

SCHOOLING FINFISH (CODS, HERRINGS, SARDINES, MACKERELS, AND OTHERS)

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Keywords: schooling fish, catches, utilization, habitat, biology

Contents

1. Introduction
 2. Peruvian Anchoveta (*Engraulis ringens*, Jenyns 1842)
 3. Alaska Pollock (*Theragra chalcogramma*, Pallas 1811)
 4. Chilean Jack Mackerel (*Trachurus murphyi*, Nichols 1920)
 5. Atlantic Herring (*Clupea harengus*, Linné 1758)
 6. Chub Mackerel (*Scomber japonicus*, Houttuyn 1782)
 7. Capelin (*Mallotus villosus*, Müller 1776)
 8. South America Pilchard (*Sardinops sagax*, Jenyns 1842)
 9. Atlantic Cod (*Gadus morhua*, Linnaeus 1758)
 10. Pacific Cod (*Gadus macrocephalus*, Tilesius 1810)
 11. Japanese Anchovy (*Engraulis japonicus*, Temminck and Schlegel 1846)
 12. Sardine (*Sardina pilchardus*, Walbaum 1792)
- Glossary
Bibliography
Biographical Sketches

Summary

After a short general description of schooling finfish, some data on the biology, the catches, and the fisheries of the eleven most important commercial species of schooling fishes are given.

1. Introduction

Schooling fish include neritic fish, which are strictly confined to the waters of continental shelves from the coast to about 200 m depth. Some species are neritic pelagic—often called small pelagic fish. Other species are demersal but not benthic. These species are characterized by a common type of association, namely schooling—a school is generally an aggregation of fish all of approximately the same size, reacting quickly and in unison, almost as a single superorganism. Exceptionally, as in the herring, the school is an aggregate of fishes belonging only to one species. The small pelagic fish always accomplish their trophic migrations and spawning migrations in schools. Schools of demersal fish form particularly during their spawning migrations. The advantages of schooling are numerous—protection from predators, good chances of

locating food, and improved opportunities for mating. The economic value of this type of fish is very important because it forms varying size schools generally not very far from the coasts and sometimes not far from the harbors. The ten most important commercial species are described in the rest of this article.

2. Peruvian Anchoveta (*Engraulis ringens*, Jenyns 1842)

The anchoveta of the Engraulidae family is a small elongate fish, rather round in cross section, with a prominent pointed snout and a big mouth extending well past the eye. The high number of lower gill rakers (38 to 49) distinguishes it from all other Pacific engraulid fishes. It grows to about 20 cm SL.

The Peruvian anchoveta is the most heavily exploited fish in the world, with catches of more than 8 800 000 tonnes in 1996. There are great fluctuations in catches: there were more than 13 000 000 tonnes in 1971, and fewer than 1 000 000 tonnes in 1985. These fluctuations in the amount of anchoveta are dependent on the climatic conditions of the Peruvian current which influence the abundance of plankton. The captured fish are of about 8 cm SL, and aged 5 or 6 months. They are caught by purse seine vessels, mostly by Peru (7 400 000 tonnes in 1996) also by Chile (1 400 000 tonnes in 1996). The anchoveta is used mostly to make industrial Peruvian fish meal.

The anchoveta is a coastal pelagic marine fish. It may be found within a radius of 80 km from the coast, but sometimes occurs at up to 160 km. It forms huge schools, chiefly in surface waters of the Eastern South Pacific along Peru northwards to 6°S, and along Chile southwards to 42°30'S.

The anchoveta reaches sexual maturity at 1 year old and about 10 cm SL. Spawning takes place all along the coast of Peru mostly in the cold months from July to September, and in Chile from May to July. Spawning occurs to a lesser degree in the hot season between February and March in Peru and in December in Chile. Eggs are ellipsoidal. The growth is fast, attaining 8 cm SL in 6 months, 10.5 cm in 12 months and 12 cm in 18 months. Longevity is short, at about 3 years.

Anchoveta feed on plankton by filter-feeding, chiefly on diatoms (up to 98% of their food), but also on copepods, euphausiids, fish eggs and dinoflagellates.

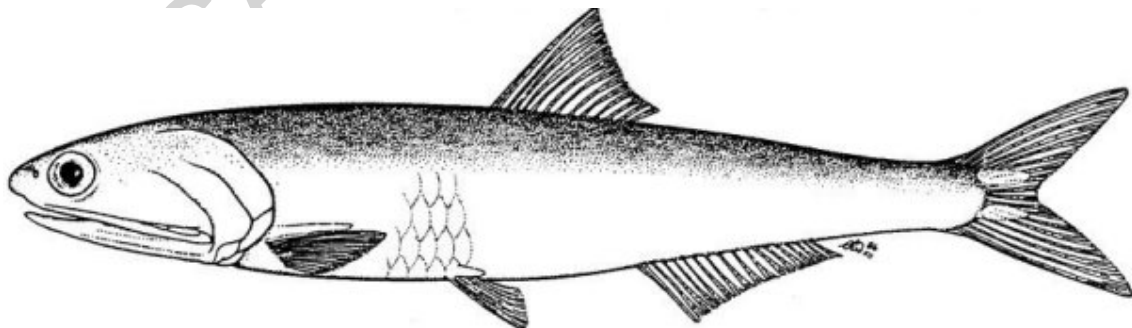


Figure 1a - Peruvian anchoveta (FAO)

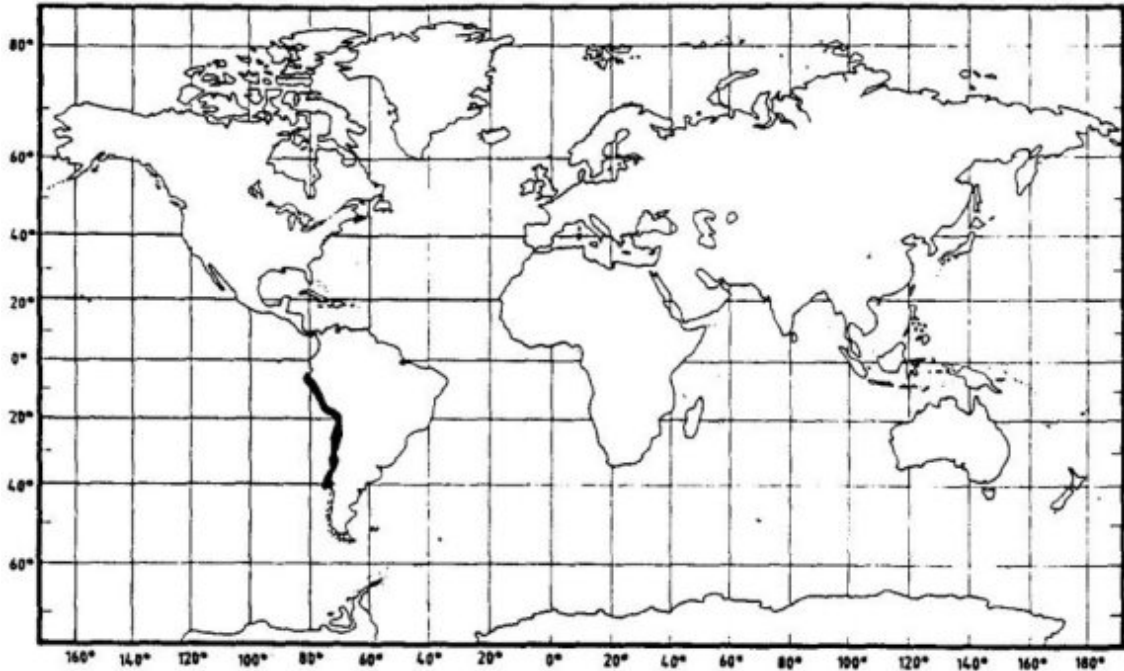


Figure 1b- (Map of distribution)

3. Alaska Pollock (*Theragra chalcogramma*, Pallas 1811)

The Alaska pollock of the Gadidae family has three separate dorsal fins and two separate anal fins (the first with a short base), a lower jaw projecting slightly with a small chin barbel, and lateral line pores present on the head. Its dorsal color is olive green to brown, often mottled, and silvery on the sides. The fins are darker. The fish grows up to 80 cm TL.

The Alaska pollock is the most important demersal resource. The catches in 1996 were 4 553 000 tonnes, mostly from the Northwest Pacific (3 293 000 tonnes) and mostly by the Russian Federation (2 439 000 tonnes), but it is also caught from the Northeast Pacific (1 293 000 tonnes), mostly by the US (1 189 000 tonnes). In 1987, the catches were more than 6 700 000 tonnes. The Alaska pollock is caught mostly by pair and stern trawls, Danish seines and longlines, gillnets and dragnets. Trawl and longline fishing are most productive in the daytime when the schools are more concentrated near the bottom.

Because Alaska pollock is soft and often small, some time ago it was used only for animal food. However, because of the importance of catches, it is now marketed for human food. It is marketed fresh, but mostly frozen, as cutlets, dressed, fillets or minced in blocks. It is also used for the Japanese “surimi”—this use developed along with the development of “surimi” processing technology in the late 1960s. It is also marketed salted or dried after being cured in brine or dry salt, or by repeated freezing and thawing. It is still marketed spice cured, the fish fillets or slices being pickled with set and rice-wine-lees. A Japanese caviar substitute called “tarako” or “momiji-ko” is prepared with its salted, usually dyed roe, often mixed with red pigment. The liver and viscera are an important source of vitamin oil.

The Alaska pollock is a demersal and semipelagic fish occurring mostly on the North Pacific shelf from the Southern Sea of Japan to Central California, from 30 m to more than 400 m in depth. It makes diurnal vertical migrations, sometimes reaching the surface. The Alaska pollock reaches sexual maturity at 3–4 years old, at about 30–38 m TL. The spawning period lasts 4–5 months, with peak spawning of a few months. Spawning takes place from December to March in the waters of southern Hokkaido, Japan, and from January to March in the Strait of Georgia. Twelve major stocks with their spawning area are distributed in the North Pacific. Females of Bering stock, according to size or age, have from 520 000 eggs at 4 years old to 15 000 000 at 11 years old. Growth is fast. Longevity is about 14–15 years. Alaska pollock produces pelagic and separable eggs. In addition, a mating pair displays a typical ventral mount during spawning, and males have species specific courtship and aggressive behavior with sound production, as does Atlantic cod. Alaska pollock spawns eggs at intervals of a few days over a month.

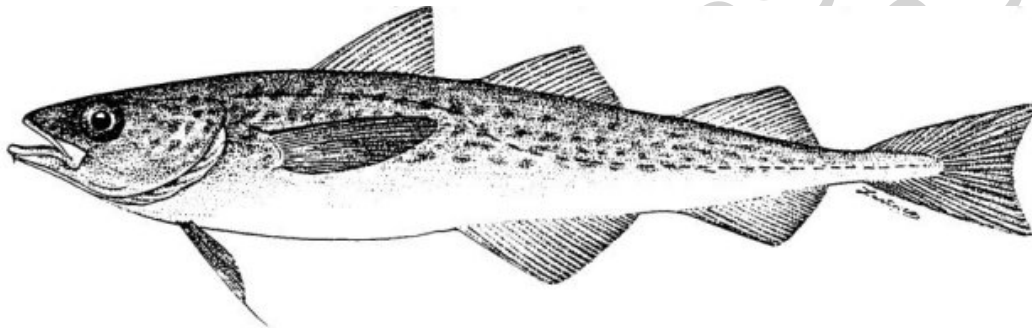


Figure 2a- Alaska pollock (FAO)

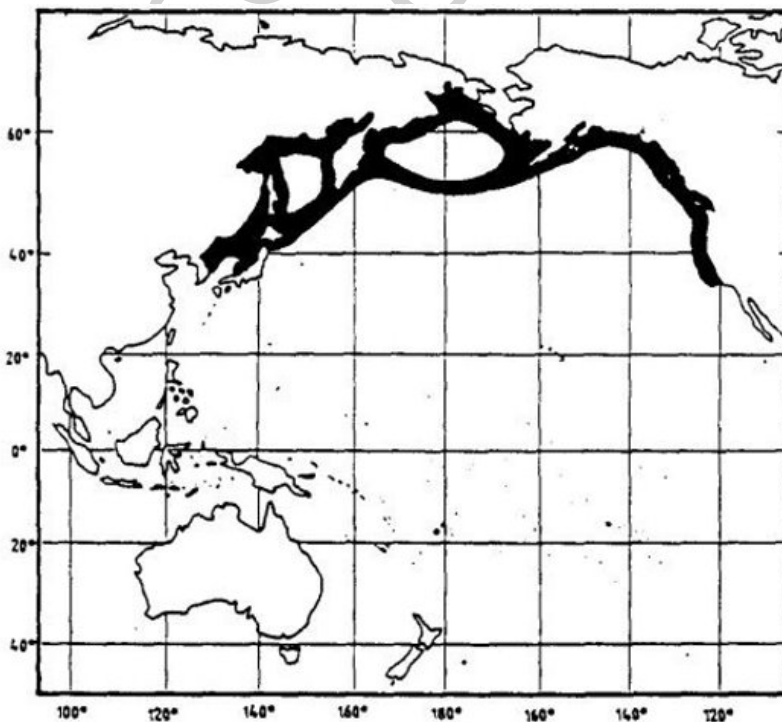


Figure 2b- (Map of distribution)

Young Alaska pollock feed mainly on copepods and their eggs. Adults prey upon shrimps, sand lance, and herring in British Columbia, on pink, chum and coho salmon in Alaska, and on mysids, euphausiids, silver smelt and capelin in Asian waters.

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Biographical Sketches

Yasunori Sakurai is a marine biologist based at the Graduate School of Fisheries Sciences, Hokkaido University, since 1987. He is author of many scientific notes, including notes on the reproductive biology and the stock fluctuations of gadid fish and cephalopods related to climate change.

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