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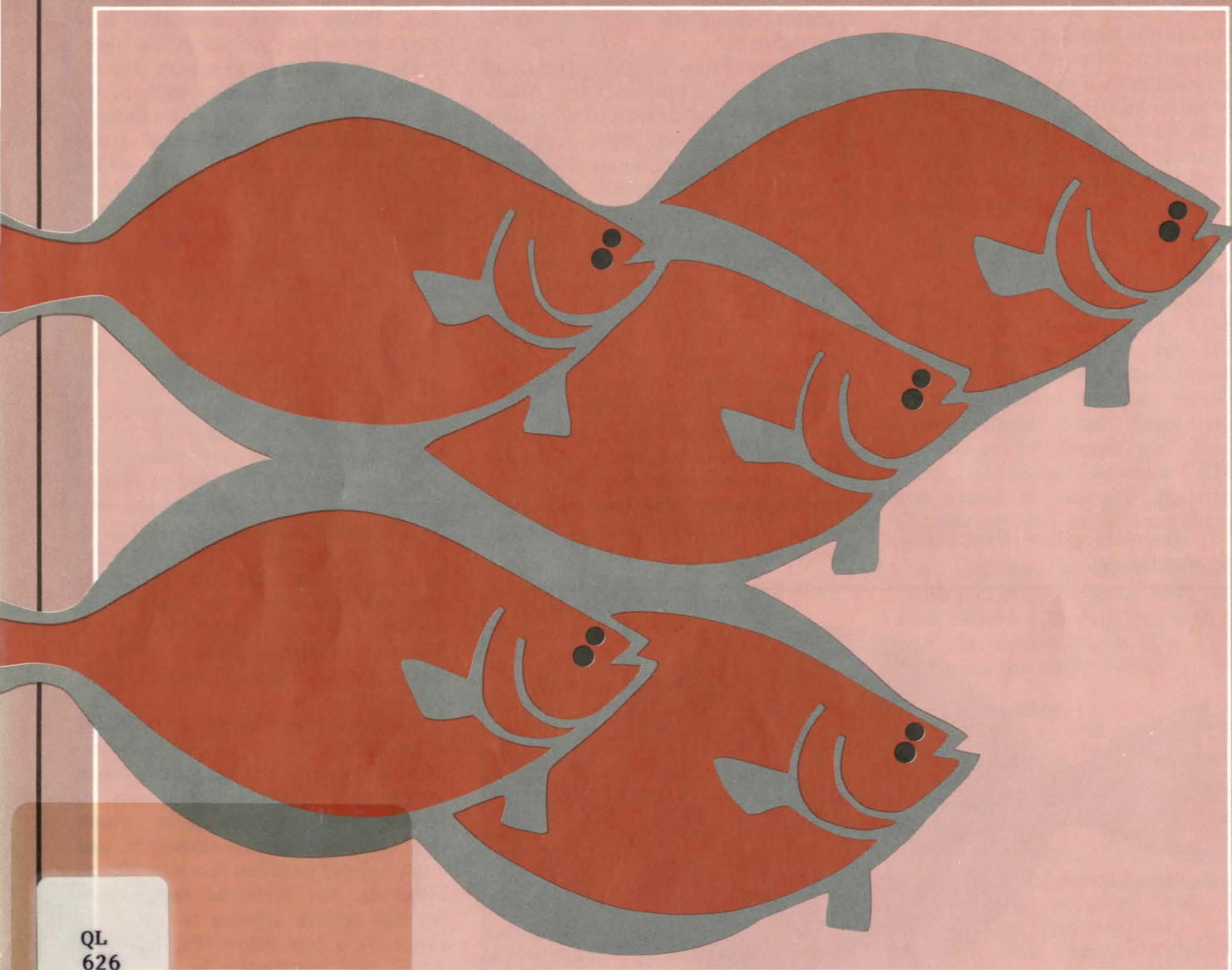
Pêches  
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# Underwater World

## American Plaice



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## American Plaice

**A**merican plaice (sometimes called *plaice* or *flounder*) is probably the most abundant flatfish in the Northwest Atlantic and has become one of the major commercially exploited groundfish species. With the extension of the 200-mile limit, the fishery for plaice has evolved into almost an exclusive Canadian fishery.

For Canada, the most important fishery for plaice is the Grand Banks, where it has accounted for up to two thirds of total Newfoundland trawler landings in the past decade. American plaice are also fished commercially in other localities and the species is fairly common throughout the whole Northwest Atlantic.

In terms of total weight of fish of all species landed in the Northwest Atlantic, the combined flatfish of all species ranks next to cod, with American plaice accounting for about 50 per cent of the total flatfish landed.

Since the extension of Canadian jurisdiction and the resulting control of its marine resources, there are encouraging signs that the stock size of plaice is increasing, especially on the Grand Banks. In the past, it appears that relatively large numbers of plaice, especially those less than commercial size, were caught and discarded by countries that were interested in catching only cod to be salted. In addition, there was no way to determine the accuracy of reported landings. However, since becoming a Canadian fishery, matters have changed.

### Description

American plaice (*Hippoglossoides platessoides*) belongs to the flatfish group of fishes, whose members are strongly compressed laterally and lie and swim on one side. When the young fish hatch from the egg, at or near the surface, they have the normal fish form. During development, as they settle to the bottom of the ocean, a change occurs in the body structure. The head becomes twisted so that the fish now swims and lies on its side. The upper side (which now has both eyes) is normally pigmented as compared to the lower side which lacks pigmentation. Plaice almost invariably have their eyes on the right side of the body.

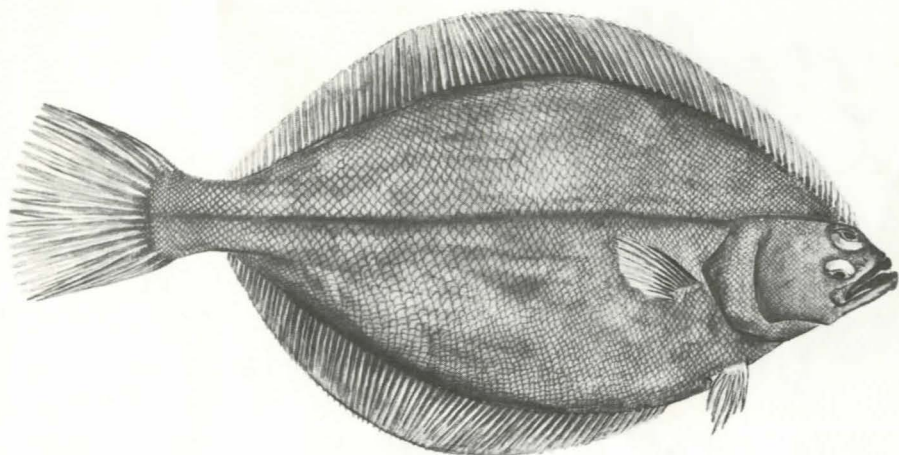
The fish has a large mouth that extends at least below the middle of the eye. The body is covered with relatively small scales, the tail fin is rounded, and the line that runs along the side of the body (the *lateral line*) is slightly curved just behind the gill openings (Fig. 1). The color is normally reddish to greyish brown on the upper pigmented side and white on the lower side.

### Distribution

This species is distributed on both sides of the Atlantic, although the European type probably is a subspecies of the North American fish. In the Northwest Atlantic they occur from West Greenland to the Gulf of Maine. The general distribution off the east coast of Canada is outlined in Fig. 2. As indicated, the occurrence of this species is widespread throughout the area and is probably the most abundant flatfish in the Northwest Atlantic. The area of highest abundance is the Grand Banks, especially the northern half.

While American plaice is considered to be a "cold" water species, it nevertheless appears to have a fairly wide temperature tolerance. It occurs in temperatures ranging from about  $-1.5^{\circ}\text{C}$  to temperatures above  $5^{\circ}\text{C}$  and from inshore localities down to 700 m. However, the preferred temperature for this species appears to be in the range from just below  $0^{\circ}\text{C}$  to about  $1.5^{\circ}\text{C}$  and principally in the 90 to 250 m depth range. As a rule, plaice encountered in the deeper ranges are at higher temperatures. It is worth noting

Fig. 1. American plaice (*Hippoglossoides platessoides*)



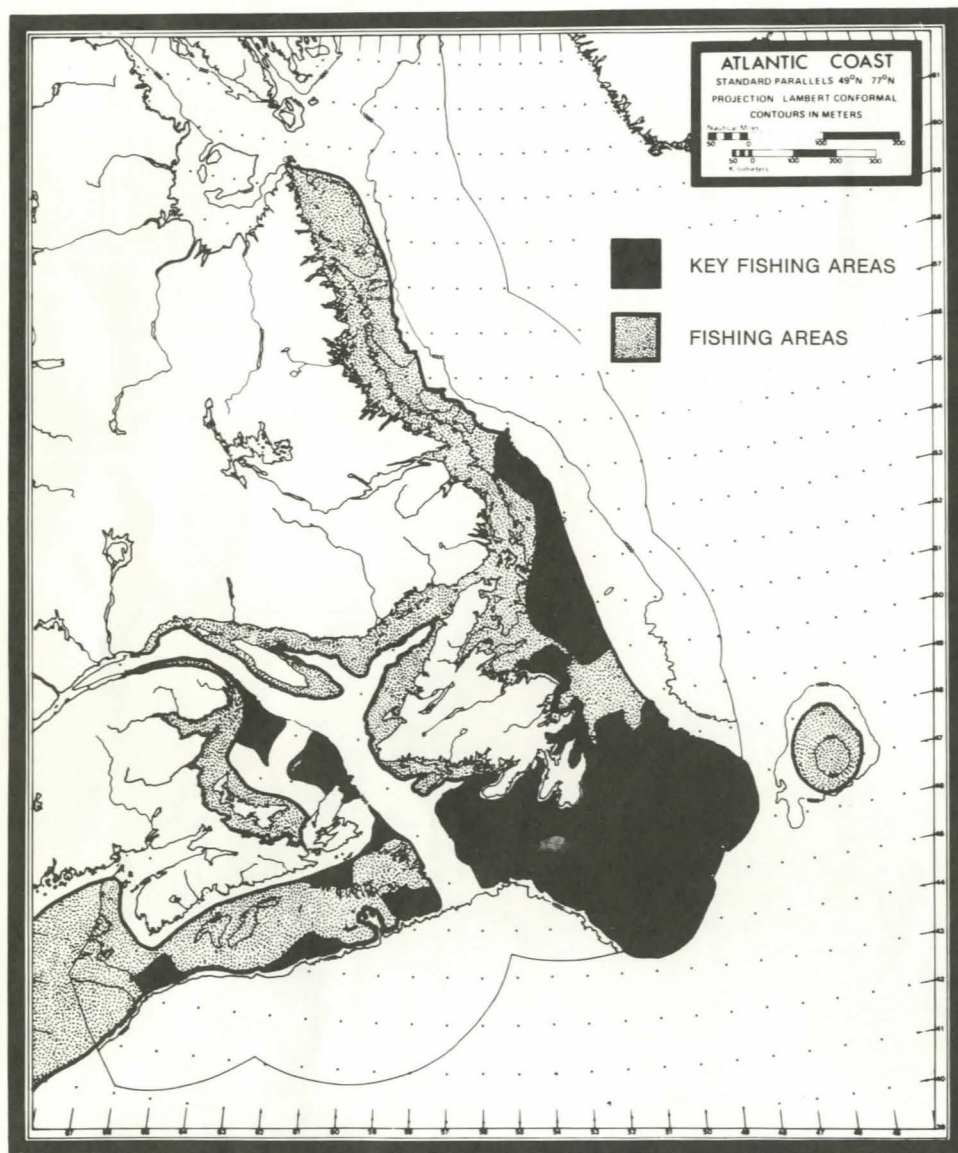


Fig. 2. General distribution of American plaice in the Northwest Atlantic

that the largest catches are normally taken between 125 and 200 m in temperatures of  $-0.5^{\circ}$  to  $1.0^{\circ}\text{C}$ .

#### Spawning

For most of their distribution, female plaice begin to spawn at eight or nine years of age when they are about 30 cm in length (*depending on the location*). However, most female plaice do not reach the spawning stage until at least 11 years of age (40-45 cm). Some males, on the other hand, become sexually mature at three years of age when they are 15-20 cm in length (*depending*

*on the locality*). However, all male plaice are usually mature after the age of six (25-30 cm).

Plaice produce large quantities of eggs. Thus, a 40 cm plaice, on the average, produces 250,000 to 300,000 eggs and a 65-70 cm plaice produces nearly 1,500,000 eggs. Spawning and fertilization of the eggs occur at or near the bottom and the fertilized buoyant eggs float to the surface layer where hatching occurs.

While no specific spawning grounds for this species have been recognized, certain localities offer environmental conditions such as bottom type, temperature and depth that are particularly favourable for spawning activity.

American plaice are spring spawners, with spawning occurring at least as early as the first part of April on the Flemish Cap (*Fig. 4*), and on the southern half of the Grand Banks, to late May or early June off Labrador.

The length of time between fertilization and hatching of the eggs varies considerably depending on the water temperature in the upper layers. Hence, developing eggs and larvae could drift a considerable distance before the young fish finally settle to the bottom.

#### Age and Growth

Plaice are relatively slow growing fish. Age is determined by counting rings on the ear bones (*otoliths*). The dark rings are probably formed when environmental conditions and food supplies are unfavourable and growth is slow. The lighter rings probably reflect more favourable conditions and periods of more rapid growth.

Because of differences in environmental conditions and food supplies throughout the region, there is considerable variability in the rate at which these fish grow. Figure 3 gives a plot of the average length of American plaice for a number of localities in the Newfoundland-Labrador area. It can be seen that plaice on the northeast part of the Grand Banks at 10 years of age are, on the average, around 32 cm, whereas, on the southwest part of the Grand Banks they are approximately 45 cm in length. The growth curves shown in Fig. 3 are for female plaice. Male plaice are slightly smaller than



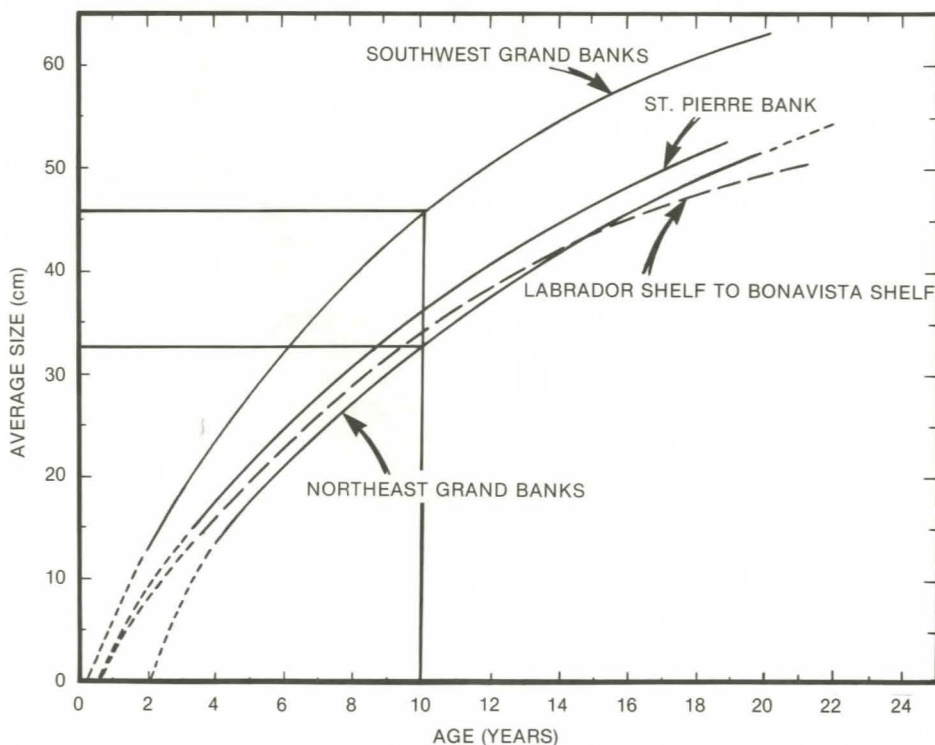
the females from about six years of age, and usually have a shorter life span. American plaice from the Gulf of St. Lawrence (Div. 4T) and the Scotian Shelf (Div. 4V, 4W, and 4X) have a growth rate slightly below the curve shown in Fig. 3 for the southwest part of the Grand Banks. Plaice up to at least 25 years of age have been caught, but in heavily exploited stocks 20 years of age is usually the maximum recorded.

### Food and Feeding

Larval plaice feed on minute plants and animals that are present in the upper water layers. When they settle to the floor of the ocean their diet gradually changes as the fish grow and the mouth size increases and accommodates a wider variety of prey. Adult plaice feed on such things as sand dollars, brittle stars, shrimp-like animals, marine worms called polychaetes, and fish; primarily capelin and launce. As a matter of fact, the latter make up most of the diet of plaice in some localities.

Although the normal habitat is at or near the ocean floor, plaice frequently move off the bottom, usually at night, possibly in pursuit of prey species such as capelin.

Fig. 3. Comparison of size-at-age of American plaice from four different localities



### Fishery Management

For management purposes American plaice in the Canadian sector of the Northwest Atlantic consists of six stocks. Additionally, there is a stock in the New England-George's Bank area. A fish stock is usually roughly defined as a discrete group of fish of a particular species occupying an area. The stock idea implies that any fishing activity on one stock (*of a particular species*) would have little or no effect on any other stock. For example, fishing the Grand Banks plaice very heavily would have no effect on the size of the population on St. Pierre Bank (Fig. 4) or on the northeast Newfoundland Shelf (NAFO Div. 3K).

Although the limits of all the stocks have not been completely defined, it is fairly certain at least that the small plaice stock on the Flemish Cap is distinct from that on the Grand Banks, and because of their geographic separation, stocks on the Scotian Shelf and in the Gulf of St. Lawrence are almost certainly discrete.

American plaice are relatively sedentary, at least in the adult phase, and tagging results have indicated minor migrations. Most tagged fish were recovered less than 30 miles from the tagging site up to seven or eight years after tagging.

The stock units that have been used to manage plaice and indeed almost all fisheries in the Northwest Atlantic are based on Northwest Atlantic Fisheries Organization (NAFO) subarea or divisional boundaries. To determine the size of fish populations, it is necessary to have knowledge of the quantities of fish caught for a number of years, and catches have been recorded by various statistical agencies and reported by NAFO divisions (Fig. 4).

The stocks of American plaice in the Northwest Atlantic are as follows:

1. Subarea 2 (Div. 2G, 2H, 2J) and Division 3K (*Labrador, northeast Newfoundland*).
2. Divisions 3L, 3N, and 3O (*Grand Banks*).
3. Division 3M (*Flemish Cap*).
4. Subdivision 3Ps (*St. Pierre Bank*).

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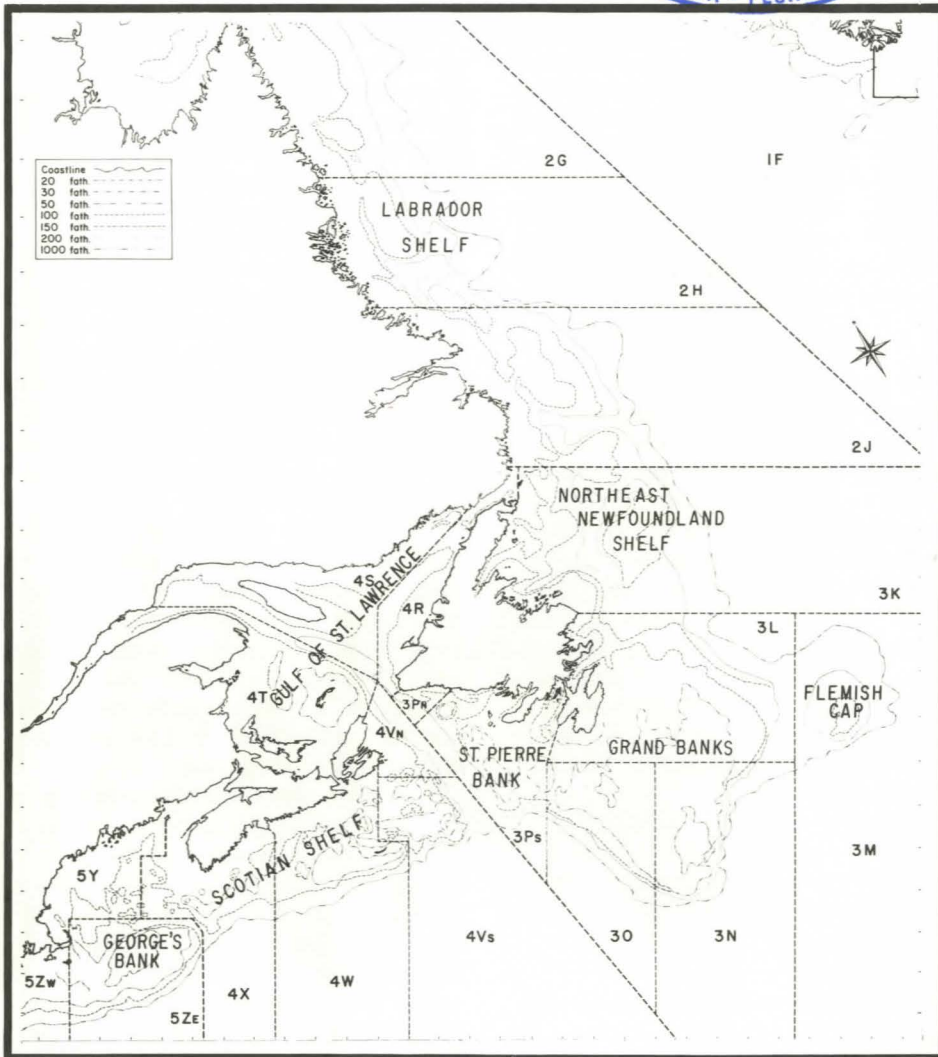


Fig. 4. Map showing NAFO Divisions and primary locations in relation to American plaice stocks

5. Division 4T (southern Gulf of St. Lawrence).
6. Divisions 4V, 4W, and 4X (Scotian Shelf).
7. Subareas 5 and 6 (Georges Bank-New England).

Stocks are assessed each year to determine the appropriate removal level by the fishery. To arrive at this level, certain biological and statistical data are required. These include, for each stock, the number of fish caught each year, an accurate estimate of the amount of fishing effort, the number of new young fish that may be taken by the fishery, and some estimate of the rate at which the fish die from natural causes such as predation and disease. The number of fish caught at each age is determined from samples of otoliths

(for age determination), and length and weight measurements of individual fish taken throughout the fishing season from commercial landings. By knowing the average weight of individual fish caught, it is possible to calculate the total number caught from the total weight landed. These total numbers can then be broken down into the numbers at age by the proportions of the different age groups in the samples. From these data the total number of fish in the stock can be estimated using the appropriate mathematical models.

In arriving at the appropriate removal number or the Total Allowable Catch (TAC), biologists aim at a target that will allow the stock to remain at a sustainable level on a continuing basis. Consideration is also given to the stock size level that needs to be maintained to produce a sufficient catch for each unit of effort expended that will be economically viable.

#### The Fishery

A large proportion of American plaice is caught by the offshore otter trawler fleet. However, up to 3,000 or 4,000 metric tons (t) are usually landed by the inshore gill net fishery primarily on the northeast and east coasts of Newfoundland. Small quantities are also taken by Danish and Scottish seines. All plaice catches are filleted and almost all that are produced in Canada are sold in the frozen condition.

As indicated in Table 1, approximately 73,000 t of plaice were landed from eastern Canadian waters in 1980 with the Grand Banks (Div. 3LN0) producing the major share.

#### Further Reading:

- Leim, A.H., and W.B. Scott. 1966. Fishes of the Atlantic coast of Canada. Fish. Res. Board Can. Bull. No. 155 (American plaice p. 389-392)
- Pinhorn, A.T. 1966. Living marine resources of Newfoundland-Labrador status and potential. Fish. Res. Board Can. Bull. No. 194.
- Pitt, T.K. 1975. Changes in abundance and certain biological characteristics of Grand Bank American plaice *Hippoglossoides platessoides*. J. Fish. Res. Board Can. 32: 1383-1398.

**Table 1.** Catches and total allowable catches (TAC) (in brackets) in metric tons from 1970 to 1980 (TAC to 1981) for American plaice stocks in the Northwest Atlantic

Year	Stock							
	2 + 3K	3M	3LNO	3Ps	4T	4VWX <sup>a</sup>	5&6 <sup>b</sup>	
1970	12.7	+	66.6	12.3	9.2	8.4	4.3	
1971	5.3	1.0	67.9	7.2	9.5	14.3	3.1	
1972	9.1	0.9	59.4	6.5	8.3	10.7	2.3	
1973	5.1	0.5	52.8 (60.0)	14.8	6.9	12.4	2.1	
1974	5.6 (10.0)	1.9 (2.0)	46.3 (60.0)	6.6 (11.0)	8.5	16.8	2.1	
1975	5.7 (8.0)	1.7 (2.0)	43.2 (60.0)	4.2 (11.0)	8.4	11.7	2.6	
1976	6.1 (8.0)	1.2 (2.0)	51.8 (47.0)	5.5 (8.0)	11.2	11.1	3.5	
1977	7.5 (8.0)	1.6 (2.0)	44.0 (47.0)	4.6 (6.0)	9.2 (10.0)	7.8	7.2	
1978	3.5 (6.0)	1.3 (4.0)	50.0 (47.0)	3.7 (4.0)	9.0 (10.0)	6.8	9.6	
1979	3.0 (6.0)	0.8 (2.0)	48.6 (47.0)	3.7 (4.0)	8.5 (10.0)	6.3	11.4	
1980	5.0 (6.0)	1.2 (2.0)	49.1 (47.0)	2.9 (5.0)	7.1 (10.0)	7.5	13.5	
1981	(6.0)		(55.0)	(5.0)	(10.0)			

<sup>a</sup> TAC combined for plaice, yellowtail, and witch since 1974.

<sup>b</sup> TAC combined with other flatfish (except yellowtail).

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