

The fishermen of British Columbia make their great catches in the summer and autumn during the migration to the spawning grounds, when millions of prime salmon, having completed their mysterious life at sea, head for the rivers.

To ensure the maintenance of the various races of salmon, the federal Department of Fisheries prescribes the type of equipment which may be used to catch them and, during the fishing seasons, enforces "closed times," during which no fishing at all is permitted and only natural obstacles are to be overcome. These "closed times" are usually 48 hours of each week, but can be longer if the departmental inspectors discover that the fish are not reaching the spawning grounds in sufficient numbers.

When they leave the ocean, the salmon are in magnificent condition — well fed and strong enough to tackle the swiftest water. Once they start for the spawning grounds they eat nothing more for the rest of their lives, but live on stored-up body fat during the long battle against the current, leaping through rapids and sometimes mounting them by means of fishways built where the waterfalls are too steep. At the end of the journey the reserve fat is nearly all used up, partly because of the rigours of the long swim from the ocean and partly in the formation of eggs and milt. Some of the muscle protein is gone and the silvery colouring has disappeared. By this time the upper jaw has developed a pronounced hook ("Oncorhynchus" means "hooked snout"). The pink salmon also develops a hump on its back. All take on different colour varying from brilliant red to muddy green and blackish hues.

In the streams which form the spawning beds each female deposits her eggs, numbering in the thousands, in a shallow basin scooped out of the river bed by snout and fin. The male, which guarded her during this period, then fertilizes the eggs and helps to cover them with gravel by means of gentle, fluttering motions. The parent fish then die. The time taken for the next generation to appear depends upon the temperature of the stream. The first thing to be seen is the eye of the fish, then, gradually, the backbone is formed. At this stage, until the yolk-sacs have been absorbed, the young salmon are known as "alevins." Until the yolk-sacs have disappeared, the fish become fry and are ready to start life on their own, foraging their own food which, throughout their lives, in the case of the pink, chum, and sockeye consists mostly of crustaceans and other forms of small marine life, found near the surface of the water. Spring and coho in later life become fish eaters.

#### Handicaps

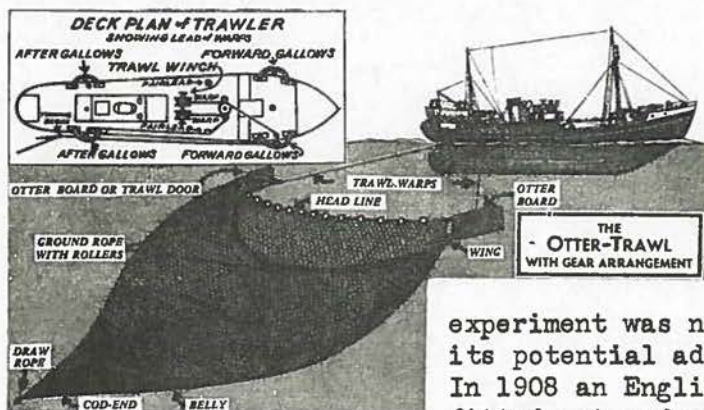
The eggs are laid in large numbers but, of course, not all of them become fully-grown salmon. Streams may dry up in some cases, causing the eggs to rot; in other localities sudden freshets may wash the fry to destruction. From the moment they leave the spawning beds, the young salmon are in danger from predatory birds and cannibalistic fish such as Dolly Varden and Cutthroat trout, squawfish and sculpins. On their way to the sea they may be sidetracked into irrigation ditches where they will perish, or meet doom at some power dam. Engineers give great consideration to the salmon when planning construction. There are probably enemies at sea and the mature salmon, on returning to their native streams, face danger from hair seals off the coast and, in the latter stages of their lives, from bears and eagles which find rich hunting in the mountain waters. Then, too, there is the big risk of being caught by net or hook.



Subject: OTTER-TRAWLING  
(Dragging)

## Origin

Otter-trawling is a method of fishing for groundfish used by some Canadian East Coast fishermen. The otter-trawl is a bag-shaped net which is dragged along the ocean floor by a powered vessel known as a trawler. This method of catching was



first adapted to Canadian fishing in 1899 when an East Coast vessel was fitted with an otter-trawl made in the Maritimes from specifications sent out from England. Although the first

experiment was not entirely successful its potential advantage was recognized. In 1908 an English steam trawler was fitted out and was the first vessel to

pursue this type of fishery in Canadian waters as a full-time job. The early vessels had many difficulties to overcome. The gear suffered severe damage when dragged over rough beds and the vessels were unsuitable for winter fishing.

Gradually most of the difficulties were eliminated as the captains became more familiar with the fishing areas and improvements were made to the gear. Larger and more powerful vessels proved to be the answer to the winter fishing problem.

Trawlers were also used for a time on the British Columbia coast during World War I but with the end of the war the demand for British Columbia flatfish and cod dropped to the point where trawling for groundfish in West Coast waters was no longer profitable. Some trawling is still being done but the boats are not as large as those used on the Atlantic Coast, and the operation is on a smaller scale.

Important changes have taken place in the type of vessel used on the East Coast since the beginning of World War II. Small and medium sized draggers were introduced during this period and their numbers have continued to increase.

## Description

The net is cone-shaped so as to form a trap at the apex which is called the "cod-end." It is kept open in the water by iron-shod wooden doors or "otter-boards" attached to each side.



Wire ropes or "warps" from the boat to the otter-boards are used to tow the trawl astern of the vessel. The otter-boards have a kite-like action. As the net is pulled forward by the vessel the otter-boards open outward, thus keeping the mouth of the net wide enough to trap the fish. Floats are attached to the upper lip of the net to hold it open. Rollers are placed at the forward lower end to aid the net in avoiding obstructions as it is dragged along. At the cod-end of the net where the fish are caught, cow hides are attached to take up the considerable friction brought about by its contact with the ocean bed. Without this protection the net would wear through in a short time.

#### Method of Operation

As the trawl is pulled forward, the fish in its path are scooped up and massed in the closed end. Four-inch mesh openings allow the escape of smaller fish that may be taken. As the trawler does not move ahead at more than three knots per hour most of these younger fish have time to escape without injury. The length of time the net is in the water depends upon the skipper and his knowledge of the fishing area. When the skipper believes that the net contains a catch, the warp lines are hauled in by winches until the otter-boards are above the water and are alongside two "gallows" frames fitted to the side of the vessel, one forward and one aft. The trawl-net, now on the surface of the sea alongside the ship between the two gallows, is hauled aboard until only the cod-end, containing the catch, is in the water. The cod-end is then hauled aboard by winch and tackle; the draw-rope which keeps the cod-end closed during the fishing operation is opened, and the captured fish are spilled into pens on the deck to be sorted and cleaned for cold storage in the hold.

#### Vessels and Equipment

The trawler is usually about 135 feet in length and carries a crew of about 25 men. The engines produce up to 500 h.p. Another form of trawler, smaller in size, is being used with success on the Canadian Atlantic coast. These vessels are mainly converted wooden schooners. They are known as draggers and may be over 100 feet in length. The draggers require a crew of 18 or 20 men. Both the trawlers and draggers carry the latest in equipment including automatic depth-sounders, radar, radio direction-finders and radio-telephones. A smaller type of dragger developed for off-shore fishing in the Gloucester County area of New Brunswick is 59 feet long.



# FISHERIES FACT SHEETS

Subject: OYSTERS (PACIFIC)

## Distribution and Importance

Although three species of oysters are grown in British Columbia, by far the most important is the one first imported from Japan about 30 years ago and now known as the "Pacific" oyster (*Ostrea gigas*). It may be grown throughout the length of the coastline but the industry is located mainly in the Georgia Strait region, on both the Vancouver Island and mainland shores and among the Gulf Islands. Nearly all suitable oyster ground in this area is now taken and further expansion must take place to the north. At present the normal annual production is about 50,000 gallons valued at approximately \$200,000.

## Description

The Pacific or Japanese oyster is one of the larger cultured oysters and, if permitted, may grow to a length of one foot or more. The colour is variable but in the young the outer new shell may be red or purple and the older shell a mouse gray. The light mauve muscle scar on the inside of the shell is not as clearly outlined as in the eastern (Atlantic) oyster. There are deep radial grooves and the concentric rings are prominent with extensive fluting. The shape is very variable, depending on the type of ground on which it is grown and on the degree of crowding. The oyster itself may be distinguished from other North American edible oysters chiefly by means of the colour of the mantle edge, which is the curly fringe. This is most often black, although in some localities it may be a dark brown--but never as light as in the eastern oyster.

## Habitat

The Pacific oyster is a hardy animal and can withstand great extremes of temperature and of salinity. Its natural habitat is at the half-tide mark, although it is grown commercially between this point and the level of the lowest tides. Most Atlantic oysters, on the other hand, are grown on ground in shallow water below the level of the lowest tides. Oyster beds in British Columbia are found in sheltered locations where wide expanses of flats of firm mud, sand or gravel composition are exposed when the tide falls below the half-tide mark or lower. If the ground is not sheltered, wave action either moves or buries the oysters and if the ground is too soft they become partly buried, grow long and thin and are difficult to work. Oyster beds are frequently found at river mouths, partly because the right type of ground is found in estuaries. However, Pacific oysters may be successfully cultured far from the influence of rivers.

## Food

The Pacific variety, like all other oysters, is a "filter" feeder, which means that it obtains its food by sieving large quantities of water through its mesh-like gills on which are caught the microscopic particles of food which float in the sea. The particles (collectively called plankton) are microscopic plants and animals with their reproductive bodies and these, enmeshed in mucous, are transported along the gills to the mouth. The adult oyster is a stationary animal so its food must be brought to it by means of currents



which thus play an important part in the growth of oysters.

### Breeding

Since the Pacific oyster is a native of Japan, where water temperatures are somewhat higher than those in British Columbia, it does not breed regularly in its new home. This is one of the industry's most serious problems. Limited successful breeding does occur on occasion in one or two localities but it is not dependable; therefore, in order to maintain the supply, young oysters, called seed, must be imported annually from Japan. During the last war this source of seed was, of course, cut off and the industry is only now recovering from the curtailment of supplies during that period. Seed is transported from Japan by ship in wooden cases as deck cargo, each case containing about 10,000 seed oysters  $\frac{1}{4}$ " in diameter, which are attached to oyster shells. The seed cases are washed daily with salt water and this, along with the hardening process they were subjected to previously, permits them to survive the 10 to 14-day voyage across the Pacific in good condition. The average annual import of Japanese seed oysters into British Columbia is 5,000 cases (50,000,000 seed).

### Growth

Under favorable conditions the Pacific oyster grows rapidly and they have been known to reach a marketable size in less than two years. However, the normal age at which they reach this size (of 4 to 6 inches in length) is about three years in most grounds in the Georgia Strait area of British Columbia. Nearly all the annual growth is added from April to October. Pacific oysters are known to live to an age of at least 20 years.

### Enemies

So far the only enemies of the oyster in British Columbia are the sea stars and oyster drills. The sea stars do not present a serious problem for it is merely a matter of picking them up from the beds at low tide or destroying them with a sprinkle of lime or carbide. The oyster drills are more difficult to combat. The two species which do all the damage have both been accidentally imported with seed oysters, one from the Atlantic coast and one from Japan, the latter being the most destructive. Fortunately, they are restricted to only a few beds and now every shipment of imported seed is carefully inspected. Most damage is done to young oysters for the drills can quickly bore a small hole in the thin shell through which they are able to attack the oyster. So far the only solution is to remove the drill from the beds and this is a difficult matter when hundreds of acres are involved.

### Culture

Oyster ground in British Columbia, as part of foreshore lands, is held by the Crown in the right of the Province and is administered by the Provincial Department of Lands and Forests in conjunction with the Provincial Department of Fisheries and the Provincial Department of Health and Welfare. All oyster ground is leased for periods of 10 or 20 years and the leases have an average size of about 40 acres, although they range from less than one acre to several hundred.



The seed oysters arrive from Japan each year early in April. They are immediately spread on beds where they are allowed to grow for a year. At this time the clusters of oysters, now two inches or more in length, are broken apart. This is necessary since there may be a dozen or more young oysters attached to one "mother" shell and as they grow larger they become crowded and misshapen and separating at an early age prevents this. They may remain on the same bed or be moved to another one on which faster growth occurs. Later they are usually moved to a bed known to be a good fattening area. When they have reached a marketable size and are considered fat and in prime condition by the grower, they are harvested during the low-tide periods, either by hand or by rake and fork, and carried in baskets to nearby floats. At high tide the floats are poled or towed to the oyster house where the oysters are washed and shucked. (Shucking is the process in which oysters are removed from the shells.) Nearly all Pacific oysters are shucked before being marketed and very few go to the half-shell trade. After shucking they are packed in gallon cans for the restaurant trade, or in glass or cardboard containers for the retail trade. Sanitary regulations governing shucking and shucking houses are strictly enforced. The containers are sealed at the time of shucking and no further packing or repacking is permitted. Therefore, the consumer is assured of a perfectly sanitary product. The shucking house registration number is stamped on the container so it is of advantage to the grower to pack oysters only of the finest quality. Only oysters from registered beds and registered shucking houses are permitted to be marketed.

While oysters may be eaten at all times of the year, during the warm summer season when they are in the spawning, or post-spawning condition, the characteristic delectable oyster taste is missing and that is why the oyster season occurs during the colder months of the year, usually from October to April. So it may be seen that the old myth regarding the eating of oysters only in those months in which an "R" occurs in the spelling, was not far from the mark. However, good quality oysters, properly fresh-frozen during the winter and stored until summer, are able to fill in for the lack of fresh oysters during the off-season.

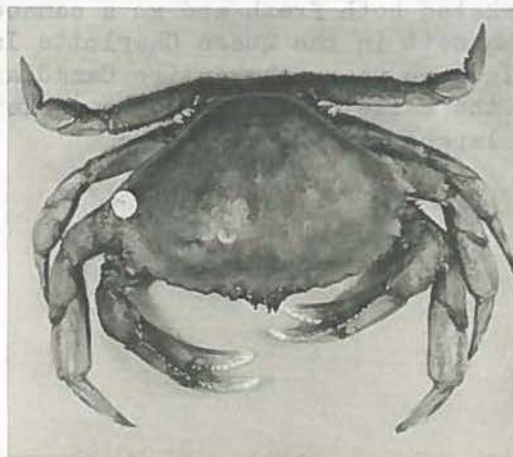


# FISHERIES FACT SHEETS

Subject: PACIFIC EDIBLE CRAB

## Importance and Distribution

The Pacific edible crab (Cancer magister) is one of the larger crustaceans found on the Pacific coast of North America, exceeded in size only by the giant crabs of Alaska and the Bering Sea. The distribution of the edible crab on the Pacific coast is from Unalaska to Monterey, California. It lives from the low tide mark to about 50 fathoms, but is not often fished in British Columbia waters below 20 fathoms. The crab fishery is one of the minor fisheries of British Columbia, having an annual total value of around \$300,000.



Tagged specimen, Pacific Edible Crab

The mature crabs usually mate during the summer months in the inshore waters. In the late fall or early winter, eggs are spawned by the female and retained on the lower surface of the abdomen. The number of eggs carried by a female crab is known to be over a million. The eggs are carried until hatching, after which the young crabs swim freely for about two months before settling to the bottom.

Growth is accomplished by frequent moulting of the juvenile crab. After the attainment of maturity (believed to be three to four years in southern British Columbia), moulting takes place annually or sometimes less frequently. The maximum size for males is about ten inches wide, measuring across the back between the tips of the longest spines. Females rarely exceed  $6\frac{1}{2}$  inches in width, which is the legal minimum size in British Columbia.

The edible crab is generally found on a firm sandy bottom. Specimens taken from a muddy habitat are small in size and quite discoloured. Its diet consists of clams, marine worms, and even small fish.

## Fishing Areas and Methods

The main crab fishing area of British Columbia is off the northern part of the Queen Charlotte Islands. Other areas of importance are found at Boundary Bay, at the mouth of the Fraser River,



in Prince Rupert Harbour, Burrard Inlet, and near Tofino on the west coast of Vancouver Island.

Traps are largely used in the capture of the edible crab. There are two types of traps in general use. A light, rectangular trap is employed in the more sheltered fishing areas where wind and wave action is reduced. On the exposed Queen Charlotte Island grounds, a heavy circular trap is used. In the area around the mouth of the Fraser River, a small trawl fishery for crabs is carried out.

The edible crab is marketed both fresh and as a canned product. Crab canneries are situated at Massett in the Queen Charlotte Islands, at Crescent Beach and at Tofino. In some years the entire Canadian canned crab pack has been processed at the Massett cannery. The marketing of fresh crab meat is important near the larger cities.

#### Tanned specimens, Pacific Edible Crab

Pacific Biological Station,  
Fisheries Research Board of Canada,  
Nanaimo, B.C.



# FISHERIES FACT SHEETS

**Subject:** THE PACIFIC HERRING  
(Clupea palasii)

The Pacific herring and Atlantic herring are very similar. They are small elongate fish with silvery sides shading into a



purplish-black colouring on the upper part of the body. The body is thin, that is, laterally compressed, and is covered with frail shiny scales except on the head. The mouth is rather small.

Herring taken in the British Columbia fishery are commonly 3.5 to 10 inches in length and 1.5 to 7 ounces in weight.

Herring are among the most plentiful of fishes. They belong to the family Clupeidae which also contains the pilchard and the shad, and which is represented in many waters throughout the world.

The British Columbia herring fishery is one of top-ranking commercial importance. The annual catch averaged over 180 thousand tons from 1949-1951, with an annual value of about ten million dollars. The main fishery takes place from September to March when the herring move in from offshore on their pre-spawning migration. It is carried out by fleets of purse seiners supported by tenders and packers. The schools are located by echo sounders which also show their position with respect to the ocean bottom. When a school is located, the seiner sets its seine around the school. The purse line is then pulled in, closing off the bottom of the net like the mouth of a purse, thus leaving the fish in a comparatively shallow "bag". The fish are then brailled by the seiner directly into the hold of a packer. Sets of three or four hundred tons are not uncommon, and larger sets up to 1,275 tons have been reported. Some trawling and gill netting for herring is also carried out for food and bait purposes but the number of fish thus taken is negligible.

The fishery is regulated on the basis of annual closing dates and by fixed quotas for well defined areas of the coast. Biological investigation has shown that the fish from these areas do not mix to any extent with fish from other areas and thus they are treated as separate populations.

(over)



The Pacific Herring (cont'd.)  
(Clupea palasii)

The majority of the fish taken are passed through reduction plants to produce fish meal for fertilizer and stock feed, and fish oil used in manufacturing processes. Some of the herring are frozen or sold fresh as bait. Some are "dry" salted and shipped to the Orient for human consumption but the market for this product has fallen off greatly during recent years. A small portion of the catch is sold fresh or canned for the local food market.

Life History

The Pacific herring spawns between February and April on various shallow beaches up and down the British Columbia coast. They spawn in large schools, often discolouring the water as far as the eye can see. Eggs and milt are emitted into the water, where fertilization takes place. The eggs are sticky, and when extruded by the female, adhere to the vegetation or bottom. Most of the spawn is deposited in the intertidal zone.

Hatching occurs in two to three weeks' time. Meanwhile many of the eggs are lost to predators (gulls and ducks) and to the action of the sea. A transparent threadlike young herring, called a larva, and about one-third of an inch long, hatches from the egg. This form is free-swimming but its feeble efforts leave it largely at the mercy of currents. During a period of about six weeks, it grows to a length of about one inch. It then changes into a truly fish-like form, schools up and grows rapidly for the rest of the summer. In September or October, when the young herring are about four inches long, they leave the inshore bays and inlets and migrate into open water. They return as mature adult fish in their third or fourth year, and spawn on the inshore beaches. They are then about 7.5 inches long and weigh 3.1 ounces. It is at this stage that they become subject to a heavy fishery. Thereafter the fish continue to grow and spawn annually. Fish up to 15 years old and 13 inches long have been taken in the fishery, but the greater part of the catch consists of herring two to five years old.

Feeding and Predation

At all stages of its life history the herring is a plankton feeder: that is, it feeds on freely swimming or floating animals and plants in the sea. Herring are in turn fed upon by most predacious fishes. They provide food for many economically important species, such as spring and coho salmon, steelhead, lingcod, halibut, and dogfish.



## Description and Distribution

The pike (Esox lucius) is also called jackfish, and in the United States great northern pike or pickerel.

Pike are soft-rayed fish with no adipose fin, and with one dorsal fin posterior to the typical position. Pike are quite long in proportion to depth and width, and are dark green, mottled with lighter spots. Their mouths bristle with sharp, pointed teeth. They are closely related to the maskinonge (Esox masquinongy), and the uninitiated often confuse the two.



Pike  
(Esox lucius)

Pike are found in lakes, ponds and quiet weedy streams throughout the northern United States and most of Canada, and their range extends across Alaska, Siberia and Europe as far west as

Ireland. In some parts of Canada they are eagerly sought by anglers, but in others they are considered less highly as a game fish.

## Life History

The adult fish spawn in the spring, generally after ascending streams tributary to their usual habitat. The eggs hatch in less than two weeks, and subsequent growth is rapid compared to most Canadian freshwater fish.

Pike are generally found in shallow water, and they tolerate higher temperatures, lower concentrations of oxygen and higher concentrations of carbon dioxide than many species of freshwater fish. They generally lie motionless and well camouflaged among the shallow water vegetation, waiting to pounce on anything which swims too close. Although they mostly eat fish, they also take any other animals which are small enough and which happen to swim within striking distance, such as frogs, mice, muskrats, ducks, etc. They are notorious for their ability to swallow fish almost as big as themselves.

(over)



### How Taken

Approximately six million pounds of pike are taken annually by commercial fishermen. Most of these are taken incidentally to other fishing operations, in gill nets, pound nets, fyke nets, and seines. Some are taken in fisheries conducted primarily for them, mainly through intercepting spawning runs with fyke nets, weirs or gill nets.

Millions of pounds of pike are taken annually for domestic use by nets, weirs, spears, angling, etc.

No. 48



Pike  
(*Esox lucius*)

### Life History

The adult fish spawns in the spring, generally after ascending streams tributary to their usual habitat. The eggs hatch in less than two weeks, and subsequent growth is rapid compared to most Canadian freshwater fish.

Pike are generally found in shallow water, and they tolerate higher temperatures, lower concentrations of oxygen and higher concentrations of carbon dioxide than many species of freshwater fish. They generally live in mottled areas and well camouflaged among the shallow water vegetation, waiting to pounce on anything which swims too close. Although they nearly eat fish, they also take any other animals which are small enough and which happen to swim within striking distance, such as frogs, snakes, muskrats, ducks, etc. They are notorious for their ability to swallow fish almost as big as themselves.

(over)



Subject: PIKE-PERCH  
OR PICKEREL

## Importance and Distribution

The fish known scientifically as Stizostedion vitreum is commonly included among the pickerels. It is actually a member of the perch family, or Percidae, and not a member of Esocidae, the family to which the pikes belong. Fisheries biologists say, the fish



should be known as the pike-perch, not as the pickerel. They use the hyphenated name partly because this one of the perches is somewhat pike-like and partly to distinguish the fish from the common yellow perch.

Pike-Perch or Pickerel  
(Stizostedion vitreum)

There are several species of Canadian freshwater fish, in addition to S. vitreum, which in

one locality or another are called pickerel — some of them properly so — and, adding something more to the possibilities of confusion, S. vitreum itself is quite often known popularly by such names as wall-eyed pike and yellow pickerel. Among French-speaking Canadians, the name doré is ordinarily used.

Other fish often marketed as pickerel include two species of pike which, by nature, never grow very large, and the term 'pickerel' is correctly applied to them since the fish are actually little pike. Sometimes small specimens of the common pike, are also referred to as pickerel. The name sand pickerel is occasionally, though incorrectly, applied to the sauger, a member of the perch group.

Among the Canadian provinces, Manitoba is much the largest producer of pike-perch, and usually has more than half of the country's annual catch to its credit. Ontario is a big producer, and landings of substantial size are made also in Saskatchewan and Alberta. Smaller quantities are taken in several other areas. Ontario fishermen also land large quantities of a fish generally known as the blue pickerel and known to the biologists as the blue pike-perch.

The pike-perch occurs also in the Northwest Territories, the Hudson Bay region, and Labrador. In the United States it ranges from Vermont westward to the upper Mississippi Valley and southward to Alabama and Georgia. In the United States, incidentally, the fish is known by a wide variety of popular names, not only as the wall-eyed pike, for instance, but also as the jack salmon, the blowfish,



okow, and green pike.

### Description

As for the pike-perch, its exterior colouration may be described as, in general, dark olive, with fine brassy mottlings forming indistinct oblique bars on the body. In maximum weight to about 20 pounds, though most specimens in the Canadian catch weigh from three to seven pounds. The pike-perch has white, firm, flaky flesh and is one of Canada's more important food fishes. Usually it frequents waters of moderate depth, and spawns in early spring, on hard or gravel bottom in shoal waters. From the very beginning of life it shows a voracious appetite, and even the youngsters are not above gobbling up their own little kin. Minnows and other kinds of small fish are staples in the pike-perch diet.

### Fishing Areas and the Fishery

Pike-perch will take the hook, both the baited hook and the fly, showing considerable fight and in various areas is of considerable importance as a sport fish. Canada's commercial catch, however, is landed mainly by gill-nets set from boats or, in some localities, by stationary pound-nets. In Manitoba and Saskatchewan most of the landings are made in winter when the nets are set under the ice.

Canada's pike-perch landings are marketed in the fresh and frozen forms, with some of the fish filleted. A large part of the annual catch is exported to the United States and the remainder sold on the domestic market.

February 1950.

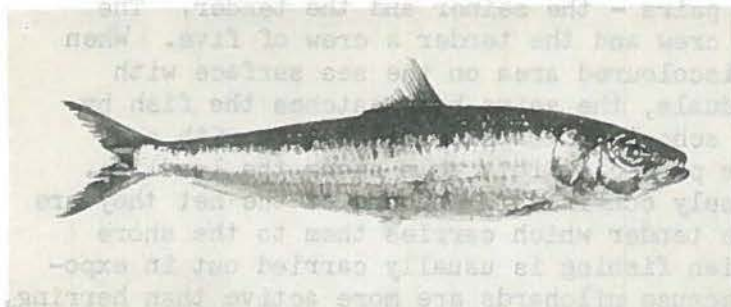


# FISHERIES FACT SHEETS

Subject:

PILCHARD

The Pacific pilchard is a moderate-sized fish of the herring family. It can be told from the herring by its rounded body form (it is nearly round in cross-section whereas a herring is considerably flattened), by



Pilchard  
(Sardinops caeruleus)

the dark spots on the back and sides, by the fine radiating ridges on the gill cover, and by the small flaps on the tail. Pilchards are dark steely blue above and silvery below, with a yellowish sheen around the head in fresh specimens. In general, the pilchards taken by the Canadian fishery are larger than herrings.

Nearly all pilchards taken in Canada are more than 9 inches long and individuals over 11 inches are not uncommon.

Closely related populations of pilchards supply great fisheries in other parts of the world such as Japan, Chile, Australia, South Africa and France.

Pilchards feed principally on the abundant small plants called diatoms which float freely in the sea and on small crustaceans called copepods. They strain these plants and animals from the water with their long and numerous gill rakers.

Pilchard eggs float freely, usually within 150 feet of the surface of the water. Spawning takes place over a considerable area but the principal spawning grounds are within 200 miles of shore between San Diego and Point Conception, California. There are, in addition, important inshore spawning grounds in the vicinity of Cedris Island off Lower California. Each female pilchard spawns one to several times during the spring months, producing around 50,000 eggs at each spawning. After hatching, the young fish swim or are carried by the currents toward the shores of southern and lower California, where they congregate.

Pilchards are highly migratory. Young pilchards make short migrations north each summer and south again in the autumn. Older ones make longer trips and the oldest and largest pilchards travel north to British Columbia in the summer and back to southern California in the autumn. The youngest pilchards to reach British Columbia waters in quantity are usually four or five years old. In some years, such as 1936 and 1940-42, when small fish have been abundant in Canadian waters, there have been significant deviations from the simple pattern of migration as outlined.

(over)



Purse seines are used for taking pilchards in Canada. The nets used for pilchards are more than 1200 feet long and more than 120 feet deep. One edge is supported by corks and other kinds of floats, and the other edge is weighted with a heavy headline. Customarily, 60- to 85-foot vessels fish in pairs - the seiner and the tender. The seiner carries a seven-man crew and the tender a crew of five. When a school is sighted as a discoloured area on the sea surface with occasional flipping individuals, the seine boat catches the fish by running the net around the school and closing its bottom with a cable running through rings placed at intervals along the headline. When the pilchards are closely confined in one end of the net they are dipped into the hold of the tender which carries them to the shore plants. Because the Canadian fishing is usually carried out in exposed offshore waters, and because pilchards are more active than herring, individual catches are usually smaller than for herring and do not frequently exceed 100 tons. The fishing is carried out in summer with its peak in August.

In California the fishing is done quite differently. Boats fish their purse seines singly at night, detecting the presence of schools of fish by the phosphorescent glow in the water. As the light produced is too weak to be seen in moonlight, the fishing comes to a stop when the moon is full. The California fishery is extensive, producing more than ten times as much as the Canadian one.

Most of the Canadian pilchard catch is reduced to oil and meal by a process of cooking and pressing the fish to separate the solid from the liquid parts. The solid part is dried to make fish meal while the liquid part is centrifuged or allowed to settle in order to separate the oil. About five per cent of the catch is canned. Formerly half flat or pound tall cans with salt only added were used exclusively, but in recent years oval cans with tomato sauce added have become more popular.

The size of the pilchard fishery has varied excessively. Between 1927 and 1947 it three times exceeded 80,000 tons and three times it was less than 5,000 tons. Since 1947 landings have dwindled to nothing. This variability has had two sources. The first is the changes in the migration pattern of the fish, which in such years as 1933 and 1939 kept the fish beyond the effective range of the Canadian fleet. This type of change is not at present predictable. The other source of variability in catch is the changing success of pilchards in reproduction. In some years many young survive to catchable size; in others, few. Five years after a succession of poor years the Canadian fishery suffers. The recent decline in Canadian landings resulted from a failure of the pilchards to have really successful spawning since 1939. Few or none of the relatively small numbers of fish which were produced in later years survived to be old enough to make the migration to Canadian fishery grounds. It now appears that the Canadian pilchard fleet will not have satisfactory fishing until there has been one spawning or a sequence of spawnings successful enough to survive the intense California fishery in substantial numbers.



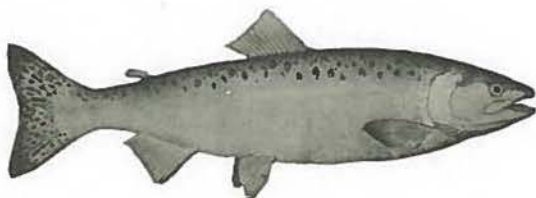
# FISHERIES FACT SHEETS

Subject: PINK SALMON

## Importance and Distribution

The pink salmon, under the scientific name Oncorhynchus gorbuscha, makes up an important part of the annual British Columbia pack. It is common along the whole B.C. coast, being found from northern California to northwestern Alaska.

## Description



Pink Salmon  
(Oncorhynchus gorbuscha)

The smallest of the Pacific salmon (other species are sockeye, chum, coho and spring), the pink is similar to all in shape, with an elongate body, and a conical head. The teeth are small and weak, and the scales also are small. It has a metallic blue back and silvery sides, and is covered with black blotches.

The sides of the male fish, at maturity, become red, sometimes with a yellowish tinge, and the blotches are obscure. The sides of the mature female turn olive green, and are marked with dusky stripes. The flesh is pink, paler in the males with advancing maturity than in the females. The young have no parr marks. The length of the pink is usually about two feet, and the weight runs from three to five pounds, occasionally going as high as 10. A peculiarity of the pink salmon is that when it is on the way to spawn in the stream in which it was born, it develops a large hump on its back. Because of this it used to be known as the humpback salmon. It lives on crustaceans. The food value of the pink is high. Of the five species, it is first in protein content and fourth in fat content.

## Migration and Reproduction

Its life cycle is similar to that of all Pacific salmon, which is dealt with in another fact sheet. The young pink goes to sea from fresh water as fry and matures in two years, returning to spawn from late September to early November. In most cases there is a large spawning run of a particular population in one year and a small one in the next. Occasionally, however, the runs of successive years are of about the same size, and in a few localities there are no runs in the second year. This means that there is only one population in each of those areas. Massett Inlet and Naden Harbour, both in British Columbia, are examples. Annual runs of equal size indicate two populations in the same region. In the southern part of B.C. the large runs are in the odd years while in the north they are in the even years. As is the case with all species of



salmon, the ocean movements of the pink are unknown, but those returning to the Fraser River pass through both Johnstone Strait and the Strait of Juan de Fuca. It usually remains near tidal water to spawn but occasionally travels long distances, for instance to the upper reaches of the Skeena River.

#### Methods of Catching

The pink salmon is taken in purse-seines and gill-nets and in the stationary traps permitted in the Strait of Juan de Fuca. In the waters around the most northerly Queen Charlotte Islands, it is occasionally taken on trolling gear.

#### Processing and Markets

Almost the entire catch is canned and is eagerly sought in many countries. Its biggest sale is in the United States.



# FISHERIES FACT SHEETS

Subject: PRIBILOF SEALS

## Countries Which Benefit

Under the Provisional Fur Seal Agreement of 1942, Canada and the United States are the only countries sharing in the fur seal catch of the Pribilof Islands which lie near Alaska and north of the Aleutian Islands. Canada's share is 20 per cent and the United States share is 80 per cent of the skins taken. The net value of Canada's share comes to about \$500,000 annually after expenses of treating the skins, transportation and selling commissions have been deducted. The 1942 agreement replaced the (North Pacific) Pelagic Sealing Convention of 1911. There was another Exchange of Notes by Canada and the United States in December, 1947, and further Canadian legislation was enacted to prevent a lapse of the wartime agreement. It received Royal Assent in May, 1948.



Pribilof Seals  
(Callorhinus ursinus cynocephalus)

## Historical Background

A group of five islands north of the Aleutians are the breeding grounds for more than 3,800,000 Alaska fur seals known scientifically as Callorhinus ursinus cynocephalus. These islands, known as the Pribilofs, are named after the Russian navigator Gerassim Pribilof, who discovered them in 1786. Since that time, the fur seals have been killed in the millions because of their valuable pelts and have earned tens of millions of dollars for those countries which shared in the profits.

The Pribilofs remained Russian territory until they were sold with Alaska to the United States in 1867. At that time the size of the herd was estimated at from two to five million animals. The population had been brought up to that level through restrictive killing regulations put into effect by the Russian government in 1834, when the herd was in a seriously diminished state.

Although the Russian and American seal hunts were carried out on the Islands themselves, other countries which had no rights on the Islands were killing the seals while they were in the water, as they migrated to and from the Pribilofs. Known as pelagic sealing, this practice was both cruel and economically wasteful. For every five animals killed only one was recovered, the others being lost through sinking. In addition selective hunting such as that carried out on land, was impossible and mother seals were killed. Their pups starved to death on the "rookeries", since a mother fur seal will not nurse the pup of any other mother. Also, females on their way to the islands to bear young were being killed,



which meant the loss of two lives.

This wanton method of hunting was so ravaging the herd that steps were taken to establish international regulations prohibiting pelagic sealing. This agreement took place in 1911 when the herd had dropped to about 125,000 animals. The signatories were United States, Great Britain for Canada, Japan and Russia. Under this agreement all killing of seals was to be done on the Pribilof Islands by the United States, as owners of the Islands. Canada and Japan each received 15 per cent of the annual catch payable either in skins or cash. Although Canada had taken her share in cash up to 1933, after that date she often elected to take her share in skins.

In 1940 Japan gave notice that she would no longer participate in the convention. She alleged that the seal herd in migrating along the Japanese coast was devouring food fishes of the area in enormous quantities. However, investigations by the United States Government showed that the majority of the seals followed the Canadian-American coast line on their way to and from the waters off Southern California where they spend the winter. In addition, stomach analyses disclosed that negligible amounts of food fishes were found, the chief contents being squid, pollock, seal fish — a small deep-water variety — and other non-commercial species. Very few salmon were eaten.

#### Identification

The fur seals of the Pribilofs are not to be confused with the common hair seals which are widely distributed throughout the world. The difference is in the soft velvety underfur that characterizes the Alaska fur seal and accounts for its economic importance. The hair seal is not generally valuable for fur and has only a transient value as oil.

Alaska fur seals are mammals that live the greater part of their lives in water. Their colour varies with sex and age. The adult male is reddish-brown on the abdomen and limbs, darkening to almost black on the back. The shoulders and neck are greyish. The adult female is considerably lighter, grey above and russet beneath, the sides being brownish-grey. The young before the first moult are glossy black above, paling to a dark brownish-grey on the sides and abdomen, sometimes with a silvery sheen. After the first moult the colour is everywhere lighter. The pelage or coat "consists of an outer covering of long, flattened, moderately coarse hair, beneath which is a dense coat of long, fine silky fur, which reaches on most parts of the body nearly to the ends of the hairs". (Allen, 1880). They are quite similar in body structure to bears. They are adapted to aquatic life, having flippers instead of feet, but when on land they can travel rapidly over short distances.

The seals of the Pribilofs are a species distinct from any other fur seals. They comprise 80 per cent of the fur seals in the world. There are other species on the Commander Islands off Siberia and in the eastern part of the Sea of Okhotsk, both areas being under Russian jurisdiction. Some are also found on Lobos Islands, Uruguay; off the Cape of Good Hope, Africa, and in limited numbers in the colder area of the Antarctic circle.



Breeding Habits

The male seals, called bulls, are of considerable size and may weigh up to 700 pounds although 500 pounds is considered average. The females are much smaller, averaging 75 pounds and sometimes reaching a weight of 100 pounds. The bulls arrive at the breeding grounds which are called "rookeries", early in April or May. Here they fight for their favourite places along the shore. Early in June the females arrive and within a few days each gives birth to one pup. Mating takes place within a short time and another pup will be born approximately one year later. The females are sought after by the bulls and set up in harems which may

Females and pups

contain as many as 40 females. Once the female enters the harem she is not permitted to leave. To ensure this the bull maintains a day and night vigil all summer. By the end of the season the bull has lost considerable weight as he does not eat during the period. As only females and pups are allowed in the harems by the bulls, young males who have not yet attained maturity or a harem are segregated from the rest and band together away from the families. They are the only ones killed by the sealers although a sufficient number of young males are left to provide replacements for the older bulls. As a natural advantage to the propagation of the herd the elimination of a certain number of these young bulls is desirable. They are very belligerent when they reach maturity at six years. If the breeding grounds were overcrowded with them many young pups would be crushed to death in the numerous and tremendous battles over established harems. Even though more than 60,000 of these males are killed annually the herd continues to increase considerably from year to year.



But not all predators are human and there is a heavy toll among the young pups when they venture into the stormy and treacherous waters at the age of four months. Killer whales would seem to be a principal predator. Two stranded whales on one of the islands were found to have 18 and 24 young seals respectively in their stomachs. Hookworm is also causing an increasing number of deaths among the newborn seals.

#### Method of Capture

When the seal hunting begins, trained Aleuts who live on the islands all year round do the hunting under the supervision of officials of the U.S. Fish and Wildlife Service.

Near the breeding rookeries on the Islands, are places called "hauling grounds", where the immature male seals, or "bachelors", as they are known, cluster together. This is an ideal arrangement for the hunters since the three-year-olds to be killed are separated from the others and driven inland a short distance. The three-year-old seals are chosen because the fur is in its best condition at that stage of the seal's growth. The seals are as easily driven as a flock of sheep.

Strangely enough after having been hunted by man for over 150 years the seals have no acquired fear of him and have never changed their breeding grounds in all that time.

#### Division of Catch

When all the skins have been placed in barrels ready for shipment, the barrels are numbered. Canada's share of the catch being one-fifth of the skins, every fifth barrel is allotted to Canada.

#### Processing Methods

The skins are cured in salt for at least 10 days, then individually rolled, with salt added and packed in barrels, 80 to 100 skins in each barrel.

Prior to 1913 all skins were shipped to London, England, which was the fur centre of the world. The firm of C.W. Martin handled them. However in recent years the Fouke Fur Company in St. Louis, Missouri, has been processing the skins. They are the only two fur companies in the world who undertake the highly specialized techniques required to impart the lustrous finish to the fur. The Martin Company plans to transfer its sealskin processing plant to Canada, where it will eventually take over the entire operation now done in London.

The process of preparing these skins involves more than 125 distinct operations. This work takes about 90 days. A dry heat treatment loosens the coarse outer hairs which can then be removed without damaging the fur. After the guard hair is extracted, the pelts are put through a chamois tanning process.

The fur of the seal is naturally curly and the dyeing permanently straightens the hair, giving it a silky lustrous gleam. The skin is then buffed to the required thickness and produces a pliable furred leather that can be styled as easily as fine cloth.



# FISHERIES FACT SHEETS

Subject:

Provincial Fisheries  
BRITISH COLUMBIA

## Value of the Fishery

The fisheries of British Columbia are of great cultural and economic importance. The history of the industry is interwoven with that of the province and the exploitation of the rich salmon and other marine resources has opened new fields for human skill and enterprise.

British Columbia lands about 600 million pounds of fish annually. The value of production has risen steadily in the post-war years to a point where it is now over \$80 million. When it is considered that the total annual Canadian commercial catch is about two billion pounds with a marketed value of nearly \$200 million, it can be seen that the commercial fisheries of British Columbia contribute significantly to the economic status of the industry. In fact, British Columbia leads the other provinces in the production value of fish and fish products.

## Salmon First in Importance

Salmon stand first in importance among the species caught off the British Columbia coast and are the chief factor in placing the province in top position. Five principal species of salmon are caught: sockeye, spring, coho, pink and chum. The marketed value of the catch has been increasing steadily and amounts to more than \$50 million. Most of the catch, which averages about 150 million pounds annually, is used for canning. British Columbia canned salmon is famous all over the world. The heaviest pack on record was in 1941 when 2,248,870 cases (48-pound cases) were produced by the canneries from the year's landings.

In 1951 the canned pack nearly reached this peak when 1,955,000 cases were produced. A good many of the fish are sent to the fresh and frozen markets, some are mild cured, and a few smoked or pickled. Waste from salmon processing operations is used to some extent in the manufacture of meal and oil and some livers go into the production of vitamin oil.

Except for the month of December, which is generally a closed season, some salmon fishing is in progress in British Columbia throughout the year. But it is in the summer and autumn months that operations are at their height and the fish are taken in huge quantities as they swarm into the mouths of rivers to begin their spawning runs.

One of the most important salmon nurseries in British Columbia is the Fraser River system. The Fraser is particularly noted for its great runs of sockeye salmon, which are protected by special conservation measures of the International Pacific Salmon Fisheries Commission. Since the sockeye runs pass through both Canadian and United States coastal waters in the Strait of Juan de Fuca as they approach the river mouth, these fish are shared by the fishermen of both countries and an international treaty provides for the operation of the Commission to prevent overfishing.

(over)

*Issued by Information Services, Department of Fisheries, Ottawa*



### Other Species

Great quantities of herring are taken annually in British Columbia waters. In fact, herring account for about fifty per cent of all British Columbia fish landings. The bulk of the catch is processed into meal and oil and the annual production value amounts to about \$10 million. Thus herring lead other fish in total weight of landings and stand second to salmon in monetary value. Third in importance are the halibut. British Columbia is close to one of the greatest halibut fishing grounds in the world. Some of the principal grounds are off the west coast of Vancouver Island, some off the Queen Charlotte Islands, some in Hecate Strait, in Dixon Entrance. Others, farther away but commercially accessible to British Columbia vessels, lie off Alaska. All told these various areas yield more than 60 per cent of the world's annual halibut catch. British Columbia fishermen share this rich fishery with United States vessels and an international commission regulates operations so that the grounds are not over-fished. Before the establishment of this commission under a treaty between Canada and the United States, the fishery was becoming depleted as a result of uncontrolled exploitation. Regulations of the commission have helped restore the stocks of halibut on the grounds to the point where large catches are again being made. Landings of halibut by British Columbia vessels total annually about 22 million pounds, with a marketed value of about \$5 million.

Also ranking high in importance in the province's fisheries are soles and tuna. Both have a production value of about \$1 million although there is considerable fluctuation each year. A small but efficient fleet of trawlers and draggers throughout the year lands steady supplies of soles and many other varieties of flat fishes as well as grey cod and rock cod. These species form the basis of a growing output of frozen fillets of fish. The fishery for albacore tuna of the North Pacific has attracted large scale development in the British Columbia fisheries in recent years. Tuna landings have increased from about one million pounds in 1945 to about two million pounds, largely as a result of special exploratory patrols sponsored by the federal Department of Fisheries to locate the fish for the fishermen. Much has yet to be learned of the yearly movements of this species and special attention has been given to it by scientists of the Fisheries Research Board. A new canning industry has been established on the basis of this fishery and several thousand cases of canned tuna are produced annually.

### Shellfish

Clams, crabs and oysters are British Columbia's most important shellfish, although shrimps and abalone are also marketed. All of Canada's commercial landings of shrimps are made on the Pacific Coast. British Columbia landings of oysters ordinarily go to the fresh fish market and most of the crabs are also sold fresh although some crab canning is done. British Columbia clams are marketed both in fresh and canned form.

### Meal and Oil Production

The meal and industrial oil production in British Columbia has expanded greatly in recent years with herring forming the chief source of raw material. The whale fishery, conducted by one whaling firm which lands some 300 whales each year, supplies a considerable amount of the raw material also.



British Columbia vitamin oils are made mainly from the livers of grayfish, sharks, halibut and lingcod, although ratfish, black cod, red cod, gray cod, skate and salmon livers are utilized in lesser volume.

#### Capital Investment

Equipment used by British Columbia commercial fishermen in catching and landing fish is valued at about \$31 million. Of this amount, \$25 million is accounted for by the vessels and boats and \$6 million by gear. Actually, however, it is estimated that the amount of capital invested in the province's fisheries, including shore establishments and processing equipment, is about \$100 million. Persons engaged in the fisheries total about 16,000, of whom 12,000 are employed in the primary operations and 4,000 in the plants.

The economic importance of the fisheries, however, is not based entirely on the earnings of those occupied in the fishing operations and on the direct production value. The operations of plants, canneries, vessels and boats require gasoline, oil and coal for power, lumber for wharfs, buildings, boxes and construction, paints, engines and machinery. These allied trades and industries are also affected by the fisheries.



# FISHERIES FACT SHEETS

Subject: Provincial Fisheries  
MANITOBA

## Importance of Fisheries

With the annual marketed value of its products ranging between five and eight million dollars, the commercial fishing industry of Manitoba does not rank high in the economy of the province. However, it gives employment to some 6,500 fishermen and probably as many more in subsidiary industries such as transportation, fish processing, fish marketing and fish box manufacture. Some 17 freighting vessels transport the catch to market and about 3,000 fishing boats and skiffs are used in the fishery. These craft represent an investment of some \$750,000. More than 100,000 gill-nets are used, valued at about \$2.5 million. All told the investment in equipment is about \$3.5 million.

Of the 100 million pounds of fish landed annually in the commercial freshwater fisheries of Canada, about two thirds of the total comes from Manitoba and Ontario. At one time about half Canada's freshwater catch came from Ontario with one quarter from Manitoba. In recent years Manitoba has forged ahead and on a few occasions caught more than Ontario. In 1951, Manitoba's total catch was about 35.5 million pounds, while Ontario landed about 31 million pounds. In 1952, however, Manitoba's catch declined to 31 million pounds while Ontario fishermen landed about 38 million pounds.

## Species

In the past 10 years the commercial fisheries of Manitoba have yielded an annual catch of about 30 million pounds. Lake Winnipeg, the seventh largest freshwater lake in North America, has provided almost half of Manitoba's annual catch. From Lake Winnipeg comes the famous Selkirk whitefish which are in great demand in the United States. The Winnipeg goldeye, which made its first appearance from Lake Winnipeg catches, is Manitoba's most famous fish but landings have declined over the years and its contribution to the total is small. The greater part of the goldeye catch now comes from Lake Winnipegosis.

In poundage, the greater part of the catch is pickerel, followed by whitefish, saugers, pike and tullibee. Other species, in addition to goldeye,

(over)



## Manitoba (Cont'd)

are bass (sheepshead) bullheads, carp, catfish, perch, suckers and lake trout.

The areas producing the catch include sixty or more lakes, some of which are quite small. The principal production is from Lake Winnipeg, Lake Manitoba, Lake Winnipegosis, Lake St. Martin, Lake Dauphin, South Indian Lake, Gods Lake, Island Lake and the Manitoba portion of Reindeer Lake.

Processing of fish for market has expanded and the demand for Manitoba fillets increased. New plants have been constructed and existing ones remodelled and improved.

Winnipeg is the centre of the freshwater fishing industry in Western Canada and handles, in addition to the Manitoba production, large quantities of fish produced in the neighbouring provinces.

### Methods of Fishing

The summer fishing operation produces somewhat less than half the total catch. The gear in general use is the gillnet and the fishermen operate motor-driven boats, usually about 32 feet long, and skiffs usually about 20 feet long. The boats go out daily and return before nightfall. In the winter the gillnets are set through holes cut in the ice and the fishermen establish camps on the ice right at the fishing grounds and usually stay out a week at a time under semi-Eskimo conditions. Part of the catch is frozen and packed at the camp site and part is hauled in heated cabooses to the packing station to be packed as fresh fish. Tractors and snow-mobiles haul it to railheads.

### Fishery Regulations

Under federal legislation the Manitoba Department of Mines and Natural Resources administers the fishing regulations. The regulations provide for conservation measures in the fishing areas and the number and sizes of boats permitted. All fish dealers are required to be licensed under the Fish Dealers Act of Manitoba. Special attention is being paid to quality products by officers of the Department of Fisheries of Canada. The federal Department introduced a system of inspection of all export shipments of whitefish from Canada, which came into full operation on May 16, 1951. Federal officers are stationed at points in the province as well as in other provinces and examine shipments of whitefish destined for U.S. markets. The Whitefish Export Inspection Regulations have been welcomed by the industry and now Departmental officers are being asked to inspect



Manitoba (Cont'd.)

shipments of other fish such as pike, pickerel, lake trout and tullibee. The Manitoba department, like Saskatchewan and Alberta, makes whitefish surveys on commercially fished lakes to determine the quality of the fish for market purposes. The data is gathered by provincial conservation officers in the field and an analysis service is provided by the federal Department of Fisheries in Winnipeg.

The concern over the quality of whitefish originating in Manitoba and other inland provinces led to the establishment of a scientific research station in Winnipeg in 1944. This station is operated by the Fisheries Research Board of Canada, the scientific arm of the federal Department of Fisheries, and while the whitefish investigation is still one of its chief responsibilities, it has become concerned with all research problems of the area. One of the more important of these is a programme of studies to determine general principles regarding the best methods to manage lakes so that they will produce the maximum fish crop perpetually. Studies have been conducted on Lake Winnipeg, as well as on Great Slave Lake in the Northwest Territories, to collect data on catch per unit of effort and the size of fish caught. Efficiency of fishing gear is also tested.



# FISHERIES FACT SHEETS

Subject:

Provincial Fisheries  
NEW BRUNSWICK

## Value of Fishery

Commercial fishing operations in New Brunswick are concentrated chiefly along the eastern coast-line and the shores of the southwest corner of the province. The catch of all fish including shellfish fluctuates from year to year but may be said to average about two billion pounds annually. The marketed value usually amounts to between \$17 million and \$20 million yearly.

Sardines and lobsters are the most important species, from the point of view of monetary returns. Sardines contribute anywhere from \$4 to \$7 million to the annual production total while lobsters account for from \$3 million to \$5 million. Herring are third in importance, contributing about \$2 million and the cod and smelt fisheries each account for more than \$1 million.

Virtually all the sardines taken on the Atlantic coast are caught in south-western New Brunswick. Here the largest sardine canning factory in the British Commonwealth is among those operated. The fish, young herring, arrive in great numbers off the New Brunswick shores along the Bay of Fundy every spring and some 400,000 barrels are landed, taken by weirs and seines. Half of the catch is canned --- some 800,000 cases annually --- while some 200,000 barrels are sold fresh.

The main sources of lobsters in New Brunswick are the waters along the north-eastern shores, including those of the Northumberland Strait. Lobsters are also taken around Grand Manan and other areas of the Bay of Fundy. Between seven and nine million pounds of these crustaceans are taken annually, the bulk of which is marketed in the shell and as fresh chilled lobster meat. At one time the greater portion of the catch was canned but this situation is now reversed because of the high demand for the "live" product. About 14,000 cases of canned lobster are produced annually.

## The Herring Fishery

The herring fishery which is conducted along the same lines as the sardine fishery utilizes the more mature herring which swarm into the coastal areas in the spring to spawn. Herring are marketed in many forms, including fresh, frozen, kippered, vinegar-cured, pickled, smoked, salted and canned in the round and as kippered snacks, as well as being sold as bait and fertilizer. The scales also have a value, being used in the manufacture of pearl essence. Between 50 million and 60 million pounds of herring are caught annually.



Although smelts are caught by fishermen of all Atlantic provinces, by far the greater catch is in New Brunswick where the smelt fishery is at its height in the winter months when the fish come into the rivers from the sea and are caught in the tidal rivers, mainly in bag nets through ice-fishing. The smelt catch usually totals from 4 million to 5 million pounds, and is marketed fresh or frozen.

New Brunswick also has the most important clam fishery of the Maritime Provinces, soft shelled clams being taken in great quantities and sold in the shell, shucked and canned to the tune of about \$400,000 annually.

Groundfish such as cod, haddock, hake, cusk and pollock; flatfish such as halibut, flounders and Canadian plaice are taken both on the off-shore and inshore grounds. The off-shore fleet has been developed in the post war years as a result of subsidies made available by the federal government to encourage construction of small trawlers. As a result, the catching efficiency of the groundfish fishery has been considerably improved through the addition of a number of these draggers of approved design. The dragger fleet operates chiefly from the ports on the Caraquet Coast of New Brunswick.

### Alewives

The catch of alewives in this province has now reached 15 million pounds with a market value of about \$500,000. This fishery has greatly expanded in the last ten years due to a strong demand for pickled fish during the second world war and also because of a steadily increasing demand in the late years for the vinegar-cured product. In the past, St. John's Harbour was the outstanding production centre within the province. A greater demand for pickled and vinegar-cured products has greatly stimulated the alewife fishery in Kent and Northumberland rivers.

Salmon is a great resource of the province of New Brunswick waters. Salmon angling is extensively practiced especially in the Miramichi River where the angling catch exceeds 200,000 lbs. a year. The commercial catch is about 1 million pounds with a market value fluctuating from \$400,000 to \$500,000.

The oyster crop is abundant in the north-eastern area and reaches 30,000 barrels yearly with a market value of \$250,000.

Mackerel, shad, sturgeon, tom cod, bass and eels, bar clams, crabs, quahaugs, scallops and winkles, also are taken in the inshore sea fisheries. The inland freshwater fishery, which represents one per cent of the total production value, produces about half a million pounds of



alewives, bass, eels, perch, pickerel, salmon, shad, suckers, sturgeon and whitefish.

Number Employed

Capital equipment in the fisheries is valued at about \$6,500,000. The total number employed is 15,000. Of this figure, the primary operations engage 10,000 and the processing plants, 5,000.

Early in the 30's, co-operative associations were organized in New Brunswick and at that time an educational movement got under way among the farmers, fishermen and miners under auspices of the Extension Department of St. Francis Xavier University, Antigonish, N.S. Study groups were organized, followed by the establishment of local associations of fishermen to form credit unions, buying clubs and stores. The most important organization is the United Maritime Fishermen's Limited, a co-operative association of primary producer groups with 41 locals in New Brunswick.



# FISHERIES FACT SHEETS

Subject: Provincial Fisheries  
NOVA SCOTIA

## Value of Fishery

Nova Scotia has long held an important position in the history and development of Canada's fishing industry, having ready access to the rich fishing banks which stretch from Cape Cod to the Grand Bank of Newfoundland.

Landing more than 400 million pounds of fish annually, Nova Scotia leads the other mainland Maritime provinces in the volume of production and marketed value of fish products. The value of the production of the fisheries for Nova Scotia has increased steadily since 1939 and now stands at some \$36 million.

About half the Nova Scotia catch is comprised of the famous codfish, great quantities of which are taken in the deep-sea fishery. This fish is marketed in as many as 20 different forms including products for industrial and medicinal use and contributes some \$13 million to the total fisheries production figure. Although traditionally cod has been marketed in the cured and salted form and has been very important in the development of Canada's foreign trade, recent years have seen an expansion in the production of fresh and frozen fillets. Haddock, another important groundfish taken in substantial quantities both by offshore and inshore fishermen, also plays a significant part in the fresh and frozen trade.

Lobsters rank second to cod in production value in the Nova Scotia industry and contribute some \$6.5 million yearly to the provincial income. More lobsters are taken by Nova Scotia fishermen than by any other Maritime province. Of the catch which annually totals more than 18 million pounds, a large portion is marketed alive in response to the great demand for this sea delicacy. At one time the greatest proportion of the catch was canned.

## Other Species

In addition to cod and haddock, the deep-sea fisheries off Nova Scotia produce related groundfish species such as hake, cusk and pollock which are chiefly marketed as canned chicken haddie; the flatfish types such as halibut, winter flounder, Canadian plaice, yellowtail, witch, skates and



others; ocean perch or rosefish.

The inshore fishery of Nova Scotia is widely dispersed along the coast. With the exception of ocean perch, all species taken by the off-shore fishermen are also taken on the inshore grounds. In addition, herring, mackerel, tuna, salmon swordfish, oysters, clams and scallops are taken. The inland rivers and lakes yield salmon, alewives, shad, smelts, trout, bass, perch, and quahaugs.

Fishing activities are limited by weather conditions and regulations for closed seasons. The length of the deep-sea fishing is governed by climatic conditions, the nature of the runs and the customary lay-up of two weeks at Christmas and six or seven weeks in the summer when the vessels are overhauled. The coastal fisheries are carried on from April to November, or to January in sheltered districts. Some of the large vessels work all winter.

Capital equipment in the province's fishing industry is valued at approximately \$16,000,000, the vessels and boats accounting for 60 per cent and nets, traps and other gear, including premises, for 40 per cent. About 20,000 persons are employed in the fisheries. The primary operations engage some 15,000 men and the processing establishments 5,000. About one third of the men in the primary operations take seasonal or shore employment during the customary lay-off period but regard themselves as full-time fishermen. The larger proportion are engaged in fishing operations for not more than six months of the year and are part-time farmers.

### Co-operative Associations

Early in the 30's, co-operative associations were organized in Nova Scotia and at that time an educational movement got under way among the farmers, fishermen and miners under auspices of the Extension Department of St. Francis Xavier University, Antigonish, N.S. Study groups were organized, followed by the establishment of local associations of fishermen to form credit unions, buying clubs and stores. The most important organization is the United Maritime Fishermen's Limited, a co-operative association of primary producer groups with 80 locals in Nova Scotia.

Much progress has been made in methods of catching, processing and the distribution of fish, compared to early days. At the turn of the century a fast-sailing schooner was developed in Nova Scotia for bank fishing. An outstanding vessel of this type was the famed "Bluenose" of the Lunenburg fleet. Today this type of schooner is in most cases equipped with diesel or gasoline engines, and sails are only auxiliary. Many of the larger fishing vessels now have radio direction finders, ship-to-shore telephones, and echo depth sounders for locating fish.



# FISHERIES FACT SHEETS

## Provincial Fisheries

**Subject:**

PRINCE EDWARD ISLAND

### Importance of Fisheries

The fisheries of Prince Edward Island occupy a secondary place in the economy of the island. Except in a limited number of communities the fishermen generally carry on their fishing operations on a part-time basis, farming being their major occupation. For example some fishermen migrate to Ship Wreck Point in Kings County to fish for lobsters in May and June. The houses in the village are for the most part temporary shacks. One farmer is reported to have migrated to Ship Wreck Point for the lobstering each season for the last 50 years.

The marketed value of all fishery products in Prince Edward Island is from \$3 million to \$4 million annually with the lobster fishery accounting for about \$2,000,000 of this figure. Cod are second in importance with hake, and smelts third and fourth. The catch of all fish including shellfish totals some 30 million pounds with a value to the fishermen of some \$2 million. Capital invested in the primary operations in catching and landing the fish amounts to about \$2 million while some 4,000 persons are employed in the fisheries, of which about 1,000 are engaged in the processing plants.

Landings of lobster total some 6,500,000 pounds, of which 2 million are marketed in the shell and 150,000 pounds are marketed as meat. The remainder is canned, producing some 21,000 cases. Prince County generally accounts for a large share of the landings, owing to the occurrence of both a summer and fall fishery within its boundaries.

In the other counties the May 1 to June 30 season only is allowed. As the open season for lobster lasts only two or three months in each zone, many turn to other fisheries in the off-season. The longest period of operations and the most diverse fishery probably is found in the eastern end of the island.

### Cod and Hake

The joint fishery of cod and hake usually yields a catch of 12 million pounds with a landed value of nearly \$300,000. More than 50 per cent of the catch is usually taken in Kings County with fishermen operating in small boats, some of which are motor-driven. A large portion of this catch is canned as "chicken haddie" while a considerable amount is produced as wet salted fish. Very little dried fish is produced on the island and the



marketing of cod in chilled, frozen or smoked forms is negligible. Marketed value of the products from this fishery amounts to more than \$500,000.

Smelt fishing is a characteristic of the fall and winter fishing on the island. The catch, which usually amounts to more than a million pounds, is marketed fresh and frozen. Value to the fishermen is about \$150,000.

Smelt fishing is a characteristic of the fall and winter fishing on the island. The catch, which usually amounts to more than a million pounds, marketed fresh and frozen. Value to the fishermen is about \$150,000.

Herring are fished, mainly for sale as bait. The catch annually totals some 6 million pounds. Some of the catch is marketed pickled, Scotch cured or otherwise and a few thousand cases of canned herring are produced.

#### Oyster Industry

Another important fishery in Prince Edward Island is the oyster industry. The bulk of the oyster production originates in Malpeque Bay and the total yield for the province amounts to some 15,000 barrels annually. Oysters are sold in the shell, canned and shucked and contribute some \$175,000 to the overall production figure. Oyster farming is encouraged by the federal Department of Fisheries and culture techniques have been developed at Ellerslie, P.E.I., where the Fisheries Research Board of Canada operates a sub-station for this particular research.

The mackerel fishery is also of importance, some 2 million pounds being landed annually by the inshore fishermen. Mackerel are marketed in the pickled and the canned forms while a sizable amount is also used for bait. Prince Edward Island is the main producer of Irish Moss in the Atlantic Provinces. Some 3 million pounds of this sea-weed are harvested annually, bringing about \$35,000 to the fishermen and adding \$75,000 to the provincial income. Haddock, halibut, flounders, alewives, tomcod, salmon, crabs, clams, quahaugs and scallops are also taken by the island's fishermen.



# FISHERIES FACT SHEETS

Subject:

Provincial Fisheries  
QUEBEC

## Location of Operations

Quebec's commercial sea fishing operations are conducted in the Gaspé Peninsula, the Magdalen Islands and along the north shore of the Gulf of St. Lawrence. The Gaspé Peninsula is well known for its dried fish of the "Gaspé Cure" type. The last few years, however, have witnessed a considerable development in the preparation of fresh and frozen fish products in this district. Although the people of the Gaspé Coast depend to a large extent on forestry and farming for their living, the fisheries are also a basic industry there.

On the Magdalen Islands and the north shore of the St. Lawrence, the fisheries provide the main source of livelihood for the population. Smoked herring (bloaters) salted and pickled products are among the most important products of the Magdalen Islands while the north shore produces both pickled and salted fish.

In addition to the sea fishery, there is a small inland commercial fishery. The main fishing, that for eel, is done in the St. Lawrence, in the vicinity of Ile d'Orleans and also at St. Paul de l'Ile aux Noix, in the Richelieu. Lake St. Pierre supplies fairly considerable quantities of sturgeon.

## Value of Fishery

Quebec lands about 100 million pounds of fish annually of which the sea fisheries account for 96 per cent. The catch brings about \$3 million to the fishermen and is marketed for about \$5 million. Cod has always accounted for more than 50 per cent of the landings, while mackerel, lobsters, herring, salmon and smelts are respectively important, each having a production value of more than \$200,000.

The number engaged in the industry totals between 9,000 and 10,000 persons, including about 1,500 in the fish processing plants. Capital equipment employed in landing the fish, including the vessels, boats, gear and premises, is valued at more than \$3 million.

The sea fishing operations are carried out both offshore and inshore. Offshore fishing is engaged in about 20 miles off the coast near Miscou Island in New Brunswick. The largest motor boats are of not more than 20 tons and generally carry four or five men. The boats return to their home port every twenty-four hours or at most every two days,



and operate mainly from ports from Cape Gaspe to Port Daniel. The inshore fishing is carried out in small motor boats of about 20 to 30 feet, carrying two or three men as a rule. The length of the fishing season depends on temperature and the condition of the water.

It is cut short by autumn storms and limited by ice fringing on the Quebec sea coast. Fishing generally begins about April 15 and ends about October 1. Inshore fishermen operate during the summer only and may fish from May to October. Between seasons, fishermen are employed primarily in logging operations, many finding employment with forestry co-operatives which exist in some fishing districts. They also repair boats and gear, build new boats and lobster traps.

Landings of cod average between 50 and 75 million pounds annually and the distribution of the catch among finished products has been closely adjusted to market demand. During the war, production of frozen fillets reached unprecedented heights. From 1942 to 1946 it ranged from five to 12 million pounds annually. In recent years this product has fallen off sharply and the salted or dried products have regained first place.

#### Catch of Herring

The catch of herring ranges between 25 to 30 million pounds, with a marketed value of more than \$400,000. Large quantities, about 5 million pounds annually, are used for bait. The more important marketed products are bloaters and pickled herring. The catch of mackerel totals from five to nine million pounds with a marketed value of more than \$500,000. Pickled mackerel is the principal marketed product, while a few thousand cases of canned mackerel are packed.

Some two million pounds of lobsters are caught annually, having a marketed value of some \$700,000. Fifty per cent of the marketed value is accounted for by the live lobster and chilled lobster meat sales while the other 50 per cent is attributable to canned lobster and tomalley.

Landings of Atlantic salmon total about one million pounds annually with a marketed value of about \$300,000. The bulk of the catch is disposed of as fresh or frozen dressed. The smelt fishery yields about one million pounds with a marketed value of about \$200,000. Hair-seal skins and oil are produced by the seal fishery and contribute some \$200,000 to the total production figure. Fish liver oils and fish meal are important by-products.

#### Administration

In contrast with the other sea-coast provinces, the Quebec government administers its sea fisheries. The



provincial authorities have fostered development through establishment of cold storages, artificial dryers, snow-houses and grading sheds. The snow-houses are built to keep snow for the preservation of fresh fish during the summer especially where communication and transportation are inadequate. Space in the grading sheds is available to fishermen for storage of their dried fish and both grading and packing are carried out in these premises.

The Quebec Department of Fisheries maintains and operates a technical school for fishermen in Grand River, Gaspé, which offers short instructional and training courses in the proper methods of fishing, processing and preserving fish. The Quebec authorities also grant financial aid to the Superior School of Fisheries, Sainte-Anne-de-la-Pocatière, which operates in conjunction with the Quebec School of Agriculture and is affiliated with Laval University.

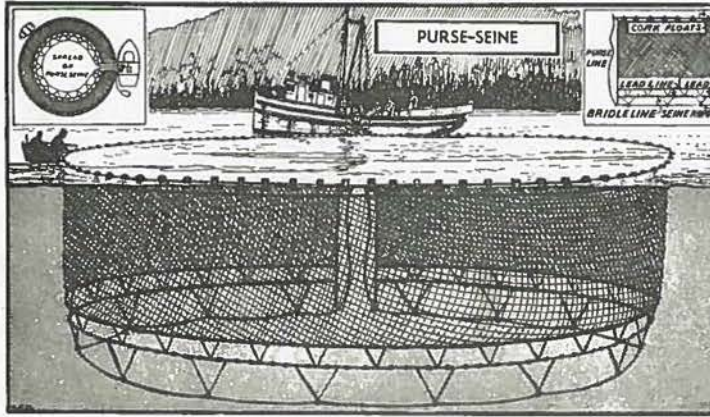
Occupational organizations exist among the processors and dealers. Examples are the Quebec and Northern New Brunswick Fish Producers and Exporters Association and the Montreal Fish Merchants Association. There are also the co-operatives such as the Quebec United Fishermen. The co-operative societies deal with the processing and sale of fish caught by their members. They handle about half the total catch taken in the province and also undertake the purchasing of motors for fishing boats and all fishing tackle for their members at favourable prices. There are 40 co-operative syndicates in the province.



# FISHERIES FACT SHEETS

## Subject: PURSE-SEINING

Purse-seining, as the name implies, involves the use of a net which can be "pursed up" to trap a school of fish. It is particularly suitable for capturing migratory species such as salmon and herring, and is used extensively in British Columbia coastal waters.



Sketch of a purse-seine in position in the water (netting and ropes enlarged for clarity). The purse-line at the bottom is hauled in by the boat's engine until the net is closed from below — thus preventing the escape of the fish.

The net, usually of cotton webbing, may be 1,200 feet long and 70 feet in depth. When put into position around a school of fish, it stands like a fence in the water, supported at the surface by floats of cork, glass or aluminum and held down by weights along the bottom. The pursing rope is strung through large metal rings spaced every 12 feet along

the bottom of the net. When the rope is tightened, the bottom is drawn together, forming a huge purse or bag.

### Method of Operation

When the boat sets out in search of fish, the net is stowed on a turntable at the stern of the boat. A small skiff is also piled on top of the net or towed astern. The seine is carefully arranged so that the floats are on one side and the weighted end is on the other. This prevents the net from becoming twisted as it is put out from the boat. The platform is power-operated and is controlled by a clutch. After a school is located the row-boat is launched with one end of the seine attached to it. The man in the boat rows a short distance from the seiner until a few fathoms of net have entered the water.

The seiner then moves in a circular direction to surround the school and the net is paid out from the table by the crew. The men are assisted by a mechanically-operated roller on the end of the turntable which helps to get the net over the end with a minimum of time and effort.

When all of the net is in the water and has taken up its vertical position both ends are brought together. The purse line around the bottom is drawn in gradually by the boat's engines until the bottom of the net is closed. The fish inside are now unable to escape. The seine is then hauled aboard until the fish are massed in a small area in the water. A dip-net or "brailer" scoops the fish from the big net and, by means of a power winch, transfers them to the hold of the vessel.



## Purse-seining (Cont'd.)

The bottom of the brailer opens by means of a drawstring to drop the fish into the hold. However, fish are sometimes loaded directly into a "packer" boat for transportation to a cannery. When the fish are taken aboard the seine-boat, valuable fishing time is lost during the run to the cannery and the return to the fishing grounds.



Brailing fish from seine to packer  
boat alongside purse-seiner

A salmon purse-seine can capture thousands of fish at one "set". As many as 1,200 tons of herring have been taken in one operation. Purse-seiners are among the largest vessels engaged in British Columbia's fisheries. They are stoutly-built diesel-engined craft from 60 to 80 feet in length. They carry crews of from six to eight men. The larger type of seiner will

carry about 130 tons of fish in its hold and has an engine of 240 h.p. These vessels are well-equipped with the latest mechanical devices for fishing and navigating, such as ship to shore telephones, radio, echo-depth sounders and automatic pilots, and have comfortable accommodation for the crews. Quite often through the use of the depth-sounding equipment a school of fish is trapped without a fish being sighted until the net is brought in.

This efficient catching equipment means quick profits for the crew members who work on a share basis. Most of the boats and gear are owned by the packers and are leased to the fishermen, but some are owned by the fishermen themselves. The equipment represents a considerable investment. A fully-equipped boat costs approximately \$90,000. A salmon net comes to between \$5,000 and \$7,000 while a herring net may cost up to \$15,000.

Fish predators, such as harbour seals and sharks, are often trapped in the nets along with the fish and cause extensive damage. Even one tear can mean the loss of hundreds of dollars worth of fish in addition to the cost of repairs. Much time, therefore, is spent between seasons strengthening and repairing the seines. Preservatives such as tar or tan bark are used to coat the webbing as a protection against corrosion and the attacks of marine organisms.



# FISHERIES FACT SHEETS

Subject: ROCKFISH

## Distribution and Importance

There are approximately twenty-two species of fish in British Columbia waters belonging to the genus Sebastes which collectively are called "rockfish". The fishermen give them a variety of common names, some of which are rock-cod, snappers, canaries, black bass, rock salmon, and Pacific Ocean perch. Their nearest relative in the Atlantic is the rose-fish. The rockfish species of the Pacific coast appear to be very abundant off the British Columbia coast. However, because of unfavourable market conditions there has been little development of the fishery by Canada.



Almost all of the annual catch by Washington vessels, which exceeds ten million pounds, is made off the British Columbia coast, particularly in the vicinity of Queen Charlotte Sound, off the northern end of Vancouver Island.

## Description

The rockfish as a group are distinguished by their stout, heavily constructed bodies. Large broad heads, usually bearing spines and strong ridges, and heavily-spined fins are notable features. The colour patterns vary greatly among species and range from black and drab green through to brilliant orange and crimson. The colour of some species is made even more bizarre by the presence of wide red or black stripes.

## Habit

As a rule the rockfishes are found in the vicinity of reefs and rough bottom. A few species, such as the copper-finned rockfish and the orange-spotted rockfish occur among the kelp patches in shallow

(over)



## Rockfish (cont'd.)

water from the intertidal zone to depths of twenty fathoms. These two species are usually termed "rock-cod" by the fishermen. Other more brightly coloured species, usually termed "red-cod", such as the red snapper, orange rockfish, and "Spanish flag" occur at depths from thirty to over one hundred fathoms. The majority of the species are inhabitants of deep water off the open coast.

Most, if not all, of the species bear their young alive in prodigious numbers. These young fish are not much more than a quarter of an inch in length when born. During the summer months large schools of fingerling rockfish are encountered in the inlets and bays bordering on the open coast. These small fish must also be very abundant in offshore waters for they are frequently found in the stomachs of the albacore tuna.

The food of the rockfishes consists of herring, sand lance and other small fish, crabs, shrimps and euphausiids.

### Age and Growth

The study of the annulations on scales has revealed that the rockfishes as a group are much slower growing than other groundfish species. It would appear that they do not reach commercial size until they are eight to ten years of age. Some specimens as old as twenty five years have been recorded.

### Fishing Methods

High opening trawls of light web have proved to be the most effective means of capturing rockfish, since these fish do not congregate so close to the bottom as other groundfish species. Small quantities are caught incidentally in the hand-line fishery for lingcod and the long-line fishery for halibut and blackcod.

### Handling

Rockfish caught by trawlers are landed in the round while those caught by line vessels are landed dressed with heads off. Most of the catch is filleted and packaged for freezing. A limited amount goes to the fresh fish market and to the "Fish and Chips" trade.



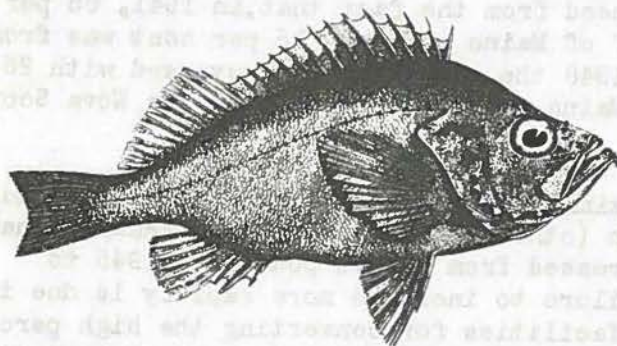
# FISHERIES FACT SHEETS

Subject: ROSEFISH

## Distribution and Importance

The Rosefish, Sebastes marinus., more often referred to along the Eastern Canadian coast by another common name, Redfish, is also called the Ocean Perch, Red Perch, Red Bream or Norway Haddock.

The rosefish is usually found in deep water and, although it is occasionally taken in shallow water, most of the catch comes from waters 80 to 110 fathoms in depth. Off the North American coast the rosefish occurs as far south as New Jersey, but is most abundant



Rosefish

in the Gulf of Maine and off Nova Scotia. Exploratory fishing carried out by the Fisheries Research Board of Canada from the Grand Banks of Newfoundland to the northern extremity of Labrador indicates further and yet untapped stocks of rosefish in depths increasing to the northward. The rosefish is found in the deep waters around Greenland, Iceland and Spitzbergen. It is found also in European waters where, as the commercial Red Fish

or Norway Haddock, it is a much larger variety than the Western Atlantic rosefish, growing to a length of three feet. A Danish scientist has found that in the North Atlantic, young rosefish of the European variety can be found in 100 to 270 fathoms distributed over immense stretches of the ocean and in quantities which would indicate that the rosefish is present in the ocean in far greater quantities than hitherto known.

The rosefish had little commercial value in Canada and the United States before 1935. Taken incidentally by trawlers while fishing for cod and haddock they were usually returned to the sea except when, through scarcity of other fish, small amounts could be sold. However, the fish were not well known to the consumer. In 1935 technological advances in handling fish, particularly filleting, quick freezing and the perfection of an automatic scaling machine, stimulated filleting trials in the United States. The fillets, packaged in cellophane and quick frozen, were shipped to mid-western



United States where the attractive new product offered as "Ocean Perch" was quickly accepted. Its mild flavour, similar to freshwater species, and its relatively low price made it increasingly popular. At the same time, conversion from line trawl with baited hooks to the more efficient fishing method, otter trawling, where an open-mouthed bag is towed over the ocean floor, and the subsequent increased use of the latter, made the catching of great quantities of such small-mouth fish as rosefish a possibility. At first the growing trawler fleet concentrated on haddock but was soon forced to become interested in other kinds of fish. With rosefish available in abundance, and a growing demand for the frozen fillets, landings by American trawlers based at New England ports skyrocketed from around 7,000,000 pounds in 1935 to a peak of 238,000,000 pounds in 1948. Landings have exceeded those of cod and haddock for the past several years surpassing cod first in 1940 and haddock in 1942.

The increased exploitation of the rosefish stocks on Nova Scotian banks by American trawlers has been responsible for the increased New England landings as evidenced from the fact that, in 1941, 85 per cent of the catch was from the Gulf of Maine and only 15 per cent was from the Nova Scotian Banks, while in 1948 the situation was reversed with 25 per cent coming from the Gulf of Maine and 75 per cent from the Nova Scotian Banks.

In spite of the proximity of the best-known fishing grounds for rosefish, landings by Canadian (other than Newfoundland) trawlers have been very small, but have increased from 25,000 pounds in 1945 to 1,300,000 pounds in 1948. Failure to increase more rapidly is due in part to the lack of Canadian facilities for converting the high percentage of wastage from the filleting operation into high-vitamin-content oil and meal. Landings by Newfoundland draggers and trawlers have been high with as much as 7,000,000 pounds being taken out of Hermitage Bay on the south coast by a fleet of small draggers between August, 1947, and the end of 1948.

#### Description

The rosefish is like the fresh-water perch in general appearance but is actually related to the salt-water sculpins by the fact that the cheek has a characteristic bony appearance. Furthermore, the cheeks are spiny. The top of the head is concave while the mouth is large and opens to below the large black eyes which contrast vividly with the orange to flame-red colour of the body. The lower jaw projects and has a bony knob at its tip fitting into a corresponding notch on the upper. The back fin has a spiny and soft portion combined into a single long fin. The rosefish of Canadian and New England waters are up to 17½ inches in length, the average being about 13 inches. Those less than eight inches are considered too small for commercial use. Fish from the coastal areas are generally much smaller than those from the offshore and deeper waters. One of the largest rosefish recorded in recent years was 22 inches long and weighed 5 pounds, 11 ounces.



### Habits and Movements

Relatively cold water is preferred by the rosefish although it is not truly an Arctic fish. In North American waters the temperature preference of the rosefish appears to range from 35 to 50° Fahrenheit in winter and summer. Even when it is found in Arctic areas it is in deeper waters that are 35° Fahrenheit or warmer. Not much is known of the movements of rosefish other than seasonal offshore and onshore migrations within the range of their temperature preference.

Otter trawling has shown that the fish are on bottom in the daytime and rise from it at night. Fishing is therefore carried on only during daylight hours. The development of practical trawling in mid-water might be expected to increase the catch.

Differences in size composition of rosefish from different areas and variations in the numbers of fish with parasites argue against rapid and extensive migrations and mixing of rosefish populations.

### Reproduction and Growth

The rosefish, unlike our other common commercial fishes, bears live young, the eggs being fertilized, developed and hatched within the female. The young are retained within the female until most of the yolk of the egg is used up and they have reached one-quarter inch in length. The female rosefish produces between 25,000 and 40,000 young each year. This is a very small brood compared to many of the marine egg-laying fishes (the cod lays 3,000,000 to 9,000,000 eggs). However, the protection offered by being inside the mother's body during early life gives the young a greater chance for survival.

American scientists have found that rosefish grow very slowly. An increase of about one inch a year is normal during the early years, the rate decreasing with age. They found that the fish first breed and bear young at about 10 years of age. It has been estimated that many of the fish included in the catch are more than 20 years of age. Because such slow growth and late maturity cannot keep pace with the removal of the adult stocks by the fishery, the catch in the Gulf of Maine is falling off rapidly.

The rosefish spawns during late spring and most of the summer after the water reaches 39 to 40° Fahrenheit. The time at which the eggs are fertilized is unknown, but well-developed eggs are found in the females in mid-May in the Gulf of Maine. The fully developed young leave the body of the female during July and August and live near the surface, drifting with the current until they are nearly an inch in length. Then they go to the bottom in deep water to remain there for the greater portion of their lives.

Female rosefish carrying young are caught over all fishing areas and young rosefish are taken in quantity almost everywhere in the Gulf of



Maine. There is apparently no special spawning ground for the rosefish.

### Fishing and Marketing

Otter trawls are responsible for the greater part of the catch. Although rosefish can be caught on line trawl, only a few thousand pounds are taken each year in shallower waters near shore.

Practically all of the catch is used in the production of fillets. In 1946 only  $1\frac{1}{2}$  per cent of these fillets were marketed fresh, the balance being frozen. Waste from filleting is used in the production of meal and oil which has a high vitamin content.

The rapid rise in importance of the rosefish is a tribute to two modern developments in catching and processing fish, the otter trawl and quick freezing. With the bulk of the known Western Atlantic rosefish stocks off her shores and new stocks still being discovered, Canada is in a particularly advantageous position geographically to exploit yet another of her vast fish resources.

St. Andrews Biological Station,  
Fisheries Research Board of Canada,  
St. Andrews, N.B.



# FISHERIES FACT SHEETS

**Subject:**

**SALMON CANNING**

Salmon canning stands first in importance among Canadian fish canning enterprises in point of size and value of annual production. It is confined almost entirely to British Columbia although there is a small pack produced in Quebec and Nova Scotia. It is the salmon canning in British Columbia that is described here but salmon canning processes elsewhere are the same in principle.

During the summer months, great quantities of sockeye, pink, chum, coho and spring salmon are caught in the coastal waters of British Columbia. They are sped to canning plants, many of which are established up-coast in deep inlets flanked by forest-clad mountains. Generally speaking, the salmon canneries operate for about five months each year commencing in July and ending sometime in November. Some canneries operate on one species only while others operate on all five.

Like other foodstuffs, salmon is canned in order to preserve it for future use. It is shipped to countries all over the world. It goes with the explorer over the trackless tundra or through the barren desert of the Sahara. Frozen or subjected to day after day of intense heat, the fish within remains fresh and palatable, tempting and satisfying when opened.

In the canning process, the cooking sterilizes the contents of the can and as the container is airtight, the salmon remains sterile.

Upon arrival at the cannery, the salmon are unloaded from the fishing boat on to a mechanical elevator which discharges into bins located in the cannery, the different species being kept separate throughout. They are delivered mechanically from these bins into the hands of a machine which does what the fish-cleaners did by hand in the old days -- removes the head, fins, tail, entrails and washes away the blood from the backbone but does it at the rate of one fish per second.

From this machine the dressed fish is conveyed by carrier to tables where washers inspect each fish to make sure that the work of the machine has been properly performed. They remove anything that might have been missed.

## Filling the Salmon Cans

Whether a salmon can is hand-filled or machine-filled, it is the raw fish that goes into the container. No preservative or colouring is used,  
(over)



## Salmon Canning (Cont'd.)

nor is anything added except a small amount of salt. The cut pieces are conveyed to a hopper above the machines which fill the cans. These machines have the empty cans fed to them from the floor above. They are entirely automatic and place the proper amount of cut salmon in each can at the rate of about seventy-five cans per minute. In another type of filling machine, the whole fish is fed into the machine at one end and the filled cans emerge at the other end.

An automatic weighing machine checks the weight of each can and rejects those that are underweight. These underweight cans then have added to their contents the amount required to bring them up to standard and are again placed in the production line.

While most of the salmon canned in British Columbia is filled by machines, there is a considerable quantity of the sockeye pack still filled by hand, especially the fancy-pack goods. Machine-filling does an excellent job but the cans filled by hand may have a slightly better appearance when opened although the quantity and quality of the fish which goes into the can is similar in each case.

In hand-filling, the cut pieces of salmon are conveyed to the filling tables and the filling is done mostly by women and girls who are experienced in this kind of work. The pieces of cut fish are placed in the cans, the skin side of the fish next to the inside wall of the can. Care is taken to see that not more than three pieces are placed in each can. The women filling the cans are constantly under the watchful eye of inspectors, whose business it is to see that the work is properly carried out. After the cans are filled they are conveyed back into the line and the same process is continued as though the cans were machine-filled.

### Sealing the Cans

The filled cans next pass through an automatic salting-machine which places a predetermined amount of common salt on the top of the fish in each can. Cans are then conveyed to a machine known as the "clinker".

The "clinker" places the cover on each can and crimps the edge in such a way that it will not shake off, but at the same time leaves it quite loose.

Next step is the "vacuum-closing machine". This equipment is quite complicated but consists essentially of a chamber which is held under a constant vacuum by being connected to powerful vacuum pumps. When the can enters the vacuum chamber, any air in the can is drawn out. The sealing apparatus operates in this vacuum-chamber so that the cover is fastened down tightly. The vacuum produced keeps the ends of the cans concave and so reduces the strain on the sealed cans in the subsequent cooking process.



## Salmon Canning (Cont'd.)

### Retort Trucks and Coolers

From the closing machines, the cans are placed on slatted iron trays stacked in tiers on low trucks or cars. These trucks are rolled into a big iron retort which holds approximately 100 cases of forty-eight 1-lb cans. Cooking is done by live steam which is turned into the retort until it reaches a pressure of 15 pounds per square inch. The temperature reaches 249 degrees F. After ninety minutes at this temperature and pressure, the steam is shut off, the pressure drops, and the retort is emptied.

This sterilization is probably the most important step in the canning process. If not properly cooked, the fish will spoil. The cooking calcines the bones of the fish so that they can be eaten with the flesh and are a source of healthful lime. After the trays are removed from the retorts, the cans are tested for leaks, given a thorough washing and cooled rapidly in cold water or by blasts of cold air.

### Labelling and Boxing

When thoroughly cool they are packed in standard wooden or fibre-board cases and are ready for shipment to central warehouses for storage until purchased. Labelling is done automatically. Most of the companies engaged in salmon canning have their own brands and label the packs which they distribute themselves.

Magnitude of British Columbia's salmon canning operations may be realized from the fact that as many as 2,248,000 cases -- forty-eight pounds to a case -- have been packed in a season.

Before British Columbia canned salmon can be sold, it must be inspected by Department of Fisheries' inspectors. The law requires that every can of fish be "fresh, firm and well-packed".

Government inspectors are qualified scientists who work in properly equipped laboratories where samples of all canned salmon are inspected. If the sample passes the tests imposed, a certificate of approval is issued and the end of each can is embossed with the word "Canada". If, however, the sample is below the standard set, no certificate is issued and the cans must be embossed with the word "Grade B" on the end of each can. Any goods below "Grade B" are confiscated and destroyed.

In addition to this inspection, some canning firms maintain their own laboratories where the firms' scientists keep a constant check on the quality of the product and devise new and better ways of preparing it for the trade.



# FISHERIES FACT SHEETS

Subject: SAUGER  
(*Stizostedion canadense*)

## Distribution and Importance

The sauger is a member of the same family as the pike-perch, which is also known as "yellow walleye". It has habits quite similar and sometimes is called the sand pike. The sauger is found from the St. Lawrence westward through the Great Lakes to the lakes in Manitoba. In fact most of the Canadian commercial catch is taken in Manitoba where it ranks third in monetary importance in the freshwater fisheries. There is a considerable quantity taken also in the Great Lakes by Ontario fishermen.

## Description

This slower growing relative of the yellow walleye is often confused with the larger species but is readily recognized by the presence of scales on the cheek. It is olive gray in colour with brassy or orange sides and dark mottlings, most distinct in the young. There are two or three rows of black dots on the first dorsal fin, and a large black blotch at the base of the pectoral fin. The average weight of the Manitoba sauger is about three-quarters of a pound and it rarely exceeds 18 inches in length. Most fish mature at about 12 inches. Due to its small average size it does not occupy a prominent position as a game fish. It will however take a baited hook readily.

It is found close to shore in rather shallow water in spring and autumn but moves offshore in deeper water in summer.

## Fishing Areas and the Fishery

The catch in Ontario averages about 200,000 pounds annually with a value of some \$24,000. Manitoba lakes yield annually about five million pounds, valued at some \$650,000. The sauger rose to importance when the pike-perch populations in certain Manitoba lakes became depleted. The reduction of the pike-perch or yellow walleye allowed the sauger to increase to such an extent that at one period one-third of the total production of fish in Manitoba was composed of this species.

Fishermen use gill nets and pound nets to take the sauger and the catch is marketed fresh and frozen.

No. 22.

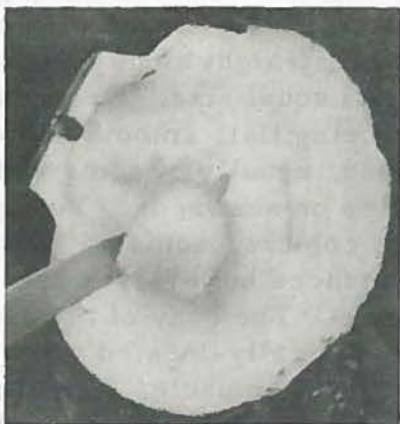


# FISHERIES FACT SHEETS

Subject: SCALLOP

The Giant, Smooth or Sea Scallop, Placopecten magellanicus, in 1950 ranked third in commercial importance among the bivalves in our Canadian Maritime waters, being surpassed in marketed value by the oyster, Crassostrea virginica, and rivalling the soft-shelled clam, Mya arenaria, for second place. It is one of the most famous of edible shellfishes and rivals the oyster in historical interest. To-day the shell of the British scallop, Pecten maximus, is the well-known trade mark of a great oil company while at the time of the Crusades in the middle Ages the shell of a well-known Mediterranean scallop was a symbol of holy pilgrimage and called the "pilgrim" or "St. James' Shell".

The Iceland scallop, Pecten islandicus, is the only other scallop in our waters. Like the giant scallop it is found in deep waters



Knife removing "meat"

but is less abundant and of no economic importance. It is a more northern form than the giant scallop, being rare south of Cape Cod, but is distributed to the Arctic Ocean on both sides of the Atlantic Ocean. It is very common on the Grand Banks of Newfoundland. Maritime fishermen often improperly call it the Bay or Cape Cod scallop, Pecten irradians, which is so important commercially in the United States. The Bay scallop is recognized by its 16 to 20 raised, rounded and radiating ribs with inter-

spaces also rounded and its maximum length of about two and one-half inches while the Iceland scallop has 50 to 100 raised and radiating ribs and a maximum size of about four inches. The occurrence of the Bay scallop in Canadian waters is doubtful but it is very common in the shallow inshore waters from the Gulf of Mexico and Florida north to Massachusetts Bay.

## Distribution and Importance

The giant scallop is a western Atlantic species, being found in the deep-water areas of the Gulf of St. Lawrence and from Labrador south to North Carolina but is rare south of Cape Cod. It is also common on some

(over)



## Scallop (Cont'd.)

of the Canadian and American offshore fishing banks. The centre of abundance in Canadian Maritime waters is the Digby area of the Bay of Fundy where, in from 35 to 55 fathoms of water, about three-fourths of the annual Canadian commercial catch, valued for the last ten years at about half a million dollars, is taken. There are smaller concentrations of scallops supporting fisheries in Lunenburg County, Nova Scotia, the southern part of the Gulf of St. Lawrence, Chaleur Bay and the west coast of Newfoundland. In Massachusetts there are heavy American landings of giant scallops taken from George's Bank which is 150 miles off the southwest coast of Nova Scotia. Of late years several Canadian boats have landed catches from the same fishing area at Halifax and Yarmouth, Nova Scotia.

### Description

The giant scallop grows to a maximum diameter of seven to eight inches. It is a bivalve, i. e., it has two almost circular valves or shells which are held together by a comparatively small straight hinge formed by two "ears" or triangular projections of almost equal size. From the outside the two valves are not alike, the lower being flat, smooth and of a white or creamy colour while the upper is cupped, usually of some reddish hue and frequently overgrown with barnacles or seaweeds. Young shells in particular have delicate and attractive colours, some with beautiful pink and white radiations. On the inner surfaces both valves are smooth, pearly-white and have a satin-like lustre. The body of the scallop consists of vari-coloured parts and a large centrally-located white muscle which is used in closing the valves. It is this muscle, sometimes called the "meat" or "eye," which is the only part eaten in Canada and which has become so well known and so appreciated that it is consistently among the highest-priced sea foods.

The Iceland scallop differs from the giant scallop in that its maximum size is only four inches, the two valves are almost exactly alike and have 50 to 100 raised and radiating ribs on their outside surface, both valves are reddish and cupped, and the "ears" of the hinge are unequal in shape and size.

### Habits

Giant scallops may be found in colonies or beds on different types of ocean bottom but prefer a firm type such as sand, gravel or shells. They are mostly sedentary, lying with the flattened valve against the



## Scallop (Cont'd.)

ocean floor. All the very small ones and some of commercial size attach themselves to bottom objects by means of strong threads like those produced by the common mussel.

Unlike the rest of our shellfish, scallops can swim. By contractions of the powerful muscle they "clap" their shells together with great force, forcing water out from the corners of the hinge and so propelling themselves forward "mouth first". As the scallop moves forward it appears to be taking great bites out of the water. From the recapture of tagged adult sea scallops it has been established that they do not move far but spend their lifetime on their native beds.

There is a most interesting association between the giant scallop and two species of fishes, the sea-snail and the common hake. The young of these fishes live between the valves of the scallops where they find refuge from larger predatory fishes. Although as many as five fishes may be found inside one scallop, it is apparently not disturbed or affected in any way.

### Food

Although scallops can swim, their movements are too restricted to enable them to avoid unfavourable living conditions. On this account, scallops can only survive and be successful in areas where the food supply and other conditions are suitable. Like most other bivalves the scallop feeds on minute plants and animals which it strains from the water by an elaborate filtering mechanism involving the gills.

### Reproduction

In method of reproduction, scallops closely resemble the oyster, clam, mussel and other allied forms. The sexes are separate, the sex glands are roes being a rose or coral colour in the mature female and a creamy white in the mature male. Spawning begins in late summer or early autumn, usually from September on. At this time about a million microscopic eggs are shed into the water by the female and are there fertilized by the milt or sperm which the male similarly releases into the water. The egg soon develops and as in all stationary marine bivalves enters a long free-swimming larval stage. This stage is believed to last about three weeks and during that time the larvae are at the mercy of the tidal currents and may be carried long distances from their parents before they settle. This aids in the distribution of the species. Settle-

(over)



## Scallop (Cont'd.)

ment takes place when the larvae are about the size of a pinhead. At this time, they give up their free-swimming habits, settle to the bottom of the sea and attach themselves by means of secreted attachment threads. This is the beginning of the adult stage of life. By the onset of the first winter the little scallops have reached a size of one-tenth to one-fifth of an inch in diameter.

### Growth

After their second year scallops lose their attachment threads and grow more rapidly. In general, it may be said that growth is greatest in the second, third and fourth years of life. The rate of growth varies from area to area and from year to year, depending on the availability of food, temperature of the waters and other factors, but is everywhere slower than most people think. In the Digby area the commercial catch is made up almost entirely of five-to nine-year old scallops which have a shell diameter of from four to five inches. The maximum life-span is 16 to 17 years of age, at which time the diameter of the shell is from seven to eight inches.

### Enemies

There is a high natural death-rate during the three weeks when the scallops are in the microscopic free-swimming larval stage, when they fall an easy prey to the larger animals and to unfavourable conditions in the water. After they become attached to the bottom of the sea, fishes, such as the cod and eelpout, feed freely on them at all sizes. Flesh-eating marine snails and starfishes are believed to destroy many adult scallops. One of the commonest enemies of older scallops is the boring sponge which perforates and honeycombs the shell. The scallop is weakened by its constant efforts to repair the damaged shell and the meat becomes so dark and stringy and of such poor quality that it is no longer marketable.

### Fishery

The Digby scallop fleet is believed to be one of the largest in the world sailing out of one port. It has consisted of as many as ninety boats and of late years has fluctuated at an average of about forty. Fluc-



## Scallop (Cont'd.)

tuations in the fleet size follow closely the abundance of scallops on the fishing grounds. The boats of the fleet are 40-to 60-foot draggers towing a gang of up to seven rectangular-mouthed iron drags with wire-meshed bags. The drags are hoisted by power-driven winches because of their great weight and the depth (40 to 50 fathoms) at which they are fished.

The fishery for scallops in the Fundy area is intense and in an effort to conserve the resources the following restrictions have been imposed there:

- (1) No one may fish for scallops on certain inshore grounds during the summer months.
- (2) The total width of scallop drags used must not exceed 18 feet.
- (3) The meshes of the scallop rake bags must not measure less than three and one-quarter inches inside diameter. This allows for the escape of the small scallops.

Scallops are shelled or "shucked" as soon as they are caught and the large central muscle, meat, or "eye," which constitutes about one-third of the weight of the soft part, is separated from the remainder of the body which is discarded. The liver or digestive gland, which is dark green to black in colour, is highly toxic to warm-blooded animals. The meats are iced and marketed fresh. Some are frozen. Formerly the bulk of the sale was to eastern United States, but of late years the Canadian markets have taken most of the catch.

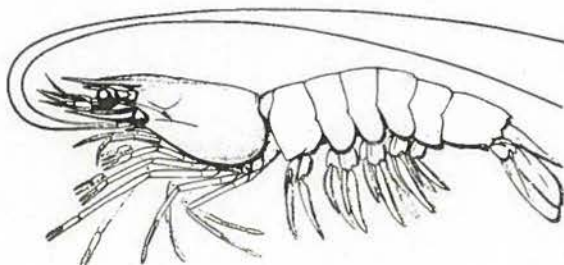
Scallop shells have been sold each year as souvenirs, the most perfectly shaped and artistically coloured being used as ash trays and ornaments.



Subject: Shrimp

## Distribution and Importance

The shrimps, of which there are many species distributed from Greenland and Alaska to South America in both Atlantic and Pacific coastal waters, are in appearance very much like their close relatives the lobster and crayfish. Of the many species, one, the



Shrimp (Common)  
Penaeus setiferus

Common Shrimp or Southern Prawn, Penaeus setiferus, make up 95% of North America's shrimp fishery. The fishery for this species is located along the coastline of the South Atlantic and Gulf States of the United States and is centred off Louisiana where about one-half of the 200,000,000 pounds annual catch is processed. Shrimp ranks fifth in volume and fourth in value of all the fisheries of the United States and Alaska, being exceeded in volume only by pilchard, menhaden,

salmon and sea herring, and in value by salmon, oysters and tuna.

According to present knowledge there are 29 different kinds of shrimp or shrimp-like animals in Canadian Atlantic coastal waters. Many are too small to be of commercial importance. The Pink or Red Shrimp, Pandalus borealis, provides a comparatively small fishery off the Pacific coast of the United States and Canada and off the State of Maine in the United States. Attempts have been made in recent years by the Fisheries Research Board of Canada to discover areas where commercial quantities of the Pink Shrimp might be taken in Canadian Atlantic waters.

Shrimp live on the sea floor, limited in their distribution to muddy and sandy bottom. On the Atlantic coast they are concentrated within six miles of shore. In the Gulf of Mexico, they are as far as the 30-fathom line in places 45 miles from shore.

## Habits and Movements

The Common Shrimp of the South Atlantic and Gulf State waters spawns from March into September. Each female lays about half a million eggs and does not carry them as the lobster, crab or crayfish does but deposits them directly into the water. The eggs and newly-hatched young drift into the inshore waters where they settle to the bottom and feed in the numerous small bays and creeks. In general, the maximum production is from August to December in inshore waters. Here, nine-tenths of the annual catch is made. The shrimp



taken then are largely young and immature and had been spawned the preceding spring. As they become larger and more mature they move into deeper water where, since their discovery in commercial quantities in 1937, they have been providing an increasingly important offshore fishery for "Jumbo" shrimp during the months from April to July. These range from six and one-half to seven and one-half inches in total length.

The Pink or Red Shrimp, which provides a small fishery in British Columbia and Alaska waters, have an interesting life history. The young are hatched in water of about 50 fathoms. It migrates to water of 25 to 35 fathoms and there spends the first summer. Some time during the winter it joins the older shrimps in deeper water and the following autumn as a mature male produces its first and only lot of sperm. It changes its sex, unlike the Common Shrimp, and becomes a female at the end of its second winter and probably spends more than one year as a female. The life span of this shrimp is at least three years. The Pink Shrimp taken in the Gulf of Maine and Bay of Fundy waters are about six inches in total length.

Shrimp are caught by otter trawls which are cone-shaped nets varying from 30 to 100 feet in width at the mouth and are towed over the bottom by power boats.

Shrimp are marketed fresh, frozen, canned, dried, cooked and peeled. Shrimp bran, a by-product, is manufactured from dried heads and hulls and sold for animal feeds.

Source: Fisheries Research Board of Canada,  
Atlantic Biological Station,  
St. Andrews, N.B.

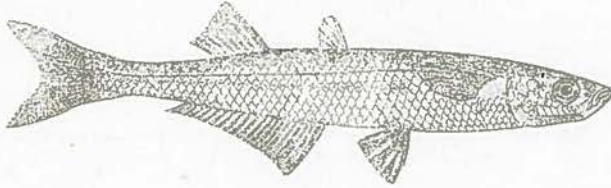
December 1949.



Subject: SILVERSIDE

## Distribution and Importance

The silverside is often confused with the young smelt. It is distributed along the Atlantic coast of North America from the Gulf of St. Lawrence to Delaware Bay. The southern part of the Gulf is about the northern limit of the silverside's range but it is found here in surprising abundance because of the comparatively high summer water temperatures.



Silverside  
(*Menidia notata*)

ate in schools in the bays and harbours where they spawn during the early summer over sandy bottom and among the water plants near the low-tide level.

The silverside lives in bays and harbours, frequenting the sandy and gravelly beaches within a few yards of the water's edge, and is rarely found deeper than one or two fathoms. The fish congreg-

The small size of the silverside has restricted its commercial value. Some have been canned on Prince Edward Island and in other parts of the Gulf, and some are used for fox food. It is not used fresh as a food to any extent but is considered very tasty.

## Description

It has a small mouth gaping only half-way to the eye. This along with the fact that it has no fleshy fin on the back identify it from the smelt and capelin. It has, however, a small spiny fin and a soft fin on its back. A thin line extends along the sides from head to tail.

Often wrongly called capelin in some areas, the silverside has large scales and is usually from three to five inches and not more than six inches in length. A translucent bottle-green on the back and upper sides, it has brown speckles on the latter. It has a silvery band along the middle of the side with the upper edge outlined by a fine back line. Its belly is white.

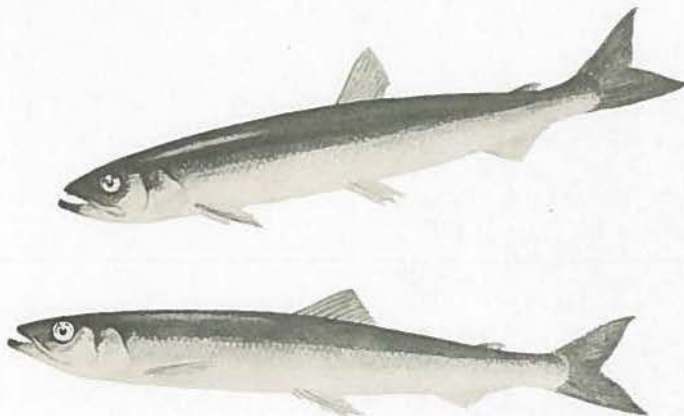
Source: Fisheries Research Board of Canada,  
Atlantic Biological Station,  
St. Andrews, N.B.,  
August, 1949.



Subject: SMELT

## Distribution and Importance

The smelt which is known scientifically as Osmerus mordax, is very much like the salmon in structure but is rarely more than nine inches in length. Ranging along the Atlantic coast of North America from Labrador to New Jersey, it is most abundant in the Gulf of St. Lawrence and the waters of the outer coast of Nova Scotia and the Bay of Fundy. It is more widely distributed than the capelin or silverside. Some smelt live all year round in freshwater lakes as far west as Lake Michigan where they provide an important commercial fishery.



Smelt  
(Osmerus mordax)

Smelt move into estuaries from the open sea each autumn and remain there during the winter. After the spring "break-up" they run into the coastal streams to spawn in the fresh and brackish water.

The smelt is highly prized as a food fish either in the frozen or fresh state. Catches of commercial size are made in many maritime centres. However, the estuary of the Miramichi River in north-eastern

New Brunswick provides one-third of the annual Canadian catch which has an average value of \$650,000. The commercial fishery in the Miramichi area is carried on mainly in the winter by means of trap nets set under the ice. In other districts some fishing is also done with gill nets both in open water and through the ice.

In Newfoundland and Labrador the smelt is of little commercial importance. The small fishery has been confined to the Port au Port Bay and St. Georges Bay areas of the south-west coast of Newfoundland. Prior to 1939 there was a small commercial fishery at the northern tip of Newfoundland.

Distributed from the Labrador to New Jersey, smelt are abundant in the Gulf of St. Lawrence and off New Brunswick, Prince Edward Island and Nova Scotia. They live in bays and harbours in open water rather than on the bottom. Some lakes contain a "land-locked" variety.

## Description

The smelt Osmerus mordax, the capelin Mallotus villosus, and the silverside, Menidia notata, small, slender, silvery fishes which occur



in Canadian Atlantic waters, are three distinct marine species yet look so much alike that some fishermen and many of the general public confuse them. Even in the adult stage smelt and capelin may often be confused and the silverside, particularly in the young stages, has frequently been mistaken for a young smelt or a capelin.

The smelt is translucent olive-green on the back, paler on the sides, and has a silvery belly. It is from four to nine inches long when taken commercially, with an occasional 12-inch fish entering the catch. The large mouth opens to behind the mid-line of the eye, and the jaws are of equal length. The tip of the tongue has large fang-like teeth, one of the chief characteristics which, along with its large mouth, identifies it from the capelin and silverside. Scales of the smelt are fairly large. They are smooth on the female, and rough along the sides of the male at spawning time. There is a fleshy fin on the back behind one large soft fin. A thin line extends along the side one-third way from the head towards the tail.

Source: Fisheries Research Board of Canada,  
Atlantic Biological Station,  
St. Andrews, N.B.

August, 1949.

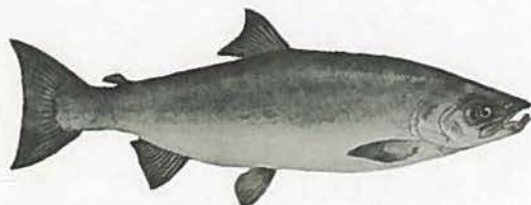


Subject: SOCKEYE SALMON

## Importance and Distribution

The Pacific sockeye salmon, with the scientific name Oncorhynchus nerka, is the most highly prized of the five species found in British Columbia waters because its rich, red flesh colouring and the firmness of its tissues give it a greater market value. The other species of

Pacific salmon are coho, pink, chum and spring. The sockeye is found in abundance along the entire coast of British Columbia. Its complete range is from southern Oregon to northwestern Alaska. Canned sockeye adds millions of dollars annually to the national income.



## Description

### Sockeye Salmon (Oncorhynchus nerka)

The body of the sockeye is elongate, the head is conical, and the teeth are small and weak. The

average life span is four years, although it sometimes goes to five or six. The length at maturity averages about two feet, and the weight runs at about five pounds. Occasionally sockeye have been caught weighing up to 15 pounds. The scales are cycloid. The colour is greenish-blue on the dorsal surface, which has a silvery sheen and is marked by fine black specklings. The head is metallic-green. The body of the male turns brilliant red towards the end of its life, and that of the female dark red with green and yellow blotches, and while on its way to the spawning grounds, the characteristic hook appears above the upper jaw. The sockeye, while commanding higher prices than the other species, is third among the five in protein content and second in fat content.

## Migration and Reproduction

After hatching in tributary streams in the interior of British Columbia, the young sockeye descends to lakes where it spends one, often two and sometimes three years before migrating to the ocean, usually during March or April, when huge schools of small fish leave the river mouths. Some go to sea as fry, including a race of sockeye which spawns in Harrison Lake and Harrison River, B.C.

In certain localities the sockeye has become "lake-locked", and spends its entire life in fresh water. In such cases it is known as kokanee, kickaninny, redfish or Kennerly's salmon.

In returning from the ocean to the inland areas where it was born, there to spawn and die, the sockeye's experience is the same



as that of the other species. (A separate fact sheet deals in greater detail with the migration and reproduction of all British Columbia salmon).

### Methods of Catching

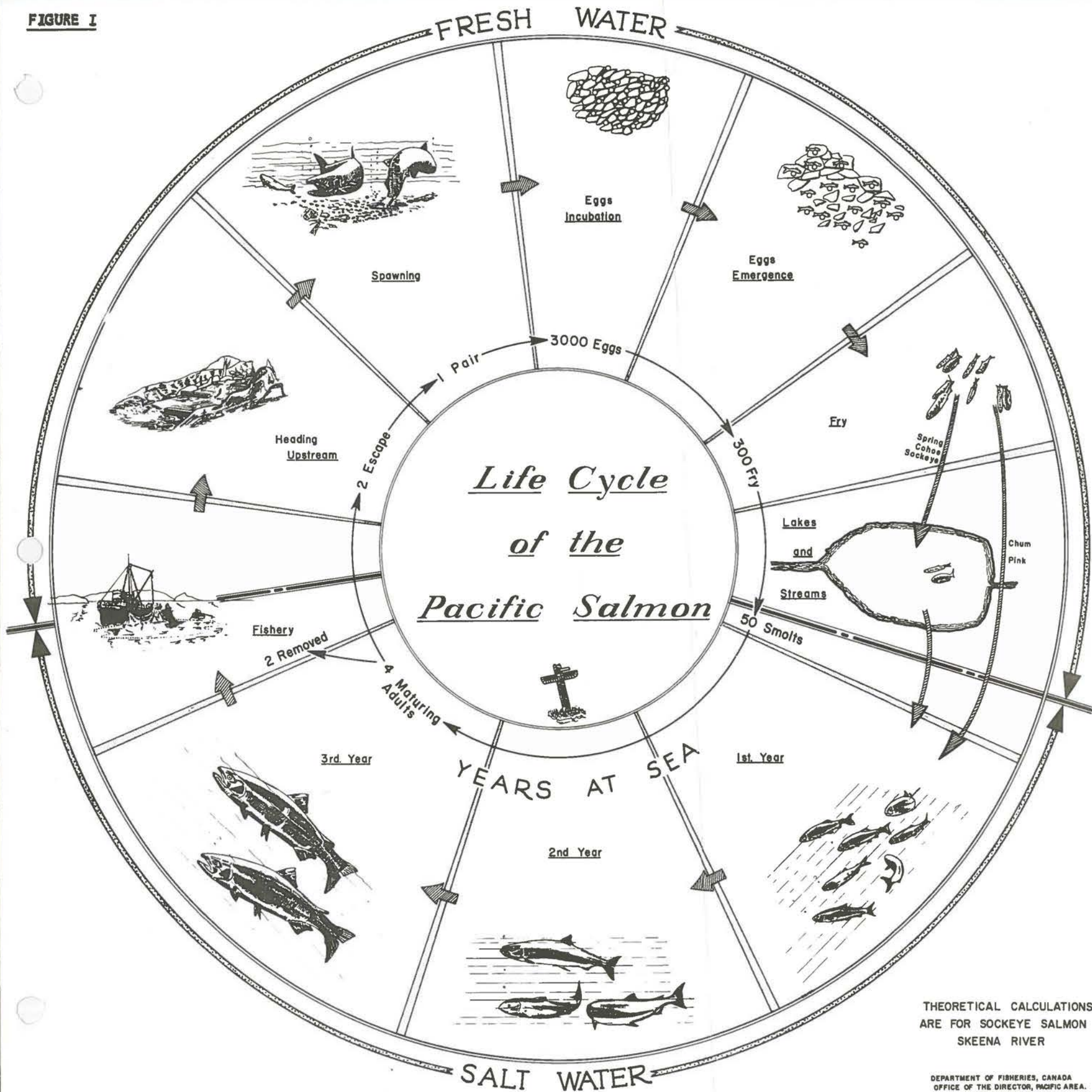
The use of gill-nets at the mouths of rivers is the most common method of taking sockeye, although a proportion of the annual catch is made in purse-seines and traps at the southern end of Vancouver Island. There are two kinds of Pacific salmon trap, floating and stationary, but only the stationary type is permitted in British Columbia and its use is limited to part of the Strait of Juan de Fuca. Few sockeye are taken by trolling.

### Processing and Markets

Nearly all the sockeye caught in British Columbia is canned, as it is best suited for this type of processing. The markets are world-wide, although the largest are on the North American continent. (A quantity of other kinds of salmon goes to the fresh and frozen fish markets, and some are mild cured, smoked, dry salted or pickled). Fishmeal and oil are made from the waste, and vitamin oil is produced from the livers.



FIGURE 1



THEORETICAL CALCULATIONS  
ARE FOR SOCKEYE SALMON  
SKEENA RIVER



# FISHERIES FACT SHEETS

## Subject: SOLES AND FLOUNDERS (Pacific)

Brill (*Eopsetta jordani*)

Lemon sole (*Parophrys vetulus*)

Rock sole (*Lepidopsetta bilineata*)

There are sixteen species of flatfish, exclusive of halibut, which inhabit the waters off the British Columbia coast. Most of them are popularly termed "soles," although properly they belong not to the sole family but the flounder and dab families. Three of the sixteen species have risen to major importance in the economy of British Columbia fisheries in the past decade.

Perhaps the most important is the brill (*Eopsetta jordani*) or Petrale sole, which is the largest of the three main species. It inhabits the open coastal waters and is fished for extensively off the west coast of Vancouver island, in Queen Charlotte Sound and in lower Hecate strait. The annual catch by Canadian vessels in recent years has averaged 3,300,000 pounds. Ages up to 16 years and lengths up to 25 inches have been recorded, but the average age is about six or seven years and the average length about 16 inches. Nothing is known of the

Brill (top), Lemon Sole (centre)  
and Rock Sole (bottom)

spawning habits, but it is suspected that the brill moves into deep water for spawning during the winter months. Small brill less than commercial size are seldom located. Unlike the lemon sole and rock sole, the

(over)



## Pacific Soles and Flounders (cont'd.)

brill has a large, strongly toothed mouth and feeds voraciously on herring and red feed (euphausiids).

The lemon sole (Parophrys vetulus) gains its name more from its delicate lemon flavour than from any resemblance to the true lemon sole of Europe. It is sometimes referred to as the English sole and is distinguished by its slender shape and pointed head. It is most abundant in Hecate strait, Queen Charlotte Sound and the Strait of Georgia on grounds where the bottom is composed of soft sand or mud. The annual catch by Canadian boats averages about 2,100,000 pounds. Fish of commercial size average 14 inches in length and five or six years of age. The male grows much more slowly than the female. While the female may reach lengths over 22 inches the male seldom exceeds 16 inches. Spawning occurs during the winter months at depths between 30 and 40 fathoms. Females of average size produce about 1,000,000 eggs while very large fish will produce in excess of 2,000,000 eggs. The eggs when spawned are free-floating and are carried by currents into shallow water along sandy beaches, where within a month or two the young transform into side-swimming, bottom dwelling creatures like their parents. The lemon sole feeds almost exclusively on clams, worms and brittle stars.

The rock sole (Lepidopsetta bilineata), commonly called the rough-back because of its rough scaly skin, inhabits hard sandy bottoms in shallow depths down to 25 fathoms. The catch runs about 1,600,000 pounds per year and the main fishery occurs in Queen Charlotte Sound and Hecate Strait. Sizes and ages are very much the same as in the lemon sole, the average length being about 14 inches and the average age being about five or six years. Spawning grounds have not been located, but they are believed to occur in regions of very shallow water and rough bottom. The rock sole feeds mainly on brittle stars, clams, worms and sand lance.

### Where taken

All three species are common along the Pacific coast, ranging from California to Alaska.

### Methods of fishing

Canadian fishermen take these species in trawls at depths of 15 to 60 fathoms on sandy to muddy bottoms.



Subject: SPRING SALMON

## Importance and Distribution

The spring salmon is the giant of the five species found in British Columbia waters (the others are sockeye, chum, coho and pink). Its



Spring Salmon  
(Oncorhynchus tshawytscha)

scientific name is Oncorhynchus tshawytscha. The spring forms an important part of the B.C. catch, being found along the entire coast. In many areas it provides excellent game fishing. In such regions, notably off the Campbell and Oyster Rivers and off Comox, B.C., it is known as the tyee when it exceeds 30 pounds. It rises readily to a lure, and puts up a good fight. Other names for the spring, chiefly in the United States, are the king, the chinook and the quinnat. It

is common over a wide range, from southern California to northwestern Alaska.

## Description

Like the smaller members of other species of Pacific salmon, the spring's body is elongate. It has a conical head, and conical teeth, which are moderately sharp and not rigid. Its back is greenish blue, sometimes almost black and often has a faint reddish or rusty hue. It is covered with black spots. The parr marks on the young are long and heavy, and extend almost completely across the sides of the body. The flesh is sometimes red, sometimes pink, and sometimes white. The average length of the spring is about four feet and the weight, while usually about 20 pounds, may be anywhere from 10 to 50 pounds. Even a 108-pounder has been landed. Its chief food is made up of herring and sand-lance, augmented by other small fishes, crustaceans and squids. The flesh of the spring makes delicious food. Of the five species it is first in fat content and fifth in protein content.

## Migration and Reproduction

The spawning runs take place in the late spring and early summer, mainly to the larger rivers along the coast. The young spring may go to sea in its first year or may remain a full 12 months in fresh water. It matures at sea anywhere between its third and eighth years, but ordinarily in the fourth or fifth. The early-maturing males are called jacks. Tagging operations have shown that the spring travels long distances, some individuals from the Columbia River having been found off Alaska, and



others from the Sacramento River in California having been noted in far northern waters. (The life cycle of the five species of Pacific salmon is similar in all important respects, and is dealt with a separate fact sheet).

#### Methods of Catching

The spring is caught commercially in purse-seines, gill-nets, trolls and in the stationary traps which are allowed only in the Strait of Juan de Fuca.

#### Processing and Markets

A favourite in the fresh fish market, the spring is also the chief variety of salmon utilized for mild curing. Its frozen fillets find a ready sale. Part of the catch is canned, and other portions are smoked and dry-salted. Canned spring salmon is sold in many foreign countries as well as in the United States and Canada, and the sale of that prepared by other methods is extensive on the North American continent.



Subject: STEELHEAD TROUT

## Distribution and Importance

The west coast has no native stocks of the "true" or "Atlantic" salmon and the sportsman finds no satisfactory freshwater substi-



tute in the various species to which the name "Pacific salmon" has been given. Instead, he turns to the Steelhead (Salmo gairdneri) which gives him the fighting qualities of the celebrated eastern fish and which can be found in small or large numbers in nearly all of the west coast salmon streams.

Although it does not grow as large as the weightiest Atlantic salmon it is still a big fish and is often more ready to accept a lure than its eastern cousin. Moreover, steelhead fishing is especially, although not exclusively, a winter sport and provides the angler with an opportunity to practise his art at a time of year when the smaller trout are protected by a closed season.

The steelhead also contributes to the commercial catch, a few thousand cases being canned each year. This quantity of course does not compare with the landings of Pacific salmon and the fame of the species rests mainly on its sporting qualities.

## Description

The steelhead very closely resembles the Atlantic salmon in structure and appearance but is usually rather more heavily spotted. It differs from the Pacific salmon in having a shorter anal fin, containing less than 12 supporting rays. When in the sea, the body is mainly silvery, with a blue back. At spawning time a band of red colour develops along each side of the body. The steelhead is a sea-going "race" or "form" of rainbow trout, the latter term being applied to fish which spend their whole lives in fresh water. Steelhead and rainbow trout can be distinguished from cutthroat trout (which occur in the same region) by the shorter head, the absence of a red dash under the lower

(over)



## Steelhead trout (cont'd.)

jaw and the absence of teeth on the back of the tongue.

Mature steelheads commonly average eight or nine pounds in weight but occasionally reach 20 pounds and individuals up to 36 pounds have been recorded.

As swimmers and jumpers, steelheads are at least equal to any of the species of Pacific salmon.

### Life History

Steelheads spawn in winter or spring in streams large or small. They may enter fresh water shortly before the eggs are deposited or they may arrive weeks or months ahead of the spawning act. In a given water-course the runs usually follow an established pattern from year to year. "winter runs", "spring runs", and "summer runs" can sometimes be distinguished.

After spawning, many adult fish go back to the sea and some, although usually not a high proportion, return to fresh water after recuperation, to spawn a second time (Pacific salmon do not spawn more than once). Females survive more often than males.

The young fish live for one or two (occasionally three) full years in fresh water before travelling to sea as smolts of from four to 10 inches in length. This migration takes place in spring. Usually two or more summers are spent in the ocean before the fish seek the spawning streams. Most spawning fish are four or five years old. The age of a fish, the number of years spent in fresh or salt water and the indications of any previous spawning operation can generally be found by microscopical examination of the scales.

### Methods of Catching

Most of the commercially-caught steelheads are taken by gill-nets in or near the mouths of the larger rivers. Freshwater anglers get two chances during the life history of the species. Some of the young fish are of legal size before going to sea and are caught as "trout". Steelhead fishing proper concerns the large fish which have returned from salt water. These are caught by spinner, bait or fly.

The commercial catch is mainly canned. The fish caught by sportsmen cannot legally be sold.



Subject:

STRIPED BASS

## Distribution and Importance

The striped bass, scientific name Roccus saxatilis, belongs to the sea bass family Serranidae, which includes the perch-like fishes found in salt water. Other common names for the striped bass are rockfish, rock or squid hound.

The striped bass has a wide range along both the Atlantic and Pacific coasts of North America and enters fresh water to spawn. On

the Atlantic coast it is distributed from the St. Lawrence River to northern Florida and in the Gulf of Mexico from Florida to Louisiana. Introduced in the Pacific Ocean in the last quarter of the 19th Century it now occurs from southern California to British Columbia. The striped bass is one of the most valuable anadromous and coastwise fishes found on the coasts of North America, especially in the areas from North Carolina to Maine.



The striped bass is important to both commercial and sporting interests. The commercial catch in Chesapeake Bay, which is the centre of the fishery along the Atlantic coast of the United States, was over 1,300,000 pounds in 1935. In these same waters it is estimated that there are 200,000 anglers each year.

## Description

The general outline and colour, arrangement of the fins and their structure, are characteristic of the striped bass. Its sides are barred with seven or eight narrow, black, longitudinal stripes from which the fish takes its name.

The colour varies from dark olive-green to blue on the back, paling on the sides and silver on the belly.

(over)



## Striped Bass (Cont'd.)

The fish is moderately elongate, stout, its back scarcely arched but sway-bellied, with a long head, oblique mouth gaping back to the eye and a projecting lower jaw. The two back fins are distinctly separate, the first being spiny and the second soft-rayed.

The striped bass grows to a great size; the heaviest, 125 pounds, was recorded in North Carolina in 1891. The usual run of fish range in weight from three to 70 pounds. A striped bass three feet long weighs about 18 pounds.

### Occurrence in Canadian Waters

Unfortunately there is comparatively little information available on the striped bass in Canadian waters. In the Gulf of St. Lawrence, especially in the rivers, estuaries and coastal waters of Northumberland and Kent Counties, landings were as high as 123,300 pounds in 1917 but had declined to almost nothing by 1935. In Nova Scotia, Colchester, Hants, Annapolis and Digby Counties of the Bay of Fundy have had combined landings which have fluctuated widely over the period 1917 to 1951 from 48,400 pounds in 1918 to 2,200 pounds in 1920, then to a recent peak of 30,400 pounds in 1943. In this area the Shubenacadie and Annapolis River systems support a consistent though varying spawning run of this species. In 1918 Antigonish County reported a peak landing of 41,500 pounds. Catches declined steadily to nil in 1929 and no fish have been reported caught over the period 1929 to 1946.

Such violent fluctuations in abundance of striped bass suggests that there are good and bad brood years for spawning and survival. The increased numbers of the 1947 brood of striped bass in the Miramichi River of New Brunswick would seem to indicate that 1947 was a particularly good year for bass in the Miramichi area and perhaps in other parts of the Gulf of St. Lawrence and in the Bay of Fundy area.

### Habits and Movements

Young striped bass wander in the rivers and in the brackish waters, feeding and growing rapidly until they are nearly two years old. Then, contrary to former belief, they tend to form large schools and may migrate over considerable distances. Tagging of fish along the Atlantic coast of the United States has indicated that there are several different stocks of striped bass which move northward and eastward from wintering areas such as Chesapeake Bay. Although



## Striped Bass (Cont'd.)

there is no proof, this presents the possibility that the Bay of Fundy stocks may be joined each year by numbers which have moved in from areas to the south. In Canadian waters, striped bass are known to winter in the tidal portion of the Saint John and St. Lawrence Rivers and possibly in the Miramichi and Shubenacadie Rivers.

Movements are into the fresh and brackish waters in the spring or early summer from the coastal waters with a movement towards brackish or salt water taking place in the late summer or early fall. Striped bass do not move out to sea in winter as do herring, shad, alewives, and salmon but remain in the river mouths and estuaries, merely retreating to the deeper parts where they are often speared through the ice and netted beneath it, or, if on open coasts, to slightly deeper water. But although more or less sluggish during the cold season, it seems that they do not hibernate but feed when opportunity offer

They chiefly frequent shoal estuaries, particularly on weedy bottom, though some -- especially the large fish -- lie in the surf along sandy beaches or about rocky headlands, islets and ledges, while others again may run up rivers for long distances.

### Reproduction and Growth

All male striped bass are mature when they are three years of age and 10 inches or more in length. Females are mature at four to six years of age and 17 to 18 inches in length. They gather about the river mouths in June for spawning, though there is no regular run of them comparable to the runs of salmon, alewives, or shad. They are usually described as anadromous--- that is running up into fresh water to spawn -- which is true in the sense that they always enter some stream and never spawn in the open sea. However, they often spawn in the brackish waters of estuaries and the tidal portions of rivers. Striped bass spawn late in spring and early in summer, depending on the latitude. Available evidence points to June and July as the height of the season in the Bay of Fundy.

The eggs, about one-twentieth of an inch in diameter, are semi-buoyant -- that is, they sink but are swept up from the bottom by the slightest disturbance of the water. This is so prolific a fish that a female of only 12 pounds weight has been known to yield 1,280,000 eggs, while a 75-pound fish probably would produce as many as 10,000,000. The eggs hatch in about 74 hours at a temperature of 58 degrees; in about 48 hours at 67 degrees. By autumn the young fry

(over)



## Striped Bass (Cont'd.)

in our waters are from two to three inches long. In more southerly waters, where bass commence spawning earlier, the fry may grow to four and one-half inches by October. In Chesapeake Bay, where hatching is in May, fish are four inches long at the end of the first year, nine inches at the beginning of the second winter (one and one-half years of age); 12 to 14 inches at three years; and 16 to 18 inches at four years. Striped bass are certainly long lived for one kept in the New York Aquarium lived to an age of about twenty-three years. Fish from Miramichi River at one to one and one-half pounds were 12 to 15 inches long and in their third year.

### Food

The bass is a very voracious fish, preying indiscriminately on small fish of all kinds -- herring, menhaden, shad, smelt and such small fish as launce, mummichogs and silversides being its chief diet in enclosed waters -- and hunting for crabs, shrimps, lobsters, squid, mussels and various other invertebrates along open shores.

### Economic Importance

In Eastern Canada the striped bass is of little commercial value because of the small numbers available for a fishery. Bass, however, are caught in gill nets, drop nets, seines, traps and pounds, and are caught about rocks, in the surf, and in estuarine waters on hand lines and with rod and reel. The catch is mainly marketed locally in the fresh state.

No. 79



Subject: STURGEON

## Importance and Distribution

Four species of sturgeon occur in Canadian waters but only one of them, usually called the Lake sturgeon, is of any considerable commercial importance. The others in our waters are the Common sturgeon, the White



Common Sturgeon  
(*Acipenser oxyrinchus*)

sturgeon and the Green. The family name of the four in the scientific registers, is *Acipenseridae*, and the family goes back a long way in the earth's history. The greater part of Canada's commercial catch of sturgeon comes from the fisheries of Ontario and Manitoba and the freshwater fisheries of Quebec, though a few are taken in the Atlantic sea fisheries, in New Brunswick inland waters, in Saskatchewan, and some

in the Fraser River area of British Columbia. The bulk of the catch is made up of Lake sturgeon but the Atlantic landings include Common sturgeon and the British Columbia landings the White.

Sturgeon also occur in United States areas and in some parts of Europe, notably Russia.

## Description

It is characteristic of the sturgeon that the body is relatively long, with no true scales but with rows of irregular bony plates (or scutes) on the sides. The snout is elongated, the mouth small and without teeth but capable of being thrust out to suck up food. In front of the mouth are four long feelers or barbels.

The Lake sturgeon is generally dark olive in exterior colouring, with paler or reddish shading on the sides, and is frequently marked by blackish spots. The Green sturgeon, true to name, is olive green, with a few olive stripes. The White is not white at all but dark gray. The Common sturgeon is grayish.

## Habits and Movements

In general, sturgeons are large creatures and the Lake variety is the biggest of Canada's purely freshwater fish. On the average, Lake sturgeon weigh about 40 pounds though much heavier specimens are sometimes taken. In length the Lake sturgeon is usually less than six feet



but, there are sometimes exceptions to the rule. The White sturgeon, however, which frequents both fresh and salt water may be very much bigger than its lake cousin. For instance, a White taken in the Fraser River, British Columbia, in 1941, measured 11 feet 2 inches from the point of the nose to the tip of the tail and weighed 970 pounds. The largest specimen known weighed approximately 1,800 pounds and was reported in the "British Columbian" of New Westminster in the October 14 issue, 1897, as having been taken some years previously at Mission, B.C. The White sturgeon is undoubtedly a very slow-growing fish. Due to intensive fishing, large specimens are now rarely taken and the species is in danger of extermination.

As already noted, the Lake sturgeon is entirely a freshwater fish but the White and Common varieties are anadromous - that is, they spawn in fresh water but may also be sea-goers though it is perhaps a question whether the White does not sometimes remain permanently in freshwater and whether the Common sturgeon may not sometimes spawn in brackish water. The Green sturgeon, on the other hand, frequents the sea and seldom goes beyond the river mouth.

#### Fishing Areas and the Fishery

Sturgeon are taken by large-meshed nets, pound-nets and hook-and-line. Most of the landings in Canada however, are made with nets. The fish are bottom-feeders and fishing gear must be set accordingly. Their food consists largely of various bottom creatures but they also eat small fish.

All of Canada's sturgeon landings are marketed fresh or frozen, a large part of them in the United States. Roe of the female fish is used in the production of caviar. The major portion of it is packed in Ontario and the remainder in Manitoba.

March, 1950.



Subject:

SUCKER

## Description and Distribution

The common white sucker (*Catostomus commersonii*) is one of about 16 species of the sucker family found in Canada. This family also includes redhorse, quillback and buffalofish, and at least one member is found in all fresh waters from Labrador to British Columbia.



Sucker

(*Catostomus commersonii*)

the first call of spring. Most of the species of suckers are distinguished on the basis of divisions of the air-bladder, on differences in their lateral lines, lips, and other anatomical features. In the sucker family there are no spiny fin rays, adipose fins, nor teeth on the jaws.

Buffalofish, native of some waters of the western plains, have a very long dorsal fin with many rays; the quillback also has a similar dorsal fin, the first rays of which form a long point equal in length to the base of the fin. The remainder of the family have more rounded bodies and the typical sucker mouth familiar to all small boys who go fishing with

## Life History and Habits

The end of winter, with melting of ice and snow and increased stream flow, is the signal for the sucker run. Crowding into rivers and creeks from the lakes below, suckers seek rapids and fast-flowing shallows and in a week of hectic activity spread their eggs by the millions. These eggs sink into crevices among the rocks, lodge in debris and vegetation, and in a few days hatch into small fry which drift down with the current. Schools of young suckers gather at stream mouths, and soon range along lake shores in search of small aquatic organisms and green algae.

Young suckers are a favorite forage fish for the larger predaceous kinds, and their numbers usually become severely decimated under attack. The survivors feed upon bottom insects, shells and vegetation sucked up from shallow, muddy places, and after about three or four years become

(over)



## Sucker (Cont'd.)

mature and join in the spring spawning migration. Suckers live in nearly all types of water but thrive in warm, shallow, turbid rivers and lakes.

### Commercial Importance

The commercial catch of suckers totals from two to four million pounds, but the value of this catch is low because these fish usually bring the fishermen only from one to three cents per pound. The low price is a reflection of the slack demand arising from the sucker's mediocre table qualities. Many thousands of pounds are taken annually but not listed in the statistical reports because the fish are either not shipped to market or are used locally.

Gill nets take most of the sucker catch but some are caught in dip nets, hoop nets, pound nets and seines.

### No. 47

### Life History and Habits

The end of winter, with melting of ice and snow and increased stream flow, is the signal for the sucker run. Crowding into rivers and creeks from the lakes below, suckers seek rapids and fast-flowing shallows and in a week or hectic activity spread their eggs by the millions. These eggs sink into crevices among the rocks, lodge in debris and vegetation, and in a few days hatch into small fry which drift down with the current. Schools of young suckers gather at stream mouths, and soon range along lake shores in search of small aquatic organisms and green algae.

Young suckers are a favorite forage fish for the larger predaceous kinds, and their numbers usually become severely decimated under attack. The survivors feed upon bottom insects, shells and vegetation sucked up from shallow, muddy places, and after about three or four years become

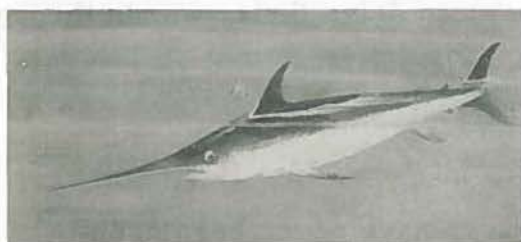
(over)



Subject: SWORDFISH

## Distribution and Importance

The swordfish or broadbill swordfish, scientific name Xiphias gladius, is found in the warm waters on both sides of the Atlantic Ocean, north to northern Norway, the Newfoundland Banks and Cape Breton Island and south to North Carolina. The same species is found in the Mediterranean and Red Seas, about the Cape of Good Hope and in the Indian and Pacific Oceans. Like the mackerel and bluefin tuna, it is a summer visitor to the waters of eastern United States and Canada.



Swordfish, because of their great size, activity and power, are becoming increasingly attractive to the deep sea angler. Appreciation of the swordfish as an article of food has grown rapidly in recent years and now the demand would take care of a much greater supply than is available. Canadian commercial catches have climbed steadily from a few hundred thousand pounds a year in the early part of the Twentieth Century to over 3,000,000 pounds in 1952 with a marketed value of well over a million dollars.

## Description

The distinguishing feature of the swordfish is the prolongation of its upper jaw into a long, horizontally flattened, sharp-edged and pointed "sword" making up nearly one-third of the total length of the fish. The fish has powerful shoulders tapering toward the rear to a very slender tail stub. When basking at the surface of the ocean the swordfish is easily recognized by the large back fin and the upper portion of the large crescent-shaped tail fin which are clearly visible.

The back of the swordfish varies in colour from purplish to a dull blue or even black while the belly is whitish with a silvery sheen. Adult swordfish have neither teeth nor scales.

(over)



## Swordfish (Cont'd.)

### Habits and Movements

Like the bluefin tuna, another important summer visitor to our waters, very little is known about the swordfish. They appear in quantity on the offshore banks south of Nova Scotia in July and along the coast of Nova Scotia as far as Cape Breton Island. Here they feed and bask singly at the surface throughout the summer months and then disappear, presumably to return to the open Atlantic.

Many tales have been told of swordfish attacking boats but all such attacks have come after the fish have been injured. Under these circumstances swordfish have been known to drive their swords through the heavy planking of a fishing vessel.

### Reproduction and Growth

Swordfish which are ready to spawn have never been seen in the waters of the western Atlantic Ocean. Presumably the swordfish which visit the Canadian Atlantic coast in the summer months spawn during that part of the year when they are absent and probably in the warmer parts of the open Atlantic Ocean. The fact that they are thin when they return in the spring but fatten during their summer stay indicates that they have spawned before they appear in our waters. In contrast, the swordfish which inhabit the Mediterranean Sea are known to spawn in June and July. The eggs are small and buoyant and the larval fish hatch out in about two and one-half days. The young fish are entirely unlike their parents, there being no sword and an abundance of long, pointed teeth. As the young grow up the lower jaw becomes gradually shorter and the teeth disappear.

Because of the lack of scales which might show annual rings of growth, nothing definite is known of the rate of growth of the swordfish in our waters. In the Mediterranean, the young fish of  $\frac{1}{2}$  lb to 12 lbs are thought to be one-year old, unusually rapid growth. The large size, a maximum of nearly 20 feet and over 1,000 pounds, indicates very long life. Sizes vary from seven to 13 feet and 120 to 600 pounds. Sizes of fish taken from the George and Browns Bank areas are about 100 to 125 pounds and from the Cape Breton area 150 to 200 pounds. Fish of less than 50 to 60 pounds are rarely taken in our waters.



## Swordfish (Cont'd.)

### Feeding

Swordfish feed on almost all other smaller fishes which inhabit the open ocean. Mackerel, herring, hake and squid form a large part of the diet. The remnants of deep-sea fishes found occasionally in the stomachs indicates that swordfish feed at considerable depths. It is thought that the sword is slashed right and left among schools of fish to stun or kill them before they are eaten. Adult swordfish are so active, powerful and well armed that they have few enemies. However the larger sharks do attack swordfish.

### Fishing and The Fishery

Advantage has been taken of the basking habit of the swordfish and the fact that they will allow themselves to be almost run down by a boat, to establish a fishery which uses the harpoon exclusively and with great success. As in whaling, individual fish are singled out and harpooned.

Fluctuations in the abundance and movements of swordfish have caused great variation in the location and size of the catch from year to year. For example, in 1946 the waters off the northeastern part of Cape Breton Island provided about four-fifths of the Canadian swordfish landings of about 2,800,000 pounds while in 1952 about one-half of a catch of almost 3,200,000 pounds came from the George and Browns Bank areas off southwestern Nova Scotia.

The Canadian swordfish catch is dressed, iced and shipped to the United States where it is marketed fresh as "swordfish steaks." The flesh is firm, greyish-white in colour, richly flavoured and is looked upon by some as a prime delicacy. Swordfish liver oil is valued more than cod liver oil, for its high vitamin content.

Reluctance on the part of swordfish to take a baited hook readily has been a big factor in limiting its possibilities as an ideal big game fish for the deep sea angler.



Subject: TROUT AND CHAR IN  
BRITISH COLUMBIA

## Distribution and Importance

Steelhead, Kamloops trout and cutthroat trout provide most of the incentive for freshwater fishing in British Columbia. Other species, both native and introduced, contribute at times to the sportsman's creel.

The steelhead (Salmo gairdneri gairdneri) is dealt with in another fact sheet (No. 65).

Kamloops trout (Salmo gairdneri kamloops) occur naturally in the lakes and streams which constitute the upper portions of the Fraser and Columbia river systems, that is to say throughout most of the central and southern parts of the province, except in the coastal areas. In the latter districts the Kamloops trout is replaced by the very similar steelhead, which usually differs from its up-country relative by spending part of its life in the sea. In some coastal lakes and streams, however, there is a type of steelhead which lives permanently in fresh water and is usually called a rainbow trout. This term is sometimes applied also to the young of the sea-going steelhead and even to the Kamloops. Since no hard and fast distinction can be drawn between these three kinds of fish, there is no scientific objection to this wide use of the name. True Kamloops trout have often been introduced into coastal streams and lakes but have usually not flourished except in places where other kinds of trout are not present to compete with them. In their natural habitats, on the other hand, they are the preferred fish of the sportsman and this proud position has not been weakened by the introduction of speckled char in some places.

The cutthroat (Salmo clarki) is a common inhabitant of streams and lakes, large and small, in the coastal areas of British Columbia. Its total distribution extends from northern California to southern Alaska. Many individuals live permanently in fresh water; others spend part of their lives in estuaries or at sea. The species is in high repute among anglers. Certain small, fine-scaled types of cutthroat -- the "Yellowstone" and "Mountain" cutthroats -- provide good fishing in the south-eastern and central parts of the province, far from the habitats of their coastal relatives.

(over)

## Trout and Char in British Columbia (cont'd.)

The Dolly Varden char (Salvelinus alpinus malma) is found nearly everywhere, although not always plentifully, from the Queen Charlotte Islands to the Rockies and from the southern to the northern boundaries of British Columbia. Outside these limits, its range extends from California to Alaska and Kamchatka. As a sport fish it is given a second-class rating by those anglers whose standards are based on Kamloops and cutthroat trout.

The range of the Great Lakes char, or lake trout (Cristivomer namaycush) extends from Labrador westward into central and northern British Columbia and Alaska, the preferred habitat being the deeper lakes. The species does not provide a major game fishery in this province, since its haunts are far removed from the main centres of human population and more attractive sport is provided by other fish.

Brown trout (Salmo trutta) and speckled char (Salvelinus fontinalis) have been introduced in several places. The former is established in small numbers in a few Vancouver Island streams, while the speckled char occurs both in Vancouver Island and in certain waters of the southern interior of British Columbia. In their new environment neither species has won wide esteem in comparison with native trout, although the brown does on occasion provide fishing when few native trout are available.

### Identification and Size

Identification of trouts and chars is not always easy. Individual fish do not always show all the characteristics commonly used for separating the species. Also, trout and char may resemble closely Pacific salmon which sometimes live in the same waters. They may be distinguished from these by the form and structure of the anal fin, situated just behind the vent. In Pacific salmon this fin is long and is supported by 12 to 19 "rays". In trout and char the fin is shorter and contains only 8 to 12 rays. (Since some of the rays are branched, only the main stems are counted).

All the species dealt with in this sheet are of typical trout-like form and all are commonly called "trout". The "true" trouts, however, can be distinguished from the chars by the presence of black spots on the body and fins and by the distribution of teeth on the vomer, -- a bone at the front end of the roof of the mouth. In the trouts there are teeth on the head and shaft of this bone, in the chars on the head only. The spots on chars are grey, yellow, orange or red, not black.



## Trout and Char in British Columbia (cont'd.)

Among the trouts, the cutthroat can usually be distinguished by a red dash along the lower jaw (whence the name) and by the presence of teeth on the back (as well as the front) of the tongue. These teeth can be felt as small prickles by an exploring finger. The species has been known to reach a weight of 17 pounds but in small bodies of water where food resources are limited mature fish may be less than one pound in weight. The largest individuals are usually lake-dwelling rather than sea-run fish.

The Kamloops and brown trouts are not likely to be confused in spite of much seasonal and local variation in appearance. The former is dark green or blue, heavily spotted on the back and upper sides, silvery on lower sides and belly, or (in breeding fish) more uniformly dark with a red band along the side. Paralleling the case of the cutthroat, there is a small, fine-scaled "mountain" version of the Kamloops trout which occurs in small lakes in the Kootenay district. It seldom grows to a length of more than 12 inches whereas the typical mature Kamloops trout may be anywhere from this size up to 36 inches in length and over 50 pounds in weight.

The brown trout has a general brown or golden-brown ground colour and some of the dark spots, including those below the lateral line, are edged with orange, pink or red. On Vancouver Island this species sometimes reaches a weight of five pounds.

Among the chars, the Dolly Varden is olive-coloured with many pale or pink spots scattered over the body. A fish weighing 32 pounds has been reported from Idaho but the species does not ordinarily approach such a size.

The speckled char is rather like the Dolly Varden in ground colour and general appearance but has dark wavy markings on the back and dorsal fin and small pale or coloured spots on the sides. In British Columbia it does not reach the large size which it is known to attain in some eastern waters.

The Great Lakes char has a prevailing body colour of grey, green or brown, with many pale (but not coloured) spots on body and fins. The tailfin is deeply forked. A large individual may weigh up to 60 pounds.

### Reproduction and Habits

Except in the case of the Great Lakes char, which spawns on reefs or gravel areas of lakes, all the foregoing species usually deposit their

(over)

## Trout and Char in British Columbia (cont'd.)

eggs in nests or "redds" in the gravelly bottoms of streams. The chars and brown trout spawn in the autumn, the cutthroat in late winter or early spring and the Kamloops trout in spring, -- which may be as late as June at higher altitudes. The young fish, emerging from the gravel in late spring or early summer, remain in the streams for a shorter or longer period after which, in many instances, they take up residence in a lake. The mature fish move into streams again to spawn. Those fish (that is some cutthroats and some Dolly Varden) which visit the ocean, always return upstream to lay their eggs.

Small trout and char feed largely on insects and crustaceans. With increasing size, a larger percentage of fish is included in the diet. Fish-eating habits are especially developed in Great Lakes char, cutthroats, Dolly Varden and brown trout.

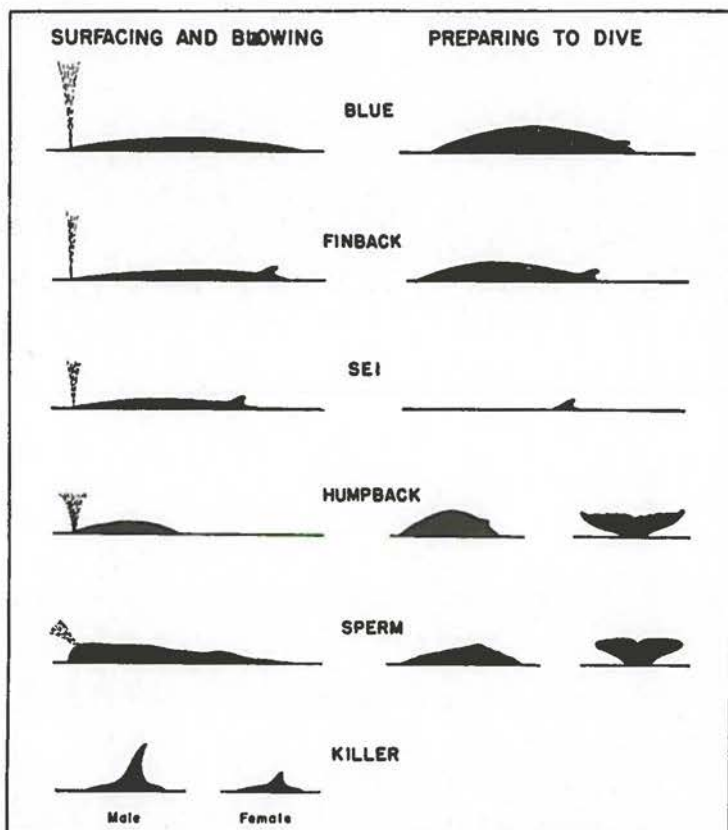
### Fishing

There is no significant commercial exploitation in British Columbia of the kinds of game fish discussed above (the steelhead, as recorded in another fact sheet, is fished commercially to some extent in the sea and in lower portions of the largest rivers). Angling, by fly, spoon or bait, is practised enthusiastically by residents and visitors wherever man meets fish.



## Identification of Whales Occurring On British Columbia Coast

The resumption of whaling operations off the British Columbia coast has stimulated a lively interest in the various species of whales. Specific identification is helpful both to those engaged in commercial whaling and to the biologist in his study of their habits, occurrence and migration.



The species most common off the B.C. coast are the blue whale, finback, sei, humpback and sperm. The killer whale is actually a member of the dolphin family, but is often confused with these larger species. Each of these animals conforms to the habit of making a series of shallow dives succeeded by one of longer duration. The moisture-charged breath is ejected between the shallow dives when the animal "blows." Body form and size, duration of dive, form of the blow and attitude of the body when diving, are all

useful characteristics for identification. Differences in the blow are usually difficult to detect as atmospheric conditions alter the permanency of the effect. The shape of the fin and form of the body when diving are probably the most useful identifying features. The characteristics outlined in the following descriptions and accompanying diagrams are brief and must be qualified as only representative of the many and diverse habits of these animals.

### Blue Whale

The largest of all the whales, ranging in size to about 100 feet, the blue whale has a very small fin placed far back on the body. Like its close relatives the finback and the sei, the blue has a high, narrow and vertical blow. The deep blue back is arched slightly and the small

fin clearly seen when the animal commences the dive. Sometimes the flukes are thrown clear of the surface. Blue whales are not often observed close to shore and are usually seen singly or in pairs.

#### Finback Whale

The finback is characterized by an acutely-ridged, bluish-grey back and the distinctive fin outlined in the diagram. The flukes are not normally exposed in diving. It occurs usually many miles offshore and often in schools. The animal attains a length of 85 feet, but lengths greater than 65 feet are not common in these waters. The dive usually lasts four to 15 minutes following four to eight shallow dives.

#### Sei Whale

When surfacing, the snout is the first part to appear. This is followed by the bluish-black coloured back and a large distinctive falcate fin. The blow is narrower and not so high as in the two larger relatives of the sei. Before diving, the back is not rounded up as in the two previously described species. The sei ranges in length to about 60 feet.

#### Humpback Whale

The humpback is the most common visitant to the B.C. coast, often remaining in bays and inlets throughout the year. The body is short and stout and the flippers are long with serrated edges. There is a great variance in the number and duration of the blows. On the last blow the back is humped and the animal dives almost vertically, throwing its flukes in the air. The flukes are large with a serrated edge and are often white or mottled white on the under surface. The dive usually lasts from five to 20 minutes. Lengths of about 50 feet are attained.

#### Sperm Whale

The sperm is markedly different from the other commercial species in having teeth and a single blowhole on the left side of a large box-like head. Following a dive, which may last as long as an hour, the sperm makes about 40 blows over a period of 20 to 30 minutes. The blow is distinctive in being directed obliquely forward. When about to dive, the grey coloured back is rounded to show a low dorsal hump, the tail is thrown in the air, and the animal submerges vertically. Lengths of 60 feet are attained.

#### Killer Whale

These animals are frequently seen in inside waters in large schools throughout the year. The bulls attain a length of about 30 feet and are distinguished from the smaller females by the distinctive high pointed fin.

Source: Fisheries Research Board of Canada,  
Pacific Biological Station,  
Nanaimo, B.C.

January 1950.



# FISHERIES PHOTOGRAPHS

Subject: CLAM FISHING  
(Captions on reverse side)



50668



47831



50673



50756



50767



57044

### CAPTIONS FOR CLAM PHOTOGRAPHS

Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

- 50668 --- Clams, considered one of the very best sea foods available, are shown here in their burrows in a beach at St. Andrews, N.B.
- 47831 --- A digger seeking out the clams which, when covered by the tide, feed on microscopic plants and animals.
- 50673 --- Those who have spent some time on the sea-coast probably know the pleasures of a "clam-bake", and of clam-chowder. For a "clam-bake" the clams are usually steamed in sea-weed. Here clams, taken from the beach near St. Andrews, N.B., are being washed.
- 50756 --- A skinner and washer checks the clams which are prepared in a variety of appetizing ways.
- 50767 --- Girls shuck high quality clams which are not only shipped in the live state, but also sold as chowder and soup. The canning of clams, developed in the early part of this century, is now the most important operation in the production of this fishery.
- 50744 --- Nearly all of Canada's production of clams in the shell and as meat is sold in the United States, with the remainder being sold on the domestic market which takes most of the canned product.



# FISHERIES PHOTOGRAPHS

Subject: HERRING PURSE-SEINING  
(Captions on reverse side)



16371



WR2748



16381



16376



WR2751



WR2750

*Issued by Information Services, Department of Fisheries, Ottawa*

CAPTIONS FOR PHOTOGRAPHS OF HERRING PURSE-SEINING

The individual glossy prints of these photographs up to 8 x 10 inches for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

16371 --- Purse-seining accounts for the greater part of Canada's Pacific Coast herring catch. Here a seiner sets out for the fishing grounds off British Columbia.

WR2748--- This familiar scene on the British Columbia coast shows a net churning with herring as the purse-seine is drawn tighter.

16381 --- Sometimes the schools of herring are so large that the net of one purse-seiner is not enough to catch the fish. When this occurs, boats co-operate in laying their nets to surround the entire school.

16376 --- After the purse-seine strings are tightened, the net is drawn close to the boat. A derrick hoists the net out of the water, where it is refolded on a turntable.

WR2751--- A power winch operates the brailer or huge scoop used to take the thousands of herring from the net. Gulls hover and swoop down on the catch.

WR2750--- The last of the herring are thrown into the brimming hold of a fish packer drawn up alongside the purse-seiner. The catch is then rushed to a shore plant for processing, mainly into fish meal and oil.



# FISHERIES PHOTOGRAPHS

**Subject:** IRISH MOSS  
(Captions on reverse side)



16478



16479A



16481



41150



41156



16482

## CAPTIONS FOR IRISH MOSS PHOTOGRAPHS

Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information and Educational Service, Department of Fisheries, Ottawa.

16478 --- Irish moss, a multi-use seaweed abundant on parts of the Canadian Atlantic Coast, is primarily used in foods as a stabilizer. In ice-cream it prevents the formation of large ice crystals during freezing and produces a smooth mixture of creamy consistency. It is used as a suspending agent in such drinks as chocolate milk, and also acts as a jellying agent in milk puddings. Irish moss, which is used also in the making of doughnuts, cakes, icings, buttermilk cream, and marshmallows, grows from near low-tide level to a depth of at least 15 feet in some places. Here a boy is raking moss along the shoreline.

16479A --- Rakes used for gathering moss have handles from 15 feet to 18 feet in length with teeth about six inches to eight inches long. Where it is plentiful more than 1,000 pounds of fresh moss can be gathered by one man in a day.

16481 --- Packing dried moss into sacks for shipment. Moss is sometimes dried on sand, canvas, grass, wire netting and on concrete. However, board surfaces are recommended.

41150 --- Irish moss, raked up from the sea, is spread to dry on flakes (wooden racks). Sun bleaching improves the "stabilizing" qualities and usefulness of the seaweed.

41156 --- Impurities being removed from Irish moss drying in the sun near Miminegash, P.E.I.

16482 --- Bales of compressed moss for shipment weigh from 100 pounds to 150 pounds. The moss may be ground and shipped in bags if satisfactory to the buyer.



# FISHERIES PHOTOGRAPHS

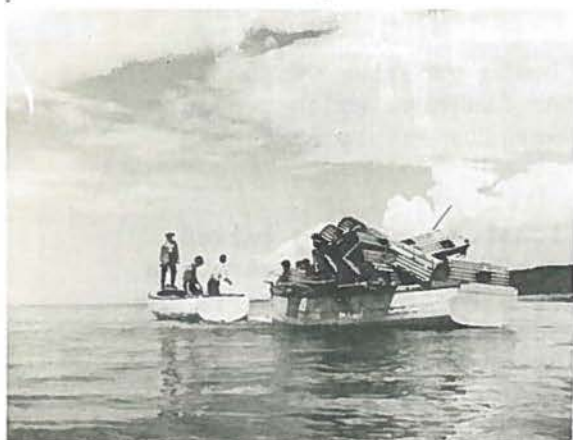
Subject: LOBSTER FISHING  
(Captions on reverse side)



40471



40458



40472



40474



10461



40457

## CAPTIONS FOR LOBSTER PHOTOGRAPHS

Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information and Educational Services, Department of Fisheries, Ottawa.

40471 --- A lobster boat sets out from Miminegash in Prince Edward Island as the lobster fishing season opens. The length and time of the closed lobster fishing seasons vary in different sections of Canada's East Coast.

40458 --- One end of the lobster trap is marked by a pine tree marker before the fisherman lays his traps.

40472 --- One of the many boats pursuing Canada's East Coast lobster fishery, which provides practically the world's supply of canned lobster.

40474 --- The oblong lath lobster traps are baited then weighed down with stones to keep them on the ocean floor. Regulations govern the size of space between the two undermost laths on each side of the trap through which small size lobsters can escape.

40461 --- Lobster traps are tied to a trapline then pushed free of the boat. Almost any kind of fresh or salted fish is used as bait.

40457 --- A delicious seafood, the lobster caught in the inshore waters of Canada's East Coast is always in high demand. With the development of air transportation and more efficient refrigeration new and more distant markets are becoming available for both the live product and the chilled meat.

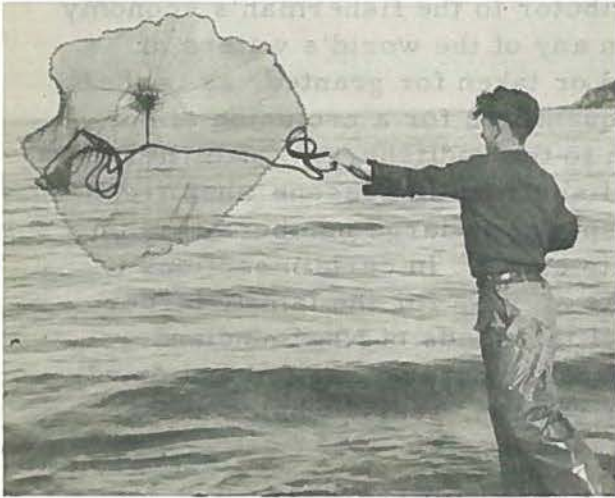


# FISHERIES FACT SHEETS

THE CAPLIN OF NEWFOUNDLAND

Subject:

NEWFOUNDLAND CAPLIN  
(Captions on reverse side)



R 160



R 158



R 161



R 150



R 153



R 166

Issued by Information Services, Department of Fisheries, Ottawa



## THE CAPLIN OF NEWFOUNDLAND

The caplin, a small, silver-sided fish which invades the beaches of Newfoundland to spawn, is an all-around contributor to the fisherman's economy in that province. Perhaps no species of fish in any of the world's waters of comparable importance is so casually accepted or taken for granted, as is the humble caplin. They are landed in enormous quantities for a profusion of purposes, the foremost being the caplin's relation to the codfishery. Quantities are frozen and held in cold storage for use by fishermen in seasons when fresh bait is not obtainable from the sea. Where it spawns in large numbers it is an important source of fertilizer for hay and potato crops. In certain sections it is lightly salted and dried to feed dogteams. As an item for the family larder it makes a worthwhile contribution to the diet of thousands of Newfoundlanders, being eaten and enjoyed fresh from the sea, frozen, "corned" (salted and dried) and smoked. The caplin also provides food for salmon, seals, whales and flatfishes as well as sea-birds.

### Captions for Photographs

- R-160 - A fisherman throws his casting net from a Newfoundland beach to catch the tiny caplin as they roll ashore with the waves during the spawning season.
- R-158 - Catching caplin with dip nets on a Newfoundland beach. The caplin swarm ashore on waves and are captured in home made equipment.
- R-161 - The pony and cart, boat and casting net have a part in Newfoundland's caplin fishery. The net is used to cast for caplin; the boat comes in handy when the caplin are lying offshore, and the horsedrawn "box-cart" hauls the catch to a central dumping site.
- R-150 - When caplin roll in on the beaches to spawn, fisherfolk in Newfoundland catch them with dipnets at the water's edge. Photo was taken at picturesque Ferryland on the southern shore.
- R-153 - Surrounded by caplin as they swarm to the beach, a young Newfoundland fisherman scoops them up with a dipnet.
- R-166 - Caplin caught on the beaches are stockpiled in one spot for later removal to fields for use as fertilizers.

Glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.



# FISHERIES PHOTOGRAPHS

SH 223

F53

C. 2

Subject: OTTER-TRAWLING  
(Captions on reverse side)



53067



27661



53058



53114



27636



53059

### CAPTIONS FOR OTTER-TRAWLING PHOTOGRAPHS

Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

- 53067--- Launching an otter door from a fishing trawler on the Grand Bank off Canada's East Coast. Two such iron-shod wooden doors keep open a huge bag-shaped net which is dragged along the ocean floor for cod, haddock, hake and other groundfish.
- 27661--- A trawl-line is brought aboard the otter-trawler preliminary to raising the net, which has been pulled along the ocean floor scooping up the fish in its path.
- 53058--- The trawl-net is hauled aboard until only the cod-end containing the catch is in the water. Here the cod-end is being hauled aboard and the captured fish are spilled into pens on the deck.
- 53114--- Fish caught by an otter-trawler are being cleaned and sorted into pens before being stowed in ice in the hold.
- 27636--- A Nova Scotia otter-trawler hauls up the cod-end of her trawl-net during the night and spills the catch into deck pens.
- 53059--- Fishermen on an "iced-up" otter trawler, operating on the Great Bank of Newfoundland, break away some of the ice on the deck.



# FISHERIES PHOTOGRAPHS

Subject: OYSTER-FARMING  
(Captions on reverse side)



41873



41823



41846



41803



41839



41855

*Issued by Information Services, Department of Fisheries, Ottawa*

## CAPTIONS FOR OYSTER-FARMING PHOTOGRAPHS

Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information and Educational Service, Department of Fisheries, Ottawa.

- 41873 --- The cold waters of Canada's Atlantic Coast provinces produce oysters of unexcelled quality. Oyster-farming has been encouraged by the Department of Fisheries of Canada to increase production which falls far short of the demand. Collectors made from cardboard, hardened in concrete, are used to catch the oyster larvae before it settles to the sea bottom
- 41823 --- Taken from the collectors, the larvae which has become spat (tiny oysters) are placed in large mesh trays to grow. Here a Prince Edward Island fisherman prepares to screen the oysters for size.
- 41846 --- The larger sized oysters from the trays are planted on the oyster beds to grow to marketable size. The smaller oysters are replaced on the trays.
- 41803 --- This photograph taken in the early dawn shows oyster fishermen on their way to the Malpeque Bay oyster beds. Towed behind a motor launch they are "dropped off" over the bed they are going to fish.
- 41839 --- Rake-end, scissor-like tongs are used to bring the mature oysters to the surface. Small dredges operated from motor boats are also used.
- 41855 --- Oysters, sorted and packed for markets; are graded Fancy, Choice, Standard or Substandard by inspectors of the Federal Department of Fisheries.



# FISHERIES PHOTOGRAPHS

Subject: SALMON GILL-NETTING  
(Captions on reverse side)



16842



28261



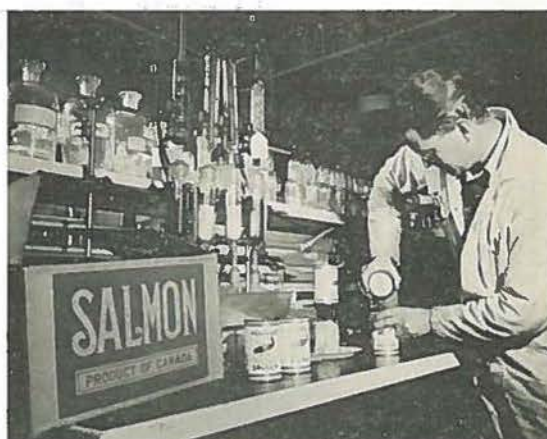
16843



28227



16869



WR-224

*Issued by Information Services, Department of Fisheries, Ottawa*

CAPTIONS FOR SALMON GILL-NETTING PHOTOGRAPHS

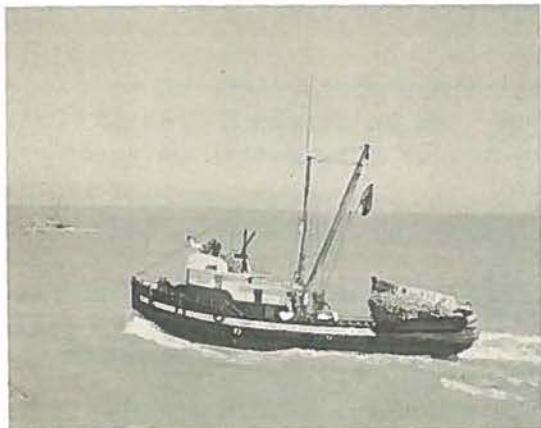
Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

- 16842 --- A gill-netter heaves to as he waits for a new run of fish off Vancouver.
- 28261 --- Typical of the vessels which pursue the British Columbia fisheries are these gill-netters, which are the most common type of vessel used to catch salmon. Purse-seiners and traps also take part of the annual catch.
- 16843 --- As its name implies the gill-net catches the salmon by its gills when it tries to swim through the mesh.
- 28227 --- A British Columbia fisherman removes a salmon ensnared in his gill-net. The huge mechanically-driven wheel hauls in the net and keeps it from tangling as the fisherman removes the fish.
- 16869 --- Largest of the five types of British Columbia salmon is the spring. This fish not only is important to the commercial fisheries of Canada's West Coast, but is also an excellent game fish. It rises readily to a lure. When over 30 pounds it is known as a tyee.
- WR-224--- One of the top products of Canada's commercial fisheries, British Columbia canned salmon is served on tables around the world. Here a laboratory worker in a British Columbia salmon cannery checks for accuracy of vacuum, one of the varied tests made to assure the finest quality.

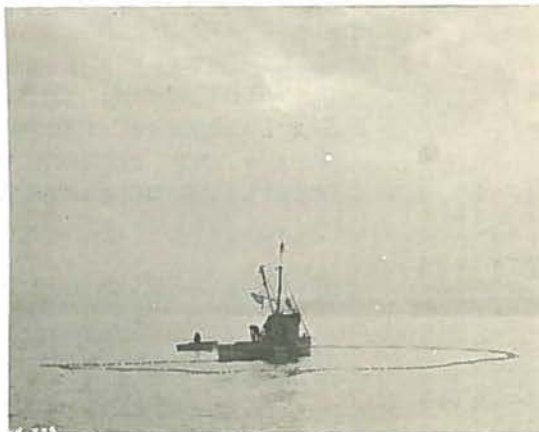


# FISHERIES PHOTOGRAPHS

Subject: SALMON PURSE-SEINING  
(Captions on reverse side)



SP-5001



WR-228



16845



16856



16881



48136

CAPTIONS FOR SALMON PURSE-SEINING PHOTOGRAPHS

Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

- SP-5001 -- With net and troll-line, British Columbia fishermen pursue the yearly runs of salmon. Here a purse-seiner, one of the more important types of British Columbia commercial fishing vessels, heads out to seek the schooling salmon.
- WR-228 -- As its name implies, the British Columbia purse-seiner runs a net from a turntable around the school of salmon, then "purses-up" the bottom of the net by drawing it together, preventing the downward escape of the fish.
- 16845 -- When the fish have been trapped, the net is drawn aboard until only a small portion holds the catch of salmon in the sea at the side of the boat.
- 16856 -- To empty the seine net a "brailer" is used to scoop up the salmon and deposit them in the hold of the vessel.
- 16881 -- A purse-seiner empties its catch into a cannery fish barge. The salmon are immediately iced to keep them fresh for processing.
- 48136 -- After weighing, these freshly-caught salmon are stored in a trough in a Prince Rupert (B.C.) packing plant.



# FISHERIES PHOTOGRAPHS

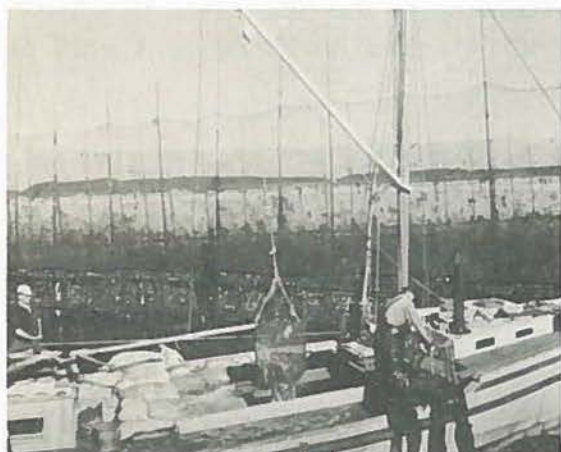
Subject: SARDINE FISHERY  
(Captions on reverse side)



42213



37349



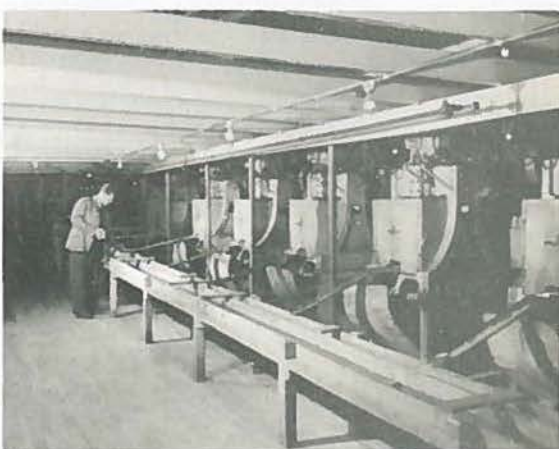
37348



42211



42212



42214

*Issued by Information Services, Department of Fisheries, Ottawa*

## CAPTIONS FOR SARDINE FISHERY PHOTOGRAPHS

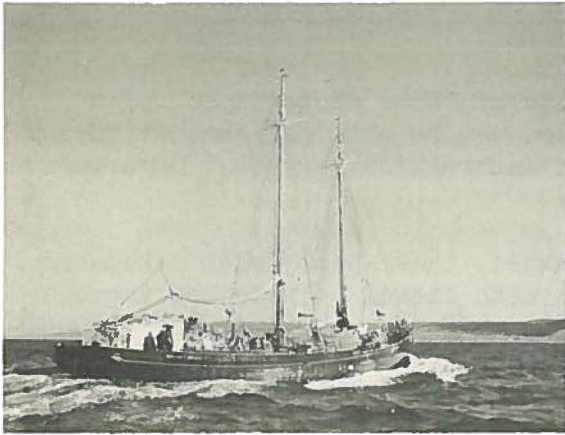
Individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information and Educational Service, Department of Fisheries, Ottawa.

- 42213 --- Virtually all the sardines taken on the Atlantic Coast are caught by weirs and seine nets in southwestern New Brunswick waters. Here a group of sardine boats is tied up at Black's Harbour, N. B., site of the largest sardine canning factory in the British Commonwealth.
- 37349 --- "Seining the weir" is the term applied to the operation in which the sardines are concentrated into a mass in the 60-foot weir by gradually decreasing the net space.
- 37348 --- With a power-operated brailer the sardines are transferred to the hold of a carrier boat where they are held in brine for three hours.
- 42211 --- A bucket on a windlass is used to remove the catch from the hold of the carrier boat to the processing plant at dockside.
- 42212 --- Trays of tinned sardines are put into sealing machines. Main markets for Canada's canned sardines are South Africa, the United States, Trinidad, Cuba, Venezuela, The Netherlands, West Indies, Jamaica, the Leeward-Windward Islands, and the Dominican Islands.
- 42214 --- A bank of sealing machines from which the tins of sardines drop on to a carrier belt which conveys them to retorts for cooking and sterilization.



# FISHERIES PHOTOGRAPHS

Subject: SCHOONER FISHING  
(Captions on reverse side)



53008



26339



53010



16343



53087



44956

# CAPTIONS FOR PHOTOGRAPHS OF SCHOONER FISHING

The individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

- 53008 --- Formerly full-masted, these East Coast schooners are now equipped with diesel or gasoline engines and sail is only auxiliary. Cod and other groundfish are the main species caught by the dorymen who set hook-and-lines on the fishing banks from small boats called dories.
- 26339 --- While in port these dory fishermen repair their trawl lines. The lines, which have hundreds of hooks, are wound in tubs when not in use.
- 53010 --- Canadian salt codfish finds its way to many markets of the world. This freighter is loading Newfoundland codfish destined for the Portuguese market.
- 16343 --- Lunenburg, home of the famed Bluenose which was the pride of the Nova Scotia fishing fleet, is the port where many schooners unload their catch. Here a future fishermen helps to unload the catch of cod, which is to be weighed and sent to the plant for processing.
- 53087 --- This familiar scene is known to Newfoundlanders as "making fish". It is a method of drying salted cod for the export market.
- 44956 --- Modern quick-freezing plants ensure that high-quality fillets reach the Canadian consumer.



# FISHERIES PHOTOGRAPHS

Subject:

WINTER FISHING, MANITOBA  
(Captions on reverse side)



30032



30027



30051



11248



30018



11265

*Issued by Information Services, Department of Fisheries, Ottawa*

## CAPTIONS FOR PHOTOGRAPHS OF WINTER FISHING, MANITOBA

The individual glossy prints of these photographs up to 8 x 10 inches, for editorial use, can be obtained free of charge upon request to the Director of Information Services, Department of Fisheries, Ottawa.

- 30032 --- An inland commercial fisherman sets his gill-net under the ice on Lake Winnipeg with a "jigger". After the first hole in the ice has been cut, it is possible to set 50 fathoms of net in three minutes with this ingenious yet simple device.
- 30027 --- Lifting the gill-net is cold work. Leather mitts protect the hands from the icy water.
- 30051 --- Frozen on the ice immediately they leave the water, these fish are removed from the gill-net and loaded on to the horse-drawn caboose.
- 11248 --- Stowing frozen gill-nets is a difficult job in below-zero temperatures.
- 30018 --- This tractor train covers the Dauphin Bay area of Lake Winnipeg, picking up fish and taking them to the railhead at Gypsumville, a 40-mile trip through the bush.
- 11265 --- Canada's inland winter fishing industry is a heritage from northern Indians and Eskimos. Whitefish and lake trout are the chief commercial species. Fish are packed in ice and crated for shipment, mainly to the United States.