping the water in the tanks every fifteen minutes, night and day, for fifteen days. The result was very encouraging, and gave strong hopes that the lobsters would reach the Pacific Ocean alive.

"The start from Albany was propitious and encouraging. We had with us three tanks of lobsters, three tanks of striped bass, two tanks of black bass, and two tanks of eels. The lobster tanks contained 22 female lobsters with over a million eggs nearly ready to hatch out. * * * The tanks were very heavy and difficult to lift, weighing about 300 pounds apiece.

"Besides the tanks containing fish, there were two large freezing tanks, in which were kept the reserve of ocean water and a constantly-renewed freezing mixture to maintain the reserve at as low a temperature as possible. These weighed nearly 300 pounds apiece when full. We also had two 5-gallon stone jugs containing the freezing mixture, and a large supply of ice and salt, an assortment of dippers, hatchets, thermometers, and other small articles indispensable to a journey of this kind.

"The main points about the care of the fish were: (1) to keep the temperature of the tanks just right all the time; (2) to keep the water constantly aerated; (3) at every change of cars to make the transfer from one train to another without injury to the fish and in season to take the connecting train. * * * I aimed to keep the lobsters at a temperature of between 45° and 55°.

* M. L. Perrin, in Report United States Commissioner of Fish and Fisheries, Part III, 1876, p. 260.

"It was easy enough to manage the temperatures of all the tanks except those containing the lobsters; but these gave us a good deal of trouble, because they could only be cooled by exchanging the water on the lobsters with the water in the coolers, and by using the stone jugs containing the freezing mixture. On very warm days it was extremely difficult to reduce the temperature in the lobster tanks as fast as the heat of the day raised it. With great pains, however, we succeeded in preventing it from rising high enough to do any mischief."

At Omaha one lobster was found dead. It "proved to be the one that had hatched its brood at Boston, and was undoubtedly not in condition to survive the journey. * * * No further mishap occurred during the journey. We passed the Laramie Plains into the Rocky Mountains in safety, and on the morning of June 17 descended into the valley of Great Salt Lake at Ogden, with lobsters, striped bass, black bass, and the remaining eels in splendid order. We made the transfer to the Central Pacific Railroad at Ogden successfully, and renewed our anxious journey with lighter hearts and more hope of favorable results than we had dared to entertain in all the previous part of the journey. Cheered by the hope of getting the fish through alive, we redoubled our exertions and kept at work with the dippers every minute, aerating the water in the tanks night and day till we reached Sacramento June 20, at 10.30 a. m. (eight days after the start).

"The lobsters were carried to Oakland wharf by the writer, where they were met by a steamer chartered for the purpose, which took them to the Bonito light-house, under the shadow of which, in a sheltered bay a few miles outside the Golden Gate, I had the pleasure of placing them with my own hands—the first lobsters ever introduced into the Pacific Ocean. They were all in splendid condition except one, and had with them over a million eggs nearly ready to hatch.

"Thus terminated one of the most important and difficult expeditions ever attempted with living fishes. The dangers they had to encounter were innumerable. It seemed as if only a miracle could save them, but they escaped all their dangers, and the result was as gratifying as it was unexpected."*

RESULT OF THE EXPERIMENTS.—Despite the numerous favorable reports made from time to time on the appearance of young lobsters in the vicinity of San Francisco, since the first introduction above described, we cannot find that any of them are authentic or based upon the examination of specimens by persons capable of identifying the species. Numerous small lobster-like forms that never attain a greater length than a very few inches at the most, live upon the California coast, and might easily be mistaken for genuine young lobsters by one not well acquainted with the structure of the latter. Such forms are undoubtedly taken at times in the nets of the fishermen and have probably given rise to the reports mentioned.

Mr. W. N. Lockington, of San Francisco, who had been studying the crustacea of California, was applied to, in 1880, for information regarding the matter. In reply he states: "I have been unable to ascertain whether any young lobsters have yet been taken in our waters. Reported examples prove, on inquiry, to be 'something like lobsters,' probably *Gebia* or *Callianassa*, which are very plentiful along sandy shores. An introduction worthy of mention, however, is that of the King Crab (*Limulus Polyphemus*), the young of which are supposed to have been brought over mingled with the spat of the eastern oyster, which has been largely imported for transplantation to the shallow waters of San Francisco Bay."

More recent information is wanting and there is still a possibility that some of the last lot of lobsters introduced may have survived. Before further shipments are made, it would be well to compare the coast temperatures of the two sides of the continent, with the view of ascertaining where on the west coast the conditions most resemble those of New England, whence the supplies are obtained.

* Report United States Commissioner of Fish and Fisheries, Part VII, for 1879 (1882), pp. 637-644.

10. COAST REVIEW OF THE LOBSTER INDUSTRY OF THE UNITED STATES, FOR 1880, STATISTICAL SUMMATIONS, TABLES, ETC.

MAINE.

PASSAMAQUODDY DISTRICT.

This district includes the line of coast from Calais, on the Saint Croix River, to West Quoddy Head, in Lubec. Lobster-fishing is carried on mainly from the lower part of the Saint Croix, from Eastport and from Lubec. The fishing season is practically that during which the canneries are open, beginning, by law, April 1, and ending August 1. Some years, however, as in 1879, the season does not open until the middle or latter part of April, and generally it closes as early as the middle of July, the lobsters becoming scarce, or largely soft-shell, about that time. Many of the lobstermen fish only about two months, which is said to be about the average length of the season for all of the fishermen. June is considered to be one of the best months for fishing. Lobsters are said to be most abundant on rocky bottoms, and in such places the traps are commonly set; but some fishing is also done on smooth bottoms of gravel and sand. In the spring, from April 1 to about the middle of May, the pots are mainly set outside of the island of Campobello, from Head Harbor to Herring Cove. Fishing first begins in depths of 20 to 25 fathoms, but, as the season advances, the pots are gradually shifted shoreward into much shallower water. About the middle of May the fishermen begin upon the so-called inside grounds, which are very extensive, and reach from Lubec to near Saint John, New Brunswick. Eastport is the only market for most of this region. During the summer the pots are usually set in depths of 3 to 10 fathoms. Many lobsters are brought in from about the Wolves, on the New Brunswick coast, and a few also from Grand Manan. Both the Saint Croix and Pembroke Rivers furnish a profitable summer lobster fishery, the supplies from those waters containing, it is said, many larger individuals than are obtained elsewhere. The lobsters from Grand Manan are described as being smaller and poorer in quality than those from along the mainland; while those taken in South Bay, Lubec, and the Pembroke River run above the average size.

A curious fact concerning the occurrence of soft lobsters, which influences the market to a certain extent for a limited period in this region, has been described to us by several reliable persons. According to their accounts, although soft lobsters are more or less abundant from the middle of May to August, they are far more plentiful from the 1st to the 10th of May than at any other time during the fishing season. During this period sometimes fully one-half the catch will be soft-shell and unfit for use, and great care has to be exercised in making contracts to furnish large quantities of lobsters at this time. In April soft-shell lobsters are quite rare, especially during the first part of the month. August and September correspond with the first ten days of May in the abundance of soft lobsters, and this is said to account for the fact, that during these two months the lobster fishery has never proved successful about Eastport. There is no fall lobster fishery of any account in the Passamaquoddy district.

The lobster fishermen in this district own their gear, go singly or in pairs, and use from forty to one hundred pots to a boat, the average number being about sixty. On rough bottoms the pots are set on single warps but on smooth bottoms they are worked in trawls. According to a careful estimate by Mr. George R. Ray, of Eastport, the average catch per boat for the season of 1879 (April 20 to August 1) was 3,939 pounds, the lobsters averaging in weight for the entire catch about one pound each. The average catch for 1880 was much less, and the season shorter, lobsters having been less abundant. In 1879, 3,050 barrels of fresh lobsters were shipped from Eastport, and, in

1880, only 2,546 barrels. The prices paid to the fishermen for cullings, or canning lobsters, were 90 cents per 100 pounds, at the traps, or $1, delivered at the canneries. The larger lobsters, intended for shipment to the fresh markets, brought 3 cents each to the fishermen. Sales are generally made by weight for the canning lobsters, and by count for the fresh market. The fishermen live mainly on the islands, and comparatively few lobsters are now caught in this district by Americans. About 94,500 pounds of lobsters were landed in Eastport by the American lobster fishermen in 1880, the balance of the sales recorded for that place having been brought in by provincial fishermen. The lobstermen are mostly farmers, tending weirs being the only other fishery in which many of them engage. Some, however, also go boat fishing. The lobstermen of the Saint Croix River fish only about two months, during May and June, and sometimes a little in the fall. They catch about 500 lobsters weekly to a boat, each boat stocking, on an average, $30 per month, and sell at Calais, Robbinston, Saint Andrews, and Eastport, receiving 3 cents each at the three former places. The fish used as bait in this district are as follows, in the order of their importance: herring, flounders, sculpins. They are usually caught by the lobstermen themselves.

The canning of lobsters began at Eastport in 1842, but at that time these crustaceans were not known to occur in the immediate neighborhood, in sufficient abundance to warrant fishing for them. Hence smacks were sent in quest of supplies as far to the westward as Muscle Ridges, stopping and buying also at intermediate ports. Large quantities were thus obtained from the vicinities of Millbridge and Stuben. It was not until 1855 that lobsters were found to be plentiful near Eastport, and then for the first time was the fishery engaged in extensively in that region. From 1855 to 1865 this fishery continued to develop, reaching its height about the latter year. Since then, however, it has greatly declined in the American waters, although it has proportionally increased among the British islands of the vicinity. Formerly the entire catch was used by the factories, but, later, when the demand for fresh lobsters, in New York and Boston, increased beyond the capacities of the fisheries nearer home, the Eastport fishermen found a profitable market in those places for their largest and best fish.

Lobsters are sent from Eastport to the fresh markets at the west, mainly in flour barrels, which hold from 135 to 140 pounds each, or about fifty-five lobsters by count. In the bottom of each barrel a hole of about an inch diameter is bored to permit of drainage. The lobsters are then packed in them, care being taken to have the tail of each curled up under the body. The barrel is filled about even full, and on top is placed a large piece of ice, weighing from 10 to 15 pounds. Over this is arranged a covering of marline or gunny cloth, which is held in place by the upper hoop of the barrel. The journey from Eastport to Boston occupies about thirty-six hours, but lobsters will live in the barrels fully forty-eight hours or longer, if properly packed. They are transferred to cars, or boiled as soon as they reach Boston. The regular steamer from Eastport for Boston leaves the former place, during the summer, about noon of every other day. It is customary to pack the lobsters in the morning of each steamer day, in order that they may start in good condition.

A portion of the lobster scrap or refuse from the canneries is sold to the Red Beach Plaster Company, by which concern it is dried and ground with plaster for fertilizing purposes. In 1879 2,000 barrels of scrap were thus disposed of, and in 1880, 1,500 barrels. A large quantity of the scrap in its crude state is also used directly upon the farms in the vicinity.

CANNERIES.—There were four canneries located in Eastport in this district, in 1880, as follows: One established in 1870, and owned by the American Sardine Company; one established in 1877,

and owned by Thomas L. Holmes, and two established in 1879, and owned by Pike & Faben, and P. M. Kane, respectively. These canneries put up nothing but lobsters in 1880.

Two canneries are located in the province of New Brunswick, in close proximity to this district, viz., one at Saint Andrews, on the Saint Croix River, owned by Hart & Balkam, and one at Grand Manan, owned by George Underwood & Co.

FRESH-MARKET DEALERS.—In addition to the canneries, two or three of which engaged in shipping fresh lobsters, there were also three exclusively fresh lobster and fish dealers at Eastport, with a small working capital.

SMACKS.—There is but one lobster smack owned in this district, the Swampscott of Eastport. She is schooner-rigged, measures 22.88 tons, is valued at $500, and carries a crew of four men. She carries lobsters in the spring and summer, and herring in the summer and fall, to the Eastport canneries.

THE LOBSTER FISHERY AT EASTPORT, IN 1882.—While at Eastport in July, 1882, the author made many inquiries regarding the condition of the lobster industry at that time, and it may be interesting to note, in this connection, the few changes which have taken place since the official investigation of 1880. Lobsters were much more abundant and averaged larger this year than in 1881 and 1880, both of which were considered off years, and although only about the same quantity of canned lobsters was produced, the number shipped fresh to Boston in ice was much greater. The canning of lobsters is no longer profitable at this place, because of the great competition which has arisen in connection with the fresh trade. The dealers, in purchasing of the fishermen, are obliged to take all sizes that are brought in, and the latter are in consequence able to demand a higher price for the poorer part of their catch. Lobsters intended for the fresh-market trade must measure at least 10½ inches in length; all under this size, designated as cullings, are canned. The former, since 1881, have paid to the fishermen 5 cents each, and the latter $1.30 at their cars, or $1.50 delivered at the canneries. This is an advance, since 1880, of about 50 cents a hundredweight. The dealers claim that they can the cullings simply to prevent a loss, and that the canning of lobsters only about pays its way, without adding to their profits. There are now in Eastport only three lobster canneries, which keep open for lobsters from the first part of April until about the middle of July, or perhaps a week or two longer if supplies remain abundant. After this time, they engage in the sardine business, during the proper seasons. All of these three canning establishments ship fresh lobsters by steamer to Boston, and in addition there are one or two other fresh dealers, who sell their cullings to one or other of the canneries at reduced prices. The fresh lobster trade is said to yield fair profits. Contracts are occasionally made with Boston dealers to supply them with a specified quantity every week, during the season, the latter, on their part, agreeing to receive these quantities, whatever may be the state of the market.

In 1882 only about 1,500 cases of canned lobsters were prepared in Eastport, against 4,500 cases ten years ago. The largest shipper of fresh lobsters states that, in 1879, he canned 1,500 cases of lobsters; in 1880, 500 cases; in 1881, 500 cases; and in 1882, 500 cases. Ten years ago, when he started in the business, he put up 1,400 cases and also shipped about 1,400 barrels of fresh lobsters. This year, in canning 500 cases, he has shipped about 1,600 barrels.

Information was solicited respecting the general decrease of lobster supplies during the past ten years, but the result of the inquiries was quite unsatisfactory, from the contradictory statements of the informants. It seems quite certain, however, that lobsters are much less abundant now than formerly, in very shallow waters near shore, and in the more inclosed areas, such as the mouths of rivers and inner bays. There appears also to have been a decrease in the

average size of lobsters, the run of small individuals being greater than was the case ten years ago. Nearly four times as many fishermen supply the Eastport market now as then, and still the quantity handled is no greater. Formerly a large proportion of the supplies came from the Pembroke River, which was fished to within about 2 miles of Pembroke, and from the Saint Croix River, as far up as Robbinston. Broad Cove, back of Eastport, also furnished at one time valuable lobster fisheries. The lobsters of the Pembroke River averaged larger in size than the ordinary. Of late years the catch in these areas has been much less extensive, and some seasons has amounted to little or nothing, although in 1882 it was far better than for several years back. The extent of the area fished over for lobsters has been gradually increased from year to year.

Summation of the lobster fisheries in Passamaquoddy district in 1880.

Number of fishermen	62
Number of marketmen	4
Number of vessels above 5 tons burden	1
Value of same	$670
Number of boats	37
Value of boats	$1,015
Number of lobster pots	2,775
Value of lobster pots	$2,081
Total amount of capital invested in the fishery	$3,766
Number of barrels of bait used	1,220
Value of bait	$610
Quantity of lobsters sold fresh to the Boston market and local trade, in pounds	351,348
Value of same	$12,883
Quantity of lobsters sold to canneries, in pounds	953,910
Value of same	$9,539
Total quantity of lobsters taken and sold, in pounds	1,305,258
Value of the same to the fishermen	$22,422

Summation of the lobster canneries in Passamaquoddy district in 1880.

Number of canneries	4
Value of buildings and fixtures	$4,000
Additional cash capital required	$7,000
Number of boats	7
Value of boats	$1,500
Total capital invested	$12,500
Average number of men employed	31
Average number of women and children employed	31
Average number of smacknen employed	19
Total number of persons employed	81
Number of pounds of live lobsters used	953,910
Amount paid to the fishermen for the same	$9,539
Number of 1-pound cans of lobsters put up	135,792
Number of 2-pound cans of lobsters put up	4,776
Number of other brands of lobsters put up	12,000
Enhancement in value of lobsters in process of canning	$9,254
Value of the canned lobsters	$18,793

Summation of the entire lobster industry in Passamaquoddy district in 1880.

Total number of persons employed	147
Total amount of capital invested	$16,266
Total value of the products as they entered into consumption	$31,676

MACHIAS DISTRICT.

In this district lobster fishing is carried on principally from Cutler, Machias and Little Machias Bays, Mason's Bay, Jonesboro', Jonesport, Harrington, Addison, and Millbridge.

QUODDY HEAD TO JONESBORO'.—Passing westward from Quoddy Head, the first lobster fishing station met with is Cutler. Here there are a few men who, like the average lobster fishermen of this part of the coast, farm and fish for lobsters at the same time, selling their catch to smacks

running to the factories at Eastport or the Little Kennebec River. Some of these fishermen live on Cross Island and about the shores of Little Machias Bay, both of which places are favorably situated for engaging in the lobster fishery. At Machiasport all of the lobster fishermen live on the west side of Machias Bay, at Larribee Cove, Buck's Harbor, and Howard's Bay. The lobster fishermen of this region are all farmers, and usually do not begin to set their pots until after planting, although a few may commence to fish as early as the middle of April; but a small portion of the day is occupied in hauling the pots, the remainder being spent in procuring bait and in working on the farms. About one-fourth of the bait used is small herring brought from Eastport in the dry smacks. The greater part of the catch (probably three-fourths) is sold to the cannery at the Little Kennebec River, the remainder going to the Jonesport factory. Smacks generally go around to obtain the lobsters, but sometimes the fishermen carry them to the canneries in their own boats. Machias Bay is considered an excellent fishing-ground for lobsters, the statements of several persons warranting the belief that the average daily catch falls but little, if any, short of two lobsters to a pot. Mr. O. S. Church, of Cutler, says that, in 1879, one of the boats fishing from that place was paid for 6 tons of lobsters, which is equivalent to about 11,000 lobsters by count.

To the westward of Machiasport we come upon the Little Kennebec River, on the west side of which, near the mouth, is situated a lobster cannery, owned by Messrs. Burnham & Morrill, of Portland. It is located in the township of Jonesboro', and draws its supplies mainly from the fisheries to the eastward. A few lobsters are also obtained from the Jonesport fishermen, in Mason's Bay, and from fishermen at Chandler's River, Jonesboro'. The catch at the latter places is, however, mostly sold to the Jonesport cannery, situated at the "Reach" in Jonesport.

JONESPORT.—About seventy-one men are engaged in lobstering from Jonesport, including the mainland and Head Harbor, Beals and Great Wass Islands. They fish singly, using boats valued at $30 each, and, on an average, about sixty-five pots apiece. The average catch per man for the season of 1880 (three and one-half months, April 15 to August 1) was about 9,250 lobsters by count, valued at about $125 to the fishermen. The pots are set singly, as lobsters are not considered to be abundant enough for the use of trawls, although there has been no apparent decrease in their numbers during the past ten years. They are, however, said to run smaller now than formerly, the average weight of those taken during the summer being about 1 pound. The average daily catch for a man is about one hundred and twenty-five lobsters. This fishery began in the vicinity of Jonesport about 1860. Formerly only flounders and sculpins were used as bait, but during the past two or three years one-half of the bait employed has consisted of salted herring, brought from the weirs at Millbridge. The average amount of bait used to a boat for the season is about 34 barrels. After the close of the lobster season the men engage in boat and other fisheries. Three or four men, however, trap lobsters in the fall to sell to the fresh markets, but they do a very limited business. Most of the lobsters taken are sold to the factory at Jonesport, being carried there in dry smacks, owned on the islands. Of the average catch of each man for 1880 (9,250 lobsters) about 7,650 were sold to the cannery and 1,700 to well smacks in the spring, at the rate of 3 cents each. The lobsters taken in the fall and winter are mainly sent to Portland and Boston packed alive in barrels.

HARRINGTON.—At this place nine men use on an average sixty pots each, and make an average stock for the summer season of about $75. The catch is sold entirely to Jonesport, Cape Split Harbor, and Millbridge. The men are all farmers, depending more upon that branch of labor than upon fishing.

ADDISON.—Twenty-four men from Addison fish for lobsters from April to August. They set on an average sixty pots each, and make an average season's stock of $100. Herring are prin-

cipally used as bait. The catch is sold both to the canneries and to well smacks, and a few lobsters (about 3,000 annually) are consumed locally.

MILLBRIDGE.—About twelve men from this place engage in lobstering from April to August, setting from fifty to one hundred pots each, or an average of seventy-five pots, and fishing in depths of 3 to 15 fathoms. The men go singly, sometimes having a boy with them to help, and generally use the so-called "reach boats," measuring 15 to 16 feet in length. In 1879 the average daily catch to seventy-five traps was stated to be about 700 pounds of lobsters, and in 1880, 500 pounds. About one-sixth of the catch, weighing on an average 2½ pounds each, was sold to the Boston smacks at 3 cents apiece. After July or August all of the lobstermen engage in hand-line fishing for cod, hake, pollock, &c.

CANNERIES.—Four lobster canneries are located in this district, as follows: Jonesboro', established in 1867, and owned by Burnham & Morrill; Jonesport, established in 1863, and owned by William Underwood & Co.; Cape Split, Addison, established in 1879, and owned by the Portland Packing Company; Millbridge, established in 1861, and owned by J. Winslow Jones & Co. The Jonesport cannery puts up mackerel and clams as well as lobsters, but the other three canneries are entirely limited to lobsters.

SMACKS.—Only one registered smack, the Havelock, of Jonesport, is owned in this district. It is a well sloop, of 32.97 tons measurement, is valued at $1,500, and has a crew of two men. It engages in carrying lobsters from Grand Manan and the coast of Maine to the Jonesport cannery and to Boston.

Summation of the lobster fisheries in Machias district in 1880.

Number of fishermen	222
Number of marketmen	2
Number of vessels above 5 tons burden	1
Value of same	$1,670
Number of boats	200
Value of same	$6,030
Number of lobster pots	8,251
Value of same	$6,188
Total amount of capital invested in the fishery	$13,888
Number of barrels of bait used	4,330
Value of same	$2,165
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	107,950
Value of same	$3,958
Quantity of lobsters sold to the canneries, in pounds	2,474,300
Value of same	$24,743
Total quantity of lobsters taken and sold, in pounds	2,582,250
Value of same to the fishermen	$28,701

Summation of the lobster canneries in Machias district in 1880.

Number of canneries	4
Value of buildings and fixtures	$11,650
Additional cash capital required	$26,748
Number of boats	8
Value of same	$1,200
Total capital invested	$39,598
Average number of men employed	58
Average number of women and children employed	71
Average number of smackmen employed	12
Total number of persons employed	141
Number of pounds of live lobsters used	2,474,300
Amount paid to the fishermen for the same	$24,743
Number of 1-pound cans of lobsters put up	438,624
Number of 2-pound cans of lobsters put up	24,144
Enhancement in value of lobsters in process of canning	$32,986
Value of the canned lobsters	$57,729

Summation of the entire lobster industry in Machias district in 1880.

Total number of persons employed	375
Total amount of capital invested	$53,486
Total value of the products as they entered into consumption	$61,687

FRENCHMAN'S BAY DISTRICT.

In this district the lobster fishery is carried on principally from Stuben, Gouldsboro', Winter Harbor, Sullivan, Lamoine, Mount Desert, and Bartlett's, Gott's, Cranberry, and Tinker's Islands.

At Gouldsboro' some lobster fishing is done during most of the year, but the principal fishing season is from April 1 to August 1. Lobsters are said to be most abundant in May, June, September, and October. The traps are set mainly in depths of 4 to 10 fathoms, but sometimes as deep as 30 fathoms, on both rocky and sandy bottoms. The boats used by the fishermen are the so-called "reach boats" and dories, the former measuring about 15 feet long by 4½ feet broad, and costing about $20 each. There are about seventy-eight lobstermen in this place, a portion of whom go singly in their boats and others in pairs, and they set on an average sixty pots each. The greater part of the catch is sold to the canneries, the remainder being taken by the well smacks or consumed locally. The prices paid for lobsters range from 80 cents to $1.20 per 100 pounds. Sculpins, flounders, herring and fish heads are employed as bait. About one-half of the bait used by the Gouldsboro' lobstermen in 1880 consisted of fish heads, obtained from the boat fishermen, many of whom dress their catch on shore. Two-thirds of the lobster fishermen of Gouldsboro' follow boat fishing after July, and the remainder engage in coasting, farming, mining, &c. About 13,000 lobsters were sold for local consumption in and about Gouldsboro' in 1880. The average stock, with fifty pots, in that year was $80, and the best stock, with one hundred pots, was $200. The largest catch for one day by a single fisherman was 850 pounds, live weight, and the average daily catch about 200 pounds. The lobsters average in weight 1¼ pounds each.

About eleven men at Winter Harbor and vicinity fish for lobsters in the canning season, selling to the South Gouldsboro' cannery. All of these men also fish for cod and hake at the same time, hauling their pots in the morning and going out line fishing the same day. They set about thirty pots each, and make an average daily catch of about 75 lobsters.

At Sullivan seven men engage in lobstering during about three months, from April to August, setting on an average about sixty pots each, and selling principally to the Gouldsboro' cannery. Some lobsters are also sold to the Southwest Harbor cannery, and in 1880 about 1,200 pounds were used locally. One man sets his pots during three months in the fall and winter, selling his catch to the country trade. About an equal quantity each of herring, flounders, and sculpins, was used as bait. The average season's stock per man was about $105. At the close of the lobster season most of the men stop fishing and obtain work on land. There are nine lobstermen fishing from Lamoine.

At Mount Desert and Bartlett's, Gott's, and Cranberry Islands seventy-seven men engage in the lobster fishery from April 1 to August 1, using on an average ninety pots each. Fish heads constitute about one-half of the bait used, the remainder consisting of sculpins, flounders, and herring. In some cases the lobster fishermen assist the boat fishermen to dress their catch, taking the heads as payment. In 1880, 45,500 lobsters by count were sold for local consumption. Three well smacks visit this region during the summer and carry away fully one-half the catch to western markets.

The lobster fishery of Tinker's Island is participated in by five men, who set about one hundred pots each, and make an average season's stock of $125.

CANNERIES.—There are three lobster canneries in this district, as follows: One at Prospect Harbor, Gouldsboro', worked for one season, in 1863, and re-established in 1867, run for the Portland Packing Company; one at Hammond's Cove, South Gouldsboro', established in 1870, and owned by the Portland Packing Company; and one at Southwest Harbor, Mount Desert, established in 1853, and owned by William Underwood & Co. The Prospect Harbor cannery puts up lobsters only, and obtains its supplies mainly from Schoodic Point and Boisbubert. The cannery at Hammond's Cove cans both lobsters and clams, and that at Southwest Harbor puts up lobsters, clams, mackerel, salmon, clam chowder, and fish chowder. The latter cannery obtains its supplies from a radius of about 20 miles, or from the region lying between Naskeag Point, Isle au Haut, and Prospect Harbor. Eighty lobstermen fish regularly for this cannery.

List of lobster smacks owned in Frenchman's Bay district, all of which carry lobsters only.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Citizen	Gouldsboro'	Sloop	Well	18.21	$400	2	Prospect Harbor cannery.
Naiad	do	Schooner	Dry	8.76	200	2	Gouldsboro' cannery.
Total				26.97	600	4	

Summation of the lobster fisheries in Frenchman's Bay district in 1880.

Number of fishermen	176
Number of marketmen	4
Number of vessels above 5 tons burden	2
Value of same	$940
Number of boats	198
Value of same	$4,747
Number of lobster pots	12,990
Value of same	$9,742
Total amount of capital invested in the fishery	$15,429
Number of barrels of bait used	6,600
Value of same	$3,300
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	269,000
Value of same	$9,863
Quantity of lobsters sold to the canneries, in pounds	1,368,726
Value of same	$13,687
Total quantity of lobsters taken and sold, in pounds	1,637,726
Value of same to the fishermen	$23,550

Summation of the lobster canneries in Frenchman's Bay district in 1880.

Number of canneries	3
Value of buildings and fixtures	$11,000
Additional cash capital required	$41,000
Number of boats	6
Value of same	$3,150
Total capital invested	$55,150
Average number of men employed	42
Average number of women and children employed	65
Average number of smackmen employed	12
Total number of persons employed	119
Number of pounds of live lobsters used	1,368,726
Amount paid to the fishermen for the same	$13,687
Number of 1-pound cans of lobsters put up	155,244
Number of 2-pound cans of lobsters put up	33,336
Number of other brands of lobsters put up	127,801
Enhancement in value of lobsters in process of canning	$32,900
Value of the canned lobsters	$46,587

Summation of the entire lobster industry in Frenchman's Bay district in 1880.

Total number of persons employed	299
Total amount of capital invested	$70,579
Total value of the products as they entered into consumption	$56,450

CASTINE DISTRICT.

The lobster fishery is carried on from Blue Hill, Brooklin, Deer Isle, Little Deer Island, Brooksville, Castine, Swan's Island, Long Island, and Isle au Haut, in this district. Fourteen men engage in lobstering at Blue Hill during the canning season, selling their catch principally to the Brooklin and Deer Isle canneries. They set on an average seventy pots each, and make an average season's stock of $100. One-fourth of the bait consists of herring, and three-fourths of flounders and sculpins.

There are twenty-eight lobster fishermen at Brooklin, who begin setting their pots in April. After June the greater number go smack fishing from other places, or coasting, and during the spring and fall all dig clams. The average duration of the fishing season is six to eight weeks only. One-fourth to one-third of the catch by weight, and nearly one-half in value, is sold to the well smacks carrying to Portland, Boston, and New York. More would be sold to these smacks, but early in the spring, when the smacks obtain abundant supplies from the outer islands, they do not go as far up the "Reach." The larger part of the remainder of the catch is sold to the Brooklin factory. Flounders and sculpins form the principal bait. The average number of pots used by each man is one hundred and twenty-five, and the average season's stock per man about $125.

At Deer Isle there are one hundred and forty men who fish for lobsters during the season. The fishery begins at the Thoroughfare the latter part of February or about the 1st of March, but in other sections about the 1st of April. Seven-eighths of the men fish until August, the remainder dropping off from time to time after June to go boat fishing. Three-fourths of the catch is sold to the canneries and one-fourth to Portland and Boston smacks. A fall fishery of two and one-half months, from the middle of September to December 1st, is carried on by some of the men. The average stock per man for the summer season of four months in 1880 was $200, and for the fall season of two and one-half months $150. A few of the fishermen own two boats each. The average number of pots to a man is seventy-five; 11,200 barrels of herring, flounders, and sculpins were used as bait in 1880.

The lobster fishery of Little Deer Island is of limited extent, being engaged in by only eight men, who set their pots during the canning season of four months. The greater part of the catch is sold to the Castine cannery, but the larger lobsters are taken by the Portland, Boston, and New York smacks. Outside of the lobster season the men do little beyond a small amount of farming and fishing. Lobsters are caught all about the island in summer, but remain a short distance farther off during the spring. The average number of pots to a man is forty-five, and the average stock for the season about $60. The boats used are mainly old dories.

There are thirteen lobstermen at Brooksville, fishing from April to August, and again from October to January. They set on an average fifty pots each. The greater part of the spring and summer catch is sold to the Brooklin and Castine canneries. The fall and winter catch is shipped by steamer to Boston or sold to the well smacks, a small amount (about 8,000 by count) being peddled up the river.

At Castine there are four men who fish for lobsters during the canning season. They set two hundred and fifty pots in all, and in 1880 used 215 barrels of flounders, sculpins, and herring as bait; they made a total catch of 12,000 lobsters, equal to 16,000 pounds.

Seventy-four men engage in the lobster fishery at Swan's Island. Of these, fifty-one are vessel fishermen, who set lobster pots only in the spring and early summer. They use on an average one hundred pots each, each man also owning at least two boats, one for lobstering, the other of smaller size for catching bait. Sculpins, flounders, and herring are used as bait, two-thirds of the quantity consisting of sculpins. In 1879 many pots were set close inshore, upon

the eel grass, in such shallow water that they were uncovered at low tide. The average weight of smack lobsters in that year was 2 pounds each, and of canning lobsters from three-fourths of a pound to 1 pound. The average daily catch to forty pots was about seventy-five lobsters, the larger part being smack lobsters. By fishing in deep water in the spring but few small lobsters are taken. According to Mr. David Smith, the lobster fishery was started at Swan's Island by four parties from Gloucester, Mass., who hired others to assist them at this place. They came in the fall in a smack, which waited until they obtained a load; but they did not return for a second trip. The year in which this occurred was not stated by Mr. Smith, but prior to this time the inhabitants of the islands had no idea of the abundance of lobsters in their neighborhood. They began fishing the next spring, and ten men engaged in the business up to 1855, after which time there followed an interval of three or four years when but little was done. In 1860 eight or ten men were again fishing, using from thirty to forty pots each. In 1855 the daily catch for forty pots varied from two hundred to two hundred and fifty lobsters, very few of which were small. About one-fourth were rejected as soft, or otherwise unsalable, the marketable ones averaging 3 to 3½ pounds each.

Long Island, lying to the southeast of Swan's Island, is the outermost of all the islands in the vicinity of Mount Desert, and is considerably isolated. It is visited in the lobster season by dry smacks running to the Southwest Harbor and Deer Isle canneries, and by well smacks from Boston and Portland. There are eight men on the island, who fish for lobsters, with about fifty pots each, from April to August, and stock on an average about $75. The pots are set singly. At the close of the lobster season these men engage in hand-line fishing to some extent. Flounders, sculpins, and fish heads are used as bait.

The boat fishermen of Isle au Haut and the adjacent islands make almost a specialty of fishing for lobsters. As a rule, however, they all catch enough fish for home use, while a portion also fish for a few weeks in midsummer, curing most of their catch, and peddling it up river in the fall. When mackerel are abundant they fish for them quite generally. There are six fishermen who regularly abandon lobstering about the middle of June to go trawling. They fish for cod, hake, and mackerel until September, when they usually begin to set their lobster pots again. Those who do much other fishing than that for lobsters generally have two boats, a square-stern, center-board, sloop-rigged fishing boat, 15 to 20 feet long, similar in most respects to the "Matinicus boat," and a "double-ender," for lobster fishing. In 1878 one-half of the fishermen fished for lobsters the entire season, or from the 1st of March until December. The others had taken up their pots by the middle of July, in order to fish for cod, hake, and mackerel until the middle of September, when they set them again, completing the lobster season about the first of December. In 1879 all of the fishermen, forty in number, fished for lobsters from the 1st of March to the 1st of August, selling the count lobsters to Portland, Boston, and New York smacks, and the cullings to dry smacks running to Green's Landing, Oceanville, North Haven, and Castine. After the 1st of August most of the men engaged in the mackerel fishery. Only ten of the fishermen set pots in the fall of 1879, beginning in October and continuing until December, and selling all of their catch to Portland, Boston, and New York smacks. No lobster fishing is done in the winter. The fishermen make and repair their gear, and build a boat, if needed; but the greater part of the time is spent in idleness, as no other employment than fishing is to be obtained on the island. A few of the men do a little farming to supply their own needs.

A larger number of pots to the man is used here than in most localities, and the more active fishermen make very fair earnings. One instance is recorded of a man stocking $425, lobstering during the five months from March to August of 1879, and several others, during the same period,

stocked over $350 each. Isle au Haut is favorably situated for boat fishing of all kinds. Lobsters are caught around the entire island, but are most abundant on the eastern side. The bar in the Thoroughfare, which is left dry at low tide, is a favorite locality for digging clams, as well as for procuring lobster bait—flounders and sculpins—which are also to be found in all of the coves and along the shores where there is gravelly, sandy, or muddy bottom. They are caught with hook and lines, spears, and nets. In windy weather, when spears are employed, oil is used to render the surface of the water smooth. The nets used to catch flounders and sculpins measure 20 to 30 fathoms in length, 2½ fathoms in depth, and have a 4-inch mesh. They are set mostly on the edge of the bar, where the water is about 3 or 4 feet deep at low tide. For several years previous to 1879 about 500 barrels of herring were used annually as lobster bait. They were employed principally in the spring, and were kept salted in barrels over winter.

CANNERIES.—There are five canneries in this district, located and owned as follows: Brooklin, established in 1870, and owned by J. Winslow Jones & Co.; Burnt Cove, Deer Isle, established in 1877, and owned by the Portland Packing Company; Green's Landing, Deer Isle, established in 1877, and owned by W. K. Lewis & Bro.; Oceanville, Deer Isle, established in 1858, and run by the Portland Packing Company; and Castine, established in 1871, and owned by Littell and Hunt. The products of the several canneries were as follows: Brooklin, lobsters only; Burnt Cove, lobsters and mackerel; Green's Landing, lobsters, mackerel, and clams; Oceanville, lobsters and mackerel; Castine, lobsters, mackerel, and clams. The Brooklin cannery obtains its supplies from over an area extending east and west about 20 miles; the Burnt Cove cannery depends mainly upon the fishermen at Vinal Haven, Isle au Haut, Deer Isle, and Blue Hill Bay; the Green's Landing cannery mainly upon those at Deer Isle, Isle au Haut, Rockport, and Mount Desert; and the Oceanville cannery upon those at Swan's Island, Isle au Haut, Sluson's Neck, Buck's Harbor, or Eggemoggin Reach, and Hodgkins' Cove Port. The lobsters are mostly brought in by dry smacks, of which there are fifteen, with a combined crew of about twenty-five men, running to the five factories.

List of lobster smacks belonging in the Castine district.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Ethel and Edith	*Brooklin*	*Schooner*	*Dry*	10.12	$500	2	Camden and Deer Isle canneries.
Mountain Fawn	do	do	do	18.18	500	2	Brooklin cannery.
Dry Spring	Deer Isle	do	do	12.73	200	2	Burnt Cove cannery.
Dolphin	do	do	do	11.52	250	2	Castine cannery.
J. C. Jameson	do	do	Well	24.07	800	2	Portland.
Minna	do	do	Dry	17.80	500	2	Green's Landing cannery.
Mozart	do	do	do	17.73	100	5	Fishes with traps, and sells locally.
Mary Elizabeth	Castine	do	do	9.04	200	2	Castine cannery.
Little Eva	Eagle Island	do	do	0.79	200	2	Camden cannery.
Total				128.04	3,250	21	

ENGAGED IN OTHER FISHERIES ALSO.

Favorite	Deer Isle	Schooner	Dry	7.12	$150	3	Oceanville cannery.
Hattie L. Gray	do	do	do	6.71	200	2	Camden cannery.
Helen M. Macomber	do	do	do	14.75	300	4	Green's Landing cannery.
Israel Washburn	do	do	Well	25.14	800	8	Portland.
Three Sisters	do	do	Dry	17.40	800	6	Burnt Cove cannery.
Trifle	do	do	do	8.56	350	2	Brooklin cannery.
William	do	do	do	12.77	200	2	North Haven cannery.
Cadet	Swan's Island	do	do	18.68	400	2	Oceanville cannery.
Total				111.16	2,700	29	

Summation of the lobster fisheries in Castine district in 1880.

Number of fishermen	311
Number of marketmen	50
Number of vessels above 5 tons burden	17
Value of same	$7,630
Number of boats	390
Value of same	$12,785
Number of lobster pots	28,050
Value of same	$21,038
Total amount of capital invested in the fishery	$41,453
Number of barrels of bait used	16,860
Value of same	$8,430
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	868,500
Value of same	$31,845
Quantity of lobsters sold to the canneries, in pounds	2,099,360
Value of same	$20,994
Total quantity of lobsters taken and sold, in pounds	2,967,860
Value of same	$52,839

Summation of the lobster canneries in Castine district in 1880.

Number of canneries	5
Value of buildings and fixtures	$15,550
Additional cash capital required	$38,500
Number of boats	15
Value of same	$7,350
Total amount of capital invested	$61,400
Average number of men employed	79
Average number of women and children employed	86
Average number of smacknen employed	25
Total number of persons employed	190
Number of pounds of live lobsters used	2,099,360
Amount paid to the fishermen for the same	$20,994
Number of 1-pound cans of lobsters put up	411,804
Number of 2-pound cans of lobsters put up	13,416
Enhancement in value of lobsters in process of canning	$31,393
Value of the canned lobsters	$52,387

Summation of the entire lobster industry in Castine district in 1880.

Total number of persons employed	551
Total amount of capital invested	$102,853
Value of the products as they entered into consumption	$84,232

BELFAST DISTRICT.

The principal lobster fishing stations in this district are Searsport, Belfast, Lincolnville, Rockport, Islesboro', North Haven, and Vinal Haven.

BELFAST TO OWL'S HEAD.—Along the mainland of this district the lobster fishery was carried on in 1880 as follows: From Searsport, by two men; from Belfast, by two men; from Lincolnville, by four men; from Rockport, by ten men; from Rockland, by eight men, and from Owl's Head, by ten men. The lobster season in this region is mainly limited to the period when the canneries are open, but some lobstering is also done in the spring and fall. More lobsters are taken in May than in any other month. The pots are set in depths of 1 to 20 fathoms, dependent upon the season. The best lobstermen will earn as much as $40 per month in good seasons. The average price of smack lobsters is 4 cents each, and of the small or canning lobsters $1 per 100 pounds. At retail they sell in the markets at about three times the price of the commoner fish of the same region, and are, therefore, rather beyond the means of the poorer classes. Flounders, sculpins, and herring in small quantities, are used as bait. The men go singly and set, on an average, eighty pots each. The boats are mostly valued at $15 each. After July a majority of the lobstermen

engage in boat-fishing. Two-thirds of the catch in value is sold to the Portland and Boston well smacks, and the remainder to the Camden and Castine canneries and the local trade. Forty-eight thousand pounds of fresh lobsters are sold annually for food in the neighboring regions.

ISLEBORO'.—Thirty-two men engage in lobstering from Islesboro' from April 1 to August 1, setting an average of sixty pots each and stocking on an average $80 for the season. Thirteen of these lobstermen go boat fishing after July, principally in the vicinity of Matinicus Island, at which place they camp out during the fishing season. Most of the bait employed consists of flounders and sculpins, but a few herring are also used. The boats are all small, and are valued at about $10 each. The men go singly, and all farm a little for their own use. One-half of the catch in value is sold to the well smacks and one-half to the canneries and local trade.

NORTH HAVEN, &c.—The lobstermen of the fishing area including North Haven, Eagle, Bear, Spruce Head, and Beach Islands, belong mainly at North Haven and live along the coves, harbors, and inlets which indent its shores; but a few are also located on each of the smaller islands. They fish for lobsters a part of each day only, working on their farms the remainder of the time. Those who have the most to do on shore set but a limited number of pots, which can be hauled in the few hours of early morning; but others, who do less farming, work with a larger number of pots, and devote much more time to tending them, and to collecting bait. The methods of fishing are similar to those employed at Vinal Haven, and the fishing season is about the same, beginning, possibly, a little later or about the first week of April. About the middle of June many stop lobstering in order to fish for hake, and from that time until the middle of July they are constantly dropping off, one or two at a time, to engage in the other fisheries. Before the close of the summer season (August 1) not more than one-third of the original number are still fishing for lobsters.

Prior to 1879 nearly all the lobstermen of this region engaged in the fall lobster fishery, which continued until about November 20, this season being considered the best of the year, as farm labors are then done with and the men can devote themselves more fully to fishing than in the spring. The presence of mackerel in 1879, until well into October, greatly interfered, however, with the fall lobster fishery of that year. There is no winter fishery for lobsters. When herring are abundant it is customary for some of the lobstermen to set several herring nets and take the fish from them before hauling their pots. Likewise in the fall it has generally been the custom, whenever schools of mackerel appear, to haul the lobster pots in the morning and fish for mackerel the latter part of the day.

Lobsters are found in all the waters surrounding these islands, but are somewhat more abundant about the smaller islands and dry ledges to the southwest of Long Island (Islesboro'); consequently very many of the fishermen set their pots in these localities, using sail boats when there is a breeze and row boats when it is calm. In the early spring (March), the pots are usually set in depths of 14 to 20 fathoms, but as the season advances they are gradually shifted in, until, by the first or middle of May, they are placed in from 3 to 6 fathoms. The bait consists principally of flounders and sculpins, but salt herring, fish heads, and ham fats, are sometimes put to the same use. The heads and livers of sheep have also sometimes been employed.

Eighty-nine men engaged in the lobster fishery in this section in 1880, setting on an average about sixty pots each. The monthly stock per man in the spring and summer ranged from $20 to $30, but in the fall it advanced to an average of $45 per month. Mr. Nathaniel D. Wooster, of North Haven, states that the average daily catch to a trap at present is about

one and a half to two lobsters. He considers 400 pounds a large daily catch for one man; but twenty years ago, with the same amount of gear, he could obtain as many as 1,500 pounds a day.

The fall catch of lobsters is sold almost entirely to Portland, Boston, and New York smacks. During the canning season the larger or count lobsters are mostly disposed of in the same way, while the small lobsters are sold to the canneries at North Haven and Castine. A small quantity of lobsters is peddled up the river. About ten well smacks visit this region during the lobster season. They seldom make regular trips, but run whenever they feel certain of obtaining a load. The fishermen generally contract for only one load at a time.

VINAL HAVEN.—Lobsters are very abundant in all the waters surrounding the island of Vinal Haven, and are quite equally distributed. In the early spring they are found somewhat farther from land than in the summer, and in depths of 15 to 25 fathoms. As the season advances they gradually move shoreward, into more shallow water, and enter the coves and creeks. Good fishing is frequently obtained in the summer in water so shallow that the pots are left uncovered at low tide. The fishermen are moreover rarely obliged to go much more than a mile from the shore, at any season.

A large percentage of the professional boat fishermen of Vinal Haven engage exclusively in lobstering for several months of each year. The season usually begins between the middle and the last of March, and continues until the first of August. Some of the men, however, drop off at intervals from the first to the middle of July, to engage in other fisheries, and a few also leave off in June. A very few men keep down their pots, or a portion of them, into the fall, or until about December, catching a few lobsters, and keeping them in their cars until such times as they can find a sale for them. The fall of 1879 afforded so good a mackerel fishery that but little lobstering was done. The fall fishery in previous years began about the middle of September, and continued until about the first of December. But very little lobster fishing has ever been done in the winter.

The homes of the lobster fishermen are scattered along the shores of the island, but are principally located in the coves and harbors and on some of the smaller islands, which lie close to the western side of the main island. The pots are usually set at the nearest fishing grounds, either in trawls or singly, the latter method generally having preference, as they can then be scattered more in case the lobsters are scarce. The fishermen claim that by shifting them a little every time they are hauled, which naturally results from the drifting of the boat, they obtain better results. Row boats are generally used in setting and hauling the pots, and sail boats very rarely. One of the most common kinds of row boats employed in this region is the so-called "double-ender," or "pea-pod," which has already been described in the general account of lobster boats, and which is said to have originated either at this place or at North Haven. Most of the lobster fishermen of Vinal Haven do a little farming in the summer for their own use. In the winter a few may find employment elsewhere, but the larger number do little beyond repairing their boats and gear for the next spring, building a new boat, perhaps, or getting in their year's stock of fuel.

Flounders and sculpins principally are used as bait, and also some fish heads, when they can be conveniently obtained. The flounders and sculpins are caught by the lobstermen themselves, by means of spears, fyke-nets, and hooks and lines. Although not as abundant as formerly, they still occur in considerable numbers in most of the shallow coves and inlets. In windy weather the surface of the water is rendered smooth by the application of oil.

In 1880 eighty-two men from Vinal Haven were engaged in the lobster fishery, setting on an average sixty pots each, a smaller number than in many neighboring sections. The average stock per man for the four months from April 1 to August 1 was $100, and for the two and a half months

from September 15 to December 1, was $85. Some of the men own two boats each. The spring and summer catch was largely sold to the cannery at Vinal Haven, all of the small lobsters having been disposed of in that way. A large percentage of the larger, or count lobsters, taken in the spring and summer, and all of that character caught in the fall, are sold to the Portland, Boston, and New York smacks.

CANNERIES.—Three canneries are contained in this district, being located and owned as follows: One in Camden, established in 1878, and owned by J. Winslow Jones & Co.; one in North Haven, established in 1866, and owned by W. K. Lewis & Brother; and one at Carver's Harbor, Vinal Haven, established in 1868, by E. C. Schenck, of New York, and owned, since 1870, by J. Winslow Jones & Co. Lobsters are carried to these canneries in seven dry smacks, having a combined crew of thirteen men. Mackerel, as well as lobsters, are put up at all of these canneries. The first factory was built at North Haven in 1857, the lobsters being caught at that time with the old style of hoop-net pots.

List of lobster smacks belonging in the Belfast district.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
George M. Hodgdon	Stockton	Schooner	Dry	16.19	$1,000	3	Castine cannery.
William Herbert	Islesboro'	do	do	10.50	1,000	2	Camden cannery.
Caro Piper	Rockport	do	Well	29.64	3,000	3	Boston.
Matilda	do	do	do	23.13	600	2	Do.
Clear the Track	Vinal Haven	do	do	41.03	800	3	Do.
Total				120.49	6,400	13	

ENGAGED IN OTHER FISHERIES ALSO.

Glendale	Vinal Haven	Schooner	Dry	12.77	900	5	

Summation of the lobster fisheries in Belfast district in 1880.

Number of fishermen	258
Number of marketmen	18
Number of vessels above 5 tons burden	6
Value of same	$8,150
Number of boats	312
Value of same	$6,295
Number of lobster pots	15,930
Value of same	$11,948
Total amount of capital invested in the fishery	$26,393
Number of barrels of bait used	6,555
Value of same	$3,277
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	699,000
Value of same	$25,630
Quantity of lobsters sold to the canneries, in pounds	1,177,464
Value of same	$11,775
Total quantity of lobsters taken and sold, in pounds	1,876,464
Value of same	$37,405

Summation of the lobster canneries in Belfast district in 1880.

Number of canneries	3
Value of buildings and fixtures	$14,000
Additional cash capital required	$18,000
Number of boats	7
Value of same	$3,925

Total amount of capital invested	$31,925
Average number of men employed	37
Average number of women and children employed	47
Average number of smackmen employed	13
Total number of persons employed	97
Number of pounds of live lobsters used	1,177,464
Amount paid to the fishermen for the same	$11,775
Number of 1-pound cans of lobsters put up	164,292
Number of 2-pound cans of lobsters put up	43,320
Enhancement in value of lobsters in process of canning	$16,560
Value of the canned lobsters	$28,335

Summation of the entire lobster industry in Belfast district in 1880.

Total number of persons employed	373
Total amount of capital invested	$58,318
Total value of the products as they entered into consumption	$53,965

WALDOBORO' DISTRICT.

This district includes many important fishing stations, among which are Rockland, Owl's Head, South Thomaston, Friendship, Saint George, George's Island, Muscle Ridges, Bristol, Bremen, and Matinicus Island.

The boat fishermen of this district constitute the larger part of those engaged in the lobster fishery; but there are quite a number of men employed on the shore and bank fishing vessels, and on the menhaden steamers, who own lobster boats and pots, and who, in the fall (about October), after they have done with those fisheries, begin to fish for lobsters. A few may continue in this industry all winter, but the majority of all the lobster catchers take up their pots in December. Many begin lobstering again in February and March and continue until April or May; some even fish as late as June. The catch is sold to Boston and Portland smacks, and to the canneries at *East Boothbay and Saint George. About one-third of all the lobster fishermen are also vessel* fishermen; but as about one-third of the boat fishermen do not engage in lobstering, the number of lobstermen is about equal to the entire number of summer boat fishermen. Many of the boats used by the lobstermen are the same as are employed in the other fisheries, and are known locally as "lobster boats." They are quite large, measuring 18 to 26 feet in length, and have a cuddy forward, where the lobsters can be kept from freezing in cold weather, by means of a stove, until they can be transferred to the floating cars. There are also accommodations for cooking and sleeping on board. These boats are sloop-rigged, and generally furnished with a center-board.

The men go singly, and as their pots are set on single warps, unlike the general method to the westward, they keep their boat under sail while hauling. The pots are set in rows; in winter the inner pots will be near one or other of the outer islands or ledges, the remainder extending off shore.

From the large size of their boats, the lobstermen of this region are enabled to begin fishing by the middle of February, and to venture some distance from land, where lobsters are most abundant in cold weather; but the well smacks do not begin to run regularly until between the 1st and the middle of March. By about the middle of April the lobsters have worked back into shallow water, and soon after this the fishery attains its height. The smack lobsters average about 2 pounds each, while the cullings or canning lobsters run from seventy-five to ninety by count to the hundred weight. Four to 5 cents each is paid for smack lobsters until the middle of April, and after that about three cents each. The smacks cease running about the middle of July, and beginning again about the middle of September, continue into November, and even as late as December.

The lobstermen on the west side of Pemaquid fish in John's Bay and the Damariscotta River in the summer, shifting into deeper water in cold weather. Those on the east side and about Friendship take lobsters well up among the islands and in the coves between Saint George and Pemaquid, in the spring, summer, and fall; but in the winter they have to go some distance out, the best winter fishing-grounds lying beyond the outer islands and headlands. Many of the men live on the little islands, between Bristol and Bremen on the one side and Saint George and Friendship on the other, several of these islands containing the homes of from one to four families, who also do some farming on a small scale.

The fishermen of this district set from twenty-five to sixty pots each, or an average of about forty-five; the season's stock in lobstering ranges from $25 to $200, the average being about $110. In obtaining flounders for bait the "dark water" spear is frequently used when the water is rough, during February and March. At Bremen and Friendship the same kind of bait is generally secured by means of fyke-nets, set in the coves, into which the flounders swim during high water. On some of the islands, where flounders are not abundant, cunners are much used, and are taken in box-shaped lath traps about 2 feet high, 18 inches square, and open above. Fish-heads, sculpins, and catfish are also largely used as bait. About a quarter of a barrel of bait is used daily to each fifty traps. The average daily catch per trap for the entire season is said to be about one count and two small lobsters. The cullings are sold mostly to the Saint George and East Booth-bay canneries.

At the Muscle Ridges, during the week ending May 12, 1880, four men on Hunt's Island stocked on cullings $85, and on smack lobsters $115, making a total of $200 for the four men.

According to the Cape Ann Bulletin of April 17, 1878, "there have been over 100,000 lobsters caught and sold by the fishermen of Friendship, Me., since the 1st of February, averaging 4 cents each. Six smacks from this place are constantly employed to carry lobsters to Boston and Portland, from which they receive from 1½ to 2 cents freight on each lobster. One smack made three trips to Boston this spring, carrying in all 23,000."

The Gloucester, Mass., Telegraph, of June 8, 1870, states that "a firm in Rockland, Me., is said to have shipped to Boston and Portland, during the months of March, April, and May, 100 tons of live lobsters."

At Matinicus Island lobster fishing was introduced in 1868. The season extends from April 1 to August 1. The men for the most part go singly, set on an average eighty traps each, and make an average stock of about $150 for the four and one-half months. In the spring the traps are set on trawls, but during the summer on single warps. One-half the bait used consists of fish-heads.

CANNING.—There is in this district but one cannery, located at Port Clyde, South Saint George, and owned by Burnham & Morrill, of Portland. Both lobsters and mackerel are put up. This cannery is situated in one of the best lobster sections of the Maine coast, and gathers its supplies from Pemaquid Point, on the west, to Owl's Head, on the east, including Matinicus and George's Islands, Muscle Ridges, the east side of Bristol, Bremen, Friendship, Cushing, and Saint George. Two dry smacks, with four smackmen, are employed in gathering the lobsters from the fishermen.

List of lobster smacks belonging in Waldoboro' district.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
(*Unknown*)	Rockland	Schooner	Dry	9.86	$200	2	Burnt Cove cannery, Deer Isle.
Exchange	Saint George	do	Well	20.09	800	3	Boston.
May Queen	do	Sloop	Dry	11.58	300	2	Saint George cannery.
General Worth	*Cushing*	*Schooner*	*Well*	*19.00*	*500*	*2*	*Boston.*
I. W. Crawford	do	do	do	16.79	400	2	Portland and Boston.
John Dexter	do	Sloop	do	24.78	1,000	2	Boston.
Republican	do	Schooner	do	19.00	600	2	Portland.
Sentinel	do	Sloop	do	15.06	400	2	Boston.
True Republican	do	do	do	16.38	600	2	Do.
Highland Lass	Friendship	do	do	16.80	400	2	Do.
Planter	do	Schooner	do	32.57	600	3	Do.
Total				211.91	5,800	24	

ENGAGED IN OTHER FISHERIES ALSO.

Minnie Davis	Friendship	Schooner	Well	27.51	$2,000	3	Boston.
Pride of the Port	do	do	do	32.39	1,500	3	Do.
Sarah E. Hyde	do	do	do	36.44	1,200	3	Do.
Total				96.34	4,700	9	

Summation of the lobster fisheries in Waldoboro' district in 1880.

Number of fishermen	250
Number of marketmen	33
Number of vessels above 5-tons burden	14
Value of same	$12,370
Number of boats	220
Value of same	$17,600
Number of lobster pots	12,500
Value of same	$9,375
Total amount of capital invested in the fishery	$39,345
Number of barrels of bait used	9,595
Value of same	$4,798
Quantity of lobsters sold to market smacks and local fresh trade, in pounds	947,700
Value of same	$34,749
Quantity of lobsters sold to the canneries, in pounds	748,182
Value of same	$7,482
Total quantity of lobsters taken and sold, in pounds	1,695,882
Value of same to the fishermen	$42,231

The statistics of the South Saint George cannery are given in connection with those of the Wiscasset district.

WISCASSET AND BATH DISTRICTS.

The principal lobster fishing stations in the Wiscasset district are Boothbay Harbor, North and East Boothbay, Southport and Westport; and in the Bath district, Georgetown and Small Point.

When the lobster fishery was first started in Boothbay Harbor, the waters between the numerous islands which dot the entrance to the harbor abounded in lobsters from the early spring until December, and some lobsters remained there even during the winter. So plentiful were they, and so easily obtained from the sheltered waters of the harbor and bay, that those who first engaged in this industry did much better than the other fishermen. This circumstance naturally tended to draw fishermen from the other branches of fishery, and the older men and boys

who could not endure the hardships of the more active kinds of fishing found in this one remunerative employment close at hand.

The summer lobster fishery of this region is of comparatively little importance at present. In some places, as in Boothbay Harbor, a few men continue to catch lobsters through the summer, selling to the canneries until August, and also to the smacks and to the summer residents on the islands. The larger part of the fishermen, however, stop lobstering in May, or perhaps earlier. Some go to the banks, and after making one or more trips, when the vessel hauls up, begin lobstering again. The majority of the lobster men, however, go boat fishing during the summer. As a rule, the lobster-fishing season may be said to fairly begin by November 1. Many of the men set their traps all winter, but some do not. Mr. Steven Seavy states that in Boothbay Harbor and Linnegan's Bay the ice makes around the shores in winter to such an extent that the men cannot get to the cars in their boats, and they therefore do not fish in the coldest weather, but take up their traps and lay by for about two months. This is also the case, to a limited extent, in some other places. This fishery, like all the small-boat fishery of this region, is carried on with great irregularity; and if the fisherman sees a chance of bettering himself for a time, he leaves off lobstering, returning to it again when he feels inclined or when want compels him.

Good lobster-fishing grounds extend off from Small Point to Seguin Island. The next important grounds are those of the Sheepscot River, which furnish as good fishing as can be found anywhere in these two districts. The depth of water in the river prevents its freezing over in the winter, and offers a good retreat for the lobsters in cold weather without their going far from land. Lobsters are caught as far up as Wiscasset bridge, and thence out to Seguin. In the winter the fishermen shift their pots into the deeper water, toward the middle of the river; but Mr. Joseph R. Rodgers, of Georgetown, says he catches lobsters in the winter, in depths of only 5 to 10 fathoms. The Cape Newagen lobstermen fish as far out as Bantam Ledge, frequently setting their pots in depths of 35 to 40 fathoms.

Notwithstanding the large amount of gear used by the fishermen in this region, they now find the business of lobstering far from remunerative; but as most of them already have their gear, and can fit out with but little additional expense, they are still induced to engage in it, as it offers in many places the only means of making a living. A fair average stock for a man fishing from November to April is now about $75. Formerly the traps were set on single warps, but now the method of setting them trawl fashion is almost universally employed, as it enables one man to do approximately the work of two. This method was first adopted at Harmon's Harbor about 1865, and at Small Point in 1867. In the winter, however, two men generally go out in each boat, more as a matter of safety and for the proper handling of the boat in rough weather.

At Small Point two men engage in lobstering during the entire year, and eight men from April to November, inclusive, trawling for hake and other fish at the same time during the latter season. They set on an average thirty-eight traps, the average yearly stock per man being about $125. A small portion of the catch (about 6,000 by count in 1880) is used locally for bait and food, the remainder being sold to Portland smacks.

At Georgetown fifty-two men were engaged in lobstering from November, 1879, to April, 1880. The remainder of the year they were occupied in other kinds of boat fishing, but some kept down a few traps during the same time to obtain lobsters for bait. The local consumption is not great. About one-third of the catch is sold to boats trading up the Kennebec River, and the remainder to Portland smacks. Mr. Rodgers, of Georgetown, fishing from September to May with sixty traps, stocked only $160, which is, however, much better than most fishermen do. On the Kennebec River side of Georgetown lobstering is carried on only about the extreme southern part of the

point, where in 1879 four men from Portland, living on a scow, caught and sold to the Portland smacks and Kennebec River boats.

At Westport five men were fishing for lobsters from November to April, and two men during the entire year. They set an average of thirty-five traps each and made on an average about one dollar each daily. The catch is disposed of as at Georgetown. At Southport there were thirty men fishing from November to April and five men during the entire year, using on an average about fifty traps each. During the canning season the small lobsters are sold to the Boothbay cannery.

There were fifteen lobstermen at North Boothbay fishing from November to April, and to some extent also during the summer, with about twenty-five traps each and stocking about one dollar each daily. Sales were made to the Boothbay cannery, to the Portland smacks, and for local consumption. In Boothbay Harbor and East Boothbay there were seventy lobstermen, with thirty-five boats, fishing from the 1st of February to the middle of March, about thirty-five men from the latter date until June, and ten men from June to November 1. The Boothbay cannery takes the smaller lobsters during the canning season, the remainder being sold to the Portland smacks and the local markets.

CANNING.—There is but one lobster cannery in the Wiscasset district, and none in the Bath district. The Wiscasset cannery is located at Boothbay, on the eastern side of the strip of land known as Spruce Point, adjoining Linnegan's Bay. It is owned by J. Winslow Jones & Co., and was established in 1876. Clams and mackerel, as well as lobsters, are put up. The lobsters for this cannery are procured from the fishermen living between Cape Small Point, on the west, and Pemaquid Point, on the east.

Summation of the lobster fisheries in Wiscasset district in 1880.

Number of fishermen	130
Number of boats	106
Value of same	$6,200
Number of lobster pots	5,895
Value of same	$4,421
Total amount of capital invested in the fishery	$10,621
Number of barrels of bait used	2,700
Value of same	$1,350
Quantity of lobsters sold to the market smacks, and local fresh trade in pounds	428,800
Value of same	$15,723
Quantity of lobsters sold to the canneries, in pounds	367,342
Value of same	$3,673
Total quantity of lobsters taken and sold, in pounds	796,142
Value of same to the fishermen	$19,396

Summation of the lobster canneries in Waldoboro' and Wiscasset districts in 1880.

Number of canneries	2
Value of buildings and fixtures	$8,750
Additional cash capital required	$18,411
Number of boats	5
Value of same	$1,500
Total amount of capital invested	$28,661
Average number of men employed	35
Average number of women and boys employed	33
Average number of smackmen employed	9
Total number of persons employed	77
Number of pounds of live lobsters used	1,115,524
Amount paid to the fishermen for the same	$11,155
Number of 1-pound cans of lobsters put up	185,340
Number of 2-pound cans of lobsters put up	21,912
Enhancement in value of lobsters by process of canning	$15,531
Value of the canned lobsters	$26,686

Summation of the lobster fisheries in Bath district in 1880.

Number of fishermen	88
Number of boats	68
Value of same	$4,100
Number of lobster pots	3,835
Value of same	$2,876
Total amount of capital invested in the fishery	$6,976
Number of barrels of bait used	1,900
Value of same	$950
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	213,400
Value of same	$7,825

PORTLAND AND FALMOUTH DISTRICT.

PORTLAND.—Lobsters are taken off Portland, in greater or less quantities, during the entire year, but are said to be most abundant and in the best condition from March to July, and again from October to the end of good weather, and during those seasons most of the fishing is done. From July to October a very large proportion are soft, and but few are caught. The fall catch is only about one-half as large as that in the spring, although fully as many lobsters could be taken were there a market for them. The fishermen belonging to Portland who engage exclusively in this industry number about twenty-five, and live mostly on the islands of the vicinity—Hog, House, Peaks, Cushing, and Chebeague Islands, and at Cape Elizabeth. Nearly all of the shore fishermen of this region, however, catch lobsters, to a greater or less extent, during the height of the season, and sell to the Portland fresh markets and to the canneries. The local or warm-weather fishing grounds are situated off the back side of Hog Island, about Peaks and Cushing Islands, and in the vicinity of Portland Light. The winter grounds are mainly off Cape Elizabeth. The depth of water in which the traps are set varies with the season, from 3 to 30 fathoms. The men generally go singly, set from forty to sixty-five pots each, and, during the height of the season, sometimes visit them twice daily. A fair average daily catch per trap is about one marketable and three small lobsters, which is said to be much less than in former years. Mr. Trefethen, of House Island, states that twenty to twenty-five years ago he used to average seven lobsters to a trap each day, the weight of the marketable lobsters ranging from 4 to 6 pounds. Marketable lobsters average at present about 2 pounds each. As a rule, the fishermen carry their catch directly to market, and do not depend upon the smacks, as those living farther away are obliged to do. Lobsters of 10½ inches in length and larger bring to the fishermen in the fresh markets from 4 to 5 cents apiece; the smaller ones sell at 1 cent per pound.

SOUTH HARPSWELL.—At South Harpswell the lobster fishermen go singly, tend forty to fifty pots each, and make an average daily catch per trap of about three lobsters. A fair week's catch per man amounts to about 900 or 1,000 lobsters, of which about one-third are of marketable size and the remainder only suitable for canning purposes. The marketable lobsters weigh, on an average, about 2 pounds each. The smaller lobsters weigh so nearly 1 pound each that the canneries buy them either by count or weight, as the fishermen may desire, at the rate of 1 cent per pound or piece. Smack or count lobsters bring about 5 cents each. The best fishing is said to occur during March and April. From July to October many soft lobsters are taken in the traps. The summer fishery is conducted along the shores and about the inner islands of Casco Bay, but in cold weather the fishermen are obliged to resort to the outer islands and off-shore grounds. Most of the lobster fishermen go shore fishing at certain seasons, but a few make a business of lobstering the entire year. Many engage in other kinds of fishing at the same time, keeping their pots set and hauling them every two or three days, or when they cannot fish. During the present closed season (1880) for small lobsters, many of the lobstermen have kept a few pots down, saving the

large lobsters for the smacks, but using all of the small and otherwise unmarketable ones for bait. The above remarks concerning South Harpswell apply to all the lobster fisheries of Casco Bay, excepting Portland.

For many years after 1850, when the first cannery was started at South Harpswell, the fishermen worked in pairs, using about seventy-five traps to a boat. The daily catch per boat averaged 400 to 500 lobsters of salable sizes. All under 2 pounds in weight were thrown away, and the remainder were sold to the canneries at an average price of 3 cents each in the spring, and 2 cents each in the fall. The season extended from March to May and from September to November 15. After the factories had closed the catch was sold to New York and Boston smacks, only a small quantity going to Portland. The prices paid by the smacks were about the same as those given by the canneries, beginning at 3½ to 4 cents in the early spring, and falling as low as 1½ cents when lobsters became more plentiful. Frequently, when the markets were dull, the fishermen, after culling out all under 2 pounds in weight, would bring their catch to the smacks, which, in turn, would throw out about a third more, taking only the very largest lobsters. This happened only late in the fall, or during very dull times. At other times the smacks would take all weighing over 2 pounds at a fair price. The marketable lobsters then averaged about 3½ pounds each.

SMALL POINT.—On the Casco Bay side of Small Point, from Horse Island Harbor to Bald Head, lobsters have grown very scarce during late years, and a large share of those taken are unfit for market. The fishery is carried on by a few men in small boats, who sell their catch to the Portland, Harpswell, and Freeport smacks. The season extends from April 1 to December 1. It often happens that the fishermen leave off lobstering for days or even weeks at a time to fish for mackerel when they are abundant near shore. At such times they leave their pots set, and haul them when an opportunity offers. Flounders, sculpins, fish heads, lumpfish, and catfish are mainly used as bait. The men handle on an average thirty-five pots each, go singly, and make a gross season's stock of about $125. The daily catch per trap averages about one marketable and three small lobsters.

CANNERIES.—There are two lobster canneries in this district, one located at South Harpswell, the other at South Freeport. The former is owned by Marsh & Dennett, and the latter by William K. Lewis & Brother. At the South Harpswell cannery mackerel, as well as lobsters, were originally preserved, but this branch of the business has been abandoned. This establishment was started in 1876; in 1879 it was opened from April 8 to July 3, only closing at this early date because of the scarcity of lobsters. The South Freeport cannery was established in the fall of 1876, and puts up lobsters, clams, and mackerel. The season of 1879 lasted from April 12 to July 31. Both of these canneries draw almost all of their supplies of lobsters from Casco Bay. The total live weight of the lobsters used by them in 1880 amounted to 305,000 pounds, for which the sum of $3,050 was paid to the fishermen. Mr. George F. Lewis, superintendent of the South Freeport cannery, states that the lobsters used there average larger than at most canneries, as the fishermen supplying them set their pots mainly out of the course of the well smacks, and find about their only market at the cannery. During the two years prior to 1880 the following quantities of one-pound cans of lobsters were put up by these two canneries: In 1878, 81,000 cans; in 1879, 64,000 cans. Three-fourths of the products of the South Harpswell cannery are sent to Burnham & Morrill, Portland, and one-fourth to Kemp & Day, Boston. All of the products of the South Freeport cannery are sent to William K. Lewis & Brother, Boston.

The canning of lobsters was started in this district, about 1850, by Mr. William Underwood, who opened a factory at South Harpswell, and kept it running for about five years. A year or

two later, Messrs. Burnham & Rumery established another cannery, which continued in operation during only a single season. Nothing further was attempted in this line, however, from that date until 1876, when the present canneries were opened. According to the statements of the fishermen, many more lobsters were canned in those early days than at the present time.

PORTLAND FRESH MARKET.—The Portland fresh-lobster market is largely controlled by two firms, although a third firm buys and sells to a greater or less extent. The supplies are brought to the city by about sixteen well smacks, with an aggregate measurement of 345.55 tons. These smacks run up and down the Maine coast, from Cape Porpoise to Eastport and Grand Manan, buying directly of the fishermen. The greater part of the lobsters carried to Portland, however, come from between Portland and Mount Desert. The smacks are gone from one to two weeks on each trip, dependent upon the weather and the abundance of supplies, and carry each time from 2,000 to 8,000 lobsters by count. As a rule, they buy only the larger lobsters, those measuring above 10½ inches in length, which sell most readily in the fresh markets. In 1880 the fishermen received from the smackmen 3½ to 5 cents each for count lobsters, the latter in turn selling to the Portland dealers at a slight advance. Lobsters must reach Portland alive, no dead ones being accepted by the dealers. They are transferred at once to floating cars, where they await orders. Of late years many lobsters have been shipped to Portland, as well as Boston, packed in barrels, with ice in warm weather. This method of shipping is much in vogue at Eastport, but is also practiced at some other places along the Maine coast. The majority of the fishermen of Casco Bay bring their lobsters directly to market in their own boats, not depending upon the smacks. About twenty-five small boats are thus employed.

The lobster trade at Portland is most active from March to about the middle of July, this being the principal lobster-fishing season of the coast of Maine, whence all supplies are obtained. From the middle of July until October but little is done in this line, as lobsters are then generally considered to be in poor condition. From October to the end of favorable weather there is, however, a good trade, supplied by the so-called fall fishery.

The demand for fresh lobsters in Portland generally exceeds the supply, and in case of an overstocked market, which but rarely occurs, the surplus is disposed of to the canneries of the vicinity. The fresh-market trade in Portland in 1880 amounted to about 1,900,000 pounds, valued at $70,000, fishermen's price, and $90,000, market prices. About 1,000 men on the Maine coast catch for the Portland market.

Lobsters are shipped from Portland to Boston and New York, and to many smaller places in Maine, New Hampshire, Massachusetts, and Canada. About 10 tons are pickled yearly by the dealers, and put up in barrels or kegs for the trade. In 1880, 213,355 lobsters, received from the smacks buying on the Maine coast, were shipped from Portland to Boston by railroad, without passing through the hands of Portland dealers.

CANNING INTERESTS AT PORTLAND.—Although but few lobsters are now canned at Portland, owing to the great demand for fresh lobsters and the high prices paid for them by the fresh-market dealers, that city has probably more capital invested in this industry than any other city in the world, both as regards the coast of Maine and the coast of the British provinces. Portland interests are centered in three firms, which own or control sixteen canneries in Maine and thirty-one in the provinces. The cans and cases for these Maine canneries are mostly made in Portland, this branch of the industry giving employment to about eighty men for three months, at the rate of about $2 a day. The details and statistics of the canneries are given elsewhere.

List of the lobster smacks owned in Portland and Falmouth district.

Name.	Where owned.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
A. Morse	Portland	Schooner	18.16	$800	2	Portland.
Cornelia	do	Sloop	14.33	500	3	Do.
Georgia	do	do	25.05	600	2	Do.
James Beckwith	do	do	24.54	500	2	Do.
Star of the West	do	Schooner	21.21	800	2	Do.
Young Chief	do	do	21.79	375	2	Do.
Adaline Adams	Harpswell	do	27.27	1,000	2	Portland and Harpswell.
B. F. Brown	do	Sloop	24.15	600	2	Portland.
Mary H. Lewis	do	Schooner	19.07	1,100	3	Do.
Monterey	do	Sloop	32.25	700	2	Do.
Total			227.82	6,975	22	

The above smacks are all well smacks, engaged in carrying lobsters only.

List of the smacks carrying lobsters to the Portland market in 1880.

Israel Washburn, 25.16 tons; J. C. Jameson, 24.07 tons; General Worth, 19 tons; I. W. Crawford, 16.79 tons; Republican, 19 tons; Cornelia, 14.33 tons; Young Chief, 21.79 tons; Alwida Morse, 18.16 tons; James Beckwith, 24.54 tons; Star of the West, 21.21 tons; Georgia, 25.05 tons; Lizzie May, 13.71 tons; Adaline Adams, 27.27 tons; Mary H. Lewis, 19.07 tons; Monterey, 32.25 tons; B. F. Brown, 24.15 tons; total tonnage, 345.55.

Summation of the lobster fisheries in Portland and Falmouth district in 1880.

Number of fishermen	175
Number of marketmen	22
Number of vessels above 5 tons burden	10
Value of same	$8,875
Number of boats	160
Value of same	$7,500
Number of lobster pots	9,015
Value of same	$6,761
Total amount of capital invested in the fishery	$23,136
Number of barrels of bait used	4,000
Value of same	$2,000
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	241,000
Value of same	$8,836
Quantity of lobsters sold to the canneries, in pounds	305,000
Value of same	$3,050
Total quantity of lobsters taken and sold, in pounds	546,000
Value of same to the fishermen	$11,886

Summation for the Portland wholesale market in 1880.

Amount of capital invested (estimate)	$25,000
Quantity of lobsters handled, not including those shipped to Boston without passing through the hands of Portland dealers, in pounds	1,929,967
Amount paid to the fishermen for the same	$70,765
Value of the same at wholesalers' prices	$90,065
Enhancement in value in the Portland market	$19,300

Summation of the lobster canneries in Portland and Falmouth district in 1880.

Number of canneries	2
Value of buildings and fixtures	$3,500
Additional cash capital required, including the capital employed in handling the canned lobsters in Portland	$56,000
Number of boats	4
Value of boats	$1,100
Total capital invested	$60,600
Average number of men employed	55
Average number of women and children employed	16

Average number of smackmen employed	6
Total number of persons employed, including the men engaged in the manufacture of lobster cans in Portland	77
Number of pounds of live lobsters used	305,000
Amount paid to the fishermen for the same	$3,050
Number of 1-pound cans of lobsters put up	51,600
Number of 2-pound cans of lobsters put up	7,800
Enhancement in value of lobsters in process of canning	$4,713
Value of the canned lobsters	$7,763

Summation of the entire lobster industry in Portland and Falmouth district in 1880, not including the Portland wholesale market.

Total number of persons employed, including the men engaged in the manufacture of lobster cans in Portland	274
Total amount of capital invested, including the capital employed in handling the canned lobsters in Portland	$83,736
Total value of the products as they entered into consumption	$16,599

SACO DISTRICT.

This district includes the lobster stations of Biddeford Pool and Pine Point.

Biddeford Pool is the most important lobster-fishing station of Maine west of Portland. Fishing is kept up more or less continuously throughout the year, with a break from August to November. During the warmer months th traps are set about the islands of the vicinity, and outside of them to a distance of about 2 miles; but in cold weather, when the lobsters move off shore, the traps are shifted farther out, being often set as far off as 7 miles to the east and southeast of Wood Island, in depths of 20 to 40, or even 50, fathoms. In the deeper waters a greater proportion of large lobsters are taken. The bait used consists of several species of small common fish, including hake, brim, and small cod. In 1880 twenty-one men were engaged in this industry, using sixteen small boats, and twelve hundred and sixty pots. The catch for that year amounted to 139,000 lobsters, valued at $6,950. Several of the fishing schooners owned at this place also participated in the lobster fishery, making a total catch of 54,000 lobsters, valued at $2,700. At Goose Rocks, between Biddeford Pool and Cape Porpoise, five men, with three sail boats, took, during the same year, 45,000 lobsters, valued at $2,250. Of the twenty-one boat lobstermen from Biddeford Pool, eleven follow lobster fishing for ten months of the year, and ten for only five months, the latter engaging in other kinds of boat fishing during the summer.

The larger lobsters are mostly shipped to Boston and New York by rail, packed in barrels of 140 pounds each. The principal market for small lobsters is Portland, where they are canned. Soft lobsters, when obtained in quantity, are also sent to the latter place for canning. The prices are about 5 cents apiece for the large lobsters, sent to the fresh markets, and 1 cent each for the small ones, sent to the canneries.

Lobsters are eaten to a certain extent by the poorer people of the neighborhood, during the summer, when the small ones cost about the same price per pound as the commoner food fish of the same region. During other seasons they are too expensive and too much in demand for the larger markets.

The lobster fishermen do some codfishing during a portion of the year, and some of them also belong to the life-saving station located near the Pool.

PINE POINT.—About ten men from this place fish for lobsters during six months every year, setting their pots from Cape Elizabeth on the east to Wood Island on the west. They use ten dories, and six hundred pots, and in 1880 made a total catch of 32,400 lobsters, valued at $1,620.

List of lobster smacks belonging to the Saco district, all of which engage both in lobstering and in other fisheries.

Name.	Where owned.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
Florence Pearl	Biddeford Pool	Schooner	10.62	$750	4	Portland.
H. F. Ward	do	do	8.97	500	4	Biddeford Pool.
J. L. Berry	do	do	8.03	400	5	Portland.
Maid of the Mist	do	do	12.12	1,000	4	Biddeford Pool.
Ripple	do	do	10.41	800	4	
Total			50.15	3,450	21	

All of these smacks set pots in the vicinity of Biddeford Pool.

Summation of the lobster fisheries in Saco district in 1880.

Number of fishermen	42
Number of marketmen	21
Total number of persons employed	63
Number of vessels above 5 tons measurement	5
Value of same	$3,450
Number of boats	33
Value of same	$1,250
Number of lobster pots	1,860
Value of same	$1,395
Total amount of capital invested in the fishery	$6,095
Number of barrels of bait used	870
Value of same	$435
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	405,600
Value of same to the fishermen	$14,872

KENNEBUNK DISTRICT.

In this district lobster fishing is carried on principally from Cape Porpoise, Kennebunk Port, and Mousam River.

CAPE PORPOISE.—The winter fishery of Cape Porpoise is mainly limited to the catching of lobsters. About twelve hundred traps are set during that season outside of the harbor, and to a distance of 4 miles from land. In the spring the number of traps is increased to fifteen hundred or two thousand. They are generally set in trawls of fifty pots each. The boats used in this fishery are mostly dories. The catch for the past few years has been poor. In 1880, 34,400 lobsters, by count, valued at $2,064, were taken.

KENNEBUNK PORT.—About four hundred lobster traps are set near the mouth of the river at this place. The fishery is confined to the spring and summer, and is carried on by five men with five boats.

MOUSAM RIVER.—Four men fish for lobsters from this place, using four boats and setting three hundred and fifty traps. The catch for 1880 amounted to 5,000 lobsters by count, valued at $300.

List of lobster smacks belonging to Kennebunk district.

Name.	Where owned.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
Fannie T	Cape Porpoise	Schooner	6.84	$450	3	Cape Porpoise
Poor Jim	do	do	7.64	200	5	Portland
Total			14.48	650	8	

Both of these smacks engage in setting lobster pots along the coast of Maine, and also in other fisheries.

Summation of the lobster fisheries in Kennebunk district in 1880.

Number of fishermen	55
Number of marketmen	8
Total number of persons employed	63
Number of vessels, above five tons burden	2

Value of vessels	$650
Number of boats	50
Value of same	$600
Number of lobster pots	2,250
Value of same	$1,688
Total amount of capital invested in the fishery	$2,938
Number of barrels of bait used	1,050
Value of same	$525
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	108,600
Value of same to the fishermen	$3,982

YORK DISTRICT.

Lobster fishing is carried on from Wells, Cape Neddock, York, and Kittery in this district.

WELLS.—Lobsters have not been abundant in this locality for several years past. The fishery is carried on in small wherries, measuring from 13 to 20 feet in length, and either schooner or sloop rigged. The old style of hoop-net pot, with iron ring measuring 2½ feet in diameter, is still employed to a large extent. About thirteen men now engage in the fishery, using seventy-five lath traps and two hundred and fifty hoop-net traps.

CAPE NEDDOCK.—At Cape Neddock three hundred lobster pots are set from April to July, the catch being marketed at Portsmouth and Gloucester. Dories are used for tending the traps.

YORK.—A small fishery for lobsters is carried on about the ledges near York Harbor, the season being limited to the three and one-half months, from April to the middle of July. The catch during late years has greatly fallen off, and the lobsters have also become reduced in size. Two hundred traps were set in 1880.

KITTERY.—Six men from this place engage in lobstering from March to October, using three boats and setting two hundred and eighty traps.

Summation of the lobster fisheries in York district in 1880.

Number of fishermen	30
Number of boats	23
Value of same	$460
Number of lobster pots	1,105
Value of same	$829
Total amount of capital invested in the fishery	$1,289
Number of barrels of bait used	510
Value of same	$255
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	99,000
Value of same to the fishermen	$3,630

STATISTICAL RECAPITULATION OF THE LOBSTER INDUSTRY IN THE STATE OF MAINE IN 1880.

Table of lobster smacks owned on the coast of Maine.

District.	Including all smacks.				Engaged in lobstering only.				Engaged in other fisheries also.			
	Number of smacks.	Tonnage.	Value.	Crew.	Number of smacks.	Tonnage.	Value.	Crew.	Number of smacks.	Tonnage.	Value.	Crew.
Passamaquoddy	1	22.88	$670	4	1	22.88	$670	4				
Machias	1	32.97	1,670	2	1	32.97	1,670	2				
Frenchman's Bay	2	26.97	940	4	2	26.97	940	4				
Castine	17	239.20	7,630	50	9	128.04	4,250	21	8	111.16	$3,380	29
Belfast	6	133.26	8,150	18	5	120.49	7,200	13	1	12.77	950	5
Waldoboro'	14	308.25	12,370	33	11	211.91	6,922	24	3	96.34	5,448	9
Portland and Falmouth	10	227.82	8,875	22	10	227.82	8,875	22				
Saco	5	50.15	3,450	21					5	50.15	3,450	21
Kennebunk	2	14.48	650	8					2	14.48	650	8
Total	58	1,055.98	44,405	162	39	771.08	30,527	90	19	284.90	13,878	72

Of the fifty-eight smacks included in the above list, fifty are carriers merely, while eight engage directly in the fishery, setting pots. Of the fifty carriers twenty-nine are well smacks, carrying to the fresh markets, principally Portland and Boston, and twenty-one are day smacks, carrying to the canneries. These smacks do their buying and fishing almost exclusively on the Maine coast.

Table of the lobster industry of Maine for 1880, showing the extent of the lobster fishing, canning, and market interests of the State of Maine, including the men employed, capital invested, and the quantity and value of both the fresh and canned products.

District.	Grand total for lobster industry.			Fisheries.									
					Fishing smacks.		Boats.		Lobster pots.			Bait used.	
	Persons employed.	Capital invested.	Value of products as they enter into consumption.	Fishermen.	Number.	Value.	Number.	Value.	Number.	Value.	Total capital invested.	Barrels.	Value.
Passamaquoddy	147	$16,266	$31,676	62			37	$1,015	2,775	$2,081	$3,096	1,220	$610
Machias	375	53,486	61,687	232			209	6,030	8,251	6,188	12,218	4,330	2,165
Frenchman's Bay	299	70,579	56,450	176			198	4,747	12,990	9,742	14,489	6,600	3,300
Castine	551	102,853	84,232	316	1	$150	390	12,785	28,050	21,038	33,953	16,860	8,430
Belfast	373	58,318	53,065	258			312	6,205	15,930	11,948	18,243	6,555	3,277
Waldoboro'	358	58,356	52,539	250			220	17,600	12,500	9,375	26,975	9,505	4,798
Wiscasset	162	20,271	24,619	130			106	6,200	5,895	4,421	10,621	2,700	1,350
Bath	88	6,976	7,825	88			68	4,100	3,835	2,876	6,976	1,900	950
Portland and Falmouth	294	108,736	35,899	175			160	7,500	9,015	6,761	14,261	4,000	2,000
Saco	63	6,095	14,872	63	5	3,450	33	1,250	1,860	1,295	6,095	870	435
Kennebunk	63	2,938	3,982	63	2	650	50	600	2,250	1,688	2,938	1,050	525
York	30	1,289	3,630	50			23	460	1,105	829	1,289	510	255
Total	2,773	506,163	431,376	1,843	8	4,230	1,797	68,552	104,456	78,342	151,154	56,190	28,095

District.	Fisheries.						Canneries.					
	Quantities of lobsters taken.											
	Sold to market smacks.		Sold to canneries.		Total.							
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value to fishermen.	Number of canneries.	Value of buildings and fixtures.	Additional cash capital required.	Number of boats.	Value of boats.	Total capital invested.
Passamaquoddy	351,348	$12,883	953,910	$9,539	1,305,258	$22,422	4	$4,000	$7,000	7	$1,500	$12,500
Machias	107,950	3,956	2,474,300	24,743	2,582,250	28,701	4	11,650	26,748	8	1,200	39,598
Frenchman's Bay	269,000	9,863	1,368,726	13,687	1,637,726	23,550	8	11,000	41,000	6	3,150	55,150
Castine	868,500	31,845	2,099,360	20,994	2,967,860	52,839	5	15,550	38,500	15	7,350	61,400
Belfast	699,000	25,630	1,177,464	11,775	1,876,464	37,405	3	13,000	18,000	7	2,925	31,925
Waldoboro'	947,700	34,749	748,182	7,482	1,695,882	42,231	1	5,000	13,411	2	600	19,011
Wiscasset	428,800	15,723	367,342	3,673	796,142	19,396	1	3,750	5,000	3	900	9,650
Bath	213,400	7,825			213,400	7,825						
Portland and Falmouth	241,000	8,836	305,000	3,050	546,000	11,886	2	3,500	*56,000	4	1,100	60,600
Saco	405,600	14,872			405,600	14,872						
Kennebunk	108,600	3,982			108,600	3,982						
York	99,000	3,630			99,000	3,630						
Total	4,739,898	173,796	9,494,284	94,943	14,234,182	268,739	23	65,450	205,659	52	18,725	280,894

* Including the capital employed in handling the canned lobsters in Portland.

Table of the lobster industry of Maine for 1880, &c.—Continued.

District.	Canneries.										
	Average number of men employed.	Average number of women and children employed.	Average number of smack-men employed.	Total number of persons employed.	Number of pounds of live lobsters used.	Amount paid to the fishermen for same.	Number of one-pound cans of lobsters put up.	Number of two-pound cans of lobsters put up.	Number of other brands of lobsters put up.	Enhancement in value of lobsters in process of canning.	Value of canned lobsters.
Passamaquoddy	31	31	19	81	953,910	$9,539	135,792	4,776	12,000	$9,254	$18,793
Machias	58	71	12	141	2,474,306	24,743	438,624	24,144	.....	32,986	57,729
Frenchman's Bay	42	65	12	119	1,368,726	13,687	155,244	33,336	127,801	32,900	46,587
Castine	79	86	25	190	2,099,360	20,994	411,804	13,416	.....	31,303	52,387
Belfast	37	47	13	97	1,177,464	11,775	164,292	42,320	.....	16,560	28,395
Waldoboro'	19	22	4	45	748,182	7,482	123,816	14,448	.....	10,308	17,790
Wiscasset	16	11	5	32	367,342	3,673	61,594	7,464	.....	5,223	8,896
Bath	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland and Falmouth	*55	16	6	*77	305,000	3,050	51,600	7,800	.....	4,713	7,763
Saco	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kennebunk	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
York	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	337	349	96	782	9,494,284	94,943	1,542,696	148,704	139,801	143,337	238,280

District.	Wholesale markets.								
	Market smacks.								
	Smacks.	Smacknen.	Value.	Marketmen.	Capital invested.	Quantity of lobsters handled in the markets in pounds.	Amount paid for the same to the fishermen.	Value of the same at wholesalers' prices.	Enhancement in value in the wholesale markets.
Passamaquoddy	1	4	$670	.....	.....	.....	.....	.....	.....
Machias	1	2	1,670	.....	.....	.....	.....	.....	.....
Frenchman's Bay	2	4	940	.....	.....	.....	.....	.....	.....
Castine	16	45	7,500	.....	.....	.....	.....	.....	.....
Belfast	6	18	8,150	.....	.....	.....	.....	.....	.....
Waldoboro'	14	33	12,370	.....	.....	.....	.....	.....	.....
Wiscasset	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bath	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland and Falmouth	10	22	8,875	20	$25,000	1,929,967	$70,765	$90,665	$19,800
Saco	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kennebunk	.....	.....	.....	.....	.....	.....	.....	.....	.....
York	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	50	128	140,175	20	25,000	1,929,967	70,765	90,665	19,800

* Including the men engaged in the manufacture of cans.

† The fishing smacks accounted for on the preceding pages also carry their catch to market.

NEW HAMPSHIRE.

The lobster fishery of New Hampshire is of slight importance compared with that of its northern neighbor, and gives employment to but few men, who generally devote most of their time to other kinds of fishing or other occupations. The principal places from which lobstering is carried on are Portsmouth, New Castle, Rye, Seabrook, and the Isles of Shoals. Beyond the few lobsters used locally, the greater part of the catch goes to Portsmouth, which city acts as a small distributing center for the near inland towns. Lobsters are shipped from Portsmouth, both fresh and boiled. A small portion of the catch is also sent to Boston and New York.

The season lasts from two to four months, lobsters being most abundant in May. When men are hired by the day to tend the traps they are paid at the rate of about $25 a month, which is also about the earnings of the men using their own gear. According to the statements of the fishermen, lobsters have decreased in abundance from one-half to one-fourth during the past twenty years. The average season's (four months) catch per trap of marketable lobsters (those above 10½ inches in length) is stated to be about sixty. The prices paid to the fishermen range from 4 to 5 cents each.

Off Portsmouth the traps are set around the ledges at the mouth of the harbor, from Kittery, Me., to Odiornes Point, New Hampshire. The fishery along the remainder of the coast is mainly confined to slight depths of water near shore; some of the fishermen set their pots off the southwestern corner of Maine. No lobster smacks are owned in New Hampshire.

The average number of pots to a man in the different localities ranges from fifty to sixty-five.

Summation of the lobster fisheries in the State of New Hampshire in 1880.

Number of fishermen (two to four months)	44
Number of boats in use	31
Value of same	$460
Number of pots in use	2,350
Value of same	$2,350
Total amount of capital invested	$2,810
Number of barrels of bait used	500
Value of same	$250
Total catch of lobsters, in pounds	250,000
Value of the same to the fishermen	$7,500

MASSACHUSETTS.

GLOUCESTER DISTRICT.

In the Gloucester district, which includes the greater part of Cape Ann, lobster fishing is mainly carried on in the neighborhood of Rockport, Gloucester, Annisquam, and Manchester The fishery is not, however, of great extent in this district. The season begins in March or April and continues principally through the spring and fall, closing about November 1. Lobsters are said to be most abundant during March, April, and May, and many of the lobstermen take up their traps in September. In Gloucester Harbor the traps are set on sandy bottom, in depths of 2 to 3 fathoms in summer, and about 10 fathoms during the colder part of the season.

Captain Webb, of Milk Island, near Rockport, states that he used to set his traps in 14 fathoms in April, changing to 2½ fathoms as the water became calmer in the late spring. He often greatly increased the amount of his catch by watching the storm signals on Thatcher's Island, and shifting his traps into deeper water when a heavy wind that was likely to produce a strong undertow was predicted.

As a rule, the fishery is conducted in depths of 2 to 10 fathoms in the summer, and of 10 to

20 fathoms in the early spring and late fall. The ordinary half-cylinder lath traps, with net-funnels, measuring 4 feet long by 2½ feet wide and high, are universally employed.

Occasionally, even in recent times, the old style of hoop-net pot has been used by a few fishermen with fair success. Flounders and sculpins are most commonly used as bait in the summer, and cod and halibut heads in the spring. The boats in use by the fishermen are mostly dories, valued at about $20 each. The average catch per trap is said to be about three lobsters, but as many as thirteen are sometimes taken at a single haul.

In the height of the season the traps are sometimes visited twice a day, both morning and evening, but, as a rule, they are only hauled in the morning. In former times the fishermen earned as high as $500 in a season, but now their season's earnings seldom exceed $200. A very few men hire out at the rate of $35 to $40 per month. The average earnings per season for the lobstermen of this district are about $110. Many of the men fish during only a few weeks.

Lobsters are sold in Gloucester mainly by count, but recently the method of selling by weight has been coming into favor. The retail prices of fresh lobsters in 1880 were from 4 to 6 cents each, and of boiled lobsters from 6 to 10 cents each.

The greater portion of the lobsters caught about Gloucester and Rockport are sent to Boston, being carried there either by railroad, steamer, or smacks. There are two or three smacks which make regular trips between Gloucester and Boston. Only a small portion of the catch is sold locally. The lobsters are landed by the fishermen, and sold at once to regular buyers, who tend to the shipping. Many of the fishermen contract in the spring to sell their season's catch, whatever may be the amount, to certain parties. The lobsters sent in the steamers and by railroad are first barreled.

At Manchester, the lobster fishery is about the only fishery now carried on. The catch, which in 1880 amounted to 8,250 by count, is sold locally, and mainly to the summer visitors.

Summation of the lobster fisheries in Gloucester district in 1880.

Number of fishermen	95
Number of boats	78
Value of same	$1,560
Number of lobster pots	2,549
Value of same	$2,549
Total amount of capital invested in the fishery	$4,109
Number of barrels of bait used	570
Value of same	$285
Quantity of lobsters taken and disposed of, in pounds	285,510
Value of same to the fishermen	$10,468

SALEM DISTRICT.

The lobster stations in this district are Salem and Beverly. Fishing is carried on more or less continuously throughout the entire year, but the greater part of the catch is made in April, May, September, and October. But few lobsters are taken in warm weather. The men generally go two in a boat, each boat using on an average sixty pots. The pots are set on single warps about the ledges in the harbor and also off the harbor, at distances of 5 to 10 miles. The average daily catch to a boat during good seasons, is about one hundred and fifty lobsters. The winter catch averages about seventy-five lobsters daily to a boat. Most of the catch during the early part of the season is sold in Boston, but later the lobsters caught here are mainly boiled in the old-fashioned kettles, and sold in Salem, Beverly, and the adjacent towns. One fishing schooner, of 16.40 tons measurement, is owned in Salem, and engages in the lobster fishery during a part of

the year, setting pots in Massachusetts Bay and carrying to Salem. It is valued at $500, and has a crew of four men.

Summation of the lobster fisheries in Salem district in 1880.

Number of fishermen	46
Number of smacks above 5 tons measurement	1
Value of same	$500
Number of boats	19
Value of same	$380
Number of lobster pots	1,300
Value of same	$1,300
Total amount of capital invested in the fishery	$2,180
Number of barrels of bait used	840
Value of same	$420
Number of pounds of lobsters taken and disposed of, in pounds	422,250
Value of same to the fishermen	$15,482

MARBLEHEAD DISTRICT.

This district includes the fishing ports of Marblehead, Swampscott, Lynn, and Nahant. The Marblehead lobstermen set their pots during the entire year, the Nahant lobstermen during the fall, winter, and spring, and the Swampscott lobstermen during only a small portion of the year. The half-cylinder lath pots are used by most fishermen. The boats employed are mainly dories, the men going singly. The depths of water fished in range from 1 to 30 fathoms, according to the season. At Nahant each man handles about eighty pots, setting them attached in trawls. Two lobster-fishing schooners of more than 5 tons measurement are owned in this district. The Zeppie, of Marblehead, measuring 11.78 tons, valued at $700, and with a crew of five men, fishes on the coast of Maine and Massachusetts, and carries her catch to Marblehead. The Lizzie Phillips, of Nahant, 14.12 tons measurement, valued at $1,000, and with a crew of four men, fishes in Boston Bay, and sells to Boston.

The catch by Nahant and Marblehead fishermen is sold principally to the Boston markets; *that by Lynn and Swampscott fishermen is mostly consumed at home. Very few lobsters are* taken at Swampscott. The lobster fishery is the only one now carried on from Nahant. The Barnstable Patriot of February 19, 1861, says: "Nahant fishermen have given up winter codfishing and gone into the lobster fishery, which is a new business for this season of the year. The fleet consists of some six vessels, manned by thirty men, or thereabouts."

Summation of the lobster fisheries in Marblehead district in 1880.

Number of fishermen	62
Number of smacks above 5 tons measurement	2
Value of same	$1,700
Number of boats	24
Value of same	$430
Number of lobster pots	2,260
Value of same	$2,260
Total amount of capital invested in the fishery	$4,390
Number of barrels of bait used	650
Value of same	$325
Quantity of lobsters taken and disposed of, in pounds	325,500
Value of same to the fishermen	$11,935

BOSTON DISTRICT.

In this important district the principal lobster-fishing stations are Winthrop, Long Island, Hull, Cohasset, and Brewster's. During the warmer months of the year this fishery is mainly carried on in Boston Harbor and along shore, but in cold weather the men go farther out in

Massachusetts Bay, even to distances of 15 miles from land. The traps are mostly set in the deep channels of the harbor and among the outer ledges and islands. The summer fishery is conducted in depths of 1 to 8 fathoms, and the winter in depths of 12 to 16 fathoms or more. The season for fishing in Boston Harbor begins about the middle of April and continues until about the 1st of December. The Massachusetts Bay or deep water fishery is kept up the balance of the year. April and May, September and October are the best months for lobstering. During June, July, and August the catch is said to be much lighter, and lobsters are then considered to be in the poorest condition for eating, very many being soft-shell. The winter catch is almost always insufficient to meet the demand. The lobsters caught in the deeper parts of the bay are stated by the fishermen to run larger in size and to be thicker shelled and firmer in flesh than those taken in Boston Harbor, also keeping better when boiled. Only about one-fifth as many men are engaged in the winter fishery as in the spring, summer, and fall.

The ordinary form of lath trap is most commonly employed. The traps are now mostly set in trawls of twenty to forty each, and a fixed pulley attached at or near the bow of the boat, for underrunning the trawl has recently come into general use. Sometimes as many as five trawls of twenty pots each are handled by a single fisherman. At Hull the trawls are made up of twenty-five pots each. The bait consists of sculpins, flounders, cod and halibut heads, and other so-called refuse fish. The boats are mainly schooner-rigged and built lapstreak; they are valued at from $50 to $75 each. Some dories are also employed. The only registered lobster smack of the district is the Joseph; it is schooner-rigged, of 5.77 tons measurement, valued at $50, and is manned by a single fisherman. This schooner fishes for lobsters in Boston and Massachusetts Bays, and carries to Boston.

The average daily catch per trap, reckoning for the entire year, is about one and a half to two lobsters of marketable size. About Point Shirley a fisherman expects to obtain, on an average, about 100 lobsters per day in all his traps, of which about fifty will be of salable sizes. Lobster fishermen are supposed to earn from $2 to $4 per day, or from $300 to $500 during a season of six months. Boston is the only market for the catch of this district excepting the small quantity which may be used locally. At Hull, the only fishery receiving any attention is that for lobsters. The fishermen all report a considerable decrease in the abundance and size of lobsters, which they say has been going on steadily from year to year. The cause assigned is overfishing. They also state that it has been their experience that a greater mortality occurs among the lobsters in a car where their claws have been wedged than when they have been left free, and they have therefore abandoned the practice of wedging.

BOSTON WHOLESALE MARKET.—Lobsters are brought to this market in three different ways—from the immediate neighborhood, in the small boats of the fishermen, dry, and from a distance in well smacks, and by railroad, packed in barrels. Although the well smacks bring the largest supplies from distant grounds, thousands of barrels are received every year in good condition, from along the coasts of Maine, New Hampshire, and Massachusetts, in warm weather protected with ice, but at other times without it. As soon as they are received they are transferred, at least in the case of the larger dealers, to floating cars, capable of holding from 5,000 to 10,000 lobsters each, and in which they can be kept alive for some time. About fifteen of these cars are owned in Boston, six of the largest belonging to a single firm, who profess to keep constantly on hand, so far as possible, from five to six days' supplies. A car to hold 10,000 lobsters should measure 40 feet long, by 12 feet broad, and 5 feet high. The greatest number of lobsters is received in April and May, the smallest number about February. The sources of supply vary more or less with the season. In summer the most and best lobsters come from the eastward of Deer Isle,

Maine, but in colder weather the greater number come from the westward of Deer Isle and from as far south as Chatham, on Cape Cod. Very large quantities of lobsters are received from Portland, Me., where they are often reshipped by railroad from the smacks which bring them in from the coast of Maine. No lobsters are sent to Boston from the westward of Chatham, the entire catch of Southern New England being consumed at different places along that coast or sent to New York City. Occasional supplies of fresh lobsters are received at Boston in summer from the coast of Nova Scotia. Some of the Boston dealers anticipate that in the future they will have to depend more and more on shipments from the British Provinces in order to supply the ever-increasing demands.

Larger lobsters are demanded by customers in summer than in winter, probably because in the former season larger lobsters, which come mainly from the eastward, are more abundant, and, therefore, nearly always obtainable, while in the latter season the supply is much more limited.

The outside markets for fresh and boiled lobsters from Boston are principally the New England towns and New York City. The Middle and Western States also receive a certain amount, but Chicago is about the western limit of fresh distribution.

There are in Boston about six permanent establishments for receiving and distributing lobsters, both fresh and boiled, and also several small occasional boilers. The lobsters, in either condition, are generally shipped away in barrels, with or without ice, according to the season.

According to the estimates of Mr. W. A. Wilcox, of Boston, that city was supplied with lobsters in 1880 as follows, the figures being by count:

From Maine*	793,099
From Boston Harbor, including Winthrop and Lynn	596,400
From Hull	319,200
From Nahant	50,000
From north shore of Massachusetts Bay, including Cape Ann	300,000
From south shore of Massachusetts Bay, including Cape Cod	360,954
Total number	2,419,653
Value of same at wholesale prices	$169,758

The well smacks carrying from Maine to Boston, in 1880, were about seventeen in number, and belonged entirely to Western Maine. They ranged in size from 18 to 40 tons, and in value from $500 to $4,000 each; their combined measurement was 487 tons; total value, $28,800, and combined crew fifty men.

One Boston firm is largely interested in the canning of lobsters on the Maine and provincial coasts, controlling the products of many canneries. Statistics of these canneries have been given in the coast review of the State of Maine.

Summation of the lobster fisheries and markets in Boston district in 1880.

Number of fishermen	86
Number of marketmen	50
Number of smacks	1
Value of same	$50
Number of boats	92
Value of same	$5,275
Number of lobster pots	8,290
Value of same	$8,290
Total amount of capital invested in the fishery	$13,615
Number of barrels of bait used	2,780
Value of same	$1,390
Quantity of lobsters taken and disposed of by the fishermen, in pounds	1,390,800

*507,554 being brought directly from the fishing grounds; 213,355, forwarded from Portland by railroad; and 72,190, sent by railroad from between Portland and Wells.

Value of the catch to the fishermen	$50,996
Value of the buildings, teams, and fixtures of the Boston wholesale markets	$10,000
Active capital invested in the Boston wholesale markets	$20,000
Quantity of lobsters handled by the Boston wholesale dealers from all sources, in pounds	3,637,687
Value of same at fishermen's prices	$133,381
Value of same at wholesalers' prices	$169,758
Enhancement in value of the lobsters handled in Boston, being the difference between the fishermen's and wholesalers' prices	$36,377

PLYMOUTH DISTRICT.

Plymouth district contains the lobster-fishing ports of Scituate, Duxbury, and Plymouth. The principal season is from April to September, the pots being set near shore, in depths of a few to 15 fathoms. Off Plymouth the fishing grounds are all within 1½ miles of the shore, and extend from Cut River on the north to Sandwich on the south. One-half of the catch is marketed at home, being sold in part to the neighboring towns, and one-half is disposed of to smacks from Boston, New York, and New Haven. Lobsters are said to have been very large and abundant in this region at one time, but to have decreased greatly both in size and numbers, within the past few years. The season's catch for 1880 was, however, quite large. The average number of marketable lobsters taken to a trap is said to be about one per day. Sixty pots on an average are used by each man. The fishery is carried on in small open boats or dories, the men going singly. The average earnings per man for 1880 were about $300. The business is said to have declined one-half during the past five years.

Summation of the lobster fisheries in Plymouth district in 1880.

Number of fishermen	74
Number of boats	74
Value of same	$1,020
Number of lobster pots	4,500
Value of same	$4,500
Total amount of capital invested	$5,520
Number of barrels of bait used	1,440
Value of same	$720
Quantity of lobsters taken and disposed of, in pounds	721,050
Value of same to the fishermen	$26,438

BARNSTABLE DISTRICT.

This once exceedingly important district, which furnished at one time a very large proportion of all the lobsters marketed in New York City, has so fallen off in its production that it now stands among the poorest on the Massachusetts coast. It includes all of Cape Cod as far south as Falmouth and Wood's Holl, which places also belong to it. Lobster fishing is now carried on from Provincetown, the Truros, Orleans, Chatham, Harwich (Monomoy), Barnstable, Cotuit, Yarmouth Port, and Wood's Holl.

Provincetown was formerly the center of one of the most extensive lobster fisheries of our coast, but now comparatively few men engage in this industry there, because of the great depletion of the grounds in that vicinity, from long-continued overfishing. The history of the lobster fishery of Cape Cod has been given elsewhere.

The lobster grounds of the vicinity of Provincetown cover most of the sandy bottoms along the shore, out to a depth of 18 to 20 fathoms, where the area of mud, characterizing the deeper waters, begins. The fishery is entirely confined to the sandy belt, the traps being mostly set in depths of 4 to 15 fathoms. The season continues about five months, or from May to October, lobsters being generally most abundant during July and August. Hoop-net pots were discarded

several years ago, and the ordinary lath trap is now universally employed. A man setting fifty traps would, at present, do well to catch twenty marketable lobsters per day, making the average daily catch per trap less than one-half. Twenty-five lobsters a day to the same number of traps would be considered a large catch. The average monthly earnings of a man while fishing is about $25. Twelve to fourteen men now engage in lobstering from Provincetown, many of them fishing only a portion of the season. They are mostly old fishermen, who are unable to engage in the more active branches of fishing, and who do little work of any kind after the lobster season has ended; they fish singly. The entire catch, excepting about 500 lobsters consumed annually in Provincetown, is sent to Boston in the sloop smack Pennsylvania, of 29 tons measurement. This smack also bought lobsters at Chatham in 1880, and on some of her trips touched also at Plymouth, even then often arriving in Boston with small fares. The same year she made thirteen trips from Provincetown to Boston during the lobster season, carrying in all 11,956 lobsters, for which she paid 7 cents each, making a gross stock of $836.92. The first trip was made on May 27, when she carried 1,096 lobsters from Provincetown, and the best trip was made July 27, when she obtained 1,644 lobsters at the same place.

Capt. N. E. Atwood states that the Massachusetts lobster law does not affect the fishery at that place, as a fisherman will not catch a dozen lobsters less than 10½ inches long during the entire season.

Two men at North Truro set about one hundred traps in all. One fishes from April to September, the other from May to the middle of July. Captain Hopkins, who uses fifty-eight traps, states that his daily catch ranges from ten to twenty-five lobsters. Captain Collins sets forty-five traps and often obtains only fifteen lobsters a day, though occasionally his daily catch amounts to forty lobsters. All of the lobsters from this place are sent to Boston and New York, generally by rail, but sometimes by the same smack that visits Provincetown. In 1880 the price was seven cents each, by count, and in 1878, eight cents. At Truro two men also engage in lobstering, setting their traps both on the bay and ocean side of the cape. They handle only ten traps together, and in 1879 stocked $75 on the ocean side and $25 on the bay side. The number of lobsters taken was between 1,400 and 1,500. Most of the catch is used locally, and a portion sold to the Provincetown smack, which makes occasional visits. From 1,000 to 2,000 lobsters are caught annually by fishermen from South Truro, who also engage in other kinds of fishing at the same time. The catch is mostly sent to Boston by rail.

At Orleans only one man engages in lobstering, making an average daily catch of about forty-five lobsters from May to October. Four or five years ago there were eleven lobstermen at this place, but as the business became unprofitable they left it.

There are twenty lobstermen at Chatham and about the same number make their summer headquarters at Monomoy. They fish from about the 1st of June to the 1st of November, and set from forty to eighty traps each. At Chatham the traps are set both inside and just without the harbor. The average daily catch per man was about thirty lobsters, but in 1879 one man, with sixty-six traps, averaged sixty lobsters daily, his catch for the entire season amounting to about 7,000 lobsters. The other fishermen obtained an average of 3,000 lobsters each for the same season. The entire catch is carried to Boston in smacks. The price in 1879 was 6 cents each, by count, which was lower than for the preceding four or five years. About nine years ago the price was as high as 9 cents each.

For the past three or four years a single fisherman from Barnstable, in company with one from Yarmouth, has set a few traps in Barnstable Harbor during a small part of each year. In July, 1879, they used eight traps, and in July, 1880, twelve to fourteen traps. Their catch for each of

those years was only about 300 lobsters. At Cotuit, near Barnstable, twenty-five traps were set in 1880, taking in all only about 500 lobsters. One lobster smack, the Pontiac, is owned at Barnstable. She is a schooner of 9.93 tons, is valued at $400, and carries a crew of four men. She sets traps on the coasts of Maine and Massachusetts and also engages in other branches of fishery.

Capt. Benjamin Lovell, of Yarmouth Port, fished with seventeen traps during the season of 1880, making a total catch of about 2,500 lobsters. A portion of this catch was shipped to Boston and the remainder was used locally. Lobsters are generally sold by weight, at the rate of 5 to 10 cents a pound. Since 1876 the lobster fishery of this region has scarcely sufficed to supply the local demand until this year. Captain Lovell, in speaking of the decrease in the abundance of lobsters, states that twenty years ago, with half the number of pots, he could catch 5,000 lobsters in one week.

Five men engage in lobstering at Wood's Holl, and when not so occupied follow other kinds of fishing. The traps are set in depths of 4 to 15 fathoms, the season extending from April to October. Each man will stock from $100 to $200 per season. The average daily catch per trap is said to be four or five lobsters of all sizes. About one-half the catch is sold locally, the balance being shipped away, mainly to New York and New Bedford. The wholesale price of lobsters is 3 cents per pound; the retail, 6 cents per pound.

Summation of the lobster fisheries in Barnstable district in 1880.

Number of fishermen	66
Number of smacks	1
Value of same	$400
Number of boats	50
Value of same	$1,000
Number of lobster pots	3,000
Value of same	$3,000
Total capital invested in the fishery	$4,400
Number of barrels of bait used	420
Value of same	$210
Quantity of lobsters taken and disposed of, in pounds	211,230
Value of same to the fishermen	$7,745

NANTUCKET DISTRICT.

This district includes the islands of Nantucket and Tuckernuck. Four men engage regularly in lobstering from Nantucket, and eleven others fish at odd times. At Tuckernuck there are six regular lobstermen, who set from thirty to sixty or seventy traps each. Most of the catch, which is very small, is sold to a New York smack, which makes a trip about once every ten days.

Summation of the lobster fisheries in Nantucket district in 1880.

Number of fishermen	21
Number of boats	21
Value of same	$420
Number of lobster pots	1,500
Value of same	$1,500
Total amount of capital invested in the fishery	$1,920
Number of barrels of bait used	22
Value of same	$11
Quantity of lobsters taken and disposed of, in pounds	11,250
Value of same to the fishermen	$412

EDGARTOWN DISTRICT.

Edgartown district includes Martha's Vineyard, No Man's Land, and the Elizabeth Islands. Lobster fishing is carried on mainly from Cuttyhunk, No Man's Land, Lobsterville (Menemsha Bight), and Edgartown, Martha's Vineyard. This fishery was begun at the Elizabeth Islands

as early as 1807. "The fishes are the same as those of the vicinity, but lobsters, which are scarce at Martha's Vineyard, are caught in great abundance at all the Elizabeth Islands."* At present the lobster fishery of the Elizabeth Islands is confined almost exclusively to Cuttyhunk, where it is engaged in by the majority of all the fishermen, about thirty in number. The season lasts about four months. The thirty fishermen run six small smacks and twelve open boats, setting from forty to one hundred and twenty traps each, or a total of 2,000 traps. The Cuttyhunk Club, a New York association of sportsmen, also handles about one hundred and twenty pots, selling the larger lobsters obtained and using the smaller ones for bait. During the season of 1880 the lobster traps at Cuttyhunk averaged about one marketable lobster each per day, or a total of about 230,000 lobsters, by count, for the season. The regular tautog fishermen of Cuttyhunk use about 1,000 pounds of lobsters each for bait during the season.

At No Man's Land, in 1880, the lobster fishery was conducted by fifteen men who make that island their headquarters during the fishing season. The catch in that year was small, averaging about 1,000 pounds to each man, and amounting altogether to about 15,000 pounds. From the town of Edgartown only about two hundred traps were set in 1880, yielding a total catch for the season of about 16,600 lobsters. The greater part of the lobster fishery of this district is carried on in the vicinity of Menemsha Bight and Gay Head, at the southwestern extremity of Martha's Vineyard, and off No Man's Land, by fishermen hailing from Chilmark and Tisbury. Lobsterville consists of about fourteen temporary shanties, situated near the western end of Menemsha Bight. Along Menemsha Bight, including this settlement, about sixty lobster fishermen were located in 1880, using forty boats, of which one-half carried two men each and the remainder one man each. An average of forty traps was set by each boat in 1880, making a total of sixteen hundred traps for the region. They were worked in trawls of ten to fifteen traps each. The common form of lath trap is universally employed. The catch for 1880 amounted to about 200,000 lobsters. In 1879 this fishery was carried on from this locality by a much smaller number of men, with fourteen boats and 560 traps.

The fishing grounds range from the shallow water near shore, in depths of 1 fathom, to depths of 15 to 20 fathoms. The season usually continues four or five months, from May to October, but a few men sometimes begin fishing as early as the middle of March. Flounders, menhaden, dogfish, and other common fish are used as bait. The average number of marketable lobsters caught to a trap per day varies from one to two. Fifteen lobsters of all sizes to a trap is considered a large catch. Nearly all the lobsters taken in this region are sold to smacks running principally to New York, but also, to some extent, to other smaller markets. About twelve well-smacks of different sizes making weekly trips visit this region during the season, and pay on an average about six cents each for all lobsters above 10½ inches long.

After the smacks stop running, which sometimes happens about the 1st of August, the catch is sold mainly at Wood's Holl at 3½ cents per pound. During good seasons the monthly earnings for each man are said to range as high as $50 to $100. In 1880 the average earnings per man for the entire district were about $250 for the season. The following note from Mr. Frank M. Cottle, of West Tisbury, is of interest, as illustrating the rapid growth of the lobster industry in this region: "Twenty years ago there was but one vessel in the lobster fishery on this coast, or rather in this vicinity; now there are a dozen. Then the business was not considered to be of any value, and but few men entered it at all. Within the past fifteen years, however, it has improved rapidly, and now there are some 60 men or more in this vicinity who depend upon it

* Coll. Mass. Hist. Soc., 2d ser., vol. iii, p. 79.

almost wholly during the season." That the destruction of lobsters by fish in this district is very great is indicated by the observations of Mr. V. N. Edwards, of Wood's Holl, who, during October and November, 1877, examined the stomachs of hundreds of cod caught about No Man's Land. Nearly all the fish he examined contained one or more young lobsters, and in many cases the stomachs were almost entirely filled with them.

THE FISHERY IN 1882.—During the summer of 1882, the author made many inquiries of the fishermen regarding the lobster fishery of the Martha's Vineyard region, including No Man's Land and the Elizabeth Islands, with the following results:

Lobsters have, from year to year, steadily decreased in size and abundance, in the upper part of Vineyard Sound, while at the same time there has been a proportionate increase in numbers, and the size has remained constant, about Gay Head, No Man's Land, and Cuttyhunk. About one-third of the catch only is under size or less than 10½ inches in length. According to some of the older fishermen of No Man's Land, 1882 was one of the best lobster years ever experienced there. From fifteen to twenty men lobstered during the summer season, setting, on an average, sixty traps each, the greater part of which were arranged in trawls of eight to twenty traps. The catch during this season, from the middle of May to the latter part of September, amounted to about 100,000 marketable lobsters, weighing, on an average, 2½ pounds each. The price paid by the smacks was 8 cents each, making a total season's stock for the twenty men of $8,000.

In addition to the twenty fishermen living on the island, there were six smacks, owned in New London County, Connecticut, with a combined crew of twenty-four men, which fished in the same region. Their catch, though large, was proportionately less than for the regular fishermen. As fast as they obtained fares, they proceeded to market, generally New York. One market smack, called the Boston Smack, made weekly trips to the island, and carried the catch of the fishermen to New York, at the rate of about 6,000 lobsters each trip. Another smack, the Daboll of New York, made occasional trips, carrying about the same amount of lobsters each time.

In the above reckoning no account has been taken of the fisheries of Menemsha Bight, near Gay Head, and of Cuttyhunk, at both of which places the catch for 1882 was much larger than for 1880. In the upper part of Vineyard Sound, on both the Martha's Vineyard and Naushon sides, the fishery for 1882 was poor. The Wood's Holl lobstermen set their traps during only a very short part of the summer, and the greater portion of their catch was under size.

The lobster season at No Man's Land generally begins about the middle of May and continues until about the 20th of September. About October 1, the fishermen begin to turn their attention to the cod fishery, which lasts until bad weather sets in, and is again taken up in the spring, from April 1 to the middle of May. The lobster pots are set on all sides of the island, but mainly off the north and west sides, where there are numerous rocky patches, at distances of 1½ to 2 miles from land, and with depths of 10 to 13 fathoms. Each of the fishermen owns one or two floating cars for the storage of his catch, awaiting shipment. Thirty such cars were in use during 1882, the larger ones having a capacity of 500 to 1,000 lobsters each, but there are others of smaller size. They are tied to stakes just off the shore, in front of the fishing village, and swing with the tide. They are made of two shapes; the smaller ones are generally rectangular, but the larger ones taper at one or both ends, but from the bottom and top, so as to present a rather narrow edge to the tidal currents, or to the waves, in stormy weather. This construction is rendered necessary from the fact that the area in which they are moored is exposed to a heavy sea, during strong easterly winds, and a plain rectangular car would soon be torn to pieces.

The bait used consists of menhaden, bluefish, flounders, and cod heads. Menhaden are preferred, and, in 1882, cost $8 per thousand.

The fishermen of this region recognize the two varieties of lobsters, called "school" lobsters and "ledge" or "rock" lobsters. The latter, apparently, remain about the island during the entire year, and live only upon the rocks or rocky grounds. The school lobsters appear about July 1, and are gone by the last of September. They are most abundant on smooth bottoms, but also occur among the rocks. Lobsters can, therefore, be caught upon smooth bottoms only during the season for school lobsters.

The boats used are the so-called "Vineyard fishing boats," having one or two masts. These are moored just off the town, and are reached by means of dories. In case of an approaching storm, or when it is desirable to clean them, these small smacks are hauled upon the beach, which consists of large gravel stones, by means of a team of oxen, kept on the island for that purpose. Ladder-like frames, made in sections, and with the cross-pieces broad and flat, are placed under the boats, or, rather, the latter are hauled over the frames, to keep them from being worn by grinding against the gravel. The boat being brought in as near the shore as possible, one section of the frame, with the cross-pieces downward, is set in front of it, leading up the beach. The boat is then hauled upon it, and another section added, this operation being repeated until the boat has reached the proper height upon the beach, when it is braced from both sides.

The No Man's Land fishermen all belong to Martha's Vineyard, and live on the former island only during the fishing seasons. There are only two permanent residents on the island.

Summation of the lobster fisheries in Edgartown district in 1880.

Number of fishermen	110
Number of boats	58
Value of same	$13,800
Number of lobster pots	4,520
Value of same	$4,520
Total amount of capital invested in the fishery	$18,320
Number of barrels of bait used	1,540
Value of same	$770
Total quantity of lobsters caught and sold, in pounds	773,100
Value of same to the fishermen	$28,347

NEW BEDFORD DISTRICT.

In the New Bedford district lobster fishing is carried on mainly from New Bedford, Fairhaven, Dartmouth, and Westport. The traps are set in different parts of Buzzard's Bay to within a short distance of Cattyhunk Island, in depths of 2 to 25 fathoms, according to the season. The fishery is continued through about five months of each year, or from May to October, lobsters being most abundant during June, July, August, and September. Two kinds of traps are in use, one being rectangular and the other semi-cylindrical in shape; some of these are furnished with one, and others with two funnel openings. Hoop-net pots are also still occasionally employed. From New Bedford three small smacks engage in lobstering, but at the other localities small open boats, valued at $20 to $25 each, are mainly used. Each man uses on an average about thirty traps. Lobsters are sold by weight in New Bedford at the rate of 4 to 8 cents a pound, but elsewhere generally by count, at 5 to 7 cents each. The average season's earnings per man, in 1880, were about $200. The small-boat fishermen generally go singly, sometimes, however, hiring a man to help. Nearly all the lobsters taken by the New Bedford smacks are sold to smacks carrying to New York, New Haven, or New London. The Fairhaven catch is mostly used as bait for tautog,

scup, and squeteague, and that of Mattapoisett, Dartmouth, and Westport Point is consumed locally, or sent to New Bedford, New York, or Fall River.

The catch for the several places in this district in 1880 was as follows: New Bedford, 50,526 pounds; Fairhaven, 45,000 pounds; Mattapoisett, 3,000 pounds; Dartmouth, 75,000 pounds; Westport Point, 12,000 pounds. About fifteen well smacks, ranging in measurement from 12 to 50 tons each, visit the New Bedford district, and make about fifteen trips each, during the season, to the several markets, principally New York. Four lobster-fishing smacks are owned in this district. They are as follows:

List of the lobster smacks owned in New Bedford district.

Name.	Where owned.	Rig.	Tonnage.	Value.	Crew.
D. B. Mayhew	New Bedford	Schooner	23.51	$2,000	4
Emma Clifton	do	do	26.67	1,000	4
Rhoda G	do	do	10.47	500	3
Spray	Fairhaven	Sloop	7.30	100	2
Total			67.95	3,600	13

Summation of the lobster fishery in New Bedford district in 1880.

Number of fishermen	35
Number of smacks	4
Value of same	$3,600
Number of boats	21
Value of same	$430
Number of lobster pots	1,088
Value of same	$1,088
Total amount of capital invested in the fishery	$5,118
Number of barrels of bait used	370
Value of same	$185
Quantity of lobsters caught and disposed of, in pounds	174,726
Value of same to the fishermen	$6,406

STATISTICAL RECAPITULATION OF THE LOBSTER INDUSTRY OF MASSACHUSETTS IN 1880.

Table of the lobster industry of Massachusetts in 1880.

Districts.	Fishery.													Wholesale markets.		
	Fishermen.	Smacks.			Boats.		Lobster pots.		Capital invested.	Bait used.		Quantity of lobsters taken.		Marketmen.	Capital invested.	Enhancement in value.
		Number.	Tonnage.	Value.	Number.	Value.	Number.	Value.		Barrels.	Value.	Pounds.	Value.			
Gloucester	95				78	$1,560	2,540	$2,540	$4,100	570	$285	285,510	$10,408			
Salem	46	1	16.40	$500	19	380	1,300	1,300	2,180	840	420	422,250	15,482			
Marblehead	62	2	25.90	1,700	24	430	2,260	2,250	4,390	650	325	325,500	11,935			
Boston	86	1	5.77	50	92	5,275	8,290	8,290	13,615	2,780	1,390	1,390,900	50,996	50	$20,000	$36,377
Plymouth	74				74	1,020	4,500	4,500	5,520	1,440	720	721,050	26,438			
Barnstable	66	1	9.93	400	50	1,000	3,000	3,000	4,400	420	210	211,230	7,745			
Edgartown	110				58	18,800	4,520	4,520	18,320	1,540	770	773,160	28,347			
Nantucket	21				21	420	1,500	1,500	1,920	22	11	11,256	412			
New Bedford	35	4	67.95	3,600	21	430	1,088	1,088	5,118	370	185	174,726	6,406			
Totals	595	9	125.95	6,250	437	24,315	29,007	29,007	59,572	8,632	4,316	4,315,416	158,229	50	20,000	36,377

Table of lobster industry of Massachusetts—Continued.

GRAND TOTALS.

Districts.	Persons employed.	Capital invested.	Value of products as they enter into consumption.
Gloucester	95	$4,109	$10,468
Salem	46	2,980	15,482
Marblehead	62	4,390	11,935
Boston	136	3,615	87,373
Plymouth	74	45,520	26,438
Barnstable	66	4,400	7,745
Edgartown	119	8,320	28,347
Nantucket	21	11,920	412
New Bedford	35	5,118	6,406
Totals	645	89,572	194,606

NOTE.—In the above table no account is made of any markets outside of Boston. The Massachusetts lobster smacks all engage in fishing, and their crews have, therefore, been included among the fishermen instead of the marketmen. Boston capital invested in the Maine canneries has been included in the statistics of that State.

RHODE ISLAND.

Rhode Island ranks fourth among the States in the value and extent of its lobster fisheries. This industry is carried on to a greater or less extent from nearly all the fishing ports or stations of the State, the principal ones being Wickford, Newport, Dutch Island, Sanderstown, Narragansett Pier, Sakonnet Point, Bristol, and Block Island.

GROUNDS.—The lobster grounds in Narragansett Bay include the numerous inlets on both sides of the bay as far north as Hope Island, the ledges lying out in the bay, and the moderate depths of water surrounding the islands. Off Sakonnet Point and Brenton's Reef Light Ship lobsters are taken on both sandy and rocky bottoms, from 2 to 10 miles from shore, and in depths of 5 to 18 fathoms. In these localities the traps are generally set on rocky bottoms in the spring and fall, and on smooth bottoms during the summer. Brown's Ledge, situated about 20 miles off shore, used to be a good lobster ground, but of late years it has not yielded much. Various good fishing grounds for lobsters exist in many places off the coast and about Block Island. The Block Island region is, however, fished more by boats from Connecticut than by native ones. The Rhode Island fishery also extends to the Connecticut coast, which is visited to some extent by boats from Newport, and nearly or quite to Cuttyhunk.

The Rhode Island grounds, like those of many other sections of the coast, have been gradually extended outward with the increase of trade and the demand for lobsters, in order to accommodate the greater number now fishing, but the inner grounds, those of Narragansett Bay, still furnish many lobsters. The depth of water in which the traps are set varies from a few fathoms to 15 or 20 fathoms.

SEASON.—The lobster season usually extends from May 1 to October 1, after which the main part of the fishery generally ceases. In 1879 a few men began lobstering as early as March, obtaining good fares and high prices. As a rule, some lobsters are taken during every month from February until November. The so-called school lobsters are noticed in the waters off Rhode Island. The presence of a school, or its passage over the fishing grounds, is indicated by much better fishing for a few days at a time, after which the catch falls off to the ordinary run. In 1879 the best schools came as early as July 4; in 1880 they began about a week later. The best months for fishing are said to be July and August.

TRAPS.—The ordinary semi-cylindrical lath traps are commonly used, but there is a smaller rectangular or "square pot," as it is called, which is extensively employed by many fishermen, who claim that they can work to better advantage with it on account of its being more easily handled. These traps are furnished with the same kind of funnel openings as the lath traps to the north. Other more complicated forms of the round-top trap, said to possess several improvements, and costing about $5 each, are sometimes constructed by the fishermen. The old-fashioned hoop net pot, made of an iron barrel hoop, is also occasionally used. Although it is customary to haul the traps every morning, it sometimes happens, because of stormy weather, that those off-shore cannot be visited for several days or a week at a time. The average number of pots set by each man in this State is comparatively small, ranging from ten to thirty, but sometimes reaches fifty.

SMACKS AND BOATS.—The registered Rhode Island lobster smacks are five in number. All engage directly in the fishery, setting traps in Narragansett Bay, about Block Island, and on Brown's Ledge, and carrying their catch to Newport and Providence. These smacks also engage in other fisheries. Their total catch for 1880 was 116,250 pounds, making a gross stock of $4,068.

The ordinary Newport lobster boats used for visiting the traps are cat-rigged, and average in value about $100 each. They are also employed, to a certain extent, in other fisheries, principally for tautog, blue-fish, squeteague, and bass. Fifty of these boats are owned in Newport.

BAIT.—The bait usually consists of refuse fish, called shuck fish, which is obtained from the home markets and the fishermen, and is also shipped back from the New York markets at half price. Fish-heads are also employed.

It is customary with some of the Newport fishermen to retain their lobsters in the cars three to five days before selling, or until it is thought that they have become "cleansed" of the food or bait last eaten. They are then considered more wholesome, and often bring a higher price.

MARKETS.—The catch by Newport fishermen is sold mainly at Newport, Providence, and Fall River, from which places many neighboring towns are supplied. A portion of this catch also goes to Boston and New York, by railroad. The Bristol catch is entirely consumed at that place, and that of the west side of the bay, including Wickford, Dutch Island Harbor, and Narragansett Pier, is sold mostly to the numerous summer hotels and the local trade. Prior to 1881, when no law existed for the protection of the lobster fishery, lobsters of all salable sizes were brought to market by the fishermen. Those smaller than 10 inches long could not be shipped out of the State, and were, therefore, considered inferior in value. This gave rise to two grades of lobsters in the markets, those above 10 inches being rated in 1879 at 3 to 3½ cents a pound, and those under 10 inches at half price. Few were regarded as salable under 9 inches in length. In 1880 the prices ranged from 3½ to 4 cents a pound. Lobsters are generally shipped to distant places by railroad, packed in barrels. The retail price of lobsters in Newport is about 5 cents a pound.

List of the Rhode Island lobster smacks.

Name.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
Almeida	Schooner	9.70	$500	5	Newport and Providence.
Arabella	do	19.62	2,000	3	Do.
J. S. Whittier	Sloop	8.45	1,000	4	Do.
Pathfinder	Schooner	8.06	650	4	Do.
Stella	Sloop	7.53	500	3	Do.
Total		54.36	4,650	19	

Summation of the lobster fisheries of Rhode Island in 1880.

Number of fishermen	110
Number of smackmen who are also fishermen	19
Number of smacks above 5 tons burden	5
Value of same	$4,650
Number of boats	85
Value of same	$6,400
Number of lobster pots	2,170
Value of same	$1,627
Total amount of capital invested	$12,677
Number of barrels of bait used	840
Value of same	$420
Quantity of lobsters taken and sold, in pounds	423,250
Value of same to the fishermen	$15,871

CONNECTICUT.

The lobster fisheries of Connecticut are of considerable importance, especially in New London County. The principal places from which the fishery is carried on are as follows, beginning at the east: Stonington, Noank, New London, Saybrook, the vicinity of South Norwalk, including Black Rock and Five Mile River, and New Haven. The catch for New London County, including Stonington, Noank, and New London, is five or six times greater than that of the remainder of the State. The little town of Noank, situated at the mouth of the Mystic River, about midway between Stonington and New London, is the most important lobster station in the State, the catch for that port in 1880 having been equal to about one-half the total catch for the entire State.

SEASON.—The extreme limits of the Connecticut lobster season are from March to December, but a few lobsters are sometimes taken in the winter when the weather is not too severe. The Stonington lobstermen generally fish from April to November; the New London from April to September; the South Norwalk from April to November; the New Haven from April to October. The Noank lobstermen fish more or less the entire season, as indicated above, but state that lobsters are most abundant during the latter part of the summer and the fall, or from August to November.

GROUNDS.—The traps are set in all depths of water, from a few feet to 60 fathoms, and on all kinds of bottom, rocky, sandy, and muddy. Some of the best fishing grounds are situated in Block Island Sound off Fisher's Island, where lobsters are caught abundantly, even in deep holes sounding 50 to 60 fathoms. This region is mostly visited by the Noank fishermen. In Western Connecticut, from the mouth of the Connecticut River westward, the fishery, being of slight extent, is generally carried on near shore and in depths of 1 to 20 fathoms. The New London County fishermen are, however, more venturesome, being to a greater extent dependent upon this industry for a living. They have, therefore, extended their field of operations over a much broader area. The smaller boats set their pots everywhere and in all depths in Fisher's Island Sound and Block Island Sound, about Montauk Point, and from there towards No Man's Land, and along the Rhode Island shore to near the mouth of Buzzard's Bay. The larger smacks fish over the same area and also in Buzzard's Bay and Vineyard Sound, and off Martha's Vineyard and Nantucket.

TRAPS.—The ordinary round-top lath trap, with wooden or twine funnel openings, is most commonly used. Occasionally, however, a galvanized iron funnel is employed. Another style of trap is made from basket splints. The hoop-net pot, called in this State the "drop net" trap, is sometimes, but only rarely, employed.

BAIT.—Menhaden are generally used as bait, as they are usually more easily and cheaply

obtained than other species of fish. When they are scarce other common species, and especially flounders, are employed.

MARKETS.—Outside of New London County the catch for the several localities is generally sold near home. Most of the lobsters taken by the Stonington fishermen are likewise disposed of in that place. The New London catch is partly sold at home and partly shipped to New York and to interior towns in small quantities. Noank supplies three principal markets, New York, New London, and Norwich, sending to the first by smacks and steamer, to the second by railroad, and to the last by wagon. The Noank catch is mostly sent to New York early in the season, but later New London takes two-thirds of the catch.

Lobsters are sold in Connecticut both by weight and count, but generally by weight, the average price to the fishermen in New London County being about 4 cents per pound.

EARNINGS.—The earnings of lobstermen in New London County range all the way from $100 to $1,000 per season, the average earnings for 1880 having been about $350 per man. In good seasons the Stonington lobstermen are said to earn about $1.50 per day; the New London, $25 to $30 per month; the South Norwalk, $2 to $5 a day; and those in the vicinity of New Haven, $8 to $14 per week. The Noank small boats, fishing for lobsters only, made, in 1879, profits of $110 to $570 each.

SMACKS AND BOATS.—The lobster fishery is conducted by means of small boats and smacks. The small boats used for tending the pots in Eastern Connecticut are mainly of the pattern called the Connecticut lobster boats, already described. A few of these boats engage only in the lobster fishery, but the majority also fish for cod, mackerel, blackfish, and other species in their season. They range in value from $150 to $300 each. In addition to the regular sloop boats, there are others, generally of smaller size and of less value, employed in lobstering in this region and elsewhere. The fishermen go in their small boats either singly or in pairs, and usually fish for themselves, selling their catch.

Twenty-four lobster smacks of more than 5 tons measurement each are owned in Connecticut, all belonging to New London County; nine hail from New London, thirteen from Noank, one from Stonington, and one from Mystic. Two are well-smacks, used as carriers only, while all the remainder engage in the fishery; six are employed solely in lobstering, and eighteen engage also in other fisheries. The majority carry their catch to New York City, but many sell at New London.

List of the Connecticut lobster smacks.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	Rig.	Tonnage.	Value.	Crew.	Carrier or fishing smack.	Fishing grounds.	Markets supplied.
C. M. Harris	New London	Schooner	24.72	$3,000	3	Fishing	Martha's Vineyard	New York.
Conquest	do	do	14	1,500	2	do	Long Island Sound	New London.
Laurel	do	do	19.06	1,500	3	do	Buzzard's Bay	New York.
Phebe	Noank	do	25.74	2,400	5	do	Vineyard Sound	Do.
Tina B	do	Sloop	8.36	800	3	do	Buzzard's Bay	Do.
Victor	Mystic	do	5.82	300	2	do	Block Island	Do.
Total			97.70	9,500	18			

List of the Connecticut lobster smacks—Continued.

ENGAGED IN OTHER FISHERIES ALSO.

Name.	Where owned.	Rig.	Tonnage.	Value.	Crew.	Carrier or fishing smack.	Fishing grounds.	Market supplied.
Alnoma	New London	Schooner	23.22	$1,500	6	Carrier		New York.
Anna Elizabeth	do	do	17.03	800	4	Fishing	Block Island and Buzzard's Bay	Do.
Isabella	do	Sloop	14.43	500	3	do	Long Island Sound	New London.
Joseph Wooley	do	Schooner	32.19	1,800	6	do	Coast of New Jersey	New London and New York.
Mary and Carrie	do	do	33.90	2,500	6	do	Nantucket Shoals and Sandy Hook	New York.
Robert A Gray	do	do	12.51	800	3	do	Block Island and Vineyard Sounds.	New London.
Annie D	Noank	Sloop	23.74	1,400	5	do	Vineyard Sound and Nantucket Shoals.	New London and New York.
Ella May	do	do	14.91	1,200	4	do	Block Island and Vineyard Sounds	New York.
Ira and Abby	do	Schooner	11.77	2,000	3	do	Off Block Island and Montauk Point.	Do.
Manhattan	do	Sloop	22.59	1,000	4	do	No Man's Land, Block Island and Montauk Point.	Do.
Martha	do	do	27.80	1,000	4	do	Vineyard Sound	Do.
Sharon	do	do	15.03	600	3	do	Off Block Island	New London.
S. R. Packer	do	do	10.66	600	3	do	Vineyard Sound	New York.
Whistler	do	do	8.62	700	3	do	Vineyard Sound and Montauk Pt.	Do.
Wildwood	do	do	11.10	950	3	do	Vineyard Sound and Block Island.	Do.
William Henry	do	do	8.53	800	3	do	Block Island Sound	Norwich.
Willie	do	Schooner	13.91	1,800	3	do	Block Island Sound	New York.
Lizzie	Stonington	Sloop	7.80	500	3	Carrier		Do.
Total			309.63	20,450	69			
Grand total			407.33	29,950	87			

Summation of the lobster fisheries of the State of Connecticut in 1880.

Number of fishermen	148
Number of marketmen	9
Number of smacks above 5 tons burden	24
Value of same	$29,950
Number of boats	42
Value of same	$5,700
Number of lobster pots	2,100
Value of same	$2,100
Total amount of capital invested in the fishery	$37,750
Number of barrels of bait used	1,226
Value of same	$613
Quantity of lobsters taken, in pounds	613,385
Value of same to the fishermen	$23,002

NEW YORK.

Although New York City is next to the largest receiving market for lobsters in the country, the lobster fisheries belonging to the State are inconsiderable and at present almost entirely, if not wholly, confined to Eastern Long Island. According to Mr. Eugene G. Blackford, lobsters used to be exceedingly abundant in New York Bay and Hell Gate. On the New Jersey side of the bay they were especially numerous, but now they are nearly extinct in this section of the State. This present scarcity is probably due in part to overfishing, but also very largely to the establishment, on the shores, of obnoxious manufactories, such as oil refineries, which have so befouled the waters as to kill off the lobsters as well as other marine animals. As late as 1879, a few lobsters were received at Fulton Market from Robbins Reef, in New York Bay, but they were very small and unfit for sale.

On the north side of Long Island, at Mount Sinai, a few lobsters are taken annually, but the quantity is small. The fishery is, however, conducted to a greater, though moderate, extent from the following ports of Eastern Long Island, arranged in the order of their catch for the season of

1880, beginning with the most important: Sag Harbor, East Marion, Orient, Greenport, Springs, Southold, Water Mills, and Amagansett.

In addition to the boat fisheries from these places, there is a sloop smack of 30.87 tons, owned at Greenport, which fishes for lobsters, setting pots on the Massachusetts coast about Martha's Vineyard and elsewhere, and carrying the catch fresh to New York City. The total catch of the above places, including that of the smack, for 1880 amounted to only 135,000 pounds, worth to the fishermen, at the rate of 3¾ cents per pound, $5,062.

Six lobster smacks are owned in New York State—two at New York City, and four at Greenport, Long Island. One of the Greenport smacks engages directly in the lobster fishery, as stated above, but all of the remainder are well smacks, acting merely as carriers of fresh lobsters to New York City, mainly from Northern New England. Both of the New York smacks and one from Greenport also carry other kinds of fresh fish, but the remaining three limit themselves exclusively to the lobster trade.

The following account of the operations of the lobster smack Laura Thompson, Captain Rackett, will serve to indicate the methods of buying and carrying practiced by all the New York well smacks. This smack engages in carrying lobsters from the Deer Isle, Maine, region, and Cuttyhunk, Mass., to New York City, from April 1 to December 1. At Deer Isle, Captain Rackett buys of ten men, each handling eighty pots, and from that place can average a trip every two weeks in April and May, and one trip every week the remainder of the season, from Cuttyhunk. In 1880 he had full loads in the spring from Maine, but later only partial loads from Cuttyhunk. In cold weather, this smack can carry 20,000 pounds of lobsters in its well, but during the summer not more than half that quantity. The Maine lobsters die more quickly in warm weather than those from Cuttyhunk. The seasons of 1879 and 1880 were fair ones, but on account of the law recently passed he was obliged to stop buying small lobsters.

NEW YORK CITY LOBSTER TRADE.—There are twenty-seven wholesale lobster dealers in New York City, the more prominent ones being located at Fulton market, and most of the others in the same vicinity. Lobsters are brought to New York both by well smacks and by railroad, during the warmer months packed in barrels with ice. From one-half to three-fourths of the quantity received comes in barrels, and the remainder in smacks. About six smacks engage regularly in carrying lobsters to New York during the spring, summer, and fall, afterwards entering into other branches of the fishery. A few other well smacks, which make a business of carrying fresh fish to New York, sometimes also include a few lobsters in their cargo. From six to ten of the wholesale dealers, with headquarters at Fulton market, own part interest in the smacks, and thereby control their shipments, selling for the smacks on commission. The remainder of the wholesale dealers receive their supplies of lobsters entirely by railroad, as do also some of the retailers. The smack lobster dealers also receive barreled lobsters. The smacks begin to run about March 1, carrying from the coast of Maine from that time until the middle of May or 1st of June, when they commence to take supplies from the Vineyard Sound region, including Menemsha Bight, No Man's Land, Cuttyhunk, and Block Island. Lobsters continue abundant over this latter area until into September or October, after which the smacks return to the coast of Maine, and run until about the middle of November. Occasional fares are obtained from the vicinity of Block Island during the fall. Each trip consumes from one to two weeks or more, dependent upon the distance, weather, and abundance of supplies. During the spring and fall, while the weather is cool, the smacks can carry from 6,000 to 8,000 lobsters each trip, but during the summer months they carry only 4,000 to 5,000 at a time.

Lobsters are received in barrels during the entire year, and, after the smacks stop running,

can only be obtained in that way. They are brought from as far east as Southwest Harbor, and South Harpswell, on the coast of Maine. The fishing ports from which lobsters are sent in barrels to New York are very numerous, and include, in addition to those above-mentioned, Portland, Me.; Portsmouth, N. H.; Boston, Wood's Holl, and New Bedford, Mass.; Newport, R. I.; Stonington, Noank, New London, and New Haven, Conn., and many small places at the eastern end of Long Island, N. Y. About fifty barrels of lobsters are received annually from the vicinity of Long Branch, N. J. As in the case of the smacks, barreled lobsters are obtained mainly from Southern New England, Long Island, and Boston during June, July, August, and September, and from Boston and more northern ports during the remainder of the year. By far the larger portion of the barreled lobsters come from Boston, from 5 to 10 per cent. of the supplies from that place being boiled and the remainder fresh. Boston boiled lobsters have obtained a good reputation in New York, being more favorably regarded there than those boiled elsewhere. However, nearly all the lobsters retailed in New York are sold fresh, the sales of boiled lobsters being almost exclusively limited to those received in that state from Boston. But at times there is a small demand for boiled lobsters above the Boston supply, and as there are no regular boilers in New York, the cooking is accomplished by forcing steam from a boiler into a wooden tank containing the lobsters and water.

The floating cars employed for holding the fresh lobsters are the same as are used for other kinds of fish. About forty-eight such cars, with a capacity of about 600 lobsters each, are in use for lobsters in the slips at Fulton market during a longer or shorter period of each year.

Lobsters are sold in New York during the entire year, but the greatest demand is during the months of July, August, and September, when five times as many are disposed of as during any other three months of the year. The demand is least during February and March, when lobsters are comparatively scarce. The fall trade is good. The great summer demand results from the enormous consumption of lobsters at the summer hotels and restaurants of the vicinity. The hotels on Coney Island, for instance, often use as much as 3,500 pounds a day. This trade is of comparatively recent origin, having commenced about 1876 and increased to date. The demand for lobsters in New York City has greatly increased within the past two or three years, but the supply has remained very much the same from year to year. In consequence, the prices have advanced to such an extent that at certain seasons lobsters have come to be regarded as a luxury beyond the means of any but the richer classes.

In 1880 the wholesale prices of lobsters averaged about as follows: From May 1 to November 30, 6 cents per pound; December and January, 8 cents per pound; February, March, and April, 12½ cents per pound. The retail prices for the same periods were 10, 12½, and 15 cents, respectively. During the summer season of 1882 the wholesale prices ranged from 6 to 25 cents per pound, the average price being about 10 cents. The higher prices obtained when the demand was greatest.

About 2,500,000 pounds of lobsters, valued at $175,000 wholesale, were brought to New York City during 1880.

List of New York lobster smacks.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Cal Wells	Greenport	Sloop	Well	39.36	$1,200	5	New York City.
Laura Thompson	do	do	do	42.31	1,500	5	Do.
Wild Pigeon	do	do	do	30.87	350	5	Do.
Total				112.54	3,050	15	

List of New York lobster smacks—Continued.

ENGAGED IN OTHER FISHERIES ALSO.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Cornelia M. Kingsland	Greenport	Schooner	Well	39	$3,000	5	New York City.
Caroline Augusta	New York	do	do	21.92	1,800	7	Do.
Josie Reeves	do	do	do	45.35	3,800	6	Do.
Total				106.27	8,600	18	
Total of all smacks				218.81	11,650	33	

Summation of the lobster fisheries of New York State in 1880.

Number of fishermen	32
Number of boats	32
Value of same	$640
Number of lobster pots	960
Value of same	$720
Total amount of capital invested in the fishery	$1,360
Number of barrels of bait used	270
Value of same	$135
Quantity of lobsters taken, in pounds	135,000
Value of same to the fishermen	$5,062

Summation for the New York wholesale market in 1880.

Number of marketmen	81
Number of smacks above 5 tons burden	6
Value of same	$11,650
Number of smackmen	33
Amount of capital invested in the city markets (estimate)	$50,000
Quantity of lobsters handled, in pounds	2,500,000
Amount paid for same to the fishermen and eastern dealers	$125,000
Value of same, at wholesale prices	$175,000
Enhancement in value in the New York markets	$50,000

NEW JERSEY.

Although lobsters occur along the entire outer coast of New Jersey, they are sufficiently abundant to give rise to a regular fishery only upon that section of the coast lying between Sandy Hook and Atlantic City.

The fishing season proper begins about May 1 and continues until the last of September; but some of the fishermen set their pots as early as the middle of March, and others again fish late in the fall.

The net traps described elsewhere are the principal appliances used for taking lobsters along this coast. Two men generally go together in a boat and set from thirty to forty traps on small rocky spots in from 5 to 11 fathoms of water. They then engage in hand-line fishing for the day; after which the pots are hauled. One man rows the boat while the other tends to the pots. Two men tending thirty to forty pots will average about one barrel, equal to 140 pounds of lobsters, daily.

In 1875 lobsters are said to have run much larger in size than at present, the catch in weight having been greater, although the average number procured to the trap was about the same. Thirty pounds to a trap was not an uncommon catch in former years, but during 1880 the average to a trap was less than 5 pounds. The average weight of the lobsters taken at the present time is about 1¼ to 1¾ pounds each.

According to the statements of the fishermen of Long Branch and Seabright, the lobster fisheries were extensively prosecuted as early as 1860, the catch being sold to carters for their local trade. The business gradually declined, however, until in 1870 it was almost wholly abandoned. About 1872 it again began to pick up, and it has gradually increased until in 1880 there were four-

teen boats with twenty-eight men engaged regularly in lobstering in connection with other fishing. The catch is sold partly to the local trade and partly to the New York and Philadelphia markets, at an average price of 4 cents a pound, netting the fishermen about 3½ cents a pound. The total catch for the season of 1880 was about 156,800 pounds, worth to the fishermen $5,488.

Summation of the lobster fisheries of New Jersey in 1880.

Number of fishermen	28	Average gross stock to a boat for the season	$450
Number of boats	14	Number of barrels of bait used	314
Value of same	$280	Value of same	$157
Number of lobster pots	500	Total catch for 1880, in pounds	156,800
Value of same	$750	Value of same to the fishermen	$5,488
Total amount of capital invested	$1,030		

DELAWARE.

There is no lobster fishery within the limits of this State, although lobsters occur sparingly about the Delaware Breakwater, and are occasionally captured by those who desire them for their own use. One or more are sometimes hauled ashore in drag-seines or gill-nets, or are caught on the hooks of the fishermen. The areas in which lobsters are said to be most abundant are those resorted to by vessels for anchorage, and this would interfere with the setting of pots were there any inclination to engage in fishing. At the most but a few hundred pounds of lobsters are taken annually. Mr. A. T. Burbage, of Ocean View, Del., states that he has occasionally seen lobsters along the beach, in the surf, near Indian River Inlet, Delaware. But rare instances of the presence of lobsters south of Delaware have been noted. Two or three have, however, been recorded from the northeastern corner of Virginia, and in October, 1884, the U. S. Fish Commission steamer Albatross, obtained a single specimen of good size off Cape Hatteras, North Carolina, from a depth of about 30 fathoms, by means of the beam trawl.

STATISTICAL RECAPITULATION OF THE LOBSTER INDUSTRY OF THE UNITED STATES IN 1880.

Table of the lobster industry of the United States in 1880.[a]

States.	Fishery.											
	Fishermen.	Fishing smacks.		Boats.		Lobster pots.		Total amount of capital invested in the fishery.	Bait used.		Quantity of lobsters taken.	
		No.	Value.	No.	Value.	No.	Value.		No. of barrels.	Value.	Pounds.	Value.
Maine	1,843	8	$4,230	1,797	$68,583	104,456	$78,342	$151,154	56,190	$28,095	14,234,182	$268,739
New Hampshire	44	.....	.....	31	400	2,350	2,350	2,810	500	250	250,000	7,500
Massachusetts	595	9	6,250	437	24,315	29,097	29,097	59,572	8,632	4,316	4,315,416	158,229
Rhode Island	129	5	4,650	85	6,400	2,170	1,627	12,677	840	420	423,259	15,871
Connecticut	148	24	20,950	42	5,700	2,100	2,100	37,750	1,226	613	613,385	23,002
New York	32	.....	.....	32	640	960	720	1,360	270	135	135,000	5,062
New Jersey	28	.....	.....	14	280	500	750	1,030	314	157	156,800	5,488
Total	2,819	46	45,080	2,438	106,377	141,543	114,896	266,353	67,972	33,986	20,128,033	483,891

[a] The total value of the products as they enter into consumption is intended to represent the value of all the lobsters sold in 1880, as they pass from the hands of the wholesale dealers, in the three largest markets of the country, Portland, Boston, and New York; from the fishermen who do not supply these markets, and from the canneries. The figures of this column and of the column of "Total amount of capital invested," so far as they are made up from the "Amount of capital invested in the wholesale markets," and the "Enhancement in value in wholesale markets" are largely the result of estimates. Most of the lobster markets deal even more extensively in other kinds of fish, and it has, therefore, been impossible to properly separate the lobster capital from the fish capital. As to enhancement in value, prices fluctuate so much that an exact average could not be determined upon. For instance, in New York, wholesale prices range from 6 to 25 cents per pound, the latter price being demanded even during the height of the season, when the demand and sales are greatest. No account has been taken of the lesser wholesale markets, as no returns of their sales were made by the field agents. Of the 20,128,033 pounds of lobsters taken and sold by the fishermen, we have, therefore, figured an enhancement in value only on the following: 9,494,284 pounds used by the canneries; 8,067,654 pounds handled in Portland, Boston, and New York—a total of 17,561,938 pounds; leaving a balance of over 2,500,000 pounds, which remain at the fishermen's prices. It can be safely asserted, with reference to the balance of the table, that it is founded on as exact data as it was possible to collect of so scattered an industry. The cannery statistics were taken from the books of the canneries.

Table of the lobster industry of the United States in 1880—Continued.

States.	Wholesale markets.						Canneries.		
	Market smacks.*								
	No.	Value.	No. of smacks-men.	No. of market-men.	Amount of capital invested in the markets.	Enhancement in value of lobsters in wholesale market.	No. of persons employed.	Amount of capital invested.	Enhancement in value of lobsters by process of canning.
Maine	50	$40,175	128	20	$25,000	$19,300	782	$289,834	$143,337
New Hampshire									
Massachusetts				50	30,000	86,377			
Rhode Island									
Connecticut									
New York	6	11,650	33	81	50,000	50,000			
New Jersey									
Total	56	51,825	161	151	105,000	105,677	782	289,834	143,337

States.	Grand totals.		
	Total number persons employed.	Total amount of capital invested.	Total value of products as they enter into consumption.
Maine	2,773	$506,163	$431,376
New Hampshire	44	2,810	7,500
Massachusetts	645	89,572	194,606
Rhode Island	129	12,677	15,871
Connecticut	157	37,750	23,002
New York	146	63,610	55,062
New Jersey	28	1,030	5,488
Total	3,922	713,612	732,905

*The fishing smacks also carry their catch to market, and are, therefore, partly of the nature of market smacks.

3.—THE CRAYFISH FISHERY.

1. THE CRAYFISH FISHERY OF NORTH AMERICA.

GENERAL REVIEW.—Although fresh-water crayfish are very abundant in many portions of the United States, they are seldom used as food, and, in fact, there appear to be only two regular markets for their sale—New York and New Orleans. One of the principal uses to which they are put is for garnishing fish dishes in hotels and restaurants. Through much of the region where one or more of the many species of crayfish occur, it is probable that they are taken in small quantities for home consumption; but of so slight and scattered an industry it is impossible to collect statistics.

NEW YORK CITY.—Comparatively large quantities of crayfish are brought to the New York markets during the spring and summer, the sources of supply being the Potomac River, at Washington; Milwaukee, Wis.; and Montreal, Canada. The first supplies come from Washington, where the season opens soon after the ice has disappeared from the river, and just before the shad commence to run. About June 1 they begin to be received from Milwaukee, and about July 1 from Montreal. Originally all the crayfish sent to New York, at least in large quantities, came from Washington; later Milwaukee began to ship them east, and a year ago (1880) the first shipments

were sent from Montreal on trial. Crayfish are sent alive, packed in boxes, containing about five hundred each. In these boxes they are arranged in layers, alternating with moist water-plants.

After crayfish begin to arrive from Milwaukee, the demand for those from Washington ceases, partly because the warm weather prevailing in Washington after May renders their shipment alive quite difficult, and also because the Milwaukee crayfish are considered superior to the others. The quantities received at New York from the three places above mentioned for the past year (1880) were about as follows: From Washington (the season lasting from the middle of March to near June), about 50,000 by count; from Milwaukee (the season lasting about twenty-one weeks from June 1), 84,000 by count, or at the rate of about 4,000 a week; from Montreal the single shipment of 1880 amounted to 2,000 by count, but this year (1881) the receipts will probably be much greater. The shipments from Washington for the spring of 1881 were also larger than usual.

The crayfish sent from Washington are larger than those from Milwaukee, and the latter in turn are larger than those from Montreal. The Milwaukee crayfish are, however, preferred by epicures to those from Washington, as they are considered to be less coarse in flesh and flavor. The Milwaukee and Montreal crayfish are also said to become a deeper red in boiling than the Potomac, which is to their advantage when intended for garnishing.

In previous years the Potomac crayfish have brought, in the New York market, as high prices as $4 to $6 per hundred, but this year, on account of the large number received, the price has fallen, at times to $2 per hundred. The Milwaukee crayfish, coming in greater abundance later in the season, have been sold at lower prices—from $2 to $3 per hundred. Crayfish are used in New York principally by hotels and restaurants for making soups and bisque of crayfish, and for garnishing fish dishes and lobster salads.

Mr. Blackford, of Fulton market, to whom we are indebted for the above information and figures, often keeps large quantities of crayfish on hand for a considerable period during the season. In order to do this, he has arranged a large and deep wooden tank in the front part of his ice-house, in the bottom of which there is room for a great many crayfish to move about. Over the bottom of the tank, a thin layer of water, not deep enough to entirely cover the animals, is allowed to pass continuously. The air in the tank is also retained at a moderately low temperature. Although many die, yet the mortality is greatly lessened by this method of storing them.

The sales of crayfish in the New York markets for the year 1880, according to the figures given above, amounted to 136,000 by count, valued at $2,720 wholesale prices.

WASHINGTON.—Notwithstanding the great abundance of crayfish along the banks of the Potomac River, in front of, and below, the city of Washington, very few are taken to supply the retail markets of that city, as they find no ready sale there. The business is entirely in the hands of a few parties who fish during a short period only in the spring, and send nearly all their catch directly to New York.

NEW ORLEANS.—Crayfish are probably more commonly eaten in New Orleans than in any other American city, outside of New York, and yet they are seldom seen in the markets there in large quantities. The supplies come mainly from the shores of the lakes and canal and from the levees of the Mississippi River, in all of which localities they are said to be very abundant and easily procured. Some of the species live in the mud in which they excavate their holes, and others build chimney-like mounds for their protection. The levees of the Lower Mississippi are often much damaged by the numerous excavations of the burrowing species. The crayfish are shipped in baskets for which the gatherers receive 40 cents each. The sales for 1880 amounted to only about 2,000 baskets valued at $800.

SAN FRANCISCO.—According to Mr. W. N. Lockington, crayfish are occasionally brought

to the San Francisco markets. The only species which has yet been recognized there is the *Astacus nigrescens*, collected both in Coyote Creek, Santa Clara County, and in the sloughs of the San Joaquin.

2. METHODS OF CAPTURE, PRESERVATION, AND TRANSPORTATION OF CRAYFISH IN GERMANY.

The following account of the methods of collecting, transporting, and protecting crayfish in Germany, extracted from a report by H Rubelius, in the Industrie-Blätter, Berlin, July 29, 1880, will be of value to Americans interested in this fishery:

"The most common and profitable way of catching crayfish is with the so-called 'Bolljacken,' which consists of two hoops with a tube-shaped net attached. On the outside these two hoops are covered with a net-work, and the whole apparatus has the appearance of a cylinder. The hoops are kept open by wooden pegs. A piece of fresh fish or a frog is put inside as bait, a stone is tied to it, and thus the 'Bolljacken' is let down to the bottom.

"Another apparatus for catching crayfish is the so-called 'Tellerhamen,' a sort of purse-net, or hoop covered with a net, in the middle of which there is a long stick which serves to keep the hoop, which resembles a plate, at the bottom of the water. In that portion of the net through which the stick passes, the bait is fixed, so that the crayfish must go on the 'plate' if it wishes to seize the bait. The stick must be long enough so that its other end may protrude above the water. The stick is then pulled out with the net and the crayfish sticking to it, baited anew, and let down again.

"Another method of catching crayfish is much used by private individuals. During the summer months the crayfish seeks shallow places with a clear bottom. The fishermen use a torch of resinous pine-wood, by means of which they throw a strong light on the bottom. The crayfish are dazzled by the light and can easily be taken out of the water with the hands; and it has happened more than once that a single person has in this manner caught 900 to 1,200 crayfish in one night.

"After the crayfish have been caught, the main object of the cultivator is to preserve them, to give them a pure flavor, and to fatten them. For a number of years I have succeeded very well in this. Pure running water is the first requisite; the boxes must be made according to the plan given below, and must not be overcrowded. The best food is fresh meat, but not too much at a time. Immediately after having cast its old shell, the crayfish is very voracious, and consequently needs the largest quantity of food, while in December it needs the least. In January it becomes lively again, its voracity increases, and during its imprisonment the eggs begin to appear at that time. Great care should be taken not to leave old and spoilt fragments of meat in the boxes for any length of time, as they will very soon prove fatal to the crayfish. I have by way of experiment thrown spoilt meat in boxes where there were only a few crayfish, and the consequence was that most of them died. I would also draw attention to a very important matter, viz, to clean the boxes (at least during summer when it is very warm) twice a day and throw out all the dead crayfish, for in summer a crayfish commences to putrefy in ten to twelve hours after death, and the exhalation invariably kills the healthy. One of the greatest dangers to crayfish culture and transportation is a thunderstorm. As soon as a thunderstorm has passed over, the boxes should be opened and cleaned, and care should be taken to admit fresh air and water.

"I have transported crayfish in various ways and have finally arrived at a method which in most cases has proved successful. I have very frequently sent live crayfish by mail from Frankfort-on-the-Oder to Alsace-Lorraine, and they have invariably arrived in good and healthy condition, unless a thunderstorm came up during the journey, which, however, did not happen very

often. During the shedding period no crayfish should be shipped, as then they cannot stand any pressure, and die easily. Care should also be taken not to pack a dead crayfish among the live ones. The main point in shipping crayfish is to select good, healthy ones, well fed and properly dried. I generally employ small wicker baskets each holding sixty to one hundred and twenty crayfish, so that they are not piled too high on top of each other. First put a layer of straw in the basket, then put in the crayfish, one at a time, laying them on their feet, and if the basket should not be quite full, it should be packed with straw till full. The packing is to prevent the crayfish from turning when the baskets, as will frequently happen during a long journey, are thrown about a good deal. If the crayfish falls on its back during the journey, it will die, as it works with its feet till it becomes exhausted. On their arrival at the place of destination the crayfish are taken out of the baskets and placed (again on their feet), in a large vessel, which should be kept in a cool place, best in a cellar, but not be covered up.

"It is an old belief that crayfish are not good in those months the names of which contain the letter *r*; but I have found that when properly cared for and well fed they are good at all times, for I have sold and shipped them during every month in the year, and have never had any complaints.

"An important question remains to be answered, viz, whether artificial crayfish culture in basins is remunerative. Experience has taught me that crayfish increase and develop better when in a free state than in boxes or basins. To start a somewhat remunerative crayfish establishment involves considerable expense, and does not yield the expected result. In such establishments the cold of winter kills most of the crayfish, as they cannot find holes and other places of refuge as when in a free condition. If strong ice forms, as was the case this year, the crayfish are suffocated in the basins; the boxes are soon frozen over on the sides and top, and as soon as the admission of fresh air is stopped, the crayfish die from suffocation.

"I would therefore recommend the following method: From rivers and lakes containing but few crayfish the females should not be removed; the eels and pike should if possible all be caught, and the young crayfish, large numbers of which will make their appearance in a year or two, must be well and regularly fed with meat and turnips; during the fourth year all crayfish which have reached the length of 10 centimeters should be caught and placed in large tanks or boxes prepared in the following manner: The bottom and sides are best made of thin boards, which should not be close together, but have narrow interspaces between them, too small to let a small crayfish escape. The object of having such interspaces on the bottom is to give free egress to the slime, mud, sand, &c., which will get in the box, and thus to keep it clean at all times. The interspaces on the sides will have this advantage that fresh water is constantly passing through the boxes, which of course is an essential condition of keeping the crayfish alive and in good condition. In these boxes, through which fresh water must be kept running all the time, the crayfish are fattened. When ice forms in winter the boxes must be let down into the water so that the openings on the sides do not freeze over."

3. STATISTICS OF THE CRAYFISH FISHERY FOR 1880.

Table showing the quantity and value of the crayfishes taken for market in 1880.

Locality.	Estimated weight.	Value to the fishermen.
	Pounds.	
Washington, D. C	5,000	$500
Milwaukee, Wis	8,400	840
New Orleans, La	10,000	800
Total	23,400	2,140

4.—THE ROCK-LOBSTER FISHERY.

THE ROCK-LOBSTER FISHERY OF CALIFORNIA.

GENERAL REVIEW.—The rock-lobster, spiny-lobster, or salt-water crayfish (*Panulirus interruptus*) of the Pacific coast of the United States ranges from Santa Barbara, Cal., southward and is taken for food at Santa Barbara, San Diego, Los Angeles, Wilmington, and other smaller places. The San Francisco market is entirely supplied from Santa Barbara, whence large quantities are shipped annually. Very few, if any, are exported from the State. As there are no regular markets in the smaller places where it is sold, it is hawked through the streets with fish. It is captured in dip-nets or in traps with a funnel-shaped entrance, similar to the lobster pots of the New England coast. Fish is used as bait. This species is in season at San Francisco the entire year. The following account of the fishery is from a report by Prof. D. S. Jordan.

SANTA BARBARA.—During the summer the salt-water crayfish live in shallow water, where they are taken in a sort of dip-net anchored near the shore, with a piece of bait suspended above the middle. In October they retire to deeper water and remain in the kelp during the winter, when they are captured in lobster-pots. Fresh fish, especially bonito, makes the best bait, but any flesh, fresh or salt, will answer. During the spawning season, which is in the early summer, the flesh of the crayfish is less fat and less esteemed as food, but, nevertheless, it is eaten all through the year. At this period it is also very abundant near shore, and a single person has been able to secure 500 pounds in the space of two hours by means of dip-nets. They are sometimes taken in fish-seines. There is great danger of overfishing, especially in the spawning season. The average weight of those now taken is 3½ to 4 pounds, or about twenty lobsters to a sack of 75 pounds. Formerly, 11-pound individuals were taken about Santa Barbara, but such are very scarce there now.

Some of the crayfish caught at Santa Barbara are peddled through the streets at 10 cents each, but the greater part are sent to San Francisco, where they are sold by commission merchants, the net results being from 75 cents to $1 per sack. In summer great numbers spoil before they can be disposed of. Five or six years ago crayfish were shipped from Santa Barbara to San Francisco by only a single party, who was accustomed to send thirty or forty sacks by each steamer sailing every five days. Now he sends only twenty to twenty-five sacks by each steamer in summer, and a smaller quantity in winter, but three others have gone into the fishery and together they do an increased business. About 180,000 pounds are taken annually at Santa Barbara, the greater part of which, as stated above, are sent to San Francisco. The first shipments to that place were made in 1872.

In 1877 a cannery for crayfish was started in Santa Barbara, but it failed after the first season, as the managers were ignorant of the business. It is intended to make another start soon under better management.

The Chinese fishermen on Santa Cruz Island catch the crayfish, use the bodies for bait, and dry the tails in the sun without salting or cooking. These dried tails are sent to San Francisco and sold to the Chinese at about 15 cents a pound.

Captain Larco, the principal crayfish dealer of Santa Barbara, states that he is positive some law should be passed to protect the crayfish, at least during the spawning season, when large quantities are destroyed every year. His views on this subject are very reasonable, and no doubt

some attention should be paid at once to fostering an industry which avaricious fishing may soon destroy.

SAN DIEGO.—The fishery about San Diego is at present of very slight extent compared with that of Santa Barbara, but it would undoubtedly admit of greater development, did the demand warrant it. The Chinese alone supply crayfish to this locality from their fishery at Roseville. They catch large numbers, a part of which are used as bait, the remainder being sold to parties who peddle them through the streets after boiling them. Crayfish occur abundantly wherever there is kelp, both inside and outside of the bay and near its mouth. Lobster-pots and dip-nets with bait are used in their capture.

The quantity of crayfish sold in San Diego is very small. Three years ago the average sales per week amounted to only three or four dozens, and now still less are disposed of. The Chinese are paid from 50 cents to $1 per dozen for them, and by retail on the street they bring from 10 to 15 cents each.

WILMINGTON.—But one man engages regularly in the fishery at this place, although this crustacean is very common all along the shore. The pots are visited only two or three times a week, but these few trips are sufficient to collect all that can be sold. There is no regular market and no regular price, but after boiling they are peddled through the streets and retailed at from 5 cents to 10 cents per pound. About 20,000 pounds are sold annually.

Table showing quantity and value of rock lobsters (Panulirus interruptus) taken and sold on the California coast in 1880.

Locality.	Quantity.	Value.
	Pounds.	
Santa Barbara	180,000	$5,600
San Diego Wilmington	30,000	
Totals	210,000	5,600

5.—THE SHRIMP AND PRAWN FISHERIES.

(a) THE SHRIMP AND PRAWN FISHERIES OF THE ATLANTIC AND GULF COASTS.

1. INTRODUCTION.

THE DIFFERENT VARIETIES OF SHRIMP AND PRAWNS AND THEIR DISTRIBUTION.—Shrimp and prawns occur along the entire Atlantic and Gulf coasts of the United States, but the species are of much smaller size at the North than at the South, and shrimp fishing as an industry has thus far been developed, to any extent, at only a few points on the coast of the Southern States. The common shrimp (*Crangon vulgaris*) and prawn (*Palæmonetes vulgaris*) of the New England coast are too small and too rarely found in sufficient abundance to offer many inducements toward a regular fishery. So far as we are aware, the New England prawn is never taken for food, and the shrimp are caught for that purpose only about New Bedford, Newport, and New York. The latter species is, however, occasionally used as bait at many points along the New England coast, but mainly by amateur fishermen.

On the South Atlantic and Gulf coasts at least two species of shrimp or prawns occur, the names shrimp and prawns, throughout that district, according to several authorities, having reference merely to different sizes of the same species, the smaller ones being called shrimp and the larger prawns. They are but different stages in the growth of *Penæus setiferus* and *Penæus*

brasiliensis described in the section on natural history. They are not generally found close to the shore at the same time, the prawn coming first and staying into the summer, the shrimp following and remaining until fall or even through the winter. At least this is the case on the Atlantic coast, but we have received no information tending to confirm these statements with reference to the Gulf coast. The so-called shrimp are said to range in length from 2 to 3 inches and the prawns from 3 to 6 inches. Capt. T. E. Fisher, of Fernandina, Fla., says he has seen prawns taken at that place that measured about 9 inches, but that size was very rare. On the coast of Louisiana and Texas, the same species of shrimp and prawns occur in great abundance, the average length of those taken ranging from 5 to 8 inches. In that region they appear to go entirely under the name of shrimp.

At New Orleans one or more additional species of shrimp are utilized; one of these is the river shrimp (*Palæmon ohionis*), caught in the Mississippi River. The so-called lake shrimp, found in the bays and lakes inside of the Louisiana coast may possibly be the young of the true Gulf shrimp, but we have never had the opportunity of examining specimens. The river shrimp measure in length from 2 to 3 inches, and the lake shrimp from 3 to 4 inches.

During the shrimping season, shrimp are generally found in shallow water close along the shore. *Crangon vulgaris* is abundant in shallow water nearly everywhere along the New England coast, being easily taken with a dip-net. It also occurs in considerable depths of water off shore. At the South, in the various regions where they are taken for food, the two species of *Penæus* likewise abound in shallow water during the shrimping season, which, on the Atlantic coast, generally begins early in the spring and ends in the fall or at the commencement of cold weather. About Norfolk, Va., they are taken in seines, 16 to 18 feet deep; at Wilmington, N. C., they are caught in slight depths, in both salt and slightly brackish water; at Fernandina, Fla., they occur along the shores, in from 6 inches to 4 feet of water, principally on muddy but also, to some extent, on sandy bottoms; on the west side of Florida, they are described as inhabiting the grassy and sandy bottoms along shore, in depths ranging from a few inches to 10 or 12 feet; on the Louisiana and Texas coasts they are found everywhere to the west of the Mississippi River, in from 2 to 18 feet of water. Barataria Bay, on the Louisiana coast, and Galveston and Matagorda Bays, on the Texas coast, are especially noted for their shrimp fisheries.

2. COAST REVIEW OF THE SHRIMP AND PRAWN FISHERIES.

THE NEW ENGLAND COAST.—Shrimp are seldom taken for food on the New England coast. About New Bedford, Mass., they are caught from May to October, in dip-nets, but only at irregular intervals and in small quantities, an occasional daily catch amounting to from 1 quart to 4 gallons. The greater part of the shrimp taken are retained in New Bedford for use as bait, small quantities being sometimes shipped to Providence and New York, packed in boxes with rockweed, moss, or sawdust. Some shrimp are also used at Wareham, Mass., and along the eastern shores of Buzzard's Bay, as bait for the sea bass and squeteague. In Narragansett Bay, Rhode Island, shrimp are only taken for personal use in and about Newport. They are not generally abundant, the largest recorded daily catch by one man amounting to only 1 peck. This was considered, however, as an unusual occurrence. They are caught in fine-mesh dip-nets. At many places along the New England coast, outside of those above mentioned, small quantities of shrimp are used occasionally by amateur fishermen, but the entire amount consumed every year in this manner would not be worth more than a few dollars. Specimens of *Pandalus* are frequently taken in lobster-pots set in deep water, but they are not caught in sufficient quantities for

market. The lobster fishermen of Biddeford Pool, Me., and Noank, Conn., report their capture from time to time.

NEW YORK.—At the eastern end of Long Island a few shrimp (*Crangon vulgaris*) are taken every season for home consumption and for shipment to New York City, but the industry is of slight importance. The vicinity of Bay Ridge is the principal locality in which they are taken for shipment to New York markets, the season lasting from the middle of March until the middle of May. The amount shipped each season is about 3,000 gallons. These shrimp are cooked in brine as soon as caught, and then dried. During July and August of each year about 1,000 gallons of fresh shrimp are sold about Bay Ridge as bait for general hook-and-line fishing. The average price is about $2 per gallon.

NEW YORK CITY MARKET.—The New England shrimp (*Crangon vulgaris*) is brought to the New York markets during about sixty days in the spring, from the middle of March to the middle of May. The average sales per day are about 50 gallons, or 3,000 gallons for the season, which, at the average market price of $1.50 per gallon, are valued at $4,500. They come mostly from the vicinity of Bay Ridge, L. I., below New York City, where the nets are hauled every morning. They are cooked in brine before being sent to market.

The season in New York for the larger southern shrimp or prawn (*Penæus*) is from the 1st of February to the 1st of May, after which time the weather becomes too warm to permit their being shipped safely. During this season each year about 200 bushels are brought to New York, mainly from Charleston, S. C., and Savannah, Ga., in boxes holding about 1 bushel each. They sell in the New York market for about $1.50 per gallon. These shrimp, like the others, are dried, after being cooked in brine.

In 1879 about 200 gallons of *Penæus* were sold in the Boston market, and in 1880 about 75 gallons; they were received through New York.

NEW JERSEY.—Shrimp are reported as abundant along most of the New Jersey coast, but as yet they have given rise to no considerable industry. From a few places, however, they are shipped to New York City in small quantities. The shrimping season extends more or less continuously from May to November. Shrimp are much used on this coast as bait for hook-and-line fishing, and by many are regarded as superior to any other kinds of bait.

DELAWARE.—A small quantity of shrimp are used in this State every year, as bait for hook-and-line fishing, but there appears to be no regular source of supply, and we have not learned of their being taken there for food.

VIRGINIA.—About the same can be said of the Virginia coast as of the New Jersey. Shrimp are more or less abundant, but are only taken for use as bait in small quantities, or incidentally in seines, while hauling for fish. The season begins in the spring and lasts until cold weather, but is best in the fall. At both Norfolk and Hampton, shrimp are only rarely used as food. They are reported as having been very abundant at one time in Lynnhaven Bay, but to have nearly disappeared from that region now. They are but rarely seen in the waters about Hampton. Prawns are the favorite bait for "rock" about Norfolk, where they vary greatly in price, according to their abundance. When very abundant they are sold to fishermen at as low a price as 10 cents a quart, but, when scarce, the price sometimes advances to 25 cents a dozen.

NORTH CAROLINA.—After passing the Virginia coast shrimp appear to increase in size and abundance, and also to meet with much greater favor from the inhabitants. Wilmington, N. C., is the most northern city of our Atlantic coast where the shrimp fishery assumes the importance of an actual industry, and where shrimp are caught in sufficient quantities to merit special attention.

Pamlico Sound, some distance north of Wilmington, abounds in shrimp and prawns, which are taken in immense quantities in ordinary fish-seines, but they find no market at home, and no one in the region has yet been successful in shipping them away to where they might be better appreciated. Here, therefore, in a central location, is an undeveloped industry, awaiting the investment of a small amount of capital, backed by a spirit of enterprise. Concerning this and neighboring regions, Mr. R. E. Earll reports as follows:

"There is no shrimp trade anywhere within the district comprising Pamlico, Albemarle, Roanoke, and Croatan Sounds, although shrimp are very abundant in many localities, and enterprise alone is required to develop an important industry. The fishermen often catch the shrimp in their ordinary nets, along with fish, but find no sale for them at home, and their means of shipping them fresh to outside markets are imperfect. The fishermen of New Berne catch them in considerable numbers in their fish nets along the banks of the Neuse River, and they are also abundant at Stumpy Point, and probably not uncommon in other parts of Pamlico Sound. They are taken only occasionally and in small quantities in Croatan and Roanoke Sounds, and do not occur in Albemarle Sound except in season of unusual drought. The New Berne fishermen often secure from 30 to 40 bushels at a haul of their fish-nets, and have frequently offered them for sale to the market dealers at the low price of 50 cents per bushel, which has almost always been refused. The fishermen eat very few themselves and throw the bulk of their catch away. No shrimp are boiled and dried at this locality, as the inhabitants are entirely ignorant of the methods of preparing them as practiced elsewhere. There is no apparent reason, however, why an important shrimp industry might not be inaugurated at or in the vicinity of New Berne, by the starting of an establishment where this crustacean could be boiled and dried for market, or put up in hermetically sealed cans for more permanent preservation."

The vicinity of Beaufort and Morehead City also abounds in shrimp and prawns, but there the same difficulty exists as in Pamlico sound. There is no local demand for the shrimp, and enterprise is lacking to start a trade with outside cities. According to Mr. Earll, the Beaufort fishermen have never fished for shrimp and prawns and have never tried apparatus suited to their capture. They employ nets of large mesh for fish and frequent only the sand-banks and shores, while the shrimp are known to prefer in this locality a muddy bottom. Even with this style of net, however, it is not uncommon for from five to twenty barrels of shrimp to be taken at a single haul of the seine, indicating that they are quite abundant in the region, and might be secured in great quantities by the use of proper nets. The dealers have never given any attention to this trade, and refuse to buy the shrimp accidentally taken in the fish-seines. The fishermen, therefore, being unable to sell their catch, find no encouragement in this line of fishing. In 1879 a few shrimp were bought by one of the dealers, who tried to ship them to New York in ice, but they spoilt on the way. The result would have been much more satisfactory had the shrimp been boiled and dried, instead of being sent fresh. Those taken in this region are of large size, and it only remains for some one familiar with the methods of curing them to engage in the business, which might soon be made to develop into a very profitable trade.

The principal localities where the shrimp industry has already been started and is carried on more or less extensively are Wilmington, N. C.; Charleston, S. C.; Savannah, Ga.; Fernandina, Fla.; New Orleans, La.; and Galveston, Tex.

Shrimp and prawns are very abundant in both salt and slightly brackish water in the sounds and bays about Wilmington, N. C., from the last of May until November, but the industry is, as yet, only imperfectly developed, though it promises to become in the future of considerable importance. Prior to 1872, shrimp were taken in this locality only with skim-nets; they were not

much thought of by the people, and not over 100 bushels were marketed yearly, at the rate of about 25 cents per quart. In the year 1872, the first shrimp-seine was introduced, and from that time business increased until eight seines were in use. None of the shrimp were sent away, and the home market therefore soon became overstocked, the result being that some of the shrimpers were obliged to give up the business. At the present time only four shrimp-seines supply the Wilmington markets, all of which are owned in Wrightsville or Middle Sound. These seines range in length from 30 to 40 yards, and in depth from 6 to 10 feet; the size of the mesh is one-half inch, and they cost about $35 apiece. Two men are required for each seine, the season's catch for each being about 500 bushels, or 2,000 bushels for the four seines in use.

In addition to the seiners there are about fifty men engaged in taking shrimp with cast-nets and skim-nets, their season's catch amounting in all to nearly 3,000 bushels, though not more than one-half of their catch is marketed. The total catch of shrimp for 1880 amounted therefore to about 5,000 bushels, of which only 2,200 bushels were sold for food at a cost of $5,500. The remainder of the shrimp taken were used for fertilizing purposes or thrown away, only the best and largest specimens being marketed. Fishing is carried on only in the daytime, and then not with any precise regularity, as the markets cannot take all that could be caught. Before sending the shrimp to market, they are boiled by the fishermen for about ten minutes in kettles holding from 10 to 50 quarts each, and then spread out to cool. They are shipped in baskets.

No shrimp were sent away from the city until 1878, but since that time a trade has sprung up with the neighboring towns and northern cities, which promises to increase and become of considerable value.

The principal cities and towns supplied with shrimp from Wilmington are New York, Philadelphia, Charlotte, N. C., Florence, Sumter, Columbia, S. C., and Augusta, Ga.

SOUTH CAROLINA.—The shrimp and prawn industry of Charleston is one of the most important branches of the fisheries at that point, both as regards the number of men engaged and the value of the catch. The fishery begins the last of March or first of April, and continues until the middle of November. During the first of the season (March to July) the so-called prawns alone are taken, but after that the smaller shrimp take the place of the prawns. At the first of the season, six to eight seine-boats, with crews of about six men each, go nightly to the various fishing shores, all of which are within 15 miles of the city, and draw their seines during the two or three hours of low tide; they return before day to supply the boat fishermen with bait, after which they dispose of the remainder of their catch to the men, women, and children, who vend the prawns through the street. The catch varies greatly at this time of year, as the prawns seem to be more abundant in some localities than in others; and the successful boats may return with 10 to 20 bushels, while the less fortunate ones obtain only 4 or 5 bushels. This is also the time when whiting are most plentiful in this region, and for this species prawns are said to constitute the best bait. The whiting fishermen, are, therefore, very anxious to obtain them, even at a high figure, the ordinary price being about 50 cents per plate, containing from a quart to a quart and a half each. Sometimes, however, as high as 2 cents apiece, or about $1 a plate, is paid for them. Each hook-and-line fisherman requires one or two plates for a day's fishing, according to the abundance of fish, and this gives rise to a constant demand for them, at excellent prices. During the first few weeks of the season this fishery is one of the most profitable of any on this part of the coast.

When the prawns become more abundant, cast-nets come into use; early in May the seiners lay aside their seines, and in common with others, engage in cast-net fishing solely. The fishery soon reaches its height, and at this time not less than one hundred and twenty men with sixty

boats and seventy-five cast-nets are constantly employed. The daily catch during June and July often exceeds 100 plates to the boat, while the average catch for the season is from 60 to 75 plates daily per boat. The boats make on an average about four and a half trips per week.

Early in July the prawns disappear and their place is filled by the smaller shrimp, which continue in great abundance until the middle of November. The difference in size between the prawns and shrimp may be measured roughly as follows: Of the former only about forty are required to fill a plate, while a plate full of the latter numbers fifty to sixty. The shrimp fishery continues to the close of the season, with about the same number of men and boats as were engaged in the later prawn fishery, and the average catch also remains about the same, but the price which started at 50 cents for prawns in April soon falls to 25 cents, then to 15, and later to 10 cents per plate, the retail price being about 15 cents, and that to dealers from 8 to 10 cents. The city authorities exact a monthly license of $1 from each fish vender in the city, which tends to limit the number of that class, but the shrimp venders are placed under no such restraint, and many men, women, and children embrace the opportunity of making a few pennies in this line of business, which requires only a tray and plate in addition to the small daily stock in trade. At early dawn the entire city is aroused from its slumbers by the incessant cries of "Shrimp" and "Prawn," as more than a hundred venders, all blacks, and each with a well balanced tray upon his head, wander through the streets and alleys, trying to dispose of their goods. Shrimp have come to be considered a standard article of food by the Charleston residents, who eat them during the entire season. The greater part of the entire catch is sold in the city, either for bait or food, and the quantity sent to outside markets reaches only a few hundred bushels yearly. The shrimp catch for April equals about 10,000 plates, valued at $4,000, and the same from May to November 15 equals about 40,000 plates, valued at $34,667. This is the price as sold from the boat, but the retail value must exceed $60,000.

GEORGIA.—Shrimp abound along the entire sea-coast of Georgia, from Savannah to the Florida line. They are taken for food, the prawns from March to June, and the shrimp from July to November, in nets of one-half inch mesh. They are caught in large quantities to supply the Savannah and other Georgia markets, and are also shipped to New York and other northern cities. This industry has not, however, attained the proportions in this State which it has in South Carolina. The sales for 1879 amounted to 1,600 bushels, valued at $3,500.

EASTERN FLORIDA.—On the sea-coast about Fernandina, shrimp and prawns are very common, and furnish abundant material for a profitable industry; but at present from the want of sufficient capital this fishery is not as flourishing as it has been or as it gives promise of becoming in the future. We are indebted to Capt. T. E. Fisher, of Fernandina, for very full notes on the fishery at that place, from which the following account has been prepared:

According to Captain Fisher, the so-called prawns approach the coast about the full moon in March or thereabouts, and enter the bays, rivers, and creeks in large quantities—as he thinks, to spawn. About May or June they return again to the sea, and are replaced by very small shrimp, which from May until August are used mainly as fish-bait. From August to December they increase rapidly in size, the best shrimping season being during the months of September and October. If the winter is warm the shrimp and prawns remain on the coast during the entire year, but ordinarily prawns are found from March until May, and shrimp from May to December. The fishing is usually conducted on muddy, but sometimes on sandy bottoms in from 6 inches to 4 feet of water and deeper. Cast-nets from 10 to 15 feet in diameter are generally employed, as seines when they have been used have given less satisfaction. The shrimp and prawns do not approach the shore as thickly in the daytime as at night, so that the fishing is mostly carried on after dark.

Two men go out in each boat, one to paddle, the other to manage the net. Captain Fisher records one unusual catch of 7 bushels made by two men in three hours' time.

The shrimp after they are taken are washed very clean, so as to rid them of any mud or sand that may have remained upon them, and are then put into a kettle of strong boiling brine, which is made thick enough to hold up a common potato. About 1 bushel of shrimp is allowed to 3 gallons of brine, and the shrimp are not put into it until the froth and dirt, which usually rises to the surface during boiling, has been skimmed off. After the shrimp have been boiled about ten minutes they are taken from the pot, put into a covered basket or barrel, and allowed to steam for ten minutes more. They are then spread out in a thin layer upon a platform of boards to dry. It is very essential that they should be thoroughly dried before being collected together for shipment, but once in this condition they can be kept for weeks, if always retained in a dry place.

As to the shrimp industry at Fernandina, Captain Fisher states that shrimp and prawns are exceedingly abundant there year after year, and a few years ago he entered into the business of preparing them for market. He had no trouble in obtaining materials, and worked hard to build up a trade. Meeting with some losses and with bad returns from dealers, to whom he had been shipping, he was finally obliged to abandon the project, but, as he says, "from no want of shrimp." He continues: "I have never found any trouble in getting as many as I wanted along the entire coast from North Carolina to Florida, except during severe stormy weather. I have found them just as abundant one year as another, and they furnish a much greater supply of food along the coasts of the States mentioned than is generally supposed." With a cast-net 15 feet in diameter two men can catch on an average 2 bushels per day during the entire fishing season. In 1879 quite a business was carried on, some 300 bushels of the dried shrimps having been sent to New York, Philadelphia, Savannah, Atlanta, and Macon, Ga., and Charleston, S. C., in crates or baskets. Since then only enough fishing has been done to supply the home trade, with a very few sent away.

According to the statements of the fishermen shrimp and prawns are very abundant in the vicinity of Saint Augustine, Fla., during the months of July, August, September, and October. They are most commonly taken on the mud flats, being seen less often on sandy bottoms. Sometimes they school at the surface, but generally they remain at or near the bottom. The shrimp season is during July and August, and the prawn from the middle of August to November. Fishing is carried on mostly in the night-time, the men going out either at early twilight or at low tide, and remaining until about half-flood. Each trip realizes on an average about 4 bushels. Three trips are usually made a week. The nets used in this fishery are the so-called shrimp-nets, being the same as the English cast-nets, and measuring from 4 to 5 feet long, with a one-half inch mesh. They are valued at from $12 to $15 apiece.

The quantity of shrimp and prawns taken during a season is about 600 bushels, valued at not more than $700. None are shipped away, and not over 15 or 20 bushels are dried. At the beginning of the season they sell readily at 10 cents a quart, but the price soon falls to 5 cents a quart, and then to 10 cents for 3 quarts. After the season is well advanced or during times when the catch is unusually large, 10 to 15 cents per peck becomes a fair price.

THE GULF COAST.—The shrimp fisheries of the Gulf coast of the United States are carried on mainly to the west of the Mississippi River, and especially in Barataria Bay, Louisiana, and Matagorda and Galveston Bays, Texas. The season lasts about six months, from October to April, and during this time the shrimping crews establish temporary stations at different points along the shrimping region. Some shrimp may be taken, however, during the entire year. Both seines and cast-nets are employed, and the work goes on as in the same fisheries on the Atlantic

coast. The shrimp caught in Barataria Bay are mostly sent to New Orleans, where they are marketed fresh, or canned for shipment. These shrimp are described as being of large size and fine flavor; they are mostly caught on the grassy bottoms of the bay, and are shipped to New Orleans in steamboats or luggers, without ice. They are carried in baskets and sell at prices which vary according to their abundance. The average price to the fishermen is about 3 cents per pound.

Galveston takes most of the shrimp caught in that vicinity, both for the fresh market and for canning. The fishermen sell at an average price of about 25 cents per bucketful.

Shrimp and prawns are very abundant in Apalachicola Bay and near Cedar Keys, Fla. At the former place they are sometimes taken in small quantities for shipment to New Orleans, but they have given rise to no regularly established trade. For shipping they are first cooked and then packed dry in salt. At Cedar Keys the best months for shrimp fishing are said to be October and March. At both places they are much esteemed as bait for many kinds of fish.

Three kinds of shrimp are recognized in the New Orleans market—the river shrimp, caught on the shores of the Mississippi River; the lake shrimp, found in the lakes and bays inside of the Gulf coast; and the Gulf shrimp from the outer shores of the Gulf of Mexico, mostly to the west of the mouth of the Mississippi River. The first species is not abundant, and is taken from the beginning of spring to the fall, in small quantities only; the lake shrimp is obtained only during the equinoctial season; but the Gulf shrimp is more or less abundant the year round. In the rivers the shrimp are taken by means of cane baskets, sunk to the bottom near the banks, but in the lakes and Gulf they are captured in seines as already explained. Fresh shrimp are very extensively sold in the markets of New Orleans and large quantities are put up in hermetically sealed cans for shipment to all parts of the United States as well as to England and France. About five hundred and sixty men are engaged in this industry in connection with the New Orleans markets and canneries.

3. SHRIMP CANNING.

NEW ORLEANS.—In New Orleans, La., there is an establishment owned by the Messrs. G. W. Dunbar's Sons, where shrimp are put up in hermetically sealed cans, by a process similar to that practiced farther north with crabs and lobsters. This factory is not limited to the canning of shrimp alone, but preserves many kinds of fruit in their season, falling back upon the shrimp when they are most abundant. The shrimp season extends over about five months of the fall and winter, during which time as many shrimp are put up as can be procured. Sometimes a week or two passes when none are to be had, but as a rule the work goes steadily on through the five months.

The working arrangements of the Messrs. Dunbar are of the latest and most approved pattern, and the entire business is conducted under a single roof, even to the making of the tin boxes and the solder. In the shrimp season twenty-five men and one hundred and forty girls are employed. The former make cans and superintend the packing, while the latter prepare the meats by removing the shells and appendages after the shrimp have been boiled. Then the meats are weighed and placed in the cans, which are sealed and put through a similar process to that already described for lobsters and crabs. Messrs. Dunbar's Sons put up on an average 1,500 one and-one-half pound cans of shrimp per day, or a total of about 234,000 cans per season. Their invested capital is about $30,000.

GALVESTON.—This industry was first started in Galveston, Tex. in 1879, by the Messrs. Peacon Brothers, but at the time their establishment was visited by Mr. Silas Stearns, who supplies the data for this report, they had been running only about a year and were, therefore, not fully underway. There was, however, every indication of success, and the firm was anticipating the

building up of a large and important business. So far they had not been able to supply the demands made upon them. They have all the most improved machinery and appliances for doing an extensive business, but during the first year had not worked up to their full capacity. Their methods of preparing and canning the shrimp are the same as those practiced at New Orleans. They calculate to work about one hundred and seventy-five days out of the year, and to put up about 1,000 cans per day; but last year they had worked only about one hundred and fifty days, preparing only 450 cans a day, or a total of 76,500 cans for the season. These at the rate of 17 cents per can were valued at $13,005. The cans are flat, cylindrical in shape, and contain one pound of shrimp meat each. During the shrimping season very little other fishing is done in this locality, and this firm engage some sixty seiners to obtain shrimp for them. In the factory about forty persons in all are employed, of whom the majority are women and girls, whose duty it is to prepare the shrimp for packing. The men superintend the work, seal the cans, &c. The amount of capital invested is estimated at $5,000.

(b) THE SHRIMP AND PRAWN FISHERIES OF THE PACIFIC COAST.

4. THE SHRIMP FISHERY.

EXTENT AND CHARACTER OF THE FISHERY.—The shrimp fishery of the Pacific coast of the United States is by far the most important of any there in the line of marine invertebrates, the exports alone of shrimps from San Francisco in 1880 having been valued at about $100,000. Both species of California shrimp (*Crangon franciscorum* and *Crangon vulgaris*) are taken together, sold fresh in the markets of San Francisco and elsewhere, and boiled and dried for exportation to China and the Sandwich Islands. *Crangon franciscorum* being the larger and also generally the more abundant species, is the one that figures most conspicuously in the shrimp fishery; but *Crangon vulgaris* also forms a large percentage of the quantity taken and disposed of. This industry is controlled almost entirely by the Chinese, who prepare the larger part of their catch for shipment to their native country.

Although both species of shrimp range along the entire Pacific coast of the United States, as far south as Point Conception, they are taken for food in large quantities at only a few localities, principally in San Francisco Bay and Tomales Bay. In both of these bays there are numerous small scattered colonies of Chinese who devote their entire time and energy to the capture and preparation of shrimps, mainly for exportation to China, only a small quantity being sent to the Sandwich Islands, for the consumption of the Chinese living there. In San Francisco Bay, there is a Chinese settlement at Bay View, numbering about twenty-four men, with an outfit of 100 seines and ten boats, who fish mainly for shrimps. Another similar settlement of ten Chinese exists about 2 miles farther south, and still others are located farther up the bay, in San Mateo and Santa Clara Counties, and others also in Marin and Contra Costa Counties. In Marin County, along the coast south of San Rafael, there are two colonies of Chinese, numbering perhaps one hundred men in all, whose principal occupation is shrimp-catching. At each of these stations both *C. franciscorum* and *C. vulgaris* are taken and prepared. The process of capture and drying, which is more or less the same at all the places, is described as follows for the colony at Bay View:

METHODS OF CATCHING SHRIMP.—The seine or drag-net used by the Chinese for catching shrimp is a conical bag-like net, 20 to 25 feet long, and about 10 feet across at the larger end, which is the mouth. It tapers toward the other end, which is about 1 foot broad and open to permit of emptying the contents of the net. The mouth is furnished with a line of weights on one side, and with floats on the other, to hold it open while in use; and the lower end is closed at the

same time by a "sphincter" or "puckering string." The size of the mesh of this net at the mouth is from 1 to 1¼ inches, but it gradually diminishes to one-quarter of an inch at the lower end. The boats employed in seining are from 12 to 25 feet long, rather narrow and sharp at the ends, flat bottomed, and with thick heavy sides; they are built by the Chinese themselves of redwood lumber.

The fishing is usually carried on in rather deep water near the shore (12 to 20 fathoms) on the flood tide, and 3,000 pounds is said to be an average daily catch.

MARKETING.—After the day's fishing is over it is the usual custom to carry the fresh shrimp to the Vallejo street market, in San Francisco, in live baskets covered with a netting, which has a hole in the center closed by means of a puckering string. At the market the live shrimps are sold at 10 cents a pound, and those remaining unsold are carried back to the Chinese settlement and put at once into boiling brine.

METHODS OF PREPARING SHRIMP FOR EXPORT.—The kettle for boiling the shrimp is a rectangular iron tank, 6 feet long by 4 feet wide and 2 feet deep, with a fire-place underneath. After sufficient boiling, care being taken to prevent over cooking, the shrimps are taken out and spread to dry upon level plats of hard ground, which have been previously stripped of grass and rendered perfectly smooth. They are spread out and turned occasionally by means of a hoe-like broom. After four or five days' time or when perfectly dry, they are crushed under large wooden pestles, or trod upon by the Chinese in wooden shoes, for the purpose of loosening the meats from the outer chitinous covering; after which the entire mixture is put through a fanning mill, for the actual separation of the meats and shells. This fanning-mill, which is rather a crude affair, is constructed of wood by the Chinese, on precisely the same principle as the one used for winnowing grain. It measures about 8 feet long by 5 feet high, and consists of a square box, divided on the inside for the passage of the separated shells and meats, with a hopper above, and a large fan-wheel worked by a crank at one end.

WHERE SOLD; USES; SHIPPING.—The meats are partly used at home or at the various inland Chinese settlements, but are mostly shipped to China. The shells are also utilized as manure to some extent about San Francisco, but like the meats, are mostly sent to China, where they serve as a fertilizer for rice, the tea-plant, &c. In San Francisco they sell at about 25 cents per hundred weight. Both the meats and shells are shipped to China in sacks. The trade is entirely in the hands of Chinese merchants, who ship by way of Hong Kong. The meats are eaten by all classes in China, but are cheaper and less esteemed than the native shrimps, which are comparatively scarce.

Shrimp are said to be an excellent producer when used as food for fowls. For this purpose they are broken up, soaked, and mixed with a meal of wheat, oats, or corn. The shells are also sometimes fed to poultry.

VALUE OF THE SHRIMP SOLD FRESH IN SAN FRANCISCO.—The amount of shrimp sold in the San Francisco market during twelve months of 1879–'80, is estimated by Mr. Garibaldi of that city at about 200,000 pounds, which at the rate of 10 cents per pound at the Clay street market were valued at $20,000.

Many crabs, clams, &c., are also taken in the nets of the Chinese and sent to the Vallejo street market, San Francisco.

EXPORTATION.—It is impossible to give more than an approximate estimate of the value of the yearly export of shrimp and shrimp-shells from San Francisco, on account of the practice of lumping together the shrimp, abalones, other invertebrates and even some of the fish products in the cus-

tom-house records, under the heading of "Fish, other." The total value of the "Fish, other" exported from San Francisco to Hong Kong during the entire year 1880, was $229,858. The custom-house records give nothing more definite on the subject, but Mr. Lockington, who investigated this fishery, by reference to the manifests of the vessels in which the shrimp were shipped to China, Japan, and the Sandwich Islands, estimates that the exports for 1880 could not have fallen below $100,000 in value, and probably exceeded that amount. At this valuation the weight of the shrimp exported, including both the meats and shells, must have exceeded 1,000,000 pounds.

DANGERS OF OVERFISHING.—There is little doubt but that the consumption of shrimp in and about San Francisco Bay exceeds their rate of increase, and that they must eventually and at no distant day become much less abundant than they are at present. This is to be regretted not only because of their great value as an article of food and profit to mankind directly, but also for the reason that they form a very important part of the food of fishes, the supply of which has already become very nearly exhausted in the Bay of San Francisco. It seems imperative that some restrictions should be placed at once upon the catching of shrimp in the vicinity of San Francisco, if it is desired to keep up this important industry. At present there are no regulations concerning it, and shrimp catching is carried on continuously throughout the year, without a single interval for the peaceful spawning of the old and the maturing of the young.

5. THE PRAWN FISHERY.

VARIETIES OF PRAWNS.—Two species of prawns are now brought to the San Francisco market. One of these, *Pandalus Danæ*, averages about 7 inches in length, is variegated in color, and very abundant; the other, which is still undetermined as to its name, is smaller, less abundant, and plainly colored.

LOCATION OF THE FISHERY.—The two species are found and caught together, principally in moderately deep water off San Francisco Bay, between Point Reyes and the Farallone Islands. During the past two years prawns have been much more commonly seen in the San Francisco markets than formerly, the reason being that the fishermen driven out of the bay by the great decrease in the fish supply, once so abundant there, have been forced to resort to the deeper fisheries of the open ocean, where prawns abound. Another species of crustacean quite different from *Pandalus*, though resembling it somewhat in shape, the *Penæus brasiliensis* (?), occasionally visits the bay of San Francisco, and is taken and sold in the markets as a prawn. It is considerably larger than *Pandalus Danæ* and commands a higher price. In 1879 it was caught from time to time in the bay, but we have no notice of its occurrence there in 1880.

AMOUNT OF SALES IN 1879.—The sales of prawns in the San Francisco markets in 1879 were estimated to amount to about 20,000 pounds, valued at about $4,000.

PREPARATION OF LARGE PRAWNS.—Some large prawns (the species not determined) are prepared in Chinatown, San Francisco, by removing the carapax and stringing them on two slender pieces of cane, which pass through the flesh, giving rise to a ladder-like structure; they sell at 30 cents a pound.*

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*The account of the shrimp and prawn fisheries of California was prepared from materials furnished by Mr. W. N. Lockington and Prof. D. S. Jordan.

(e) STATISTICS OF THE SHRIMP AND PRAWN FISHERIES OF THE UNITED STATES.

6. STATISTICAL RECAPITULATION FOR THE UNITED STATES.

Table showing the quantity and value of the shrimp and prawns taken and sold on the coasts of the United States in 1880.

State.	Quantity.	Value.
	Pounds.	
New York	1,750	$650
North Carolina	63,000	4,500
South Carolina	630,000	27,500
Georgia	56,000	4,000
Florida	71,750	3,500
Louisiana	534,000	16,020
Texas	637,500	19,125
California	1,220,000	124,000
Totals	3,214,000	209,295
Enhancement in value of shrimp by the process of canning in Louisiana and Texas	.....	17,640
Total value of the shrimp as they entered into consumption	.....	226,935