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Resource Prospects for Canada's Atlantic Fisheries 1979-1985

RESOURCE PROSPECTS FOR CANADA'S ATLANTIC FISHERIES

1979 - 1985

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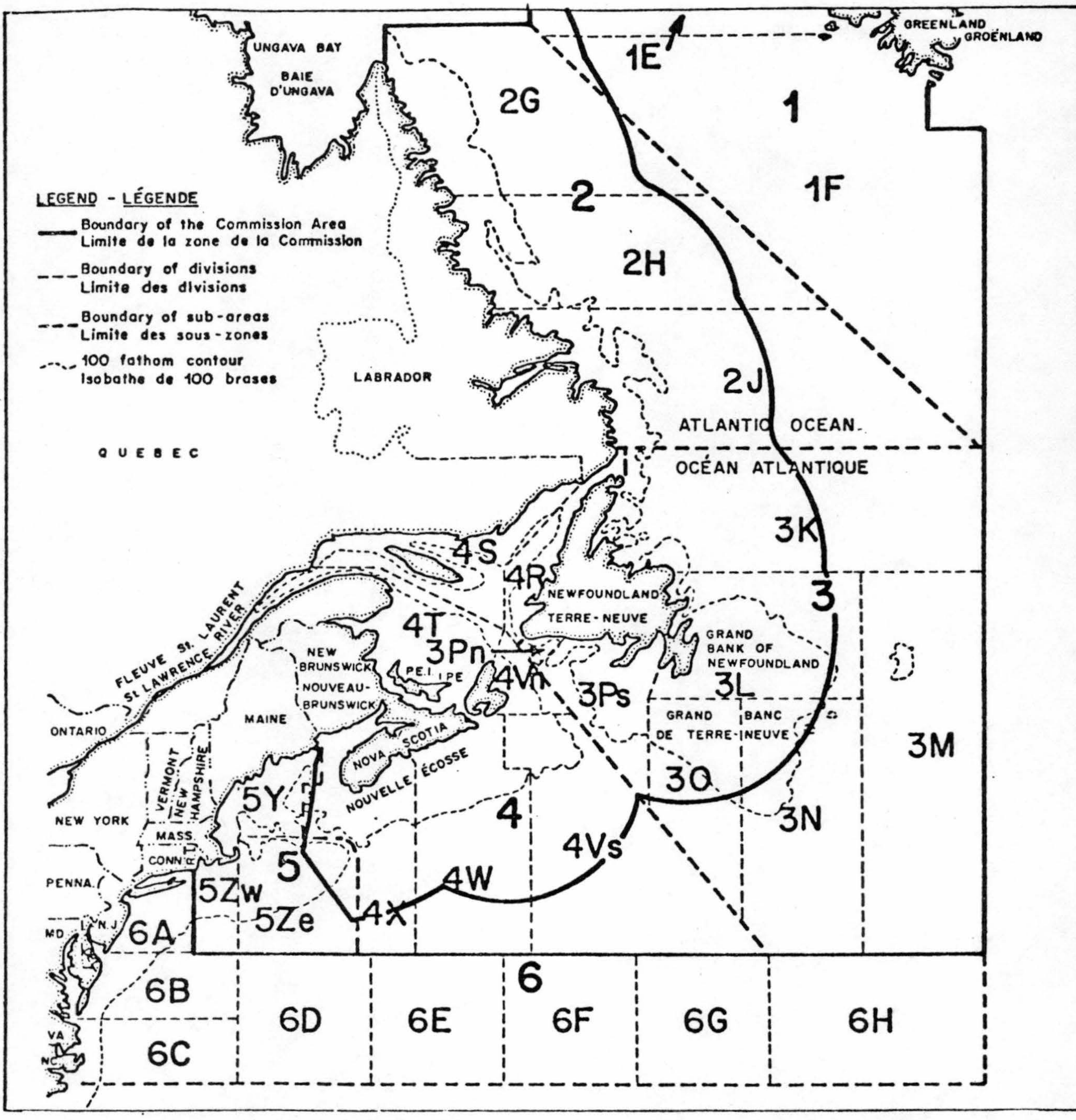
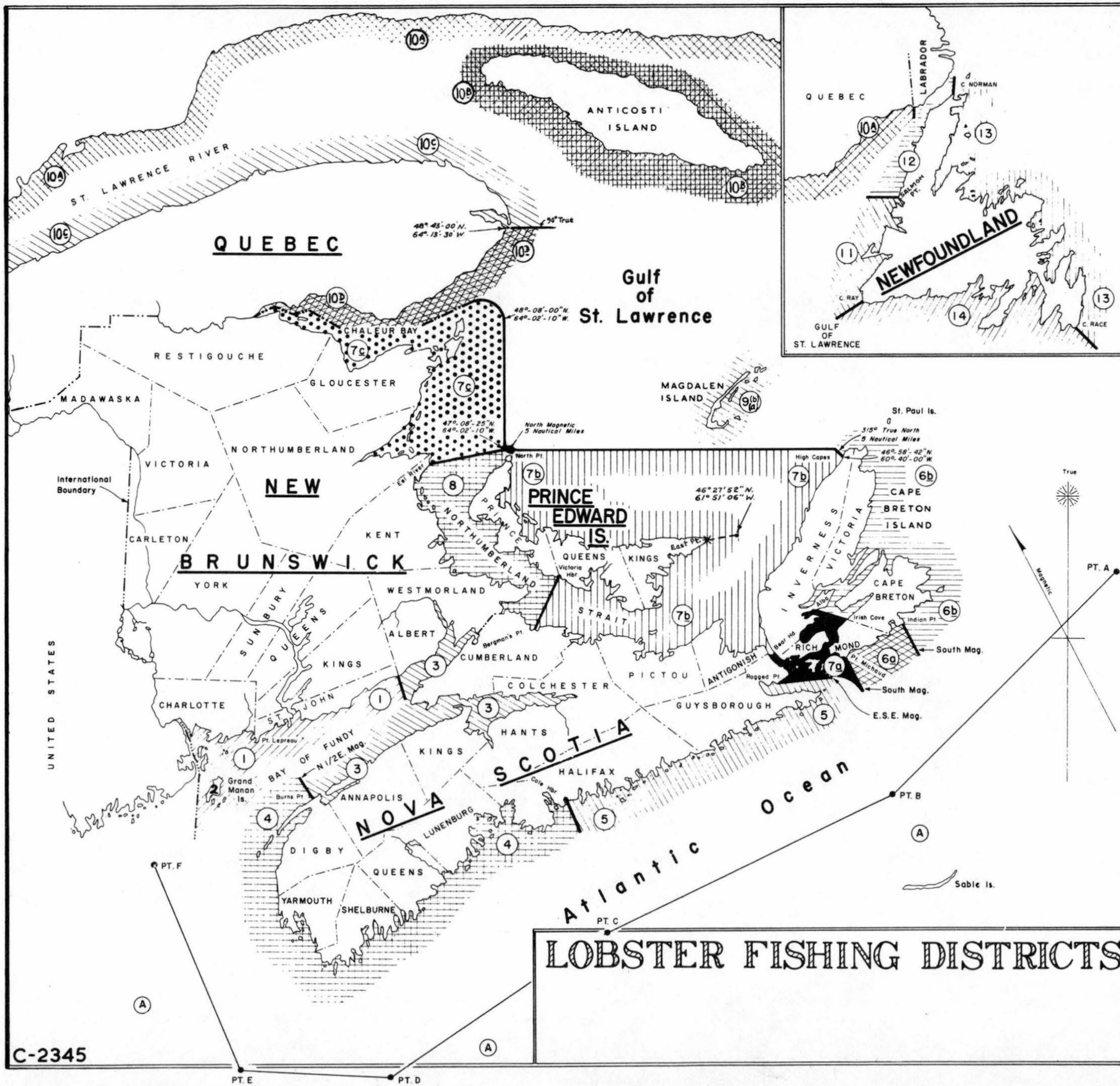


CARTE (UNIQUEMENT POUR FINS D'ILLUSTRATION) INDIQUANT LES DIVISIONS DE LA COMMISSION INTERNATIONALE DES PÊCHERIES DE L'ATLANTIQUE NORD-OUEST ET LA LIMITE DES ZONES DE PÊCHES CANADIENNES SUR LA CÔTE DE L'ATLANTIQUE.

MAP (FOR ILLUSTRATION ONLY) SHOWING ICNAF (INTERNATIONAL COMMISSION FOR THE NORTH-WEST ATLANTIC FISHERIES) DIVISIONS AND LIMIT OF CANADIAN FISHERIES ZONES ON THE ATLANTIC COAST.



LOBSTER FISHING DISTRICTS

INTRODUCTION

The decision by the Government of Canada to extend fisheries jurisdiction to 200 miles was given emphasis by a fisheries resource crisis off the Canadian Atlantic coast. Severe resource declines, falling prices and rapidly escalating costs of catching and processing combined in 1974 to threaten the survival of the Canadian Atlantic groundfish industry. A major objective of the new 200-mile management régime is to rebuild the resource so as to provide increased catches and catch rates for Canadian fishermen. In order to rebuild the fish stocks rapidly, Canada is applying stringent conservation measures within its 200-mile fisheries zone.

To provide a basis for planning and development of Canada's east coast fisheries, Fisheries and Oceans scientists prepared in 1977 a comprehensive forecast of resource prospects for Atlantic coast fish* stocks to the mid-1980's. This document represents the first annual revision.

These projections, which are given in the form of a projected Total Allowable Catch (TAC) for each stock, should be viewed only as a general guide to likely events. While 1979 predictions are based largely on formal calculations, and actual events should not differ widely from those predicted, projections of stock status in the 1980's are to a considerable extent best guesses. The precision of these estimates varies greatly depending on whether the assessment of the stock is based on known age composition, fishing mortality rates and predicted levels of recruitment, or on generalized production models relating overall landings and fishing effort, or on "best estimates from the scientists and managers concerned" based upon recent catch trends. Accurate predictions of strength of year-classes expected to recruit to the various stocks are impossible except for one or two years in advance; these "recruitment" predictions are, however, critical to any projections of catch and catch rates. Despite these uncertainties, an attempt has been made to provide long-term resource projections by major species and species groupings in order to provide a framework for fisheries development planning, although it must be borne in mind that the actual TAC for a particular stock in any year may differ widely from those projected here.

*Including shellfish, marine mammals and marine plants.

To develop these resource projections, certain assumptions have been made about management objectives in the 1980's. There has been a major change in fisheries management approach within the past few years, i.e., the abandonment of the maximum sustainable yield (MSY) concept as the basis for establishing levels of harvest. The objective of MSY management was to obtain the maximum sustainable (average) physical yield from the resource, i.e., to get every available ounce of sustainable production from the fish stocks. This approach had serious drawbacks, not the least of which was the cost of getting that production. Pursuit of MSY almost invariably meant low catch rates, relatively small fish, relatively low stock sizes and great variability in supply. Because of inadequacies in the data base, and lack of adherence to TACs, there was also a tendency for the target to be exceeded, resulting in stock decline. Indeed, catches, particularly in the years prior to the establishment of TACs, often exceeded the MSY and accelerated the introduction of management measures such as TACs.

Attention has recently been focussed on an alternative resource management concept called "optimum sustainable yield" or OSY. There will be no universal definition for this concept, since inherent in the phrase are economic and social as well as biological considerations. Thus, optimum sustainable yield will vary among species, over time, and among areas for a given species. Fisheries scientists no longer produce advice based on a lowest common denominator concept such as MSY but give a range of alternative predictions corresponding to a range of possible management strategies. For the moment, a somewhat arbitrary reference point which scientists call "$F_{0.1}$" is in wide use. In general terms, this corresponds to a level of fishing beyond which increases in total catch relative to increased in fishing effort are marginal. This reference point need not be adopted in the long-term for all fish stocks within the Canadian 200-mile zone. Fish stocks can be managed to give stable average catch rates over the long-term at various levels within the biological limits of the species, taking into account fishing costs and market prices. Within biological limits, the supply can be managed up or down in response to social and economic factors including market prospects.

In 1977 and 1978, most of the major fish stocks within the Canadian Atlantic zone were managed at the level of fishing corresponding to $F_{0.1}$ in order to permit stock rebuilding; the projections assume that this level will be maintained through the mid-1980's. There are some current exceptions, the major one being the northeast Newfoundland-Labrador cod stock (2J+3KL)[1], for which it has been assumed that the 1978 strategy of fishing at a level less than $F_{0.1}$ in order to permit more rapid stock rebuilding will be maintained through the mid-1980's. A change in management strategy for any stock would, of course, alter significantly the projections given here. These projections also assume maintenance of recent average recruitment into the future and will require revision should there be significant departures from the recent average. They further assume that TACs are in fact taken and neither exceeded nor under-utilized.

The catch rate projections are based upon a relative index of stock size (in weight) with a 1977 base index of 1.00. They are independent of vessel size and gear category and represent percentage increases or decreases compared with catch rate experienced by any particular vessel type in 1977.

It should also be noted that no attempt has been made to partition stocks straddling the 200-mile boundary into portions inside and outside 200 miles; instead, the projections have been made for these stocks as a whole. Flemish Cap stocks, which lie entirely outside 200 miles, have also been included. Although projections have been made also for Georges Bank fish stocks, future yields from this area will be dependent upon the management régime implemented over the next few years.

SPECIES OVERVIEW

Groundfish

Cod. Total allowable catches in 1978 sum to 354,500 MT[2] compared with a present estimate of maximum sustainable yield (MSY) of 960,000 MT. This compares with a peak catch of 1,187,000 MT in 1968 from the northern area (Newfoundland-Labrador) and 263,000 MT in 1970 from the southern area (Scotian Shelf and Gulf of St. Lawrence). Substantial reductions in stock abundance have occurred throughout the Northwest Atlantic as a result of over-exploitation in the late 1960's and early 1970's. If cod stocks in general are managed at an "optimum fishing mortality" ($F_{0.1}$) with certain exceptions (e.g., northeast Newfoundland and Labrador) to provide for rapid stock rebuilding or greater availability to inshore fishermen, TACs[3] of 470,500 MT,

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[1] Stocks are identified by statistical areas as illustrated in figure 1

[2] MT = metric ton(s)

[3] Including cod caught inshore in 4X estimated at 12,000 MT in 1978-79.

569,500 MT and 697,500 MT are projected for 1980, 1982 and 1985 respectively. Stock recovery is already evident for the northeast Newfoundland-Labrador (2J+3KL) and the southern Gulf of St. Lawrence (4T+4VN (January-April)) cod stock.

Projected catch rate trends are as follows (based upon a 1977 index of 1.00):

Stock	Catch Rate Index 1980	1982	1985
Northeast Newfoundland-Labrador (2J+3KL)	2.19	2.92	3.65
Grand Bank (3NO)	1.39	1.92	3.14
Flemish Cap (3M)	1.12	1.20	1.32
Southern Newfoundland (3Ps)	1.35	1.68	2.11
Northern Gulf (4RS+3Pn)	1.17	1.26	1.37
Southern Gulf (4T+4Vn (January-April))	1.40	1.15	0.94
East Scotian Shelf (4Vn (May-December))	1.00	1.00	1.00
Central Scotian Shelf (4VsW)	1.28	1.42	1.45
West Scotian Shelf (4X)	1.10	1.40	1.75

<u>Haddock.</u> Haddock catches are currently about 25,000 MT from two stocks on the Scotian Shelf (4VW and 4X) which sustained catches of about 50,000 MT in the early 1960's. Stock levels in 4VW are still low and no further rebuilding is projected at present recruitment levels. Some slight increase in the 4X TAC is anticipated in the early 1980's with an increase in catch rate, but these catches would be above the expected long-term average.

It should be noted that the Grand Banks haddock stock has never recovered from a combination of recruitment failure and over-exploitation in the early 1960's.

<u>Redfish.</u> This is an extremely slow-growing and long-lived species, first entering the fishery at ages 7-10; individuals aged 20 and over comprise a significant part of catches from lightly-fished stocks. Thus, in order to rebuild a depleted stock, catches must be restricted to low levels for a considerable number of years.

Total catches of redfish from the Gulf of St. Lawrence and Scotian Shelf peaked at 170,000 MT in 1973. Catches off Newfoundland-Labrador fluctuated between 63,000 and 136,000 MT during the period 1964-73. The present estimate of MSY, excluding the Gulf of St. Lawrence stock, is 140,000 MT. TACs for all redfish stocks add to 138,000 MT for 1978 and 135,000 MT for 1979. Overall, little change is anticipated with TACs of 137,900, 133,000 and 137,600 MT predicted for 1980, 1982 and 1985 respectively. The only significant changes expected are for the St. Pierre Bank (3P) stock, the TAC for which is expected to decline from 18,000 MT in 1978 to 5,000 MT by 1985, and the Scotian Shelf (4VWX) stock, for which the TAC is expected to increase from 20,000 to 30,000 MT in the same period.

Flatfish. Present estimates of yield at $F_{0.1}$ in the Newfoundland-Labrador area sum to 140,000 - 150,000 MT. TACs for 1979 total 134,000 MT, a reflection of reduced abundance of the Grand Banks plaice and yellowtail stocks. TACs are expected to increase to 141,500 MT, 146,000 MT and 149,000 MT in 1980, 1982 and 1985 respectively. This increase is expected to result from changes in abundance of Grand Banks plaice, for which the TAC is expected to increase by 20%. The only significant catch rate changes are projected for Grand Banks plaice, St. Pierre Bank plaice and Grand Banks yellowtail, all of which are expected to increase by approximately 25% by 1985.

On the Scotian Shelf, the current TAC is for plaice, witch and yellowtail stocks combined. The 1978 and 1979 TAC at 14,000 MT was set much lower than the TAC of 28,000 MT in 1977, in an attempt to generate higher stock levels and more economic catch rates. Yellowtail catches should be kept to a minimum for 5-10 years, but some improvement is forecast for plaice and witch; the combined flatfish TAC should increase to 16,000 MT in 1980, 18,000 MT in 1982 and 23,000 MT in 1985. The catch rate index is projected to be 1.13 in 1982 and 1.44 in 1985.

Catches of flatfish (plaice, witch, yellowtail and winter flounder) from the Gulf of St. Lawrence are projected to be approximately 19,000 MT during the 1980's compared with the 12,000 MT taken in 1977.

Pollock. Pollock on the Scotian Shelf (4VWX) and off the New England coast (Subarea 5) are managed as one stock. In recent years about 65% of the catch has been taken from the Scotian Shelf. The 1977 and 1978 TACs were set at 30,000 MT. Under a continuation of the conservative management approach the TACs for pollock could reach 40,000 MT by 1985.

Roundnose Grenadier. Nominal catches decreased from 75,000 MT in 1971 to 15,400 MT in 1977. The TAC has been set at 35,000 MT for 1978 and 1979. Catches are projected to remain at this level to 1985. However, should fishing at greater depths reveal that the stock size is larger than previously calculated, the TAC could be increased.

Argentine. No change in the TAC of this species from the present 20,000 MT level is projected.

Other Groundfish. It is expected that about 30,000 MT of other groundfish (species not currently subject to quota), e.g., white hake, wolffish, and skate, will be caught in Subareas 2 and 3 and the Gulf of St. Lawrence each year to 1985. Catches of similar unregulated stocks on the Scotian Shelf are expected to yield in the order of 50,000 - 65,000 MT annually.

Groundfish Summary

TACs for 1979 for the traditional major groundfish species* in Subareas 2, 3 and 4 (Labrador to Nova Scotia, including the Gulf of St. Lawrence) sum to 780,000 MT, the Canadian share of which is 572,000 MT. This compares with Canadian catches (of the same species) of 384,000 MT in 1974 (the lowest in recent years), 394,000 MT in 1975, 437,000 MT in 1976 and 474,000 MT in 1977. These figures do not include approximately 25,000 - 30,000 MT of miscellaneous unregulated groundfish caught by Canada. The highest Canadian Atlantic groundfish catch was 614,000 MT in 1966.

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*cod, redfish, haddock, pollock, American plaice, witch, Greenland halibut and yellowtail.

The 208,000 MT of such species allocated to countries other than Canada in 1979 consist of 128,000 MT of cod, 47,000 MT of redfish, 22,000 MT of flatfish, an estimated 9,000 MT of pollock (a transboundary stock shared with the U.S.A.) and 2,000 MT of haddock. It should be borne in mind that these figures include cod, redfish and American plaice on the Flemish Cap (entirely beyond 200 miles), portions of stocks straddling the 200-mile limit, and allocations for France in the area of St. Pierre and Miquelon and in the Gulf, the latter under Treaty rights.

TACs of the major groundfish species traditionally fished by Canada are expected to increase from 780,000 MT in 1979 to 850,000 MT in 1980, 957,000 MT in 1982 and 1,098,000 MT in 1985.

When groundfish species (e.g., skate) not subject to regulation at present, but caught regularly by Canadians, and groundfish not normally fished by Canadians, such as silver hake and grenadier, are included the overall TACs are predicted to increase from 1,010,000 MT in 1979 to 1,080,000 MT in 1980, 1,192,000 MT in 1982 and 1,342,000 MT in 1985. Thus, the predicted overall groundfish TAC in 1985 is more than double the 1977 Canadian Atlantic groundfish catch (511,800 MT) of all species.

Pelagic Fish.

Herring. Catches from individual stocks have fluctuated widely. Total catches exceeded 500,000 MT in 1968-70, (mainly taken by Canada - peak catch 478,000 MT in 1970) but declined to 229,000 MT in 1976 (Canada 225,000 MT). While some fluctuation on a stock-by-stock basis is expected, the overall TAC is forecast to increase gradually to 240,000 - 245,000 MT by 1985.

Mackerel. While total Northwest Atlantic catches have exceeded 400,000 MT in some years, the maximum catch off the Canadian coast was only 45,000 MT. The overall TAC for the Northwest Atlantic is expected to increase from 105,000 MT in 1977 to about 300,000 MT by 1985. Since this is a transboundary stock, the quantity to be harvested in the Canadian zone cannot be accurately projected but probably could be at least 40% of the TAC.

Capelin. Offshore fisheries for the species began in 1972 with the catch reaching 367,000 MT in 1975. However, since cod, whale and seal stocks will be rebuilding during the next few years, the quantity of capelin surplus to the needs of major predators may be expected to decrease. Thus, the TAC is projected to decline from 500,000 MT in 1978 to 225,000 MT by the early 1980's.

Finfish Summary

Increases in groundfish TACs will be counterbalanced by an expected major decrease in the capelin TAC. The overall finfish TAC is projected to increase between 1978 and 1985 from 1.7 to 1.9 million MT. This compares with a 1977 Canadian catch of 773,000 MT and a 1978 Canadian share of 921,000 MT.

Invertebrates

Lobsters. In the Newfoundland area, catches are expected to fluctuate between 1,100 and 2,000 MT. The present rate of fishing appears to be too high and the minimum legal size too low. In the Southern Gulf and along Nova Scotia, excessive fishing effort and existing low size limits could have already led to declines in catches in several areas. If size limits are increased to recommended levels, and effort reduced substantially, a reduction in catch fluctuations from year to year and a long-term improvement in catches of up to 50% can be expected over recent average catches of 15,000-16,000 MT.

Scallops. The recent high catches from Georges Bank of 15,000 - 16,000 MT of meats have been based on above average year-classes. The abundance of 3-4 ring scallops entering the fishery in the next few years will be less than that of recent years. Wide fluctuations in catches will continue to reflect recruitment success and will be predictable no more than two years in advance. The long-term sustainable yield is estimated to be approximately 8,000-9,000 MT. Management alternatives for this stock are under review.

Shrimps. Preliminary analyses indicate that the sustainable yield from the Gulf is in the order of 8,000 - 9,000 MT per year. A shrimp fishery is also under development on the Labrador Shelf but no long-term forecast can yet be made. The 1978 TAC in this area was 7,100 MT. There is also a large shrimp stock in the Greenland zone that spreads into Canadian waters; Canadians have not yet fished this stock. A small fishery is being developed in the deep holes on the eastern part of the Scotian Shelf.

Snow Crabs. The annual sustainable yield for Newfoundland waters has been estimated at 5,500 MT. It is not possible to predict catches each year, but they are expected to be in to 2,500 - 6,000 MT range during the next decade. Catches in the Gulf are projected to average betweem 5,000 and 6,000 MT.

Squid. Abundance of squid in Canadian waters fluctuates widely from year to year although catches were less than 11,000 MT until 1975, when an offshore fishery was started and total catches in 1977 reached 88,000 MT. A TAC of 100,000 MT was established for 1978. Present knowledge is insufficient to permit forecasting of TACs in advance of a particular year's fishery; hence it is impossible to predict annual catches during the next decade.

Marine Mammals

Seals. The harp seal population has been increasing since 1972 and conservative TACs have been adopted to allow this population increase to continue. Over the long term, the harvest may increase, perhaps in the order of 25% above the 1978 TAC level of 180,000 animals. The Canadian allocation in 1978 was 135,000 animals (plus the unregulated take by northern natives). The hooded seal is also under quota (15,000 animals in 1977-78) and recent catches have averaged 11,000 animals. The population is increasing and could sustain higher catches in future.

GEOGRAPHIC OVERVIEW

Gulf of St. Lawrence

Overall, the groundfish resource situation in the Gulf offers no possibilities for increased effort on redfish or flatfish. Indeed, there is a need to reduce effort in order to rationalize the activities of the existing fleet. Even with reasonable prospects for cod overall, the recent level of groundfish effort in the Gulf has been more than enough to harvest the projected TACs. Pelagic species. mainly herring and mackerel, should produce somehwat increased catches, with the latter particularly offering possibilities for development. The major invertebrate species, however, appear to be fully exploited.

Scotian Shelf

Catches of groundfish on the Scotian Shelf are projected to increase gradually, with the exception of the central Scotian Shelf cod, TACs for which are expected to remain constant. The moderate recovery will be reflected in improved catch rates. Thus, the Scotian Shelf does not offer opportunity for any increase in effort for groundfish beyond that expended in 1977, or even to accommodate effort displaced from other fisheries. Some re-allocation of effort could, however, result from diversion into non-traditional species, e.g., squid, silver hake or argentine. Among pelagic species, there appears to be some potential for expansion of the Canadian mackerel fishery, particularly iff offshore harvesting proves successful. The invertebrate resources of the Scotian Shelf do not offer any potential for expansion of effort, with the possible exception of deep sea red crab.

Grand Banks-South Newfoundland

The groundfish fisheries may accommodate some expansion provided that the by-catch in an expanded cod fishery does not significantly impact upon the flatfish stocks. Among the pelagic species, herring are fully exploited, but with some improvement in catch rates likely. Although the capelin TAC is expected to decrease to less than 50% of the current level, this species provides a major opportunity for expansion of Canadian fisheries, provided that this resource can be harvested economically.

Northern Newfoundland-Labrador

The dominant fishery in this area is on the northern cod stock. The TAC for this stock is expected to increase significantly (from 135,000 MT in 1978 to approximately 400,000 MT in 1985). Stock size is expected to attain levels that will greatly increase the availability to inshore fisheries. With the exception of capelin, other stocks in the area are likely to remain stable. The northern capelin situations is similar to that on the Grand Banks; there is potential for expansion of Canadian effort despite an anticipated reduction in the TAC. Invertebrate resources, especially shrimp, are attracting great attention but the shrimp fishery is not likely to offer opportunities much beyond those experienced in 1978.

Baffin Bay - Davis Strait

The resources of this area are not well known, particularly in the western area, i.e., within the Canadian zone. A small portion (currently regulated at 5,000 MT) of the Greenland shrimp stock complex extends into the Canadian zone and some Greenland halibut and roundnose grenadier have been taken there. Although the resources are unlikely to prove capable of sustaining landings in excess of current levels, there is potential for development of a Canadian fishery through displacement of foreign effort.

STOCK BY STOCK FORECAST

GROUNDFISH.

Cod: Northern Labrador (2GH)

Before introduction of quota control in 1974, intensive foreign fishing in the late 1960's had reduced significantly catches from an average of 40,000 MT (1965-74). A TAC of 20,000 MT was introduced in 1974, and has been maintained since then. Catches declined to 3,600 MT in 1977. Ice conditions are a major factor affecting catches from this area. While the TAC was set below MSY in an attempt to rebuild this stock there is no evidence that this has occurred as yet. The projected long-term TAC is 20,000 MT. The Canadian estimated requirement (allowance) for 1979 is 1,000 MT.

Cod: Southern Labrador-Northern Grand Banks (2J+3KL)

Catches declined from an average 640,000 MT in 1966-70 to 380,000 MT during 1971-75. The TAC for 1978 was set at a fishing mortality (0.165) less than $F_{0.1}$ (0.20). A continuation to 1982 of this approach, assuming average recruitment, implies a rebuilding of the spawning stock biomass from the 1978 level of 0.235 million MT to about 1.5 million MT. This is the target spawning biomass recommended by the ICNAF Standing Committee on Research and Statistics (STACRES) and would allow a 1982 TAC of 306,000 MT. If the same management approach is maintained, the 1985 TAC would be approximately 400,000 MT. Catch rates are expected to at least triple with a substantial increase in availability to the inshore fishery predicted. Inshore catches have already increased from 41,000 MT in 1975 to more than 70,000 MT in 1977. A doubling can be expected within the next few years.

Cod: Flemish Cap (3M)

At past levels of recuitment, the MSY for this stock has been estimated at 38,000 MT. A TAC of 25,000 MT was established for 1977 to prevent fishing effort exceeding that corresponding to the MSY. The TAC was increased to 40,000 MT in 1978 and 1979 to take into account an apparent increase in stock resulting from the entry of the very abundant 1973 year-class to the fishery. If this fishery were to be managed at the effort level adopted for most other stocks, (i.e., approximately $F_{0.1}$) a significant reduction in the TAC, below that set for 1979, would be necessary. It is projected that this would be followed by a slow increase in TAC to about 33,000 MT in 1985. The Canadian allocation for this stock in 1979 is 2,910 MT.

Cod: Southern Grand Banks (3NO)

Following a drastic reduction in the TAC to 15,000 MT for 1978, the stock is rebuilding to an equilibrium level which is expected eventually to permit a yield of 75,000 MT. A continuation of the same level of effort as that required to harvest 15,000 MT in 1978 over the next several years should allow the stock to recover by 1985 to a level which would result in a TAC of 67,000 MT. The 1979 Canadian allowance for this stock is 9,500 MT.

Cod: St. Pierre Bank (3Ps)

Nominal catches from this stock have declined from 60,000 MT in 1971 to 33,000 MT in 1977, and fell short of the TAC in 1973-75, even though the TAC was reduced yearly. Fishing effort in 1976 was still substantially greater than the level which would provide the long-term maximum catch from this stock, and the 1978 and 1979 TACs of 25,000 MT were set somewhat above the level which corresponds to $F_{0.1}$. If this TAC is maintained for several years, a slow increase in TAC to 32,000 MT should be possible by 1985. Canada has reserved 21,100 MT for its fishery in 1979.

Cod: North and East Gulf of St. Lawrence (4RS+3Pn)

The average annual catch during 1971-75 was 67,000 MT, with the inshore component taking about 60% of the total Canadian catch. A TAC of 55,000 MT was first established for 1977 and maintained for 1978. Recent catch rates have been very good because the 1971 year-class is stronger than average and the TAC in 1979 has been established at 75,000 MT. It is projected that catches from this stock will remain at this level to 1985.

Canada, France Portugal and Spain conducted the main fisheries on this stock; Portugal and Spain were phased out of the fishery in 1976. France has Treaty rights of access to this stock until 1986; these have been interpreted as constituting 30% of the TAC.

Cod Stocks in the Western Gulf of St. Lawrence and Eastern Scotian Shelf (4T, 4Vn, 4VsW)

Management of these stocks takes into account the fact that the three mains stocks in the area exhibit some seasonal migration among the statistical subdivisions. Subdivision 4Vn has a local stock which provides half of the summer catch. The division also receives winter immigrants from 4T (the southern Gulf of St. Lawrence) and summer immigrants from the 4VsW stock. Taking into account the known stock distributions, the current management rationale is to consider catches in 4T, and in 4Vn during January to April, as coming basically from the southern Gulf stock. Catches in 4Vn during May to December are considered to be largely based on local stocks, despite some immigration from 4Vs to 4Vn during the summer.

Cod: Sydney Bight (4Vn) (May-December)

Local stocks have traditionally accounted for half the summer catch, although there have been contributions from 4T cod early and late in the season, together with summer immigrants from 4VsW. Catches in recent years have been about 5,000 MT, roughly half the long-term average. The TACs for 1977-79 (3,500 MT) were set in response to reduced abundance of adjacent stocks in 4T and 4VsW and the need to prevent overfishing in 4Vn as a result of the depletion of these stocks. Whatever the source of cod taken in this area, it is clear that catches should be kept to a minimum for several years to allow stock rebuilding.

Cod: Southern Gulf (4T and Sydney Bight (4Vn (January-April))

Catches in 1974 and 1975 were well below the established TACs of 63,000 and 60,000 MT. In 1976, the TAC was reduced to 30,000 MT with a further reduction in 1977 to 15,000 MT. For 1978, the TAC was increased to 38,000 MT to take account of improved recruitment. The earlier reduction in TAC levels was largely a consequence of several poor year classes entering the fishery. The strength of the 1973 to 1975 year-classes appears to be good and prospects for stock rebuilding are encouraging. At current levels of fishing, the TAC is expected to peak at 50,000 MT by the early 1980's and then decline to 30,000-35,000 MT.

Cod: Banquereau-Sable Island (4VsW)

Catches averaged 60,000 MT from 1960 to 1973, decreasing to 24,000 MT by 1976. TACs in effect from 1973 to 1976 were not achieved, but fishing effort directed to cod alone does not appear to have been responsible for this decline. The decline is thought to be a consequence of recruitment failure (perhaps caused by silver hake predation, or cod by-catch in the silver hake fisheries). Scientists are concerned that recruitment failure may become irreversible if spawning stock size is allowed to decline below the present low level and have advised that the spawning stock be rebuilt. Projections assume that the lowest practicable catch will continue to be 7,000 MT as reflected in the Groundfish Management Plans for 1977 - 1979. If this is the case, and assuming average recruitment, stock size will increase gradually, as will catch rate, through 1985. The 1979 Canadian share of this TAC is 6,600 MT.

Cod: Browns Bank (4X)

Historically, cod fishing in this area has been inshore with catches averaging 15,000 MT. Catches increased from 1962 to 1968 to a level of 35,500 MT with the development of an offshore fishery. Quota and area restrictions on haddock have provided some protection to the cod since 1970. As a further measure, a TAC of 5,000 MT was placed on offshore cod in this Division in 1975. This was reduced to 4,000 MT for 1976 - 1977 for the southeastern part of 4X. The catch in 1976, including inshore catches, was 16,657 MT, the lowest since 1962. The stock structure in 4X is complex and status of the inshore stocks is essentially unknown because of difficulties in collecting inshore statistics. It is likely, however, that inshore cod are being exploited at close to optimal levels. There is evidence that the offshore component has been overexploited; approximately half the present effort would allow long-term catches of possibly 10,000 MT offshore. The total catch from all stock components in 1979 will likely be around 16,000 MT and it is possible that the total yield by 1985 will again approximate 25,000 MT.

Cod: Georges Bank (5Z)

The development of an international fishery for Georges Bank cod resulted in increased catches which reached 64,000 MT in 1966. Thereafter, catches declined to a low of 28,000 MT in 1976. Landings increased to 38,500 MT in 1977, in response to increased recruitment and higher catch rates. Since high discards of small cod were reported late in 1977, actual catches were probably higher. The TAC for 1977 of 20,000 MT applied to commercial catches only and the reported commercial catch was about 26,500 MT. The remaining 12,000 MT reported as caught in 1977 is an estimate of the U.S.A. recreational catch. Despite increased recruitment, the stock size is below the optimal level and a reduction in catch below the 1977 level is required for the immediate future to ensure stock rebuilding.

Pollock: Scotian Shelf and Georges Bank (4VWX+SA5)

This fishery is centered on Browns Bank (4X) with substantial catches both east and west. The only spawning area described to date is on Jeffreys Ledge (5Y), and the fisheries for the whole area are managed as a unit. The first TAC was introduced in 1973 (for 4X+5), with 4V and 4W being added in a TAC of 55,000 MT for 1974-76. While fisheries trends are difficult to interpret, due to changes in catchability in recent years, the stock appears to be fairly stable at present. Fishing at $F_{0.1}$ in 1979 should result in a catch of 30,000 MT (the level of the TAC in 1977-78). Continued application of this management criterion would give TACs of 35,000 MT in 1980, 39,000 MT in 1982 and 40,000 MT in 1985. Significant improvements in catch rate are also projected, with an index of 1.25 in 1980, 1.33 in 1982, and 1.38 in 1985. Management and allocation of this boundary area stock is, however, subject to agreement between Canada and the U.S.

Silver Hake: Scotian Shelf (4VWX)

Silver hake exploitation on the Scotian Shelf has been almost entirely by one country, the U.S.S.R., Cuba being a recent entrant to the fishery. Peak catches occurred in 1963 (123,000 MT) and 1973 (300,000 MT). The TAC was reduced to 70,000 MT in 1977 and again for 1979, with an increase to 81,000 MT for 1978. There is great variability in stock abundance, reflecting pronounced recruitment fluctuation. The fishery, which is prosecuted largely with small-meshed bottom trawls, generates a substantial by-catch of young fish of other commercial species, this having a depressant effect upon the productivity of the stocks involved. Minimum cod-end mesh size used in the directed silver hake fishery was set at 60 mm manilla equivalent as of April 1, 1977.

Recruitment prediction remains an intractable scientific problem and this limits substantially the value of resource projections for this species. For the purpose of this document, it has been assumed that the 1977 TAC of 70,000 MT can be sustained through 1985. The Canadian share of the 1979 TAC is 10,000 MT.

Haddock: Browns Bank (4X)

Long-term average catches 1931-1962 were 17,000 MT, split roughly equally between the U.S. and Canada. In the mid 1960s, Canada expanded the fishery to a 28,000 MT average, total catches reaching a peak of 42,200 MT in 1966 as a result of the extremely large 1963 year-class. Decreased recruitment and continued high effort led to catch declines and, in consequence, to a TAC of 18,000 MT and a closed spawning area/season in 1970, and even more restrictive regulations in subsequent years. There have been significant indications of stock recovery since 1974 and the stock is now back to a level close to the long-term average. A system of trip and monthly vessel catch limits was imposed in 1977 in an attempt to restrict the catch to 15,000 MT. However, preliminary figures indicate that the catch was rather more than 21,000 MT. If the incoming year-classes, particularly that of 1975, are as strong as predicted the stock should continue to increase and TACs of about 30,000 MT should be possible in the 1980s. The TAC for 1979 is 26,000 MT.

Haddock: Sable Island-Banquereau (4VW)

In the 1950s and 1960s, catches averaged 28,000 MT annually. However, recruitment failure followed the fishing out of the 1962 and 1963 year-classes as juveniles, and catches in 1975 - 1976 averaged only 1,500 MT, increasing to 3,300 MT in 1977. Recent TACs (2,000 MT) were set to maintain removals at the lowest possible level (by-catches only). Present low population sizes and continued by-catches in squid and silver hake fisheries may prevent recovery of the stock by 1985. The 1974 year-class may be stronger than its immediate predecessors; however, it is doubtful whether this stock could be restored to its former size. The Canadian share of the 1979 TAC is 1,700 MT.

Redfish: Labrador-NE Newfoundland (2+3K)

Recent catches have declined from 39,000 MT in 1973 to 17,400 MT in 1977. Fishing effort has been stable over the last decade, but the stock is depressed and will take considerable time to rebuild. Maintaining the present TAC of 30,000 MT should result in some modest recovery of the stock to levels providing 34,000 MT by 1985. Canada has reserved 25,000 MT from the 1979 TAC for its fishery.

Redfish: Flemish Cap (3M)

Nominal catches during 1963 - 1975 averaged 14,000 MT but were highly variable (peak - 35,000 MT). The yield corresponding to fishing at 2/3 MSY effort is variously estimated at 15-24,000 MT. The 1978 TAC was 16,000 MT and catch per unit effort has been increasing. The 1979 TAC is 20,000 MT, including 5,500 MT for Canada. TACs are projected to continue at about the 1979 level to 1985.

Redfish: Eastern Grand Bank (3LN)

The level of fishing effort in the late 1960s and early 1970s was above that estimated to provide MSY and catches peaked at 33,000 MT In 1973. Since the introduction of quota management on this stock in 1974, the TAC has been reduced from 28,000 MT in 1977 to 16,000 MT in 1978. Some improvement in catch rates was observed between 1973 and 1976 and there is evidence of increased recruitment in 3N. The TAC for 1979 has been increased to 18,000 MT (10,000 MT allocated to Canada); this level should be sustainable in the 1980s.

Redfish: Southwestern Grand Bank (3O)

Nominal catches were slightly below the TAC of 16,000 MT since regulation began in 1974, declining to 10,800 MT In 1977. Based on evidence of some stock recovery, the TAC was raised to 20,000 MT (the MSY) for 1978 and 1979. Some future adjustments may be necessary, but TACs are anticipated to remain at this level in the 1980s. The Canadian share of the 1979 TAC is 10,000 MT.

Redfish: St. Pierre Bank (3P)

Nominal catches declined since 1970 (37,000 MT) and have been further reduced by quota restrictions since 1974; the TAC for 1976-1978 was 18,000 MT. Catch rates continue to decline, however, and the mid-1960's year-classes have not entered the fishery in expected strength. Therefore, it is likely that abundance of this stock will continue to decline until as least the mid-1980s. The TAC (at $F_{0.1}$) for 1979 is 11,000 MT and is projected to be as low as 5,000 MT by 1985. The Canadian share in 1979 is 9,800 MT.

Redfish: Gulf of St. Lawrence (4RST)

Nominal catches decresed from a peak of 130,000 MT In 1973 to 14,000 MT in 1977 and catch rates have declined since 1972. The initial TAC of 30,000 MT, introduced in 1976, was exceeded. The TAC was reduced to 18,000 MT in 1977 and 1978 and to 16,000 MT for 1979. Recruitment prospects seem poor until the 1971 year-class enters the fishery in the early 1980s. The TAC is, therefore, expected to be reduced further until the early 1980s; catches of about 10,000 MT are expected by 1985, although this will depend upon the actual strength of the 1971 year-class when it enters the fishery.

Redfish: Scotian Shelf (4VWX)

The MSY for this stock is estimated to be approximately 30,000 MT, slightly less than the average catch from 1965 to 1974 (peak catch was 62,000 MT in 1971). However, recent levels of fishing mortality are believed to have been well above those which would lead to stock rebuilding. Since no strong year-classes are expected to recruit to the fishery in the near future, no major increase in abundance is anticipated. The 1978 and 1979 TACs of 20,000 MT should allow some recovery of the stock to about 30,000 MT by 1985.

White Hake: South and West Gulf of St. Lawrence (4T)

Average catches of 4,500 MT have been taken in the southern Gulf. It is anticipated that catches of this magnitude can be sustained into the 1980s.

American Plaice: Labrador - Northeast Newfoundland (2+3K)

Nominal catches have averaged 8,000 MT; a TAC at this level was in effect during 1975-1977. The TAC was reduced to 6,000 MT for 1978 - 1979 because of evidence of stock decline. Prior to 1977, the main Canadian effort in this fishery was with gillnets, and a large proportion of the offshore catches were made as by-catch in the trawl fishery. However, in 1977, there was a significant offshore fishery by Canadian otter trawlers which took two-thirds of the catch. The TAC is not likely to exceed 6,000 MT in the immediate future. Canada has reserved 5,500 MT for its own fishery in 1979.

American Plaice: Grand Banks (3LNO)

Catches declined from a peak of 94,000 MT in 1967 to 43,000 MT in 1975 (43,900 MT In 1977). Under a TAC of 47,000 MT In 1976-79 some rebuilding of the stock is expected to occur and allow long-term yields of up to 58,000 MT over the next decade. Reduction of cod quotas in the area (and hence of plaice by-catch) may speed rebuilding of the stock. The Canadian share of the 1979 TAC is 44,800 MT.

American Plaice: Flemish Cap (3M)

Nominal catches decreased from 4,000 - 5,000 MT in 1965-66 to 1,500 MT in 1974-77. A pre-emptive TAC of 2,000 MT was set in 1974. This was raised to 4,000 MT in 1978 but had been reduced to 2,000 MT again for 1979.

The TAC is likely to remain at this level to 1985. However, since this species is taken mainly as a by-catch in the cod fishery in 3M, increased cod catches could result in reductions in stock biomass for this species also. The Canadian allocation for 1979 is 250 MT.

American Plaice: St. Pierre Bank. (3Ps)

With the exception of 1973 when 15,000 MT were taken, the nominal catch has averaged 7,000 MT since 1970. The catch in 1975-76 was 4-5,000 MT. Since 1974, the stock has been regulated by quota; a TAC initially of 11,000 MT was reduced progressively to 4,000 MT for 1978 and 1979 to assist in stock rebuilding. A gradual increase in catches to 6,000 MT by 1985 is projected. Canada has an allocation of 3,580 MT in 1979.

Witch: Labrador-Northern Grand Banks (2J+3KL)

Nominal catches increased from 4,400 MT in 1961 to 24,000 MT in 1973 followed by a decline to 8,300 MT in 1977. A TAC of 22,000 MT was first introduced in 1974, but the TAC has since been reduced to 17,000 MT. Prior to 1977 the Canadian fishery was mostly inshore, but in 1977 a directed otter trawl fishery took more than one-third of the Canadian catch. TACs from the stock are unlikely to exceed recent levels by 1985. The Canadian share of the 1979 TAC is 9,000 MT.

Witch: Southern Grand Banks (3NO)

Recent catches have ranged from 15,000 MT in 1971 to 6,000 MT during 1975-1977, despite a TAC of 10,000 MT in effect since 1974. This shortfall has apparently occurred because witch flounders in this division have, until recently been largely a by-catch of other fisheries. The TAC for 1979 has been reduced to 7,000 MT to allow stock rebuilding. It is likely that this will be an appropriate figure for the next few years, although inadequate sampling data preclude a more accurate assessment at present. The Canadian allocation in 1979 is 4,900 MT.

Witch: South Newfoundland (3Ps)

Nominal catches in 3Ps declined from 1,500 - 3,000 MT during 1971-1974 to 900 MT in 1976 but increased to 4,200 MT in 1977. The information presently available indicates that the long-term average yield from the stock should be about 3,000 MT. The 1979 Canadian share is 2,590 MT.

Witch: Northern and Eastern Gulf of St. Lawrence (4RS)

Catches have averaged 2,600 MT since 1967, and have fluctuated between 900 MT and 5,300 MT during 1973-77 (1977 - 2,400 MT). The TAC in 1977 and 1978 was 3,500 MT but has been raised to 5,000 MT for 1979 following some excellent, although localized, winter fishing success.

Flatfish: Scotian Shelf (4VWX) (Plaice, Witch, Yellowtail and Winter Flounder)

Plaice and witch make up 85-90% of all flatfish catches in these divisions. A combined quota of 28,000 MT for plaice, witch and yellowtail was introduced in 1976.

(a) American Plaice. Catches increased from 3,700 MT in 1963 to an average of 12,500 MT in 1970-1977 (1977 catch 7,800 MT); 60-70% of all catches were in 4V.

(b) Witch. A catch of 21,700 MT was taken in 1968 but only 6,000 MT in 1970; fluctuations were largely due to variations in the reported USSR catch. The 1977 catch was 2,400 MT.

(c) Yellowtail. Catches decreased from 9,400 MT in 1963 to 1,000 MT in 1976 and 1,400 MT in 1977. Fishing mortality rates have been well in excess of those needed to allow stock rebuilding. Long-term potential yield from the stock is estimated to be 6,000 MT within 5-10 years.

(d) Winter Flounder. This is an inshore small boat fishery yielding between 700 and 3,100 MT per year (1,300 MT in 1977).

The TAC in 1978 and 1979 for all flatfish except winter flounder is 14,000 MT, half of the TAC in effect for 1975 - 1977. This substantial decrease in allowable catch was implemented because of current uneconomic catch rates experienced in the Canadian fishery for these species.

Much of the historical catch was taken by the international fishery at sizes and in areas not normally fished by Canadian vessels and an additional unknown quantity was discarded in the Spanish cod fishery. Although Canada has now reserved these resources for Canadian fishermen, Canadian effort cannot immediately replace previous foreign effort because the stocks must be allowed to rebuild in order to provide an economically viable fishery. The TAC for 1979 of 14,000 MT should allow such rebuilding to take place. It is projected that a yield of about 23,000 MT should be possible by 1985 at catch rates economic for the Canadian fleet.

Flatfish: Southern and Western Gulf of St. Lawrence (4T) (American Plaice, Winter Flounder, Witch and Yellowtail)

American Plaice. The long-term landings of rather less than 10,000 MT per year have been very stable, reflecting the stability of the stock. Yield could be increased if the substantial discard of small fish at sea (estimated as up to 40% by weight) could be eliminated. However, under present fishery practices the TAC of 10,000 MT set for 1978 and 1979 appears to be sustainable through 1985.

Winter Flounder. The long-term catch has averaged 2,500 MT from a complex of local stocks. No detailed assessment is possible, but it seems likely that some modest increase in landings is possible.

Witch. Long-term average catches of 1,500 MT of this species have been taken as a by-catch in the cod fishery. Recent catches have, however, declined below the long-term average, and are expected to continue at around 1,000 MT.

Yellowtail. An average annual catch of 25-30 MT has been taken as a by-catch in other fisheries.

There is no indication that 1978-85 catches for all three species will be significantly different from long-term averages.

Yellowtail: Grand Banks (3LNO)

This stock has only been fished since 1964-65; catches increased to 39,000 MT In 1972 followed by a decline to 8,100 MT in 1976 and a recovery to 11,600 MT in 1977. A TAC of 50,000 MT was introduced in 1973; this was reduced drastically to 9,000 MT in 1976 as a result of severe reductions in abundance related to an apparent combination of overfishing and adverse environmental factors. Some recovery has occurred and this is projected to continue gradually from a TAC of 18,000 MT in 1979 to 20,000 MT by 1985. Increased stock abundance should also result in higher catch rates. Canada has reserved 17,100 MT for its fishery in 1979.

Greenland Halibut; Labrador - Northern Grand Banks (2+3KL)

From 1972 to 1975 catches averaged 29,000 MT, with a 1977 catch of 31,500 MT from a TAC of 30,000 MT. There is some doubt whether this stock is fully exploited, since large mature fish in deep water are not available to the Canadian longline fishery. The TAC has been maintained since 1976 at 30,000 MT, and pending additional information, should continue at this level through the early 1980s. The Canadian share of the 1979 TAC is 25,000 MT.

Roundnose Grenadier: Labrador - Grand Banks (2 + 3)

Nominal catches of this deepwater species decreased from 75,000 MT in 1971 to 15,400 MT in 1977. Catch rates have remained fairly constant and analyses of age and size composition of the commercial catches have shown no sign of over-exploitation; the TAC has thus been maintained at 35,000 MT since 1977. Since there is a possibility that an unfished component of this stock exists in deeper water, some future increase in TAC may be possible. However, for the purposes of these projections, maintenance of the TAC at 35,000 MT to 1985 has been assumed. Canada has reserved 1,000 MT for development of a Canadian fishery in 1979.

Argentine: Scotian Shelf (4VWX)

Catches have varied between 1,000 and 17,000 MT during 1972-1977. The TAC in 1977-79 has been set at the estimated MSY level of 20,000 MT, although catches have not reached this level. Canada has reserved 1,000 MT in 1979 to permit continued evaluation of the stock's potential for a Canadian fishery.

Other Finfish: Scotian Shelf (4VWX)

Other species are taken incidental to directed fisheries with average catches in 1973-77 of: angler - 11,000 MT; skates - 11,050 MT; dogfish - 4,350 MT; cusk - 4,775 MT; white hake - 4,850 MT; wolffish - 1,200 MT, other species - 11,370 MT. Canadian vessels catch most of the cusk, white hake and wolffish, while most of the remainder has been taken by the foreign fleets. Expansion of catches from the recent average of 65,000 MT to about 85,000 MT seems possible with improved utilization of discards.

Other Finfish: Labrador - Grand Banks and Gulf of St. Lawrence (2+3+4RST).

In the long-term, annual catches of 28,000 - 30,000 MT of other groundfish may be expected from this area, including catches from presently unregulated stocks of such species as pollock, witch and yellowtail.

PELAGIC FISH

Herring

All herring stocks on the Atlantic coast are either fully exploited, or over-exploited. Future catch levels should fluctuate primarily as a result of natural fluctuations in recruitment..

Herring: Newfoundland

East Newfoundland. It is projected that catches will decline, as a result of poorer recruitment, from 22,000 MT in 1977 to 17,000 MT in 1981, with a slight recovery to 20,000 MT by 1985.

West Newfoundland. Yields from these stocks are expected to stabilize at 8,000 MT by the 1980's.

South Newfoundland. Stocks in this area are expected to rebuild, as strong year-classes enter the adult fishery, resulting in an increase in TAC to 8,000 MT by 1980 compared with 6,500 MT taken in 1977.

Herring: Gulf (3Pn+4T)

This stock is returning to long-term average size now that the exceptionally abundant 1958 and 1959 year-classes have passed through the fishery. Assuming subsequent year-classes are average, catches should recover, following the heavy exploitation of the early 1970's to provide catches approaching 75,000 MT by 1985.

Herring: Scotian Shelf including Bay of Fundy (4VWX)

Herring in 4VWX are divided into two management units since herring in 4V appear to be somewhat distinct from herring in the Gulf (4T) and to the west (4W). Tagging does, however, indicate a strong connection between herring in Chedabucto Bay (4Wa) and those as far west as the Bay of Fundy. These areas are, therefore, now managed as a unit, instead of including 4Wa with 4V, as had been done in the past. Some mixing between stocks in 4X (Bay of Fundy) and the Gulf of Maine(5) is indicated by preliminary tagging results.

Catches in 4V have declined from 16,000 - 17,000 MT in the early 1970's to 11,000 MT in 1977. Since the herring in this area may be related to the 4T (Gulf) stock which is subject to a restrictive TAC to allow rebuilding, the TAC in 4V should also be kept low in 1979.

In 4X, the abundance of herring has declined somewhat as the very large 1970 year-class has passed through the fishery. The fishery is now being supported by the stronger than average 1973 year-class. Evaluation has, however, been complicated by the change in management régime in the Bay of Fundy in recent years as this has made the projection of year-class strength from catch and effort data somewhat uncertain. The TAC for adult fish in 1978 was 111,000 MT (including catches by fixed gear). If future year-classes are, on average, as strong as those which have supported the fishery since 1965, annual catches in 1980-1985 should be in the range of 90-100,000 MT. These projections do not, however, include the substantial juvenile herring catches made by New Brunswick weir fishermen (approximately 20,000 MT per year).

Herring: Georges Bank and South (5+6)

The Gulf of Maine stock (5Y) is managed separate from that in 5Z + 6, although tag returns show some mixing between them. Both stocks are in serious decline because of overfishing and poor recruitment; the total catch has declined from a high of 400,000 MT in 1968 to 53,500 MT in 1977. To aid rebuilding of the stocks, Canadian scientists have suggested that catches from both the 5Y and 5Z + 6 adult fisheries be limited to 2,000 MT each. However, rebuilding of the 5Y stock depends on U.S. regulation of inshore juvenile fisheries which take 20,000 - 30,000 MT per year. TACs and national allocations in this area are being discussed in the context of U.S./Canada negotiations on management resources.

Mackerel: Northwest Atlantic (3-6)

Mackerel stocks from Newfoundland southwards are managed as a unit. Although two stock components have been identified, spawning in the Gulf of St. Lawrence and south of Cape Cod respectively, their degree of mixing and relative contributions to the fishable stock is not yet known. Considerable difficulty exists in determining population sizes and mortality rates for this pelagic species, with the consequence that a broad range of values for allowable catches have been proposed, depending on a range of population estimates and differing management objectives. Coastal fishing effort on this stock has depended largely on market conditions. In general, abundance levels may be expected to increase in the next few years because of reduced fishing on the overwintering stocks off southern New England, with TACs projected to increase from 105,000 MT in 1978 to over 300,000 MT By the early 1980's. Since this is a transboundary stock, the quantity to be taken in 3+4 cannot be projected accurately in the absence of a long-term Canada/U.S.A. fisheries agreement. For the purpose of this exercise, it has been assumed that at least 40% of the TAC will be taken in 3+4 each year to 1985. Total catches in 3+4 during 1970-77 ranged from 21,000 to 45,000 MT, with an average catch of 31,000 MT; the Canadian catch was 22,400 MT in 1977 but the average has been about 16,000 MT.

Capelin: Labrador and Grand Banks (2+3)

The lack of refined estimates of capelin biomass levels, fluctuations in recruitment, and relationship with predator species of fish and marine mammals render yield predictions extremely difficult. Since cod, whale and seal stocks should be increasing during the next few years, some decrease in capelin production surplus to the needs of the major predators may be expected, with consequential reductions in the TAC for both northern and southern components of the capelin resource. The TAC of capelin is thus projected to decline from 500,000 MT in 1978 to 200,000 MT by the early 1980s. There are some indications that the southern stock (3LNO) is presently overexploited so that some proportionally greater decrease in the TAC for this stock may be expected for 1979. Canada reserved 72,870 MT for its own developing fishery in 1978. In addition to the Labrador and Grand Banks stocks, catches of some 25,000 MT may be possible in the Gulf of St. Lawrence.

Bluefin Tuna

Management of this highly migratory species is coordinated internationally by the International Commission for the Conservation of Atlantic Tuna (ICCAT); Canada's domestic regulations are designed to implement an agreement under ICCAT to limit harvesting effort to recent levels. Catches are thus under strict regulation in Canada. Landings of large fish by troll, sports and trap fisheries of 670 MT in 1977, and of young fish by purse seine (300 MT) are unlikely to be exceeded in the next few years with an overall annual catch of 1,000 MT anticipated. Availability of large fish is expected to continue to decline until the new year-classes (particularly that of 1973) now being protected by stringent measures reach this size category in the late 1980s.

Swordfish

Regulations prohibiting the sale of swordfish in Canada and the U.S. are presently being reviewed. A limited fishery has existed over the last few years, landing 45-50 MT in 1977 in Canada, for experimental purposes, and transferring roughly 600 MT at sea to U.S. vessels for landing in New England, where State regulations allow its sale locally. Landings of about 2,000 MT should be possible in a controlled fishery, were resumption of sales to be permitted in the U.S. or Canada.

ANADROMOUS AND CATADROMOUS FISH

Atlantic Salmon - General

Long-term catches in all areas will depend not only on local fishing regulations and possible high seas catches, but also on human activities that affect the ability of rivers to support populations, notably pollution and the effects of agriculture, forestry and hydroelectric projects.

Newfoundland and Labrador. Continued catches approximating the 12-year average of 1,700 - 1,800 MT are forecast for 1979 with 1,140 - 1,200 MT from Newfoundland and 500 - 600 MT from Labrador. This forecast is supported by high catch rates in 1978 in the Greenland fishery for 1+ sea winter salmon. Several factors contribute a degree of uncertainty to catch forecasting, in particular the effects of ice conditions and/or hydrographic conditions which can delay significantly the spring fishery in some areas.

Maritimes. From 1967 to 1971, commercial catches of salmon in the Maritimes fell to 155 MT - 20% of the 1967 level - and a ban on commercial salmon fishing in New Brunswick was introduced in 1971. This has had appreciable effect in increasing the numbers of fish returning to New Brunswick rivers. Should the commercial fishery be re-opened, the allocation problem will be a difficult one, even after due allowance is made for spawning escapement, angling and Indian food fishing. Furthermore, there are other factors, such as incidental catches in other types of gear and poaching, both of which are growing problems in several areas. Commercial catches In Nova Scotia are projected to decline in the long-term, unless additional management measures are introduced. A catch of approximately 60 MT is projected for 1979. The ban on the Newfoundland drift net fishery, introduced in 1972, should result in somewhat improved returns to Maritimes rivers by reducing at-sea interceptions in Canadian waters. Future yields from New Brunswick and Québec rivers will, to a large extent, be dependent upon continued limitation of the West Greenland salmon fishery to approximately the presently agreed level of 1,190 MT per year.

Other anadromous -catadromous species

Included here are species such as alewife, shad and smelts which enter freshwater systems to spawn, and American eels that migrate to marine spawning grounds. While catches for several of these species are small (and often not fully reported), collectively the catches probably exceed 10,000 MT in the Maritimes. The general trend of catches is expected to decline from present levels of around 7,000 MT for alewife, 1,000 MT for smelt and 15-30 MT respectively for striped bass and sturgeon; show some slight increase for eels (315 MT) and silversides (115 MT); and remain stable for shad (113 MT). Catches of these species are expected to vary with fluctuations in market conditions.

INVERTEBRATES

Lobsters: General

Recent Canadian nominal catches (17,802 MT in 1977: 38% N.S., 23% P.E.I., 19% N.B., 12% Nfld. and 8% Québec). are below the 1940-1972 average of 18,650 MT with the decline being most pronounced in Nova Scotia and New Brunswick; catches from the other three provinces have been at, or slightly above, the recent average. The historical records suggest that this recent average is itself significantly below the attainable level (average nominal catches from 1890 to 1910 were about 34,000 tons).

Despite the introduction of regulatory measures in the late 1960's which limited the number of licenses and the number of traps fished per boat in all Canadian Atlantic lobster fisheries, there has not been a resultant decrease in fishing pressure in any area; indeed, fishing pressure has probably increased in some areas. There is some prospect that the introduction of a buy-back scheme in P.E.I. in 1978 may eventually lead to a reduction in levels of fishing mortality.

National and international assessments of Atlantic lobster stocks and the fisheries based upon them indicate that a rate of removal not exceeding 30% - 50% per year, <u>and</u> increased minimum size limits are required to maximize yield. In several Canadian inshore lobster fisheries, rates of removal of 80-90% per annum have been documented from tagging studies, while size limits are at, or below, the size at which the females mature. The combination of high rates of fishing and low legal sizes must eventually lead to major stock declines, such as have occurred in certain areas of the Maritimes. A high rate of fishing makes the catch almost entirely dependent on the strength of the newly recruited year-class. This increases the effect of environmentally-induced fluctuations in recruitment by increasing annual fluctuations in catches; it also makes it difficult to predict catches much in advance of the fishery. In order to achieve any significant long-term improvement in catch, it will be necessary to implement increases in size limit and significant decreases in fishing effort.

<u>Lobsters: Southern Gulf of St. Lawrence (Lobster Districts 7 + 8)</u>[1]

Lobster catches in district 8 declined from 4,900 MT to 1,600 MT between 1960 and 1974 but recovered slightly over the subsequent three years to about 2,300 MT. The decline was not evident in districts 7B and 7C, where catches have increased slightly during the past three years, largely because of an increase in recruitment. Catches in area 7 are now close to 5,400 MT, the 15-year average.

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[1] See Figure 2 (Lobster Fishering Districts).

Fishing mortalities in district 8 and parts of 7B and 7C are among the highest in the world. Size limits here are the lowest in the North Atlantic, roughly equivalent to the size of the smallest berried females observed in the catch. Most of the catch are juveniles, yet even mature females must survive one fishing season before extruding eggs. The combination of high fishing mortalities and low size limits reduces the potential catch and makes wide recruitment fluctuations inevitable during periods of poor reproductive success. An increase in the size limit in district 8, to 3 inches, has been proposed. It is anticipated that this would result in an increase in yield per recruit of 50% in the year after introduction, although catches would be somewhat reduced in the season of introduction. There would also be a potential longer-term improvement in recruitment provided that fishing effort did not increase. A gradual increase in size limits would delay the full benefits and spread the transition period or reduced catches.

<u>Lobsters: Nova Scotia (Halifax to Cape Breton) (4V + 4W)</u>

<u>Northern (4V).</u> The fishery is relatively stable with somewhat higher size limits than in the southern Gulf and somewhat lower rates of fishing. Yield could be increased with an increase in legal size.

<u>Southern (4V + 4W).</u> This area is currently experiencing terminal stages of a severe recruitment decline to 5-20% of previous catch levels. Rates of fishing have declined in response. While recruitment may increase the attainment of optimum sustainable yield will likely require size limit increases and stricter effort control.

<u>Lobsters: Western Nova Scotia, Bay of Fundy, and Georges Bank (4X+5Ze)</u>

Fisheries in this area are dependent on several major lobster concentrations of uncertain interrelationships. The main fisheries are (1) Grand Manan, (lobster district 2) with 1969-73 average landings of 353 MT, (2) southwest Nova Scotia inshore fishery (lobster district 4) with landings averaging 5,068 MT and (3) since 1971, an offshore fishery beyond 50 miles off the southwest Nova Scotia mainland, on Browns Bank and the northwest part of Georges Bank, with landings over 600 MT.

Tagging experiments indicate that mingling of adult lobsters may occur. Recent larval studies suggest that the offshore stock may play a significant part in contributing larvae to the inshore grounds. This is supported by the observation that a relatively low percentage of females in the inshore Nova Scotia catch survive the intensive inshore fishery which is estimated to remove 80% of lobsters (largely immature) during their first year in the fishery, and 80% of fertile but unberried female lobsters in their second year in the fishery. The survivors are probably insufficient to support recruitment to the stock without a significant proportion of recruits coming from beyond the inshore fishing areas.

Southwest Nova Scotia (Inshore). In southwest Nova Scotia landings have remained high during the past decade. Since 1968 inshore catches have been unevenly divided between fall and spring portions of the fishery, a good fall catch being followed by a poor spring catch, and vice-versa. During the 1977-78 season, catches were good north of Wedgeport, but poor south and east of Pubnico. There are no signs of improvement, particularly east of Cape Sable Island.

Offshore Lobsters. The fishery has been limited by licence to eight boats. Preliminary evidence suggests that the rate of fishing offshore is still below that on the inshore stocks. A precautionary quota was imposed on the fishery in 1977 (544 MT) because of possible impact on recruitment to inshore areas. In recent years, landings from the Browns Bank area have increased relative to Georges Bank. In 1978 a quota of approximately 400 MT was set for the Browns Bank area (offshore grounds north of Fundian channel) with no restrictions on catch from Georges Bank.

Lobsters: Newfoundland

Total lobster catches at Newfoundland fluctuate markedly and unpredictably from year to year. There was a decline from a recent high of 2,500 MT in 1955 to a low of 1,240 MT in 1972. Since 1972, there has been a recovery with 1976 catches of 2,250 MT followed by 1,890 MT in 1977. The 1977 catch is well above the average for 1965-75. While there is no obvious explanation for this recovery, it is thought to be related to low adult abundance during 1970-74 which permitted a more rapid growth rate for juvenile lobsters. Hydrographic conditions may also have been more favourable for growth of pre-recruits in recent years. Larval production, survival and settlement may have been higher for the year-classes which contributed to the standing stock in 1976 and 1977. While there is little reliable basis to predict future lobster catches, they are expected to fluctuate between 1,100 MT and 2,050 MT from now to 1985, with average catches between 1,350 and 1,600 MT. The present rate of exploitation appears to be too high and the minimum legal size too low.

Shrimp: Gulf of St. Lawrence. (4RST)

Three major shrimp concentrations are presently being exploited:

Esquiman Channel, with projected sustained catches from 900 to 1,800 MT, depending on recruitment (which can be predicted only two years in advance), and relative effort of the fleet towards other species of fish and shellfish;

Sept-Iles area, with projected yields around 3,200 MT, and

Anticosti Island area, a more recently exploited area which is expected to yield catches approximating those projected above for the Sept-Iles area.

Shrimp: Nova Scotian Shelf (4V)

A fishery is under development off southeast Cape Breton where a few boats fished during 1978 with some success.

Shrimp: Labrador. (2)

Largely unexplored resources along the inner part of the shelf may support long-term catches in the order of 5,000 - 10,000 MT. A TAC of 7,100 MT was established for 1978.

Shrimp: Ungava Bay and Baffin Island

While the abundance of shrimp in the Ungava Bay area is largely unknown, Baffin Island (0) is close to West Greenland (1) which supports a large international shrimp fishery. A combined 1978 TAC (0 + 1, and the area north of 0) was set at 40,000 MT. No definite information is yet available on the proportion of the stock residing in the Canadian zone, the best present estimate available being in the order of 10-15%. The Canadian allocation for 1978 was 1,000 MT.

Snow Crabs: Western Gulf of St. Lawrence (4ST)

The fishery in the Gulf of St. Lawrence, which developed rapidly following its start in 1966, has stabilized at 6,400 MT, despite a three-fold increase in trips fished between 1969 and 1976, and a consequent decrease in catch per unit effort for the whole fleet. Provided the current practice of harvesting only male crabs is continued, recruitment to the fishery seems unlikely to be affected. Catches in 1977 reached a high of over 8,000 MT and exceeded this in 1978, probably as a result of continuing increases in effort. There were indications of a decline in average size and in catch rates towards the end of the season. The long-term potential is estimated to be not higher than 6-7,000 MT.

Snow Crabs: Cape Breton Island

Landings from the northwestern part of Cape Breton have more than doubled during 1977-78 to about 2,000 MT. There has been an increase in both number of licences and catch rates. Preliminary results of a tagging experiment indicate an exploitation rate of above 50%. Off the northeastern part of the Island the fishery appears stable, while to the southeast, experimental fishing indicates a potential fishery of at least 1,000 MT.

Snow Crabs: South and East Newfoundland and Labrador

Nominal catches peaked in 1974 at 3,500 MT and decreased thereafter largely because of market conditions, returning to 4,000 MT in 1977. The fishery has begun to shift to the more northerly area which has been lightly exploited. The sustainable yield is projected at 5,500 MT.

Sea Scallops: Georges Bank (5Z)

The recent high catches (15,000- 16,000 MT of meats in 1977) by Canadian and U.S.A. fishermen reflect a combination of above average recruitment and effort, restriction (entry limitation and trip quotas), and a decrease in the domestic meat count regulation by Canada to the present level of a maximum of 40 meats/lb on the average. Pre-recruit estimates, based on research survey data, indicate that the catch in 1978 (at 1977 level of fishing effort) will remain at the 1977 level, but from 1979 onwards, catches are expected to decline because of reduced recruitment. Long-term average catches are projected to approximate 8,000 - 9,000 MT. Further increases in size limit (a reduction in meat count from the current level of 40 meats/lb to 35 meats/lb) will increase the long-term yield from the fishery. The Canadian catch in 1977 was about 13,250 MT.

Sea Scallops: Bay of Fundy and Browns Bank. (4X)

Prior to 1977, three principal areas were fished by the Bay of Fundy inshore fleet: (1) the traditional beds off Digby (which sustained peak catches of 900 MT in the 1930's, since declining to about 150 MT in the 1970s), (2) the Lurcher and Trinity grounds, from which catches have been negligible in recent years, and (3) Browns Bank, which was heavily fished by both the offshore and the inshore fleets in 1976; Browns Bank has a history of intermittent production and is unlikely to be very productive over the next few years. Improved recruitment in the early 1970s inside the 6-mile summer closing line in the Bay of Fundy led to increases in inshore catches to 338 MT in 1976 and 446 MT in 1977. However, excessive effort (estimated at double that required to provide MSY with long-term recruitment levels) and the lack of meat count regulation is resulting in over-exploitation of younger scallops and decreased yields. Prospects for the inshore fishery remain good until recent recruitment peaks are depleted, and, with some of the larger boats allowed to fish Georges Bank, overall landings are expected to be above average in 1978, and perhaps 1979.

Sea Scallops: Gulf of St. Lawrence (4RST)

Sea scallops stocks in the Gulf are centered in the Northumberland Strait area, but occur sparsely as far north as the Bay of Chaleur, with smaller concentrations around the Magdalen Islands and in some bays in southwest Newfoundland. Scallops have been fished since the early 1950s in the Northumberland Strait as an alternative resource to lobsters; some fishermen now fish full-time for scallops. The absence of entry control or other regulations has permitted development of excessive effort. At present, there are 250 inshore boats from P.E.I. and New Brunswick alone which participate in scallop fishing. Of the 212 licences issued in P.E.I. in 1977, only 100 were estimated to be active. Catches in the Northumberland Strait in 1976 (463 MT) were above the recent long-term average (1972-77: 324 MT) owing to over-exploitation of localized above-average recruitment, and in 1977 landings declined to 193 MT. During 1978, a two-month summer closure was imposed. It may be necessary to impose additional measures in 1979 in order to protect the resource.

Sea Scallops: Newfoundland (3P)

Peak production in southwest Newfoundland (including St. Pierre Bank) was 430 MT of meats in 1964 in comparison with the long-term (1965-73) average of 125 MT annually. No catches have been taken since 1973 and thus only small landings seem possible in the foreseeable future.

Iceland Scallops: East Gulf of St. Lawrence (4R)

In 1972, 240 MT of Iceland scallops were caught in the northeast Gulf of St. Lawrence (4R); catches have since decreased largely because of diversion of effort into the shrimp fishery. A sustained yield of 25-45 MT per annum is projected.

Squid: Northwest Atlantic (3-6)

Short-finned squid, (Illex) the principle species caught in 3+4, was originally managed as a unit with squid in 5+6. Catches fluctuated widely in the inshore domestic fishery, ranging from less than 100 MT to 11,300 MT prior to 1977 when the inshore catch increased greatly to 30,000 MT, primarily in Newfoundland. A substantial foreign offshore fishery has developed in the 1970s in 3+4 (primarily in 4) with catches of 30.500 MT in 1976 and 49,300 MT in 1977. In 3+4, an open-ended TAC of 25,000 MT was in effect during 1975-77 which was allocated 10,000 MT to Canada, and 15,000 MT to U.S.S.R., with other countries permitted to take up to 3,000 MT annually. There was little interest in the 3,000 MT option in 1975, but increased abundance of Illex in 1976 attracted several countries, and in 1977 many countries participated in the fishery, resulting in the very high 1977 catch. A TAC of 100,000 MT for 3+4 was set in 1978 with a restriction on fishing effort to guard against overfishing if abundance declined. Canada reserved 66,500 MT for its fleet and inshore fishery in 1978. It is virtually impossible to forecast future levels of catch of this species since the lifespan is only 12-18 months and abundance is highly variable.

Oysters: Gulf of St. Lawrence

Caraquet Bay remains the principal oyster producing area in New Brunswick, yielding approximately 237 MT in 1977; production in 1978 is expected to be somewhat lower. Starting in 1979 and continuing to 1982, landings should show a steady increase as the abundant 1973 and 1975 year-classes reach market size. Landings could reach 800-900 MT By 1981-82.

Reported landings in Nova Scotia in 1977 amounted to 40 MT and no significant increase in landings from the Northumberland Strait area are expected until problems of seed shortage are solved. Future production from Cape Breton is difficult to assess in that any expansion is totally dependent on the success of the various aquaculture developments presently underway. It would appear that landings, supplemented by these aquaculture developments, could reach 130 MT by 1979-80 and 150 MT by 1981.

P.E.I. is likely to remain the major oyster producing area of the Maritimes with a reported production of 725 MT in 1977. For the period 1978-81 landings should range between 800-1,200 MT per year.

Soft-Shell Clams: Maritimes

Catch data for this species are incomplete due to the highly localized nature of the fishery. Reported Maritimes catches of 10,430 MT in 1950 declined to 454 MT in 1963. Stock recovery and renewed interest in the fishery led to a steady increase in catches to 2,268 MT in 1971. Catches then declined to 1,530 MT in 1974-75, largely because of closure of some productive areas as a result of sewage pollution and shellfish toxicity. Catches increased to 2,200 MT in 1977, partly as a result of the introduction of hydraulic shellfish harvesting in P.E.I. The 1978 catch will be in the order of 2,500 MT. A further increase in catches is possible should facilities for shellfish cleansing be established in some lightly-polluted areas (e.g., Annapolis Basin) and if wider use were made of hydraulic harvesting, particularly in some presently unharvested areas of Nova Scotia and New Brunswick.

Irish Moss

The Irish moss harvest has averged 34,000 MT (wet weight) over the last ten years, and the bulk of this harvest is raked either by hand (southwest Nova Scotia) or by dragrake (southern Gulf). Since 1975, the annual harvest has fluctuated between 23,000 MT (1976) and 30,000 MT (1978). The landings in southwestern Nova Scotia, however, have not decreased markedly, and with increased prices to the harvester during 1978, the landings increased substantially. The decline in the Gulf landings is likely due to an over-harvest during the early 1970s when the number of harvesters increased. Changes in harvesting technology increased the adverse ecological impact of harvesting gear; however, harvesting effort is limited and certain gear types have been banned. Catches should improve to at least the ten-year average over the next three years.

Other marine plants harvested and their mean annual landings are as follows: Rockweed (7,000 MT wet), Furcellaria (5,000 MT wet), Kelp (300 MT wet), and dulse (50 MT dry). Fluctuations in landings of these plants generally depend on factors other than standing crop of the resource.

MARINE MAMMALS

Harp Seals

A total of 170,000 harp seals (from a TAC of 180,000 MT for the entire NW Atlantic) was allocated for the Gulf of St. Lawrence and "the Front", (northeast of Newfoundland) in 1978, compared with 160,000 MT in 1977. This is less than the scientifically determined surplus production of over 200,000, and will allow the recent population increase to continue. The TAC may increase by up to 25% in future. Canada's share of the TAC in 1978 was 135,000, with 57,000 being allocated to the Canadian large vessels at the "Front".

Hooded Seals

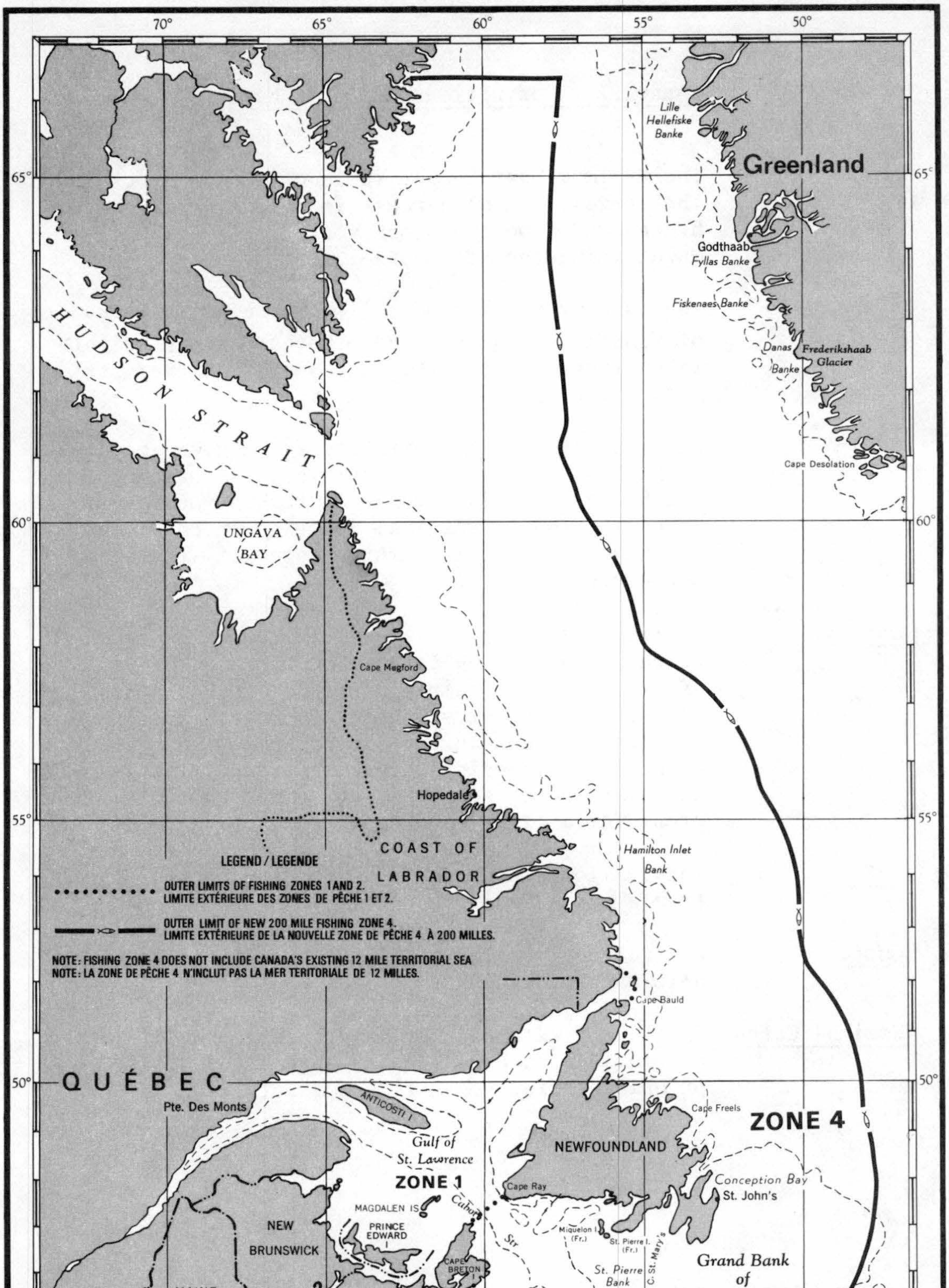
Hooded seals are also under quota regulation with TACs being 15,000 in both 1977 and 1978. Hooded seals whelp over a more extended period than do harp seals and they are more scattered in distribution and require powerful and manoeuverable vessels to hunt them effectively. Recent catches in the area of the "Front" have averaged 11,000. The population is currently increasing and could sustain higher catches in the future.

Whales

Several species of whales occur off the Atlantic coast of Canada. Historically these have been subjected to sporadic whaling operations, the last episode of Canadian whaling ending when the whaling plants as Blandford, Nova Scotia, and Dildo and Williamsport, Newfoundland, were closed in 1972. The primary species harvested was the fin whale with some sei, minke, and sperm whales taken as well as pilot whales off Newfoundland. The scientists of the International Whaling Commission (IWC) continue to classify the sei whales off Atlantic Canada and the fin whale stock off Nova Scotia as Protection Stocks. Maximum catches agreed by the IWC for stocks of fin and minke whales off Newfoundland are 90 and 48 respectively for 1978. Commercial whaling is, however, prohibited in waters under Canadian fisheries jurisdiction.

Annex I - Definitions of Terms Used.

MSY	The Maximum Sustainable Yield of a fish stock is the largest annual harvest in weight which could be removed from the stock year after year while maintaining the stock size.
F_{max}	The rate of fishing mortality for a given method of fishing which maximizes the harvest in weight taken from a single year-class of fish over its entire lifespan.
$F_{0.1}$	The rate of fishing mortality for a given method of fishing for which the marginal increase in catch for a small increase in fishing mortality is one-tenth the marginal increase in catch for the same increase in fishing mortality from a zero level.
OSY	Optimum Sustainable Yield is the annual harvest in weight which can be taken from the stock year after year while maintaining the stock size and allowing the greatest socio-economic benefit. Inherent in the concept are economic and social as well as biological considerations. The OSY will vary among species, over time, and among areas for a given species.
TAC	Total Allowable Catchis the total permitted catch from a stock in a given year.
Quota	A regulated portion of a TAC as distinct from an allowance or estimated catch.
Nominal Catch	The sum of catches that have been reported. Does not include such catches as unreported discards or unidentified young fish put into fish meal.



LIMITS OF CANADIAN FISHING ZONES / LIMITE DES ZONES DE PÊCHE CANADIENS
(EAST COAST) (CÔTE EST)

TABLE 1 - TOTAL CATCHES AND CANADIAN CATCHES OF TRADITIONAL GROUNDFISH FROM 1970 to 1977
WITH TAC's and PROJECTED TAC's FOR 1978 to 1985 (000's METRIC TONS) FOR SUBAREAS 2, 3 AND 4

SPECIES	1970 CATCH			1971 CATCH			1972 CATCH			1973 CATCH			1974 CATCH			1975 CATCH			1976 CATCH		
	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%
Cod	1,007	260	26	899	242	27	896	216	24	710	174	25	708	156	22	557	152	27	461	190	41
Redfish	204	107	52	251	110	44	264	108	41	292	158	54	219	87	40	196	103	53	154	89	58
Haddock	35	25	71	37	28	76	22	17	74	20	17	83	18	14	78	22	18	83	19	18	93
American Plaice	113	90	79	108	77	72	97	66	68	94	66	70	89	60	68	77	56	72	91	76	86
Witch	39	17	44	55	21	38	43	19	46	51	20	39	38	16	42	32	10	31	32	16	50
Greenland Halibut	38	12	42	26	10	40	31	10	32	30	8	26	29	7	24	31	9	31	27	11	43
Yellowtail	38	32	79	39	25	65	41	28	68	36	30	82	26	18	70	25	20	80	11	11	95
Pollock (4VWX+5)	19	11	56	26	12	45	33	18	54	43	27	63	38	25	66	39	27	68	38	24	63
TOTALS	1,479	554	37	1,441	526	36	1,427	482	34	1,276	500	39	1,163	384	33	978	394	40	834	437	52

SPECIES	1977 CATCH			1978 TAC			1979 TAC			1980	1981	1982	1983	1984	1985
	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TAC	TAC	TAC	TAC	TAC	TAC
Cod	393	233	59	354	225	63	424	296	70	471	521	570	617	661	698
Redfish	113	67	59	138	101	73	135	88	65	138	134	133	136	137	138
Haddock	25	23	92	25	23	92	28	26	93	29	30	32	33	32	31
(American Plaice (Witch (Greenland Halibut (Yellowtail	150	125	83	164	130	79	163	141	87	177	182	183	185	188	191
Pollock	39	25	65	30	21	70	30	21	70	35	38	39	39	39	40
TOTALS	721	474	66	711	500	70	780	572	73	850	905	957	1,010	1,057	1,098

Projected TACs are for all stocks off the Canadian Atlantic coast. They include stocks straddling the outer limit of the Canadian 200-mile zone, Canadian boundaries with the U.S.A. and France, and stocks which lie completely outside the 200-mile limit on the Flemish Cap. The PROJECTIONS ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

Slightly higher catch figures for certain species for 1976-77 between Table 1 and Table 2 reflect catches of these species from stocks not subject to quota in these years. Projected catches from these stocks are included in "other groundfish" in Table 2.

TABLE 2: PROJECTIONS OF TACs 1979-85 WITH CATCHES IN 1976 and 1977, AND TACs FOR 1978.
SUBAREAS 2, 3 and 4 (000's METRIC TONS)

Species	Area	Catch 1976		Catch 1977		1978 TACs		1979 TACs		TACs	TACs	TACs	TACs	TACs	TACs
		Total	Canada	Total	Canada	Total	Canada	Total	Canada	1980	1981	1982	1983	1984	1985
Cod	2+3	312.2	94.6	260.9	120.6	245.0	135.2	290.0	189.5	329.0	383.0	434.0	484.0	529.0	567.0
Cod (1)	4VWX	46.8	31.2	41.8	40.5	26.5	25.5	26.5	25.5	27.5	28.5	30.5	32.5	34.5	35.5
Cod	4RST	102.2	64.5	90.0	71.6	83.0	64.3	107.0	81.3	114.0	109.0	105.0	100.0	97.0	95.0
Haddock	4VWX	18.8	17.6	24.7	22.9	25.0	23.2	28.0	26.2	29.0	30.0	32.0	33.0	32.0	31.0
Redfish	2+3	98.0	39.3	80.2	37.0	100.0	68.0	99.0	60.3	99.0	97.0	97.0	96.0	96.5	97.0
Redfish	4VWX	18.4	12.6	18.4	15.2	20.0	17.5	20.0	13.0	25.0	25.0	25.0	30.0	30.0	30.0
Redfish	4RST	38.0	37.4	14.5	14.3	18.0	15.7	16.0	14.4	13.9	12.1	11.0	10.3	10.1	10.6
Silver Hake	4VWX	97.2	-	37.6	1.8	81.0	13.8	70.0	10.0	70.0	70.0	70.0	70.0	70.0	70.0
Pollock	4VWX+5	37.6	23.6	38.7	25.0	30.0	21.0	30.0	21.0	35.0	38.0	39.0	39.0	39.0	40.0
American Plaice	2+3	65.1	56.4	57.9	54.0	61.0	54.3	59.0	54.2	66.5	69.5	71.0	71.0	72.0	72.0
Flatfish (excl. witch)	4T	16.0	15.8	9.8	9.8	10.0	10.0	10.0	10.0	14.0	14.0	14.0	14.0	14.0	14.0
Witch	2+3	19.6	7.1	19.0	12.2	30.0	18.6	27.0	16.5	27.0	27.0	27.0	27.0	27.0	27.0
Witch	4RS	5.3	5.1	2.4	2.4	3.5	3.2	5.0	4.7	5.0	5.0	5.0	5.0	5.0	5.0
Yellowtail	2+3	10.5	10.2	12.0	11.7	15.0	14.2	18.0	17.1	18.0	18.0	18.0	18.0	20.0	20.0
Greenland Halibut	2+3	24.7	9.4	31.9	18.2	30.0	15.7	30.0	25.0	30.0	30.0	30.0	30.0	30.0	30.0
Flatfish	2+3	119.9	83.1	120.8	96.1	136.0	102.8	134.0	112.8	141.5	144.5	146.0	146.0	149.0	149.0
Flatfish	4VWX	17.8	10.0	11.7	11.4	14.2	13.5	14.0	13.2	16.0	18.0	18.0	20.0	20.0	23.0
Flatfish	4RST	21.3	20.9	12.2	12.2	13.5	13.2	15.0	14.7	19.0	19.0	19.0	19.0	19.0	19.0

Species	Area	Catch 1976 Total	Catch 1976 Canada	Catch 1977 Total	Catch 1977 Canada	1978 TACs Total	1978 TACs Canada	1979 TACs Total	1979 TACs Canada	TACs 1980	TACs 1981	TACs 1982	TACs 1983	TACs 1984	TACs 1985
Roundnose Grenadier	2+3	20.6	-	15.4	-	35.0	1.0	35.0	1.0	35.0	35.0	35.0	35.0	35.0	35.0
Argentine	4VWX	7.0	-	2.5	-	20.0	2.0	20.0	1.0	20.0	20.0	20.0	20.0	20.0	20.0
Other groundfish (2)	2+3	19.2	7.6	17.7	8.6	20.0	10.0	20.0	12.0	20.0	20.0	20.0	20.0	20.0	20.0
Other groundfish (2)	4VWX	29.2	12.2	18.9	15.4	35.0	30.0	58.0	50.0	58.0	62.0	62.0	66.0	66.0	70.0
Other groundfish (2)	4RST	12.1	11.6	19.4	19.2	20.0	18.0	27.0	25.0	27.0	28.0	28.0	29.0	29.0	30.0
Groundfish (3)	2+3	569.9	224.6	495.0	262.3	536.0	317.0	578.0	375.6	624.5	679.5	732.0	781.0	829.5	868.0
Groundfish (3)	4VWX	272.8	107.2	194.3	132.2	251.7	146.5	266.5	159.9	280.5	291.5	296.5	310.5	311.5	319.5
Groundfish (3)	4RST	173.6	134.4	136.1	117.3	134.5	111.2	165.0	135.4	173.9	168.1	163.0	158.3	155.1	154.6
Mackerel	3+4	33.0	15.7	22.9	22.3	30.0	25.0	117.0	112.0	94.0	98.0	96.0	94.0	105.0	122.0
Herring	2+3	30.0	30.0	29.9	29.9	26.0	26.0	25.5	25.5	25.0	26.0	27.0	28.0	29.0	29.0
Herring (4)	4VWX	147.5	143.6	143.8	143.5	138.0	138.0	129.0	129.0	126.0	121.0	126.0	129.0	130.0	132.0
Herring	4RST	51.1	51.1	55.8	55.8	74.0	74.0	76.0	76.0	83.0	83.0	83.0	83.0	83.0	83.0
Capelin	2+3	360.4	9.5	224.3	12.0	500.0	72.9	400.0	85.0	300.0	250.0	225.0	200.0	200.0	200.0
Capelin	4RST	0.5	0.5	1.9	1.9	10.0	10.0	12.0	12.0	15.0	18.0	20.0	25.0	25.0	25.0
Cod Total		461.2	190.3	392.7	232.7	354.5	225.0	423.5	296.3	470.5	520.5	569.5	616.5	660.5	697.5
Haddock Total		18.8	17.6	24.7	22.9	25.0	23.2	28.0	26.2	29.0	30.0	32.0	33.0	32.0	31.0
Redfish Total		154.4	89.3	113.1	66.5	138.0	101.2	135.0	87.7	137.9	134.1	133.0	136.3	136.6	137.6
Silver Hake Total		97.2	-	37.6	1.8	81.0	13.8	70.0	10.0	70.0	70.0	70.0	70.0	70.0	70.0
Pollock Total		37.6	23.6	38.7	25.0	30.0	21.0	30.0	21.0	35.0	38.0	39.0	39.0	39.0	40.0

Species	Area	Catch 1976 Total	Catch 1976 Canada	Catch 1977 Total	Catch 1977 Canada	1978 TACs Total	1978 TACs Canada	1979 TACs Total	1979 TACs Canada	TACs 1980	TACs 1981	TACs 1982	TACs 1983	TACs 1984	1985
Flatfish Total		159.0	114.0	144.7	119.7	163.7	129.5	163.0	140.7	176.5	181.5	183.0	185.0	188.0	191.0
Roundnose Grenadier	Total	20.6	-	15.4	-	35.0	1.0	35.0	1.0	35.0	35.0	35.0	35.0	35.0	35.0
Argentine Total		7.0	-	2.5	-	20.0	2.0	20.0	1.0	20.0	20.0	20.0	20.0	20.0	20.0
Groundfish Total (3)		1016.3	466.2	825.4	511.8	922.2	574.7	1009.5	670.9	1078.9	1139.1	1191.5	1249.8	1296.1	1342.1
Capelin		360.9	10.0	226.3	13.9	510.0	82.9	412.0	97.0	315.0	268.0	245.0	225.0	225.0	225.0
Herring Total (4)		228.6	224.7	229.5	229.2	238.0	238.0	230.5	230.5	234.0	230.0	236.0	240.0	242.0	244.0
Pelagics	2+3	395.7	44.7	262.1	49.8	531.0	103.9	445.5	129.5	341.0	292.0	268.0	244.0	247.0	249.0
Pelagics (4)	4VWX	172.1	151.0	156.1	155.2	153.0	148.0	187.0	185.0	173.0	170.0	174.0	176.0	182.0	193.0
Pelagics	4RST	54.7	54.7	60.5	60.5	94.0	94.0	127.0	125.0	129.0	134.0	135.0	139.0	143.0	149.0
Pelagics Total (4)		622.5	250.4	478.7	265.5	778.0	345.9	759.5	439.5	643.0	596.0	577.0	559.0	572.0	591.0
Finfish	2+3	956.6	269.3	757.1	312.1	1067.0	420.9	1023.5	505.1	965.5	971.5	1000.0	1025.0	1076.5	1117.0
	4VWX	444.9	258.2	350.4	287.4	404.7	294.5	453.5	344.9	453.5	461.5	470.5	486.5	493.5	512.5
	4RST	228.3	189.1	196.6	177.8	228.5	205.2	292.0	260.4	302.9	302.1	298.0	297.3	298.1	303.6
Finfish Total (5)		1638.8	716.6	1304.1	773.3	1700.2	920.6	1769.0	1110.4	1721.9	1735.1	1768.5	1808.8	1868.1	1933.1

(1) For 1978-9 includes anticipated annual catches of 12,000 MT of inshore cod in 4X not subject to quota.

(2) Groundfish species not subject to quota

(3) Includes items 1 and 2 above

(4) For 1978-1985 includes estimated annual catch (20,000 MT) of sardine herring in N.B. weirs which is not subject to quota.

(5) Includes (1), (2) and (4) above

Projected TACs are for all stocks off the Canadian Atlantic coast. They include stocks straddling the outer limit of the Canadian 200-mile zone, Canadian boundaries with the U.S.A. and France, and stocks which lie completely outside the 200-mile limit on the Flemish Cap. The PROJECTIONS ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

TABLE 3. PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE (4RS) 1978-85, WITH 1977 CATCH.

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
Groundfish											
Cod	2GH	Catch	3,600	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
		Catch Rate Index	may be some increase in 1980's but extent impossible to assess								
	3NØ	Catch	17,600	15,000	25,000	30,000	35,000	41,000	48,000	57,000	67,000
		Catch Rate Index	1.00	1.00	1.18	1.39	1.63	1.92	2.26	2.67	3.14
	2J3KL	Catch	172,800	135,000	170,000	214,000	262,000	306,000	345,000	377,000	402,000
		Catch Rate Index	1.00	1.29	1.67	2.19	2.60	2.92	3.23	3.44	3.65
	3M	Catch	27,000	40,000	40,000	28,000	29,000	30,000	31,000	32,000	33,000
		Catch Rate Index	1.00	1.51	1.56	1.12	1.16	1.20	1.24	1.28	1.32
	3Ps	Catch	32,400	25,000	25,000	25,000	25,000	25,000	27,000	30,000	32,000
		Catch Rate Index	1.00	1.06	1.19	1.35	1.52	1.68	1.86	2.01	2.11
	4RS 3Pn	Catch	76,000	55,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
		Catch Rate Index	1.00	1.03	1.09	1.17	1.22	1.26	1.30	1.34	1.37
TOTAL COD			329,400	290,000	355,000	392,000	446,000	497,000	546,000	591,000	629,000
Redfish	SA 2+3K	Catch	17,400	30,000	30,000	31,000	31,000	32,000	32,000	33,000	34,000
		Catch Rate Index	1.00	1.00	1.03	1.03	1.03	1.07	1.07	1.10	1.13
	3M	Catch	17,600	16,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE 3. PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1978-85, with 1977 Catch

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
Redfish	3LN	Catch	16,600	16,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3Ø	Catch	10,800	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
		Catch Rate Index									
	3P	Catch	17,700	18,000	11,000	10,000	8,000	7,000	6,000	5,500	5,000
		Catch Rate Index	1.00	1.00	0.84	0.75	0.67	0.61	0.55	0.50	0.47
	4RST	Catch	14,500	18,000	16,000	13,900	12,100	11,000	10,300	10,100	10,600
		Catch Rate Index	1.00	0.92	0.79	0.68	0.84	0.77	0.70	0.64	0.58
TOTAL REDFISH			94,600	118,000	115,000	112,900	109,100	108,000	106,300	106,600	107,600
Am. Plaice	SA 2+3K	Catch	7,500	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3LNØ	Catch	43,900	47,000	47,000	53,000	56,000	57,000	57,000	58,000	58,000
		Catch Rate Index	1.00	1.00	1.00	1.06	1.12	1.19	1.20	1.21	1.21
	3M	Catch	1,600	4,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3Ps	Catch	4,600	4,000	4,000	5,500	5,500	6,000	6,000	6,000	6,000
		Catch Rate Index	1.00	1.02	1.08	1.12	1.17	1.21	1.23	1.25	1.25
TOTAL PLAICE			57,600	61,000	59,000	66,500	69,500	71,000	71,000	72,000	72,000

TABLE 3. PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1978-85, with 1977 Catch

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
Witch	2J3KL	Catch	8,300	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3NØ	Catch	5,800	10,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3Ps	Catch	4,200	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4RS	Catch	2,400	3,500	5,000	5,000	5,000	5,000	5,000	5,000	5,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TOTAL WITCH			20,700	33,500	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Greenland Halibut	SA2+3KL	Catch	31,500	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yellowtail	3LNØ	Catch	11,600	15,000	18,000	18,000	18,000	18,000	18,000	20,000	20,000
		Catch Rate Index	1.00	1.06	1.09	1.14	1.18	1.20	1.23	1.25	1.25
Roundnosed Grenadier	SA 2+3	Catch	15,400	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other Groundfish	SA 2+3 +4RS		28,100	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
TOTAL GROUNDFISH		Catch	588,900	612,500	674,000	716,400	769,600	821,000	868,300	916,600	955,600

TABLE 3. PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF ST. LAWRENCE, 1978-85, with 1977 Catch

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
Pelagic Fish											
Herring	South Nfld.	Catch	3,800	7,000	7,500	8,000	8,000	8,000	8,000	8,000	8,000
		Catch Rate Index	1.00	1.08	1.15	1.23	1.23	1.23	1.23	1.23	1.23
	East Nfld.	Catch	25,700	18,000	17,000	16,000	17,000	18,000	19,000	20,000	20,000
		Catch Rate Index	1.00	0.82	0.77	0.73	0.77	0.82	0.86	0.91	0.91
	West Nfld.	Catch	12,700	9,000	6,000	8,000	8,000	8,000	8,000	8,000	8,000
		Catch Rate Index	1.00	0.75	0.50	0.67	0.67	0.67	0.67	0.67	0.67
	Labrador	Catch	300	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
		Catch Rate Index	1.00	0.75	0.50	0.67	0.67	0.67	0.67	0.67	0.67
	Gulf (3Pn-4T)	Catch	48,000	65,000	70,000	75,000	75,000	75,000	75,000	75,000	75,000
		Catch Rate Index	1.00	1.08	1.17	1.25	1.25	1.25	1.25	1.25	1.25
TOTAL HERRING			90,500	100,000	101,500	108,000	109,000	110,000	111,000	112,000	112,000
Capelin	SA 2+3K	Catch	151,700	300,000	300,000	200,000	175,000	175,000	150,000	150,000	150,000
		Catch Rate Index*									
	3LNØPs	Catch	72,600	200,000	100,000	100,000	75,000	50,000	50,000	50,000	50,000
		Catch Rate Index*									
	3Pn-4R	Catch	1,600	10,000	12,000	15,000	18,000	20,000	25,000	25,000	25,000
		Catch Rate Index*									
TOTAL CAPELIN			225,900	510,000	412,000	315,000	268,000	245,000	225,000	225,000	225,000

TABLE 3. PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, NEWFOUNDLAND-LABRADOR

(SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1977-85.

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
TOTAL PELAGIC			316,400	610,000	513,500	423,000	377,000	355,000	336,000	337,000	337,000
TOTAL FINFISH		CATCH	905,300	1,222,500	1,187,500	1,139,400	1,146,600	1,176,000	1,204,300	1,253,600	1,292,600

INVERTEBRATES

Lobster	Nfld.	Catch	Fluctuate between 1,100 and 2,000 MT with average of 1,400-1,600 MT.
Squid	SA3+4	Catch	(8 ,000) MT. Impossible to predict annual catches because depend heavily on fluctuation in squid abundance.
Scallop	Nfld.	Catch	Catches will fluctuate between 45 and 320 MT of meat per year depending on effort and abundance.
Snow Crab	Nfld.	Catch	Catches will fluctuate in the range of 2,500-6,000 MT.
Shrimp	Esquiman Channel, Gulf of St. Lawrence	Catch	Landings will fluctuate between 900 and 1,800 MT depending on recruitment picture.
	Labrador	Catch	Landingsin the order of 5,000-10,000 MT would seem likely provided successful recruitment
	SA 3	Catch	Unknown
	Ungava Bay &SA 0	Catch	Unknown
	Area North of SA 0	Catch	Unknown

* Predictions of abundance trends cannot be given with any confidence but greater predation through stock rebuilding of cod and other species would imply a downward trend.

Projected TACs are for all stocks off the Canadian Atlantic coast. They include stocks straddling the outer limit of the Canadian 200-mile zone, Canadian boundaries with the U.S.A. and France, and stocks which lie completely outside the 200-mile limit on the Flemish Cap. The PROJECTIONS ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

TABLE 4: PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, FOR STOCKS IN THE GULF OF ST. LAWRENCE (4T) AND SCOTIAN SHELF (4VWX).

SPECIES	STOCK	CATCH/ CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
Cod	4T-4Vn	Catch		38,000	42,000	51,000	46,000	42,000	39,000	35,000	33,000
	Jan.-Apr.	Catch Rate Index	1.00	1.28	1.56	1.40	1.26	1.15	1.05	0.97	0.94
	4Vn	Catch		3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
	May-Dec.	Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4VsW	Catch	10,800	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
		Catch Rate Index	1.00	1.07	1.18	1.28	1.36	1.42	1.46	1.47	1.45
	4X	Catch	23,000	16,000	16,000	17,000	18,000	20,000	22,000	24,000	25,000
		Catch Rate Index	1.00	1.00	1.00	1.10	1.20	1.40	1.60	1.70	1.75
TOTAL COD			63,000	64,500	68,500	78,500	74,500	72,500	71,500	69,500	68,500
Haddock	4VW	Catch	3,300	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4X	Catch	21,400	22,000	26,000	27,000	28,000	30,000	31,000	30,000	29,000
		Catch Rate Index	1.00	1.11	1.17	1.21	1.25	1.26	1.27	1.24	1.24
TOTAL HADDOCK			24,700	24,000	28,000	29,000	30,000	32,000	33,000	32,000	31,000
Redfish	4VWX	Catch	18,400	20,000	20,000	25,000	25,000	25,000	30,000	30,000	30,000
		Catch Rate Index	1.00	1.00	1.00	1.25	1.25	1.25	1.50	1.50	1.50
Silver Hake	4VWX	Catch	37,600	81,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flatfish	4T	Catch	11,500	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4VWX	Catch	11,700	14,000	14,000	16,000	18,000	18,000	20,000	20,000	23,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.13	1.13	1.25	1.25	1.44
TOTAL FLATFISH			23,200	28,000	28,000	30,000	32,000	32,000	34,000	34,000	37,000

TABLE 4: PROJECTIONS OF CATCHES AND INDEX OF CATCH PER UNIT OF EFFORT, FOR STOCKS IN THE GULF OF ST. LAWRENCE (4T) AND SCOTIAN SHELF (4VWX)

SPECIES	STOCK	CATCH/ CATCH RATE INDEX	1977	1978	1979	1980	1981	1982	1983	1984	1985
Pollock	4VWX+5	Catch	38,700	30,000	30,000	35,000	38,000	39,000	39,000	39,000	40,000
		Catch Rate Index	1.00	1.08	1.17	1.25	1.30	1.33	1.35	1.35	1.38
Other Groundfish	4TVWX	Catch	28,000	45,000	75,000	75,000	80,000	80,000	85,000	85,000	90,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TOTAL GROUNDFISH 4			233,900	292,500	319,500	342,500	349,500	350,500	362,500	359,500	366,500
Herring	4V	Catch	11,000	7,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Herring (Excl. NB Weirs 20,000 mt/yr)	4WX	Catch	119,000	111,000	99,000	96,000	91,000	96,000	99,000	100,000	120,000
		Catch Rate Index	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TOTAL HERRING 4			130,000	118,000	109,000	107,000	101,000	106,000	109,000	110,000	112,000
TOTAL FINFISH 4			363,900	410,500	428,500	449,500	450,500	456,500	471,500	469,500	478,500
Herring	5 + 6	Catch	53,000)	Projection not possible - by 1985 could be							150,000
		Catch Rate Index	1.00								
Groundfish	5 + 6	Catch	260,000	255,000	255,000	276,000	298,000	320,000	342,000	364,000	385,000
		Catch Rate Index	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80
Mackerel (i.e., Northwest Atlantic).	3 - 6	Catch	81,000	232,000	293,000	236,000	244,000	239,000	236,000	262,000	306,000
		Catch Rate Index	1.00	0.96	1.01	0.95	0.93	0.98	1.05	1.35	1.43

TABLE 5

PROJECTIONS OF CATCHES IN THE DAVIS STRAIT-BAFFIN BAY AREA

Species	Stock	Catch 1977 (MT)	TAC 1978 (MT)	Projected TAC 1980's (MT)
Greenland Halibut	0 +1	12,578	25,000	25,000
Roundnose Grenadier	0 +1	2,933	8,000	8,000?
Shrimp	0 +1	42,161	40,000	40,000

Projected TACs are for all stocks off the Canadian Atlantic coast. They include stocks straddling the outer limit of the Canadian 200-mile zone, Canadian boundaries with the U.S.A. and France, and stocks which lie completely outside the 200-mile limit on the Flemish Cap. The PROJECTIONS ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

TABLE 6

PROJECTIONS OF CATCHES ON THE FLEMISH CAP (included in Table 3)

Species	Stock	TAC 1978 (MT)	TAC 1979 (MT)	Projected TAC 1980's (MT)
Cod	3M	40,000	40,000	28-33,000
Redfish	3M	16,000	20,000	20,000
American Plaice	3M	4,000	2,000	2,000

Projected TACs are for all stocks off the Canadian Atlantic coast. They include stocks straddling the outer limit of the Canadian 200-mile zone, Canadian boundaries with the U.S.A. and France, and stocks which lie completely outside the 200-mile limit on the Flemish Cap. The PROJECTIONS ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

TABLE 7

PROJECTION OF CATCHES ON GEORGES BANK (Subarea 5)

Species	Stock	Catch 1977 (MT)	Projected TAC 1980's (MT)
Cod	5Y	12,501	No information available
	5Z	26,463	No information available
Haddock	5	14,121	No information available
Silver Hake	5Y	8,730	No information available
	5Ze	44,263	No information available
Red Hake	5Ze	2,879	No information available
Redfish	5	13,225	No information available
Pollock	4VWX	-	See Table 4
Yellowtail	(E69°)	13,641	No information available
Flounders	5 + 6	31,000	No information available
Mackerel	5 + 6	54,650	Perhaps 306,000 MT including SA3 4
Herring	5Y	50,932	Perhaps 25,000
	5Z + 6	2,551	Perhaps 109,000
Squid (Loligo)	5 + 6	16,442	No information available
Squid (Illex)	5 + 6	24,792	No information available
River Herring	5 + 6	6,654	No information available
Butterfish	5 + 6	4,088	No information available

Uncertainty depends in large measure upon management strategy pursued in both the short and long term.

Projected TACs are for all stocks off the Canadian Atlantic coast. They include stocks straddling the outer limit of the Canadian 200-mile zone, Canadian boundaries with the U.S.A. and France, and stocks which lie completely outside the 200-mile limit on the Flemish Cap. The PROJECTIONS ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

TABLE 8 - Foreign Allocations in 1978 in Subareas 2, 3 and 4 of Traditional Groundfish species by various Stock Categories

A. Stocks completely beyond 200 miles (Flemish Cap):

Cod 3M	37,900
Redfish 3M	11,600
American Plaice 3M	3,500
Subtotal	53,000

B. Overlapping stocks:

Cod 3NO	11,000
American Plaice 3LNO	2,200
Yellowtail 3LNO	800
Witch 3NO	3,000
Redfish 3LN	8,000
Subtotal	25,000

C. U.S.A. - neighbouring coastal state (1977 figures) excluding categories A & B.*

Cod 4VsW	100
Redfish 4VWX	6,000
Haddock 4VW	200
4X	1,500
Pollock 4VWX 5	9,025
Flounders 4VWX	500
	17,325

D. France - neighbouring coastal state and treaty rights excluding categories A and B.

Cod 2GH	450
2J3KL	2,190
3Ps	3,900
4TVn	3,200
4Vn (May-Dec)	160
4 VsW	250
4RS3Pn	15,500
Redfish 3P	2,000
4RST	2,325
4VWX	250
American Plaice 3Ps	420
Witch 3Ps	410
4Rs	300
Flounders 4VWX	250
	31,605

E. Stocks inside 200 miles - amounts allocated to foreign countries other than France and U.S.A.

Cod 2GH	18,550
2J3KL	35,810
4VsW	50
Redfish 2 - 3K	5,350
30	5,000
4 VWX	750
Haddock 4VW	100
American Plaice 2 - 3K	500
Witch 2J3KL	8,000
Greenland Halibut 2J3KL	14,290
	88,400

* Superseded by suspension of the reciprocal fishing agreement.

Figure 4

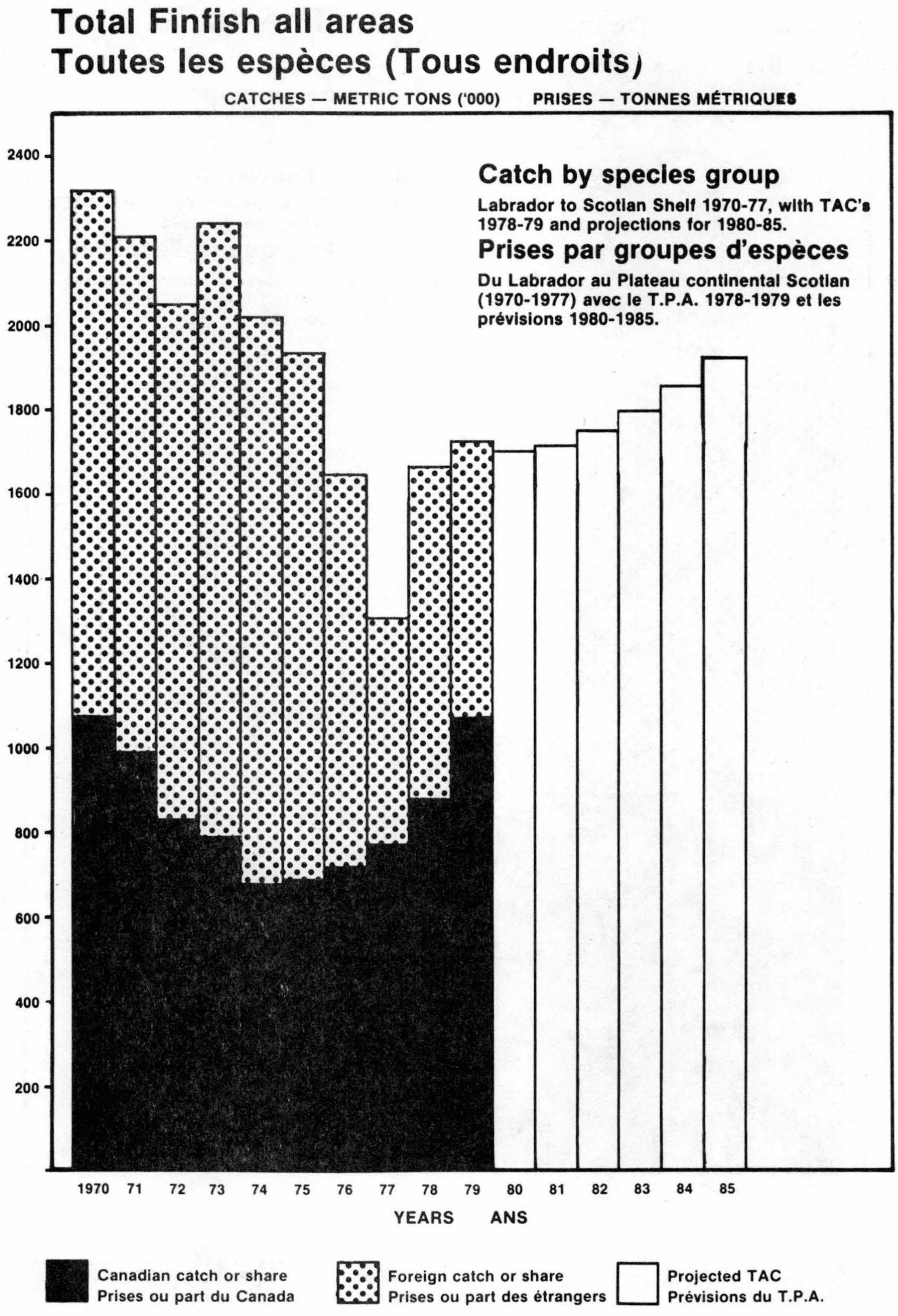

Total Finfish all areas
Toutes les espèces (Tous endroits)
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
Catch by species group
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par groupes d'espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 5

Scotian Shelf Finfish
Toutes les espèces (Plateau continental Scotian)

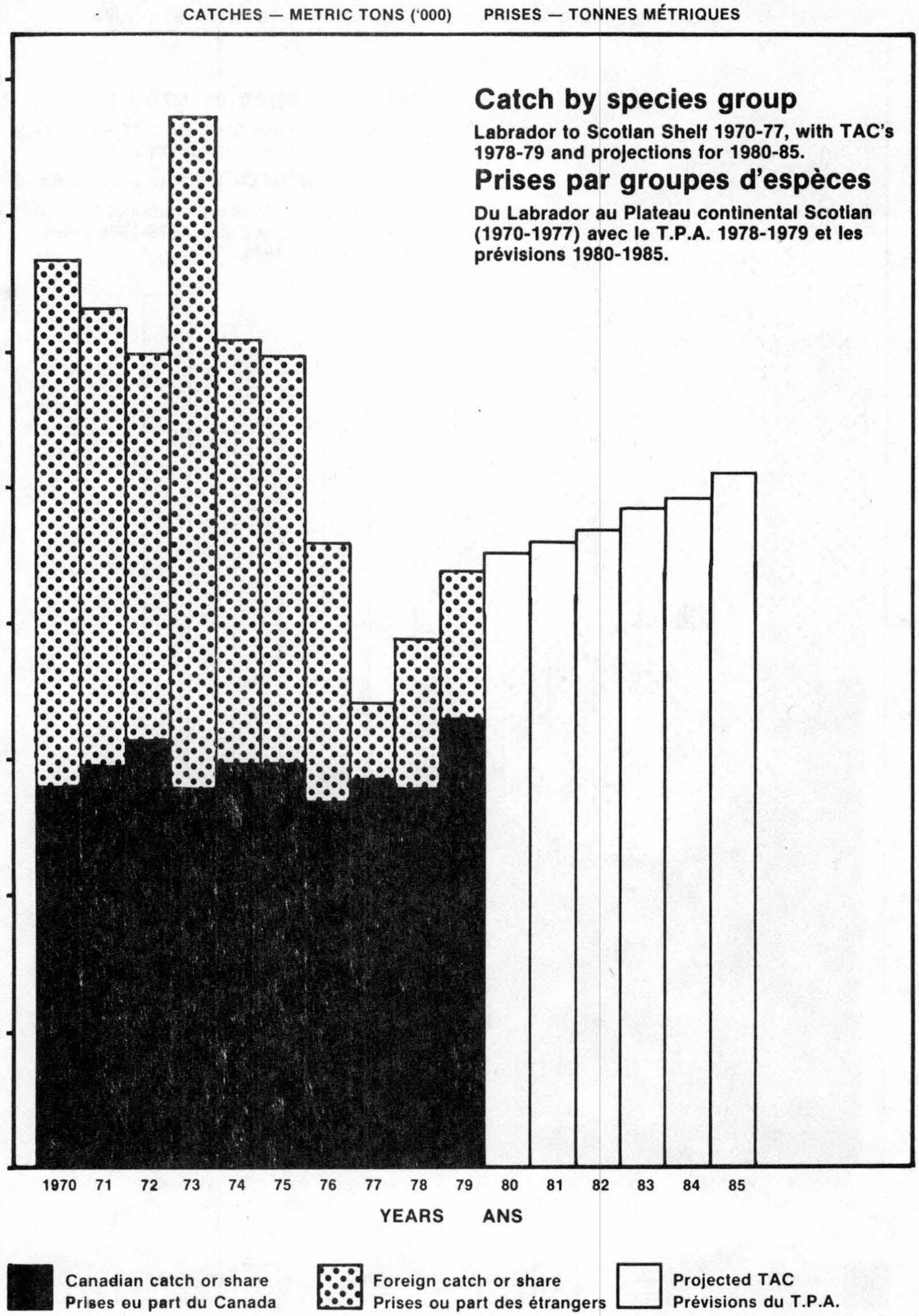


Figure 6.

Gulf Finfish
Toutes les espèces (Golfe)

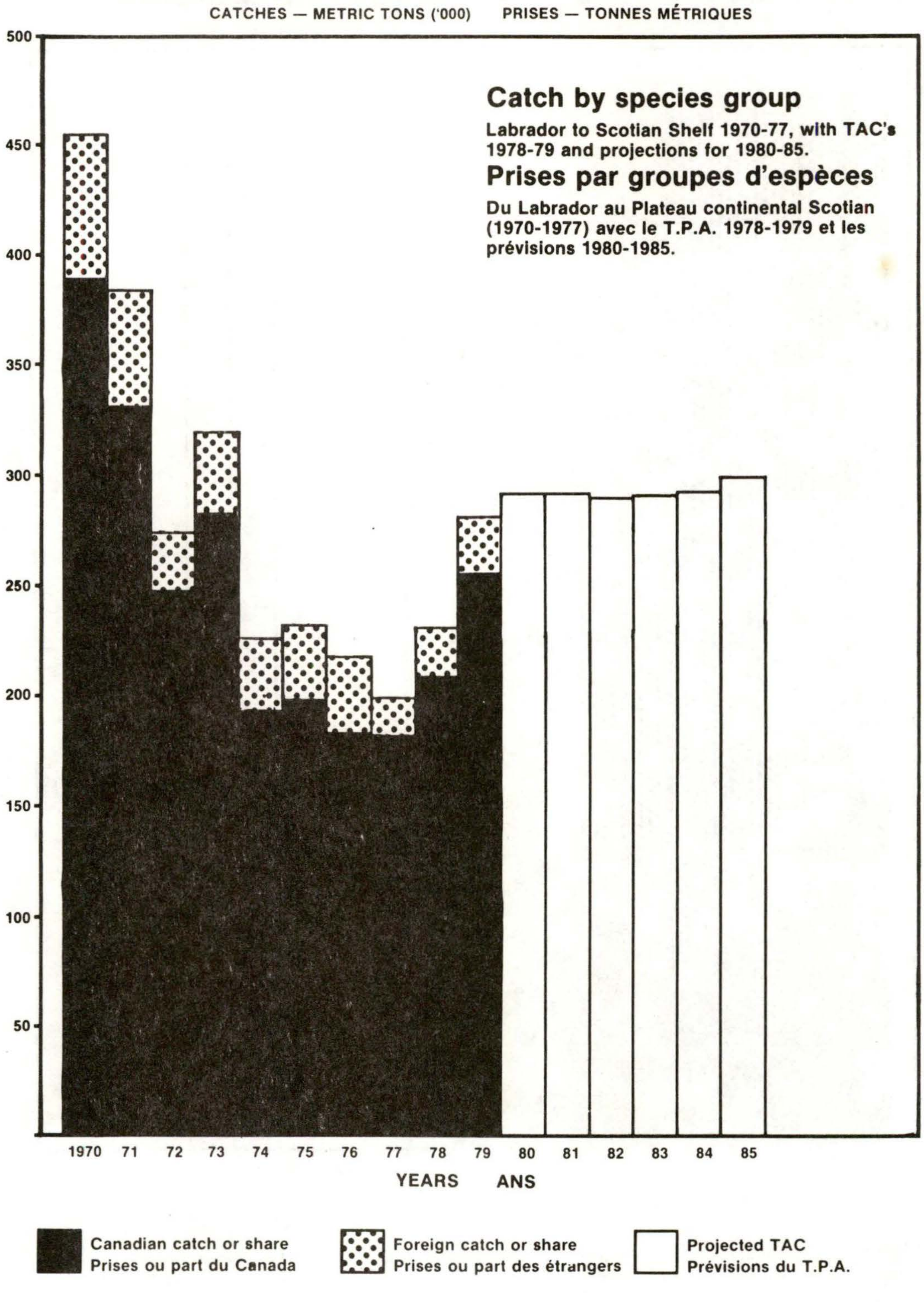


Figure 7.

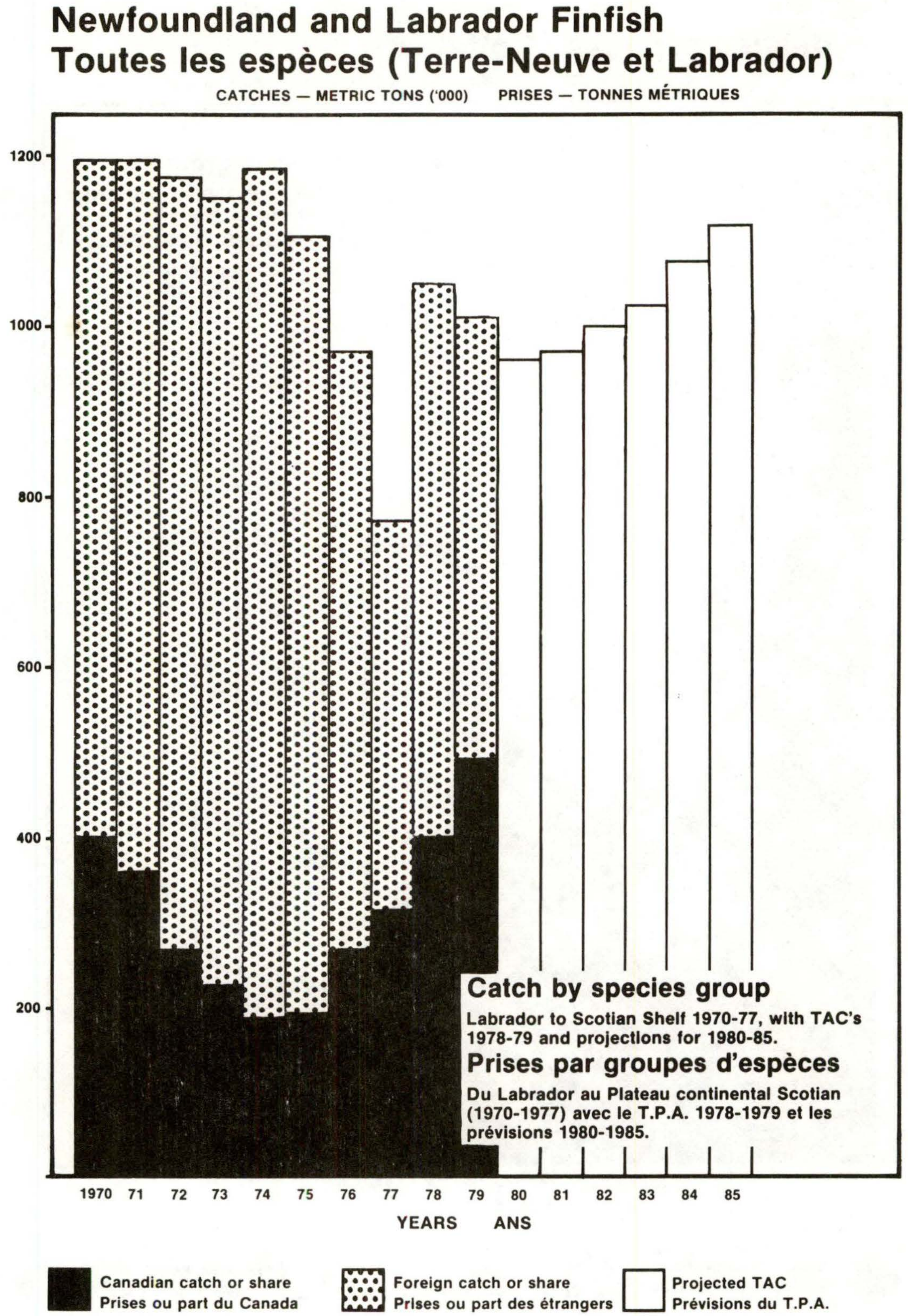

Newfoundland and Labrador Finfish
Toutes les espèces (Terre-Neuve et Labrador)
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
1200
1000
800
600
400
200
Catch by species group
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par groupes d'espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 8.

Total Groundfish
Poisson de fond (Tous endroits)

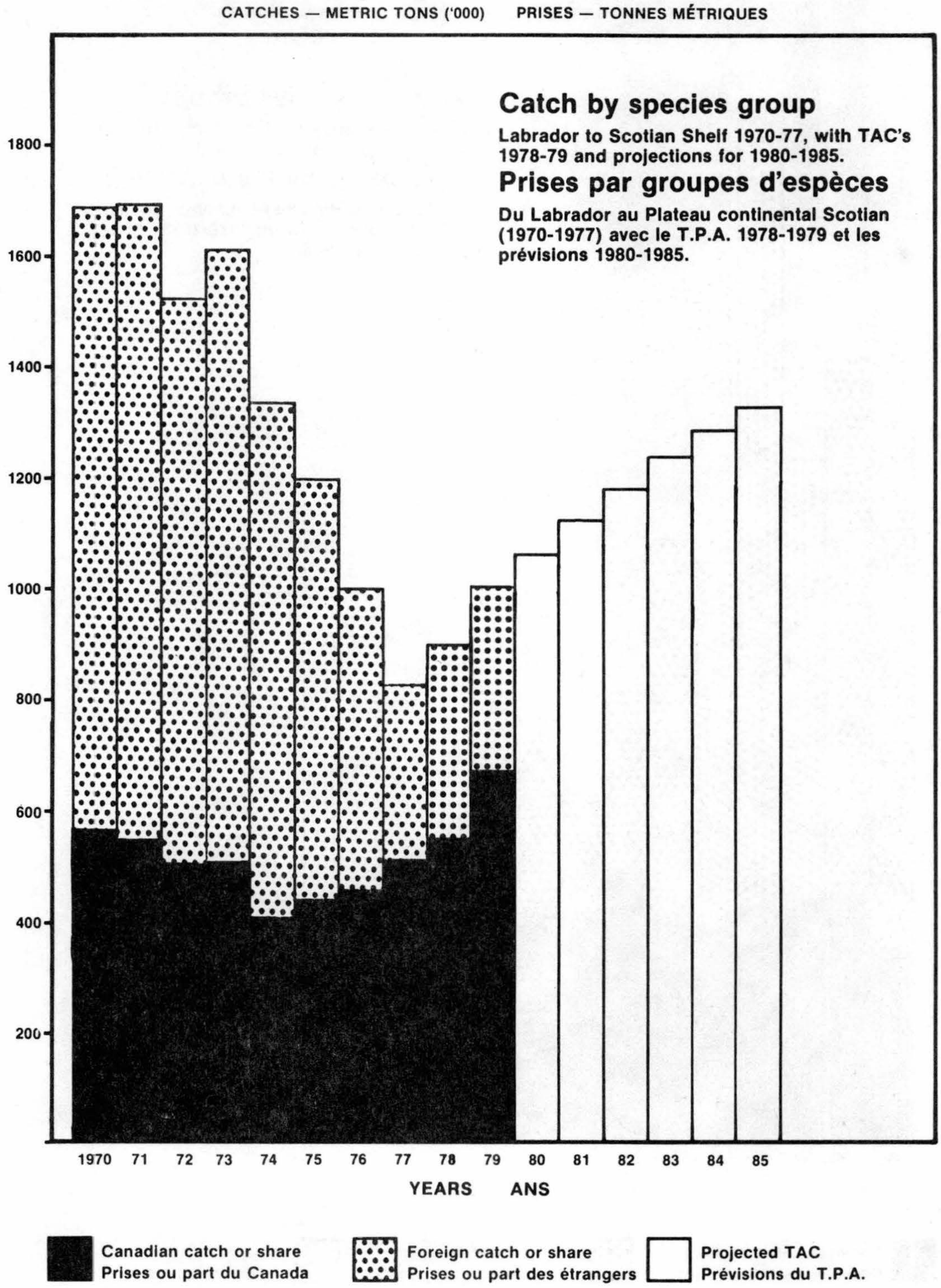


Figure 9.

Scotian Shelf Groundfish
Poisson de fond (Plateau continental Scotian)

CATCHES — METRIC TONS ('000)   PRISES — TONNES MÉTRIQUES

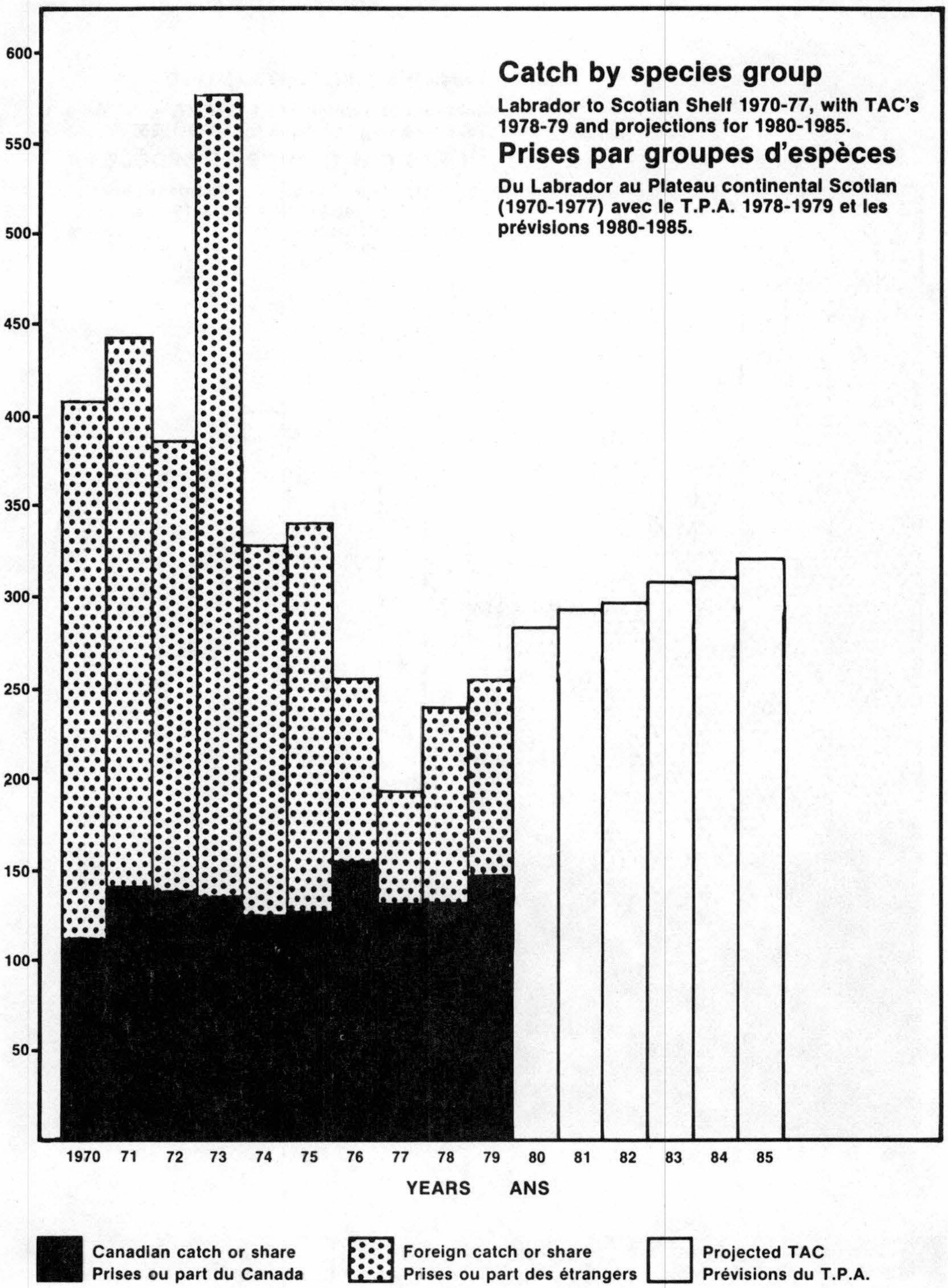


Figure 10.

Gulf Groundfish
Poisson de fond (Golfe)

CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES

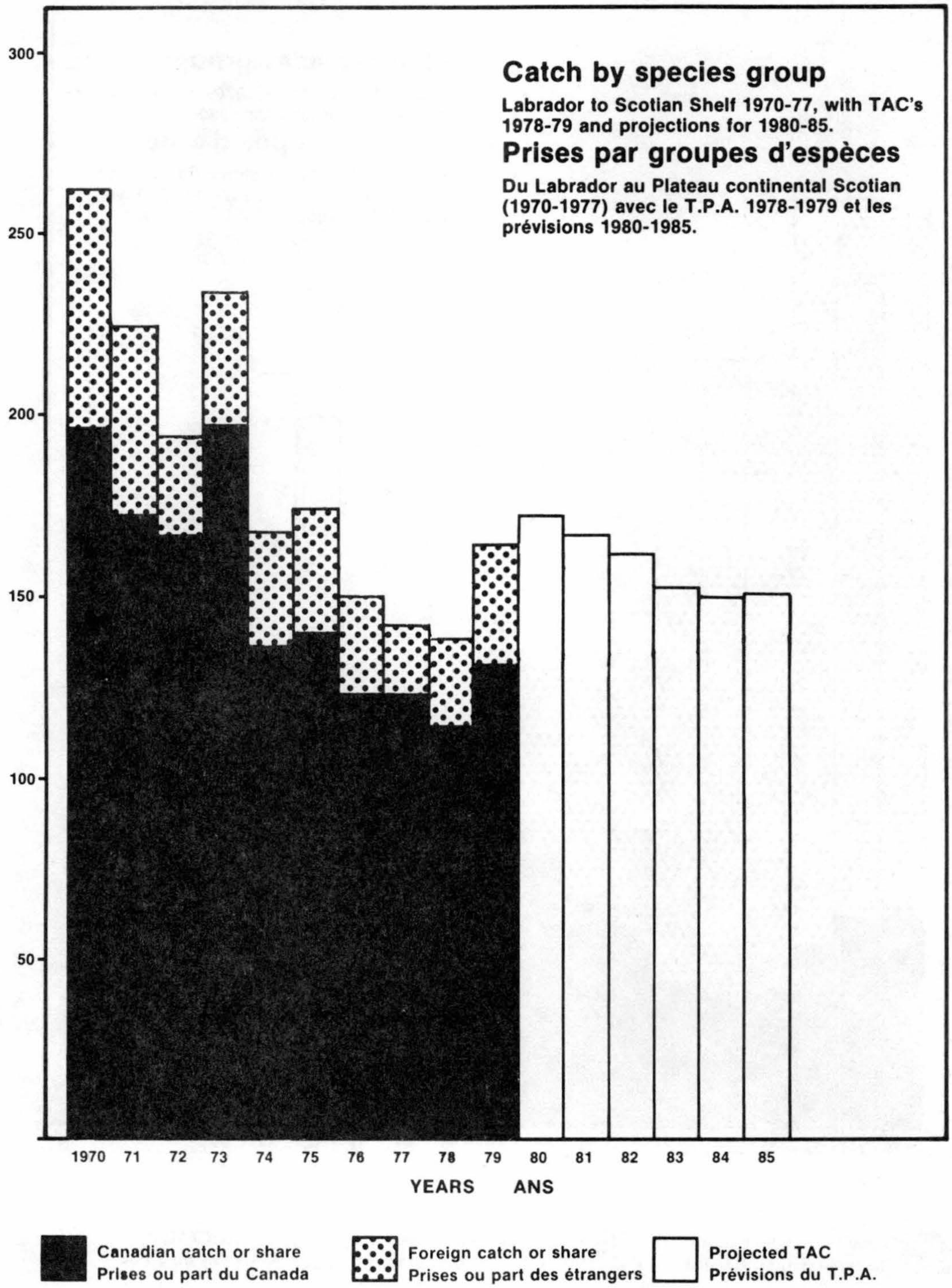


Figure 11.

Newfoundland Groundfish
Poisson de fond (Terre-Neuve)

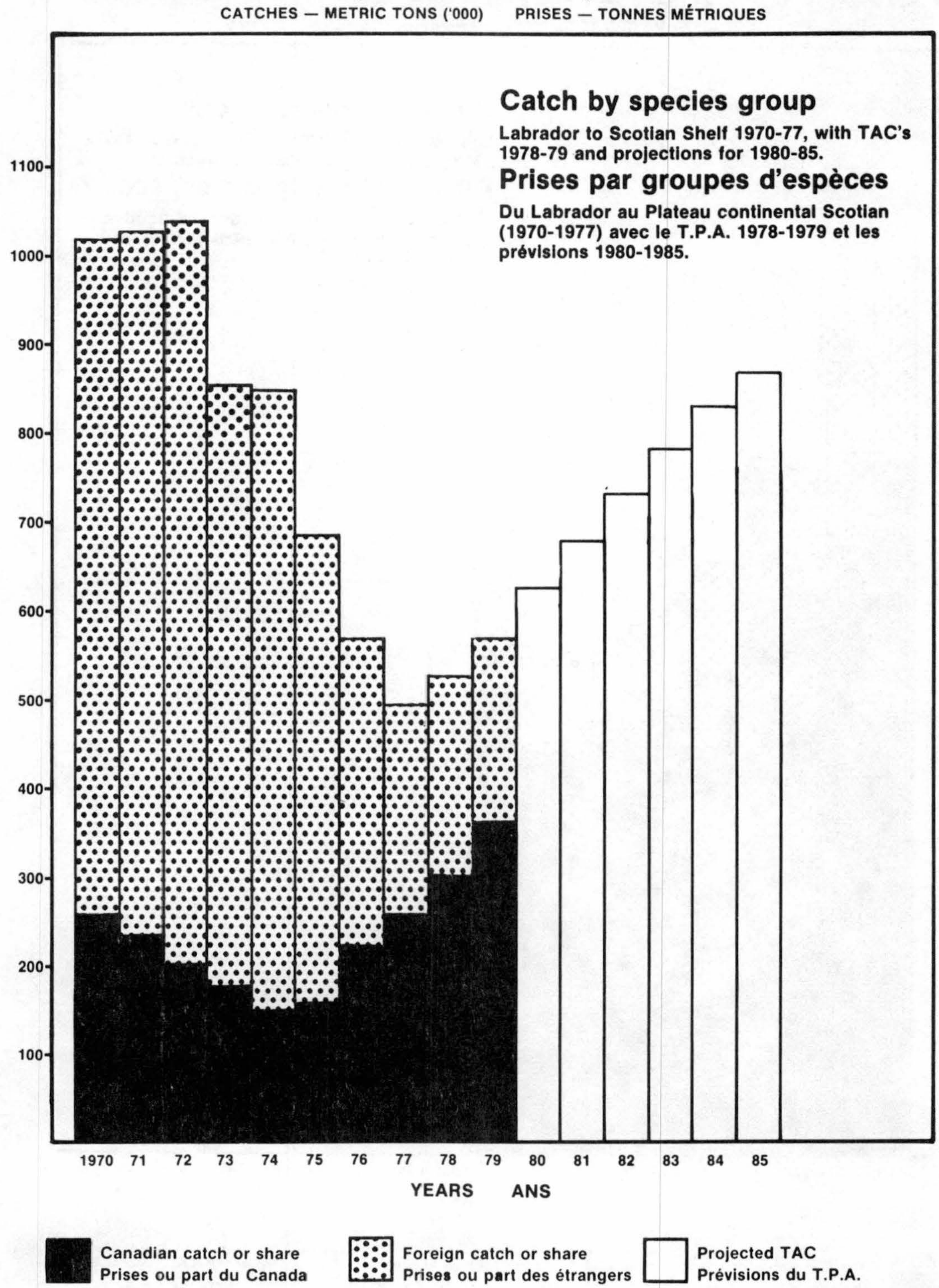


Figure 12.

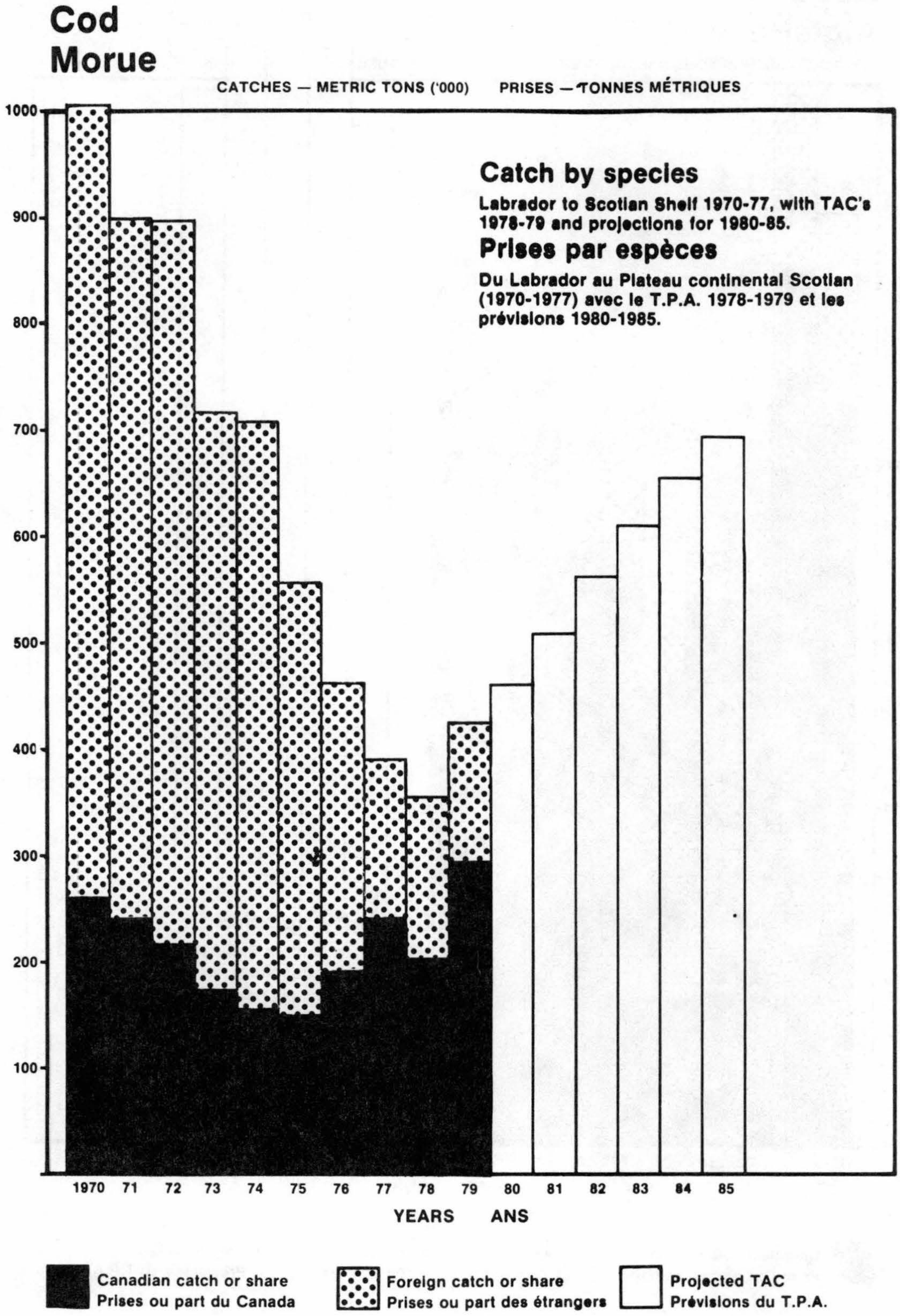
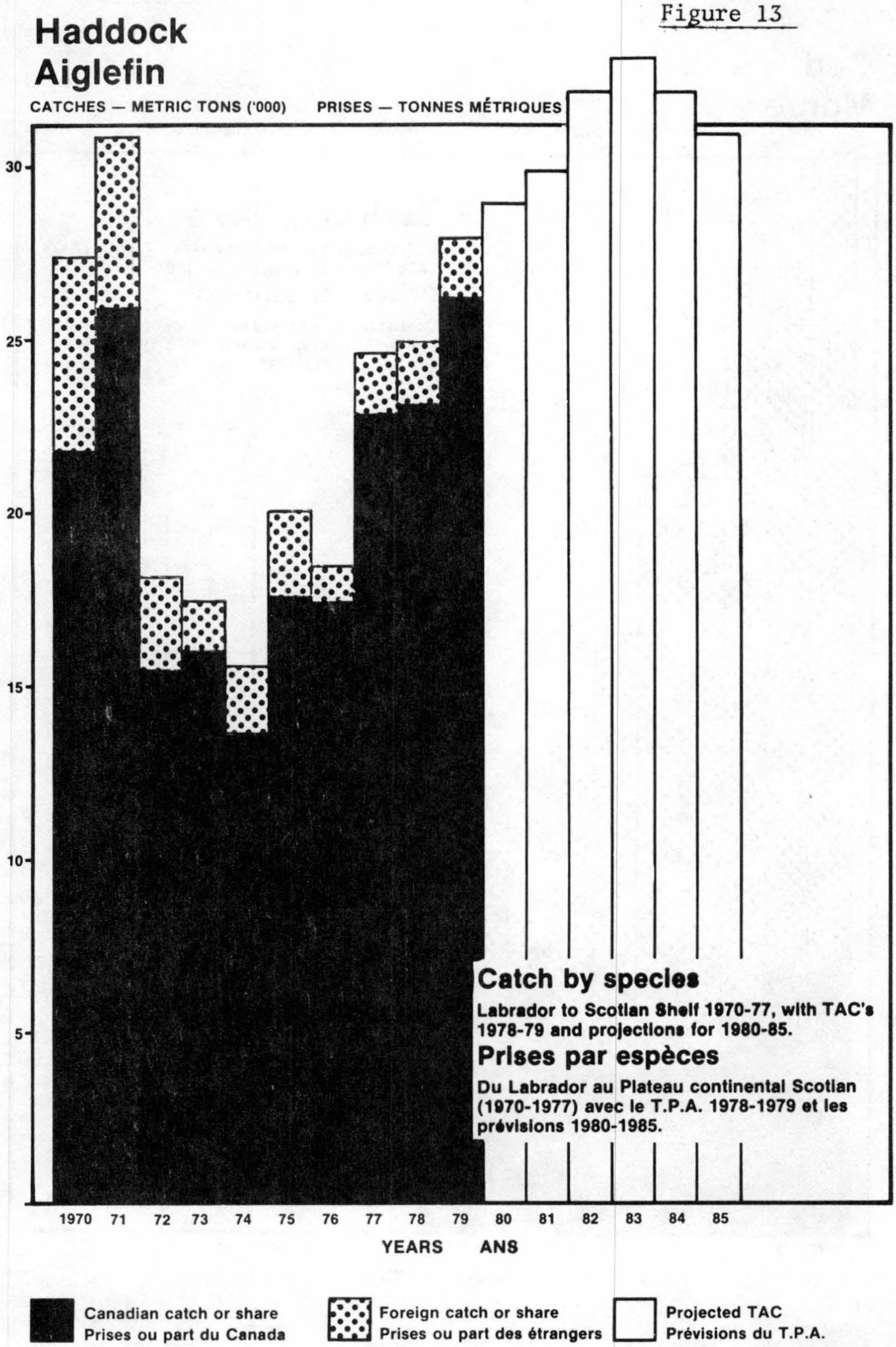

Cod
Morue
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
1000
900
800
700
600
500
400
300
200
100
Catch by species
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 13



Haddock
Aiglefin
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
30
25
20
15
10
5
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Catch by species
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 14.

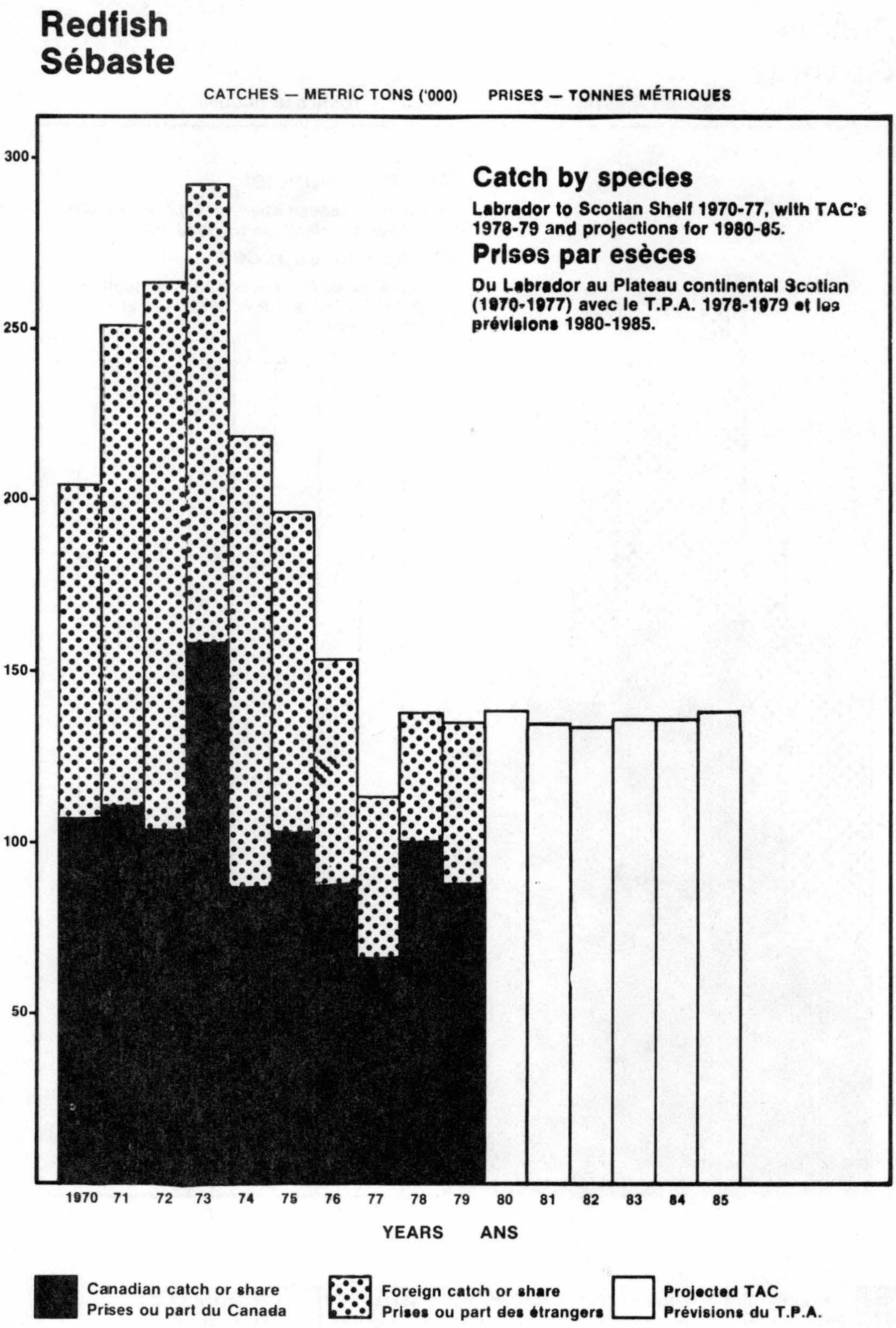

Redfish
Sébaste
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
Catch by species
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par esèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
300
250
200
150
100
50
1970
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 15.

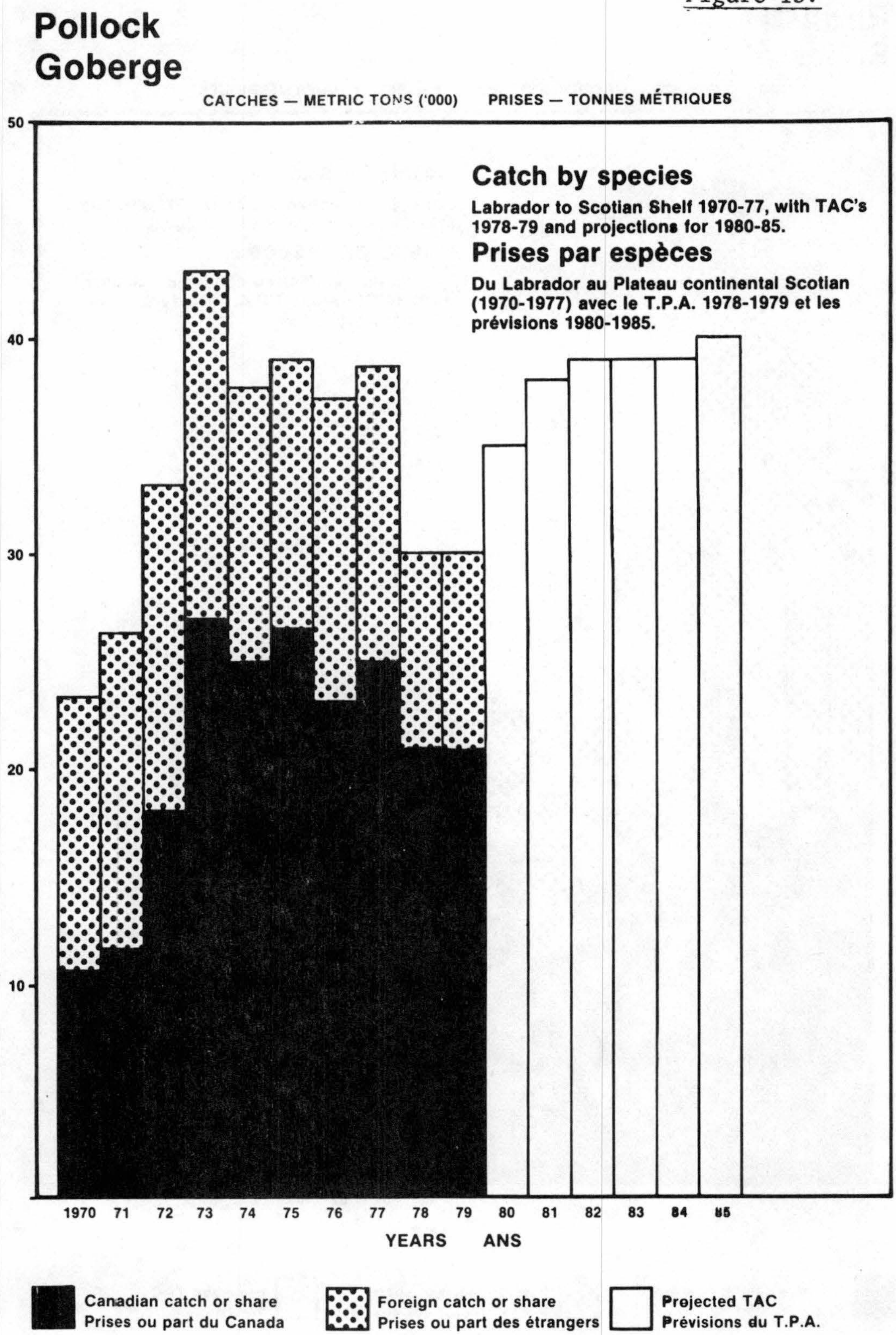

Pollock
Goberge
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
Catch by species
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
50
40
30
20
10
1970
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 16.

Silver Hake
Merlu argenté

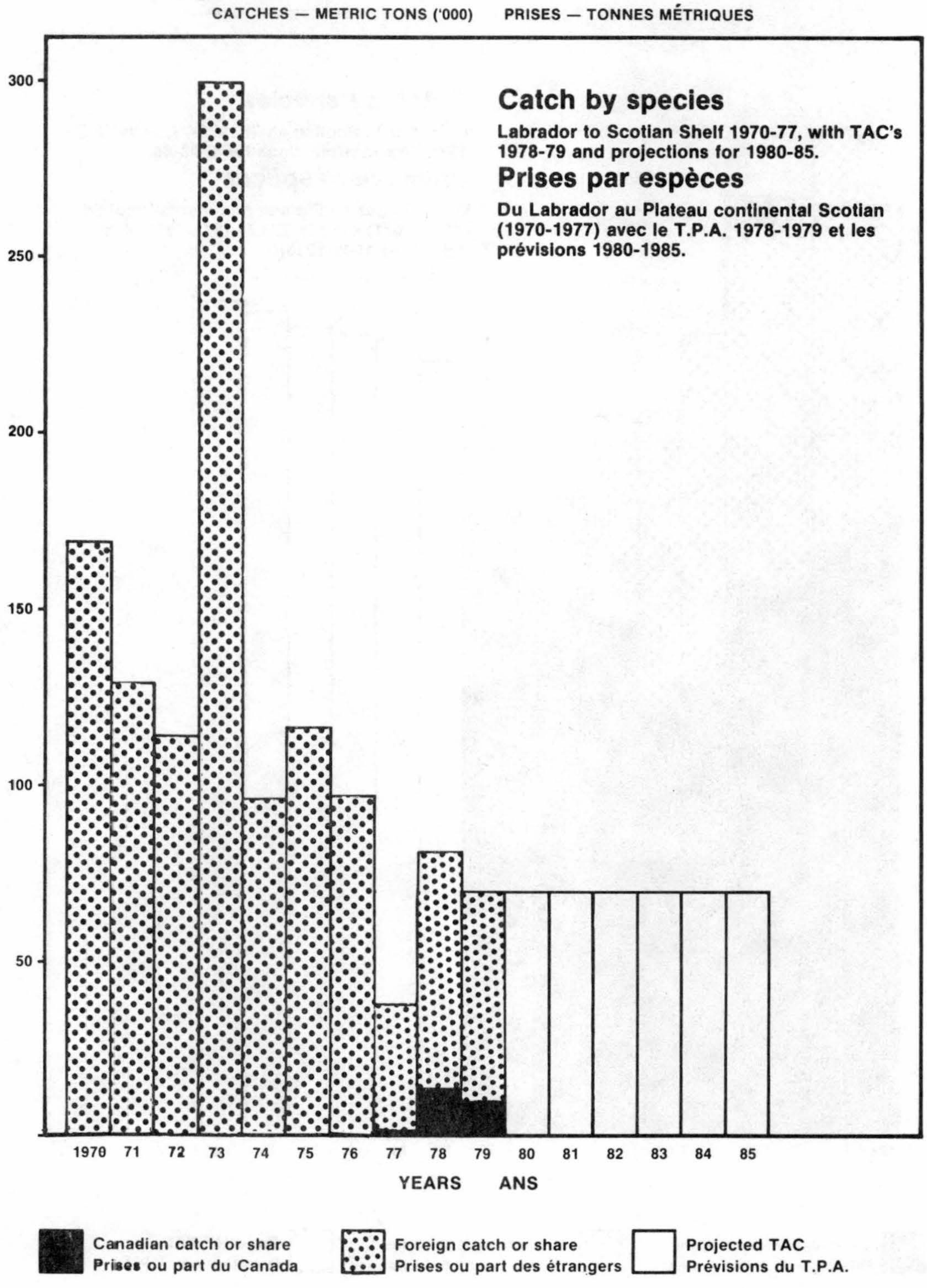
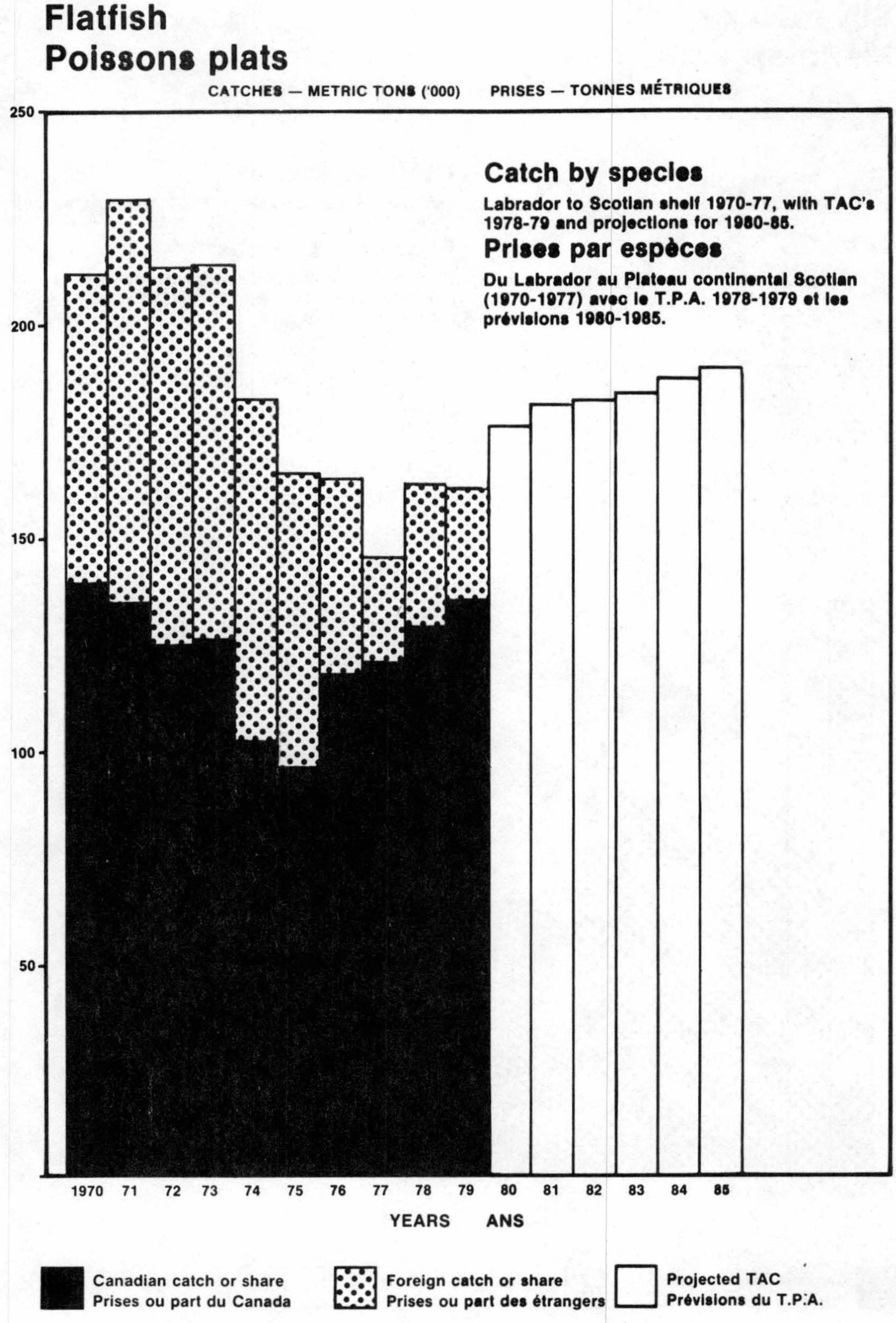


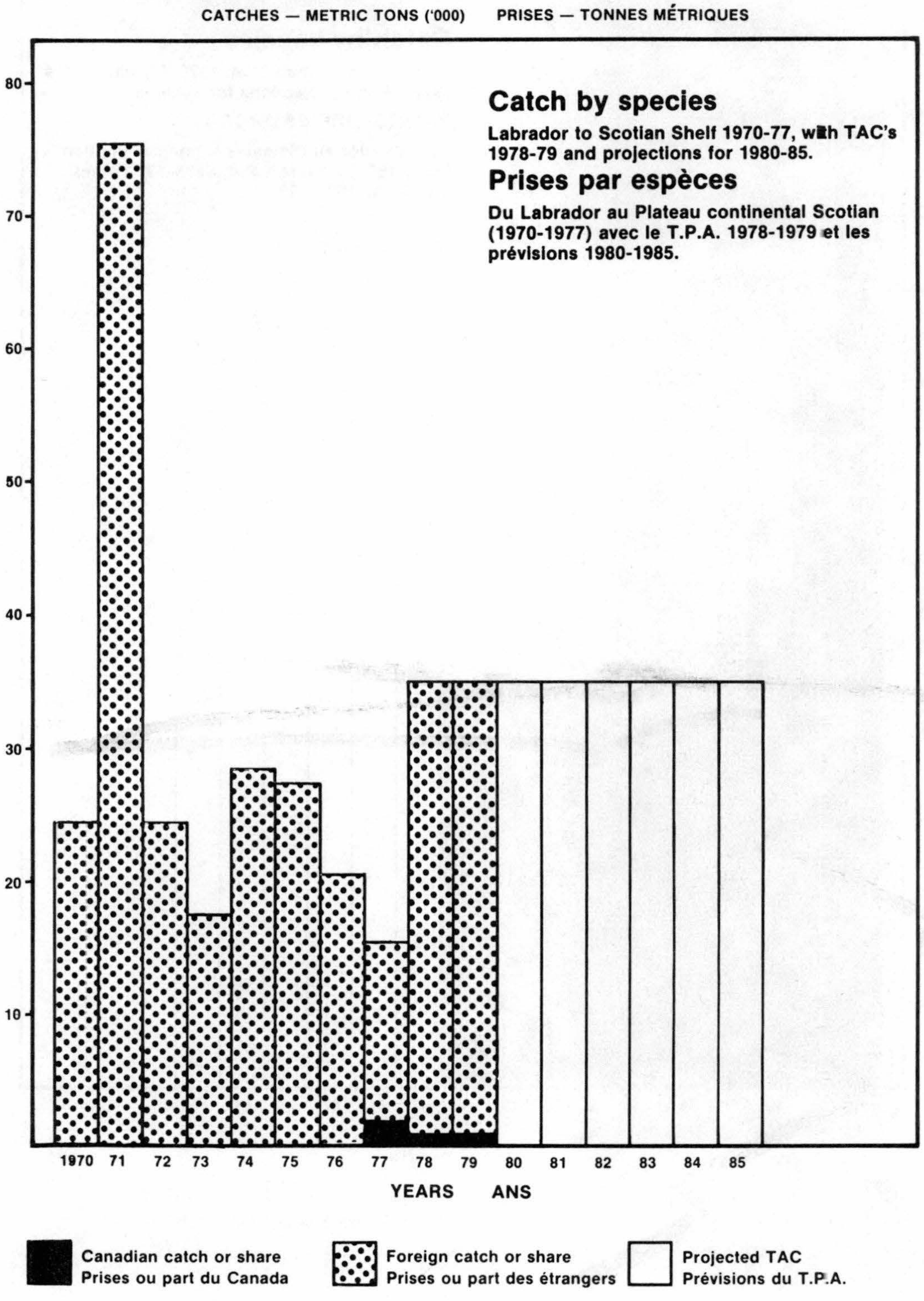
Figure 17.



Flatfish
Poissons plats
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
Catch by species
Labrador to Scotian shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
250
200
150
100
50
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 18.

Round Nose Grenadier
Grenadier de roche



Herring
Hareng

Figure 19.

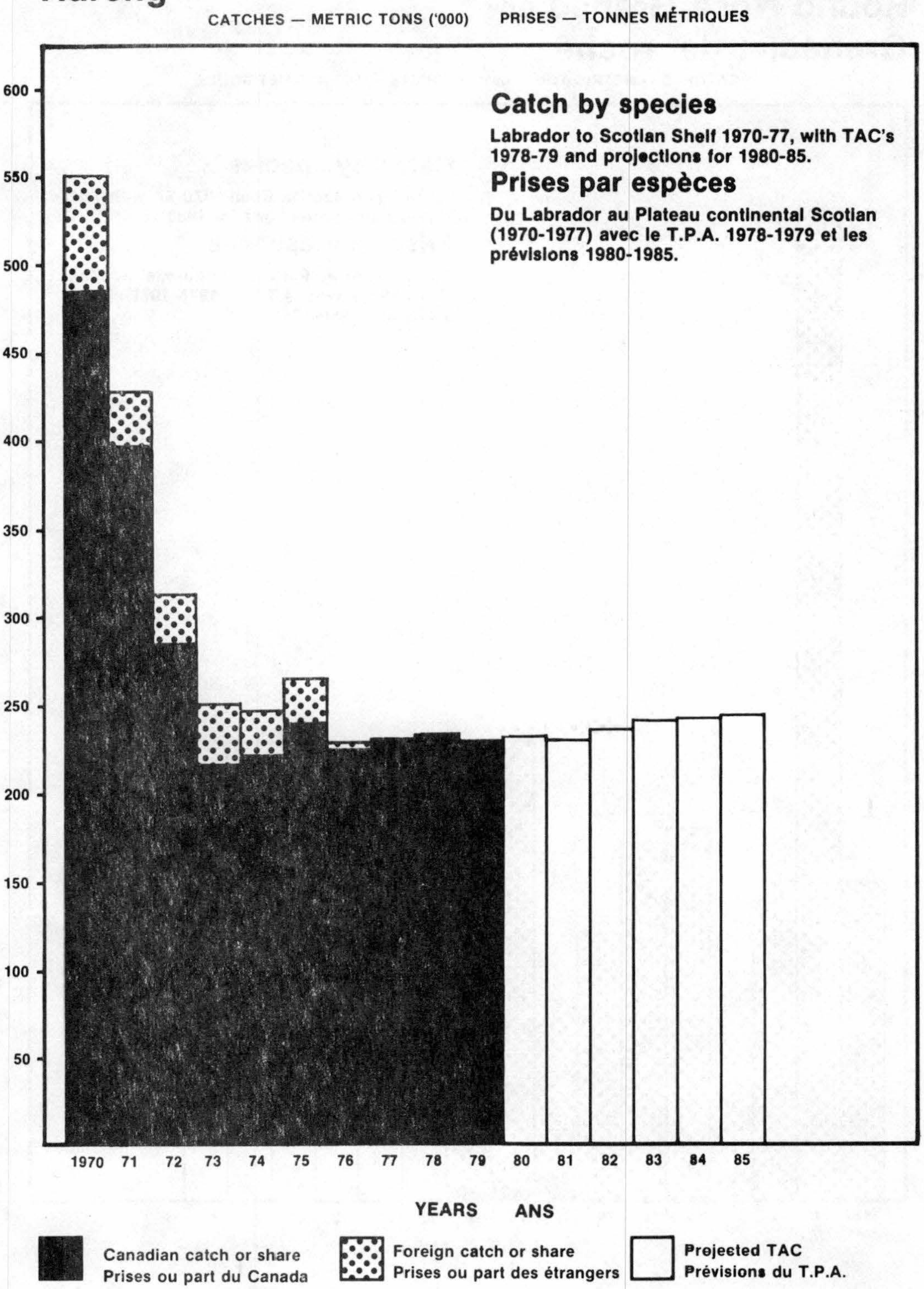


Figure 20.

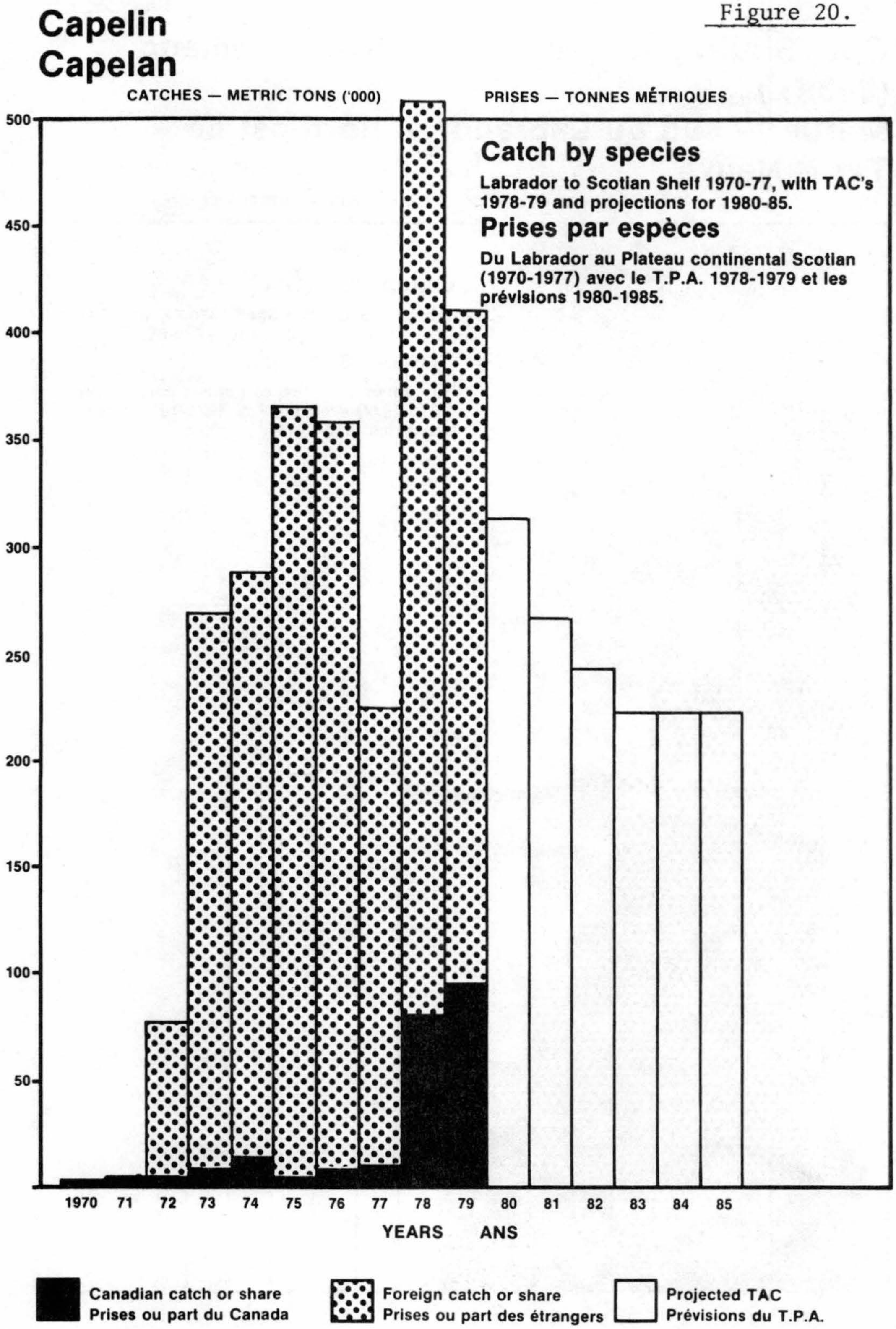

Capelin
Capelan
CATCHES — METRIC TONS ('000)
PRISES — TONNES MÉTRIQUES
Catch by species
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par espèces
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
500
450
400
350
300
250
200
150
100
50
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 21.

Cod, South Labrador — N.E. Newfoundland (2J3KL)
Morue — sud du Labrador et nord-est de Terre-Neuve

CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES

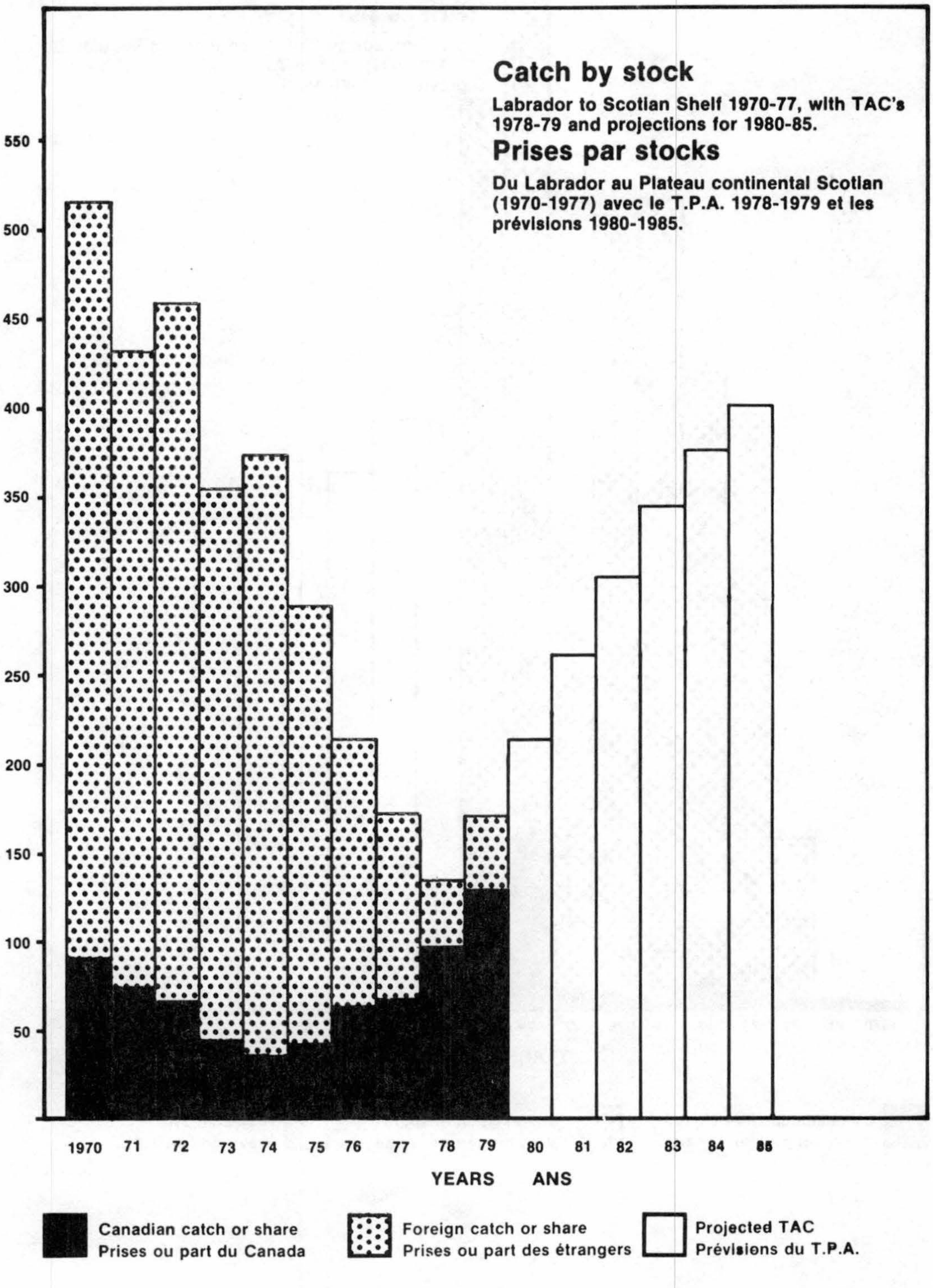


Figure 22.

Cod, Southern Grand Banks (3NO)
Morue (sud des Bancs de Terre-Neuve)

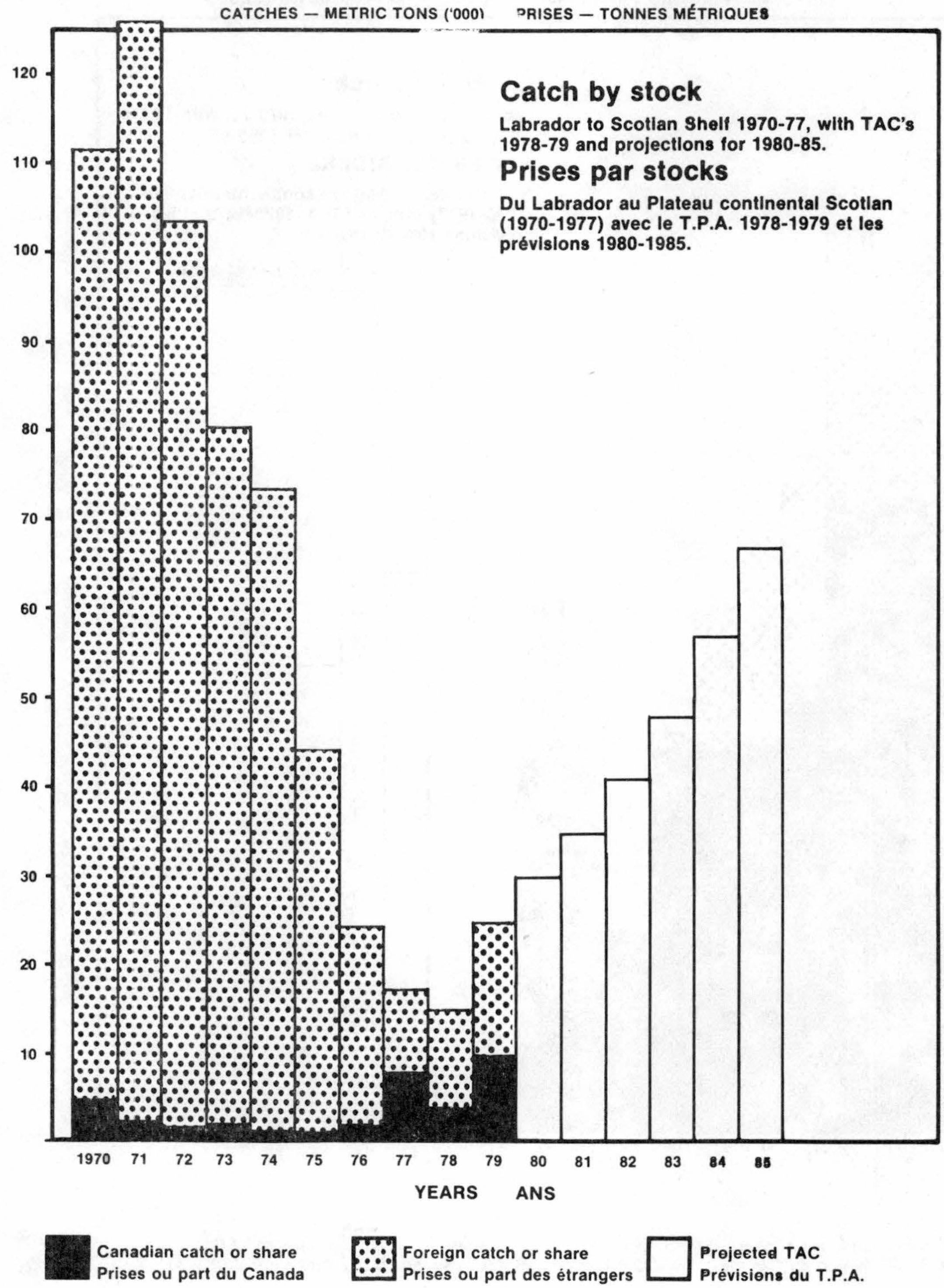


Figure 23.

Cod, Western Gulf (4TVn)
Morue (Ouest du Golfe)

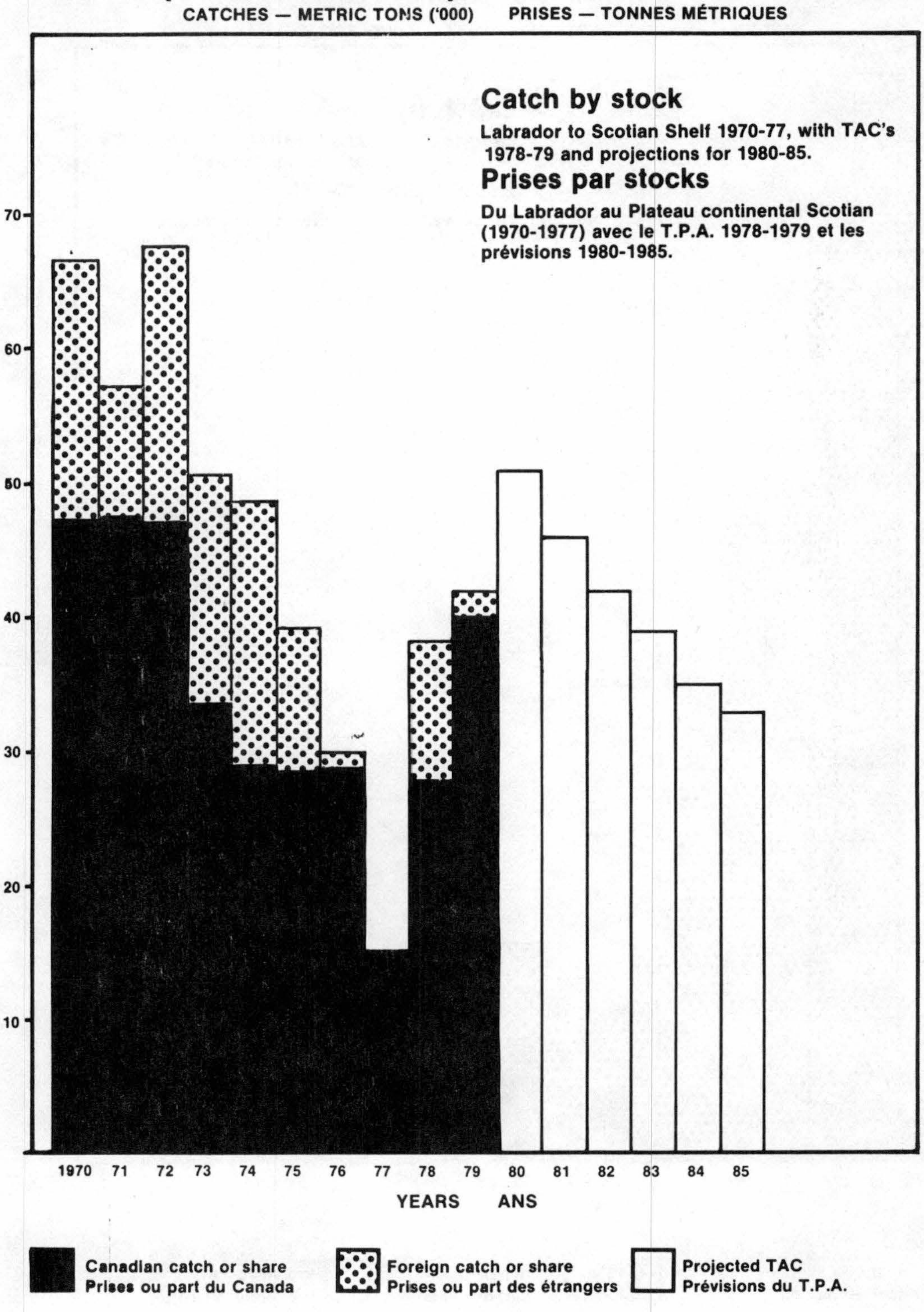


Figure 24.

Flatfish, Grand Banks (3LNO)
Poissons plats (Bancs de Terre-Neuve)

CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES

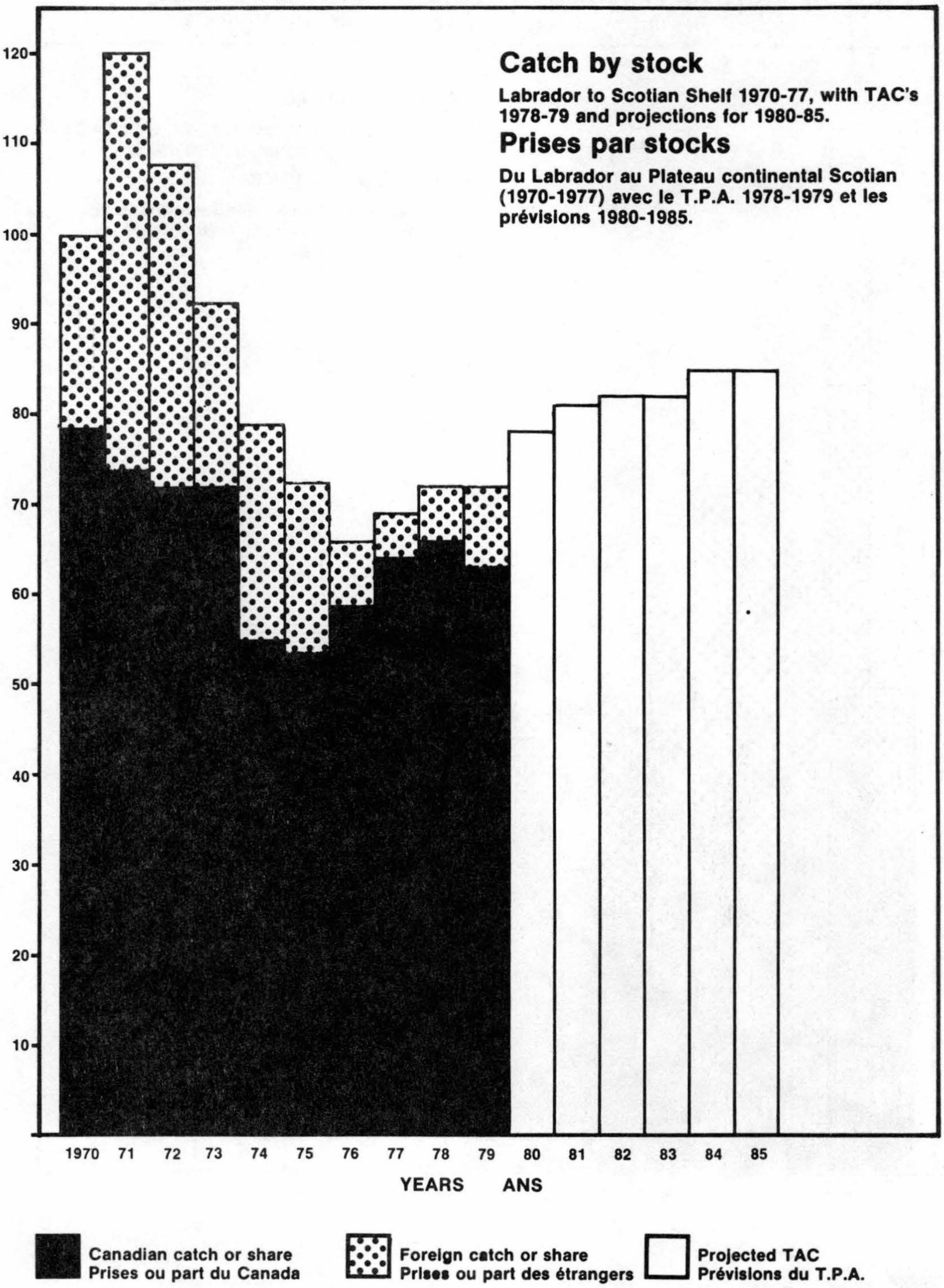


Figure 25.

Flatfish, Scotian Shelf (4VWX)
Poissons plats (Plateau continental Scotian)

CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES

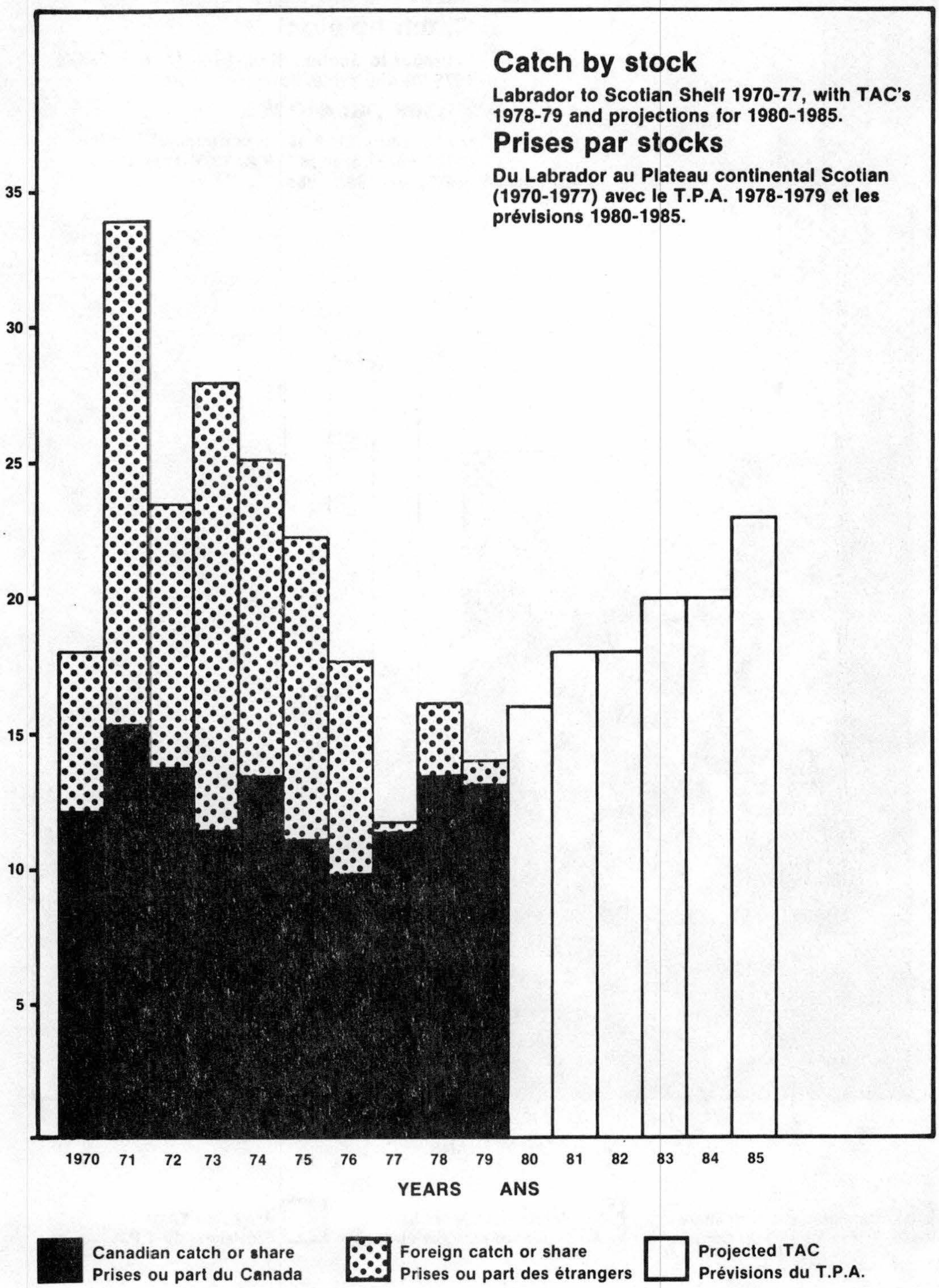


Figure 26.

Herring, Gulf
Hareng (Golfe)

CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES

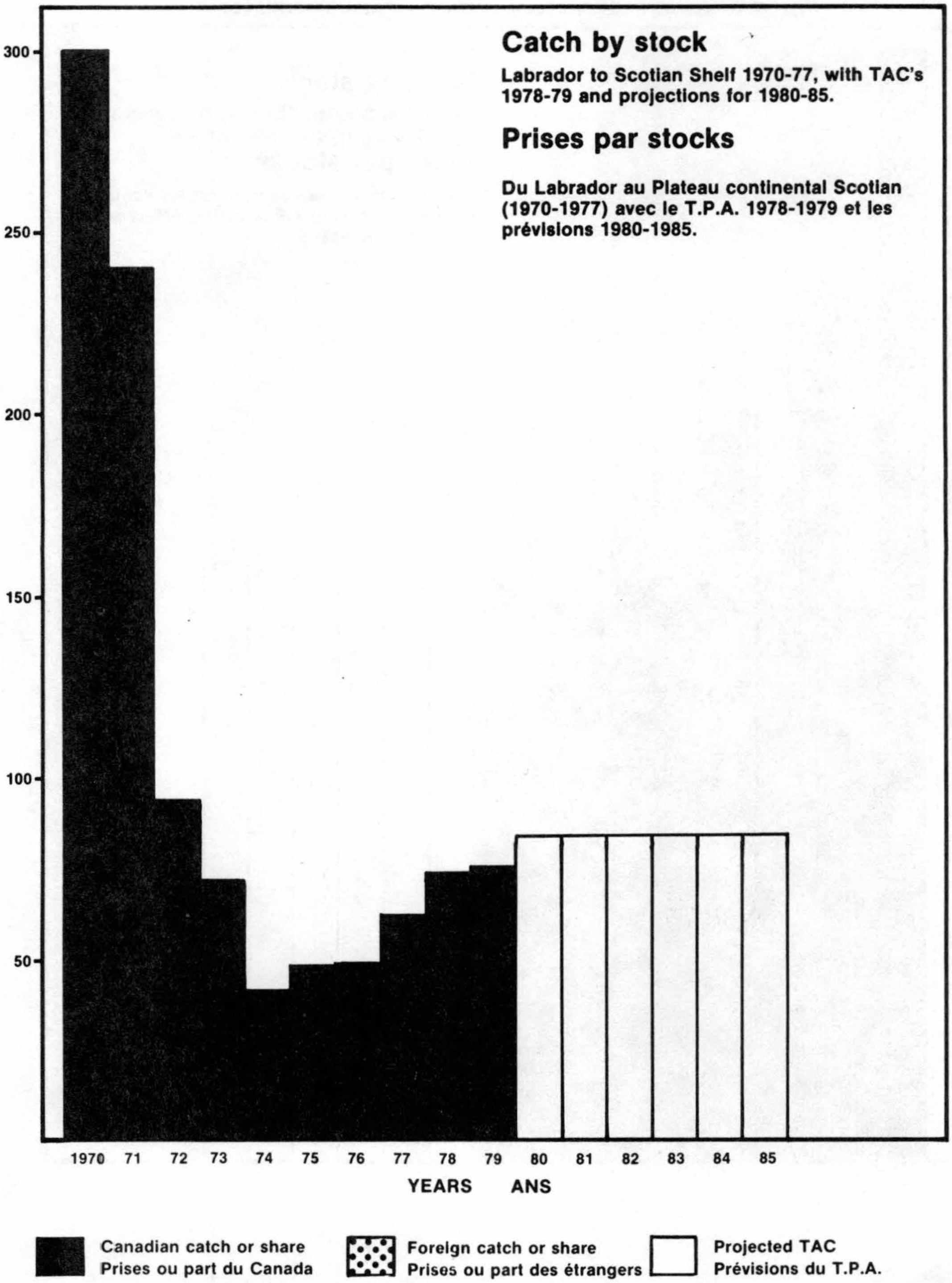


Figure 27.

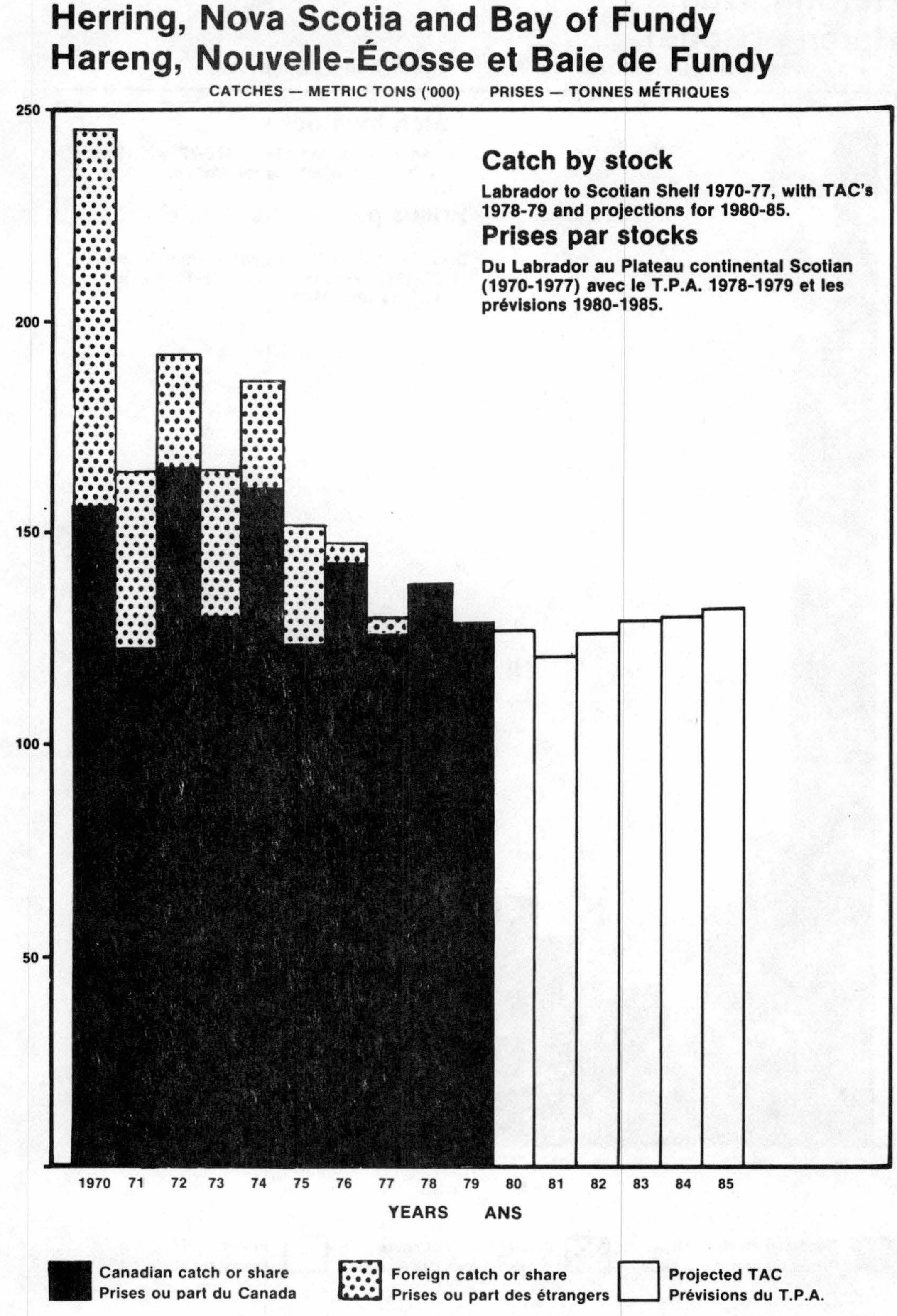

Herring, Nova Scotia and Bay of Fundy
Hareng, Nouvelle-Écosse et Baie de Fundy
CATCHES — METRIC TONS ('000) PRISES — TONNES MÉTRIQUES
Catch by stock
Labrador to Scotian Shelf 1970-77, with TAC's 1978-79 and projections for 1980-85.
Prises par stocks
Du Labrador au Plateau continental Scotian (1970-1977) avec le T.P.A. 1978-1979 et les prévisions 1980-1985.
250
200
150
100
50
1970 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEARS ANS
Canadian catch or share
Prises ou part du Canada
Foreign catch or share
Prises ou part des étrangers
Projected TAC
Prévisions du T.P.A.

Figure 28.

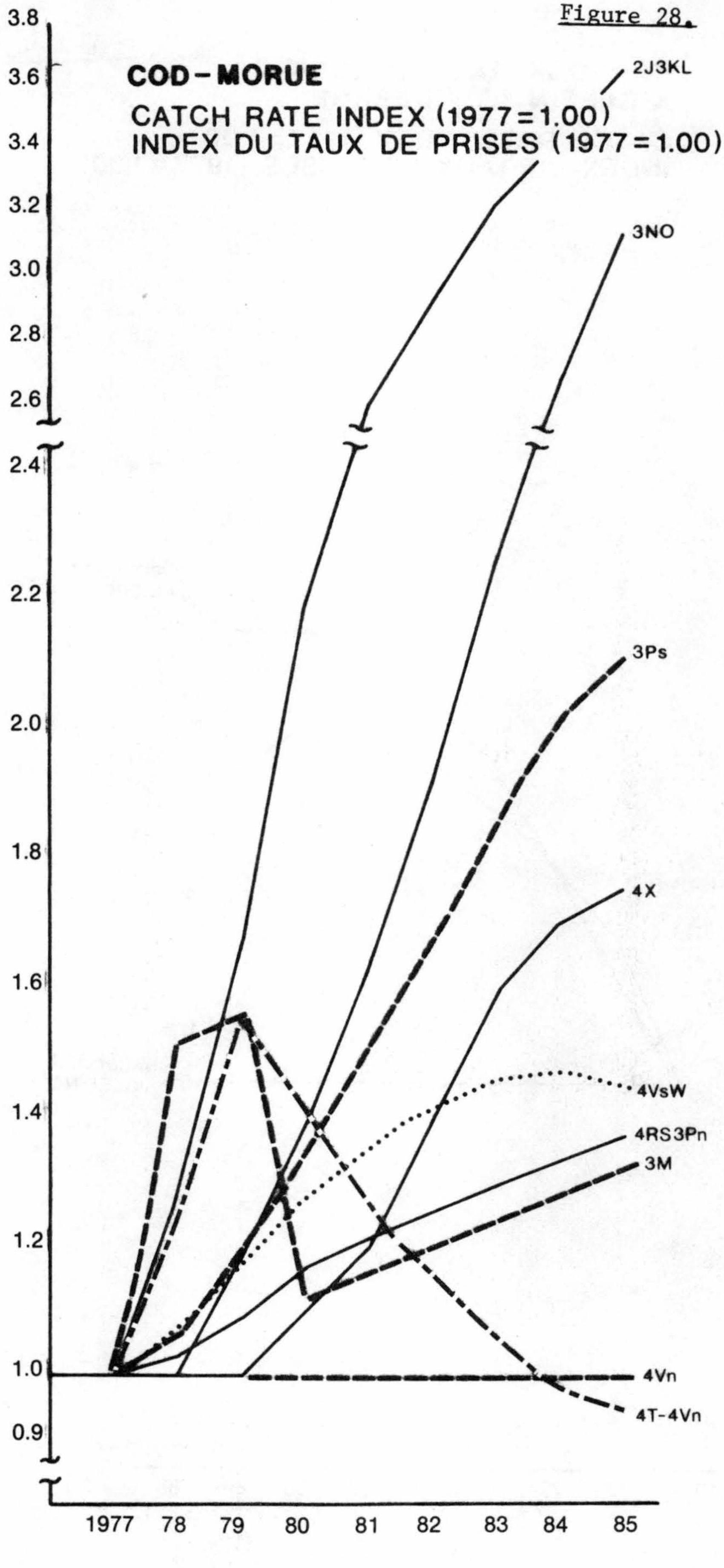

COD - MORUE
CATCH RATE INDEX (1977 = 1.00)
INDEX DU TAUX DE PRISES (1977 = 1.00)
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.9
1977
78
79
80
81
82
83
84
85
2J3KL
3NO
3Ps
4X
4VsW
4RS3Pn
3M
4Vn
4T-4Vn

Figure 29.

HADDOCK AND POLLOCK
AIGLEFIN ET GOBERGE

CATCH RATE INDEX (1977=1.00)
INDEX DU TAUX DE PRISES (1977=1.00)

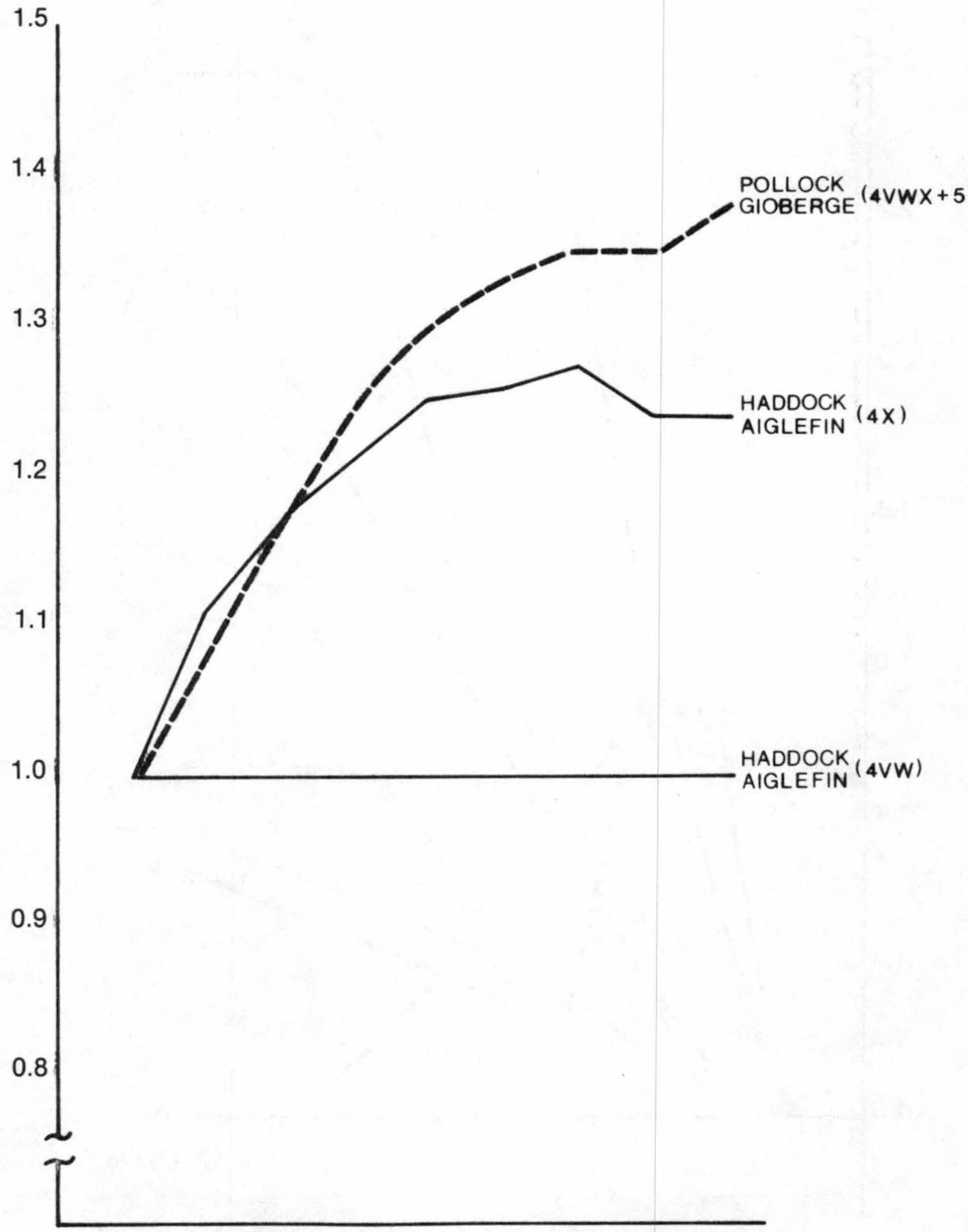


Figure 30.

REDFISH – SÉBASTE

CATCH RATE INDEX (1977 = 1.00)
INDEX DU TAUX DE PRISES (1977 = 1.00)

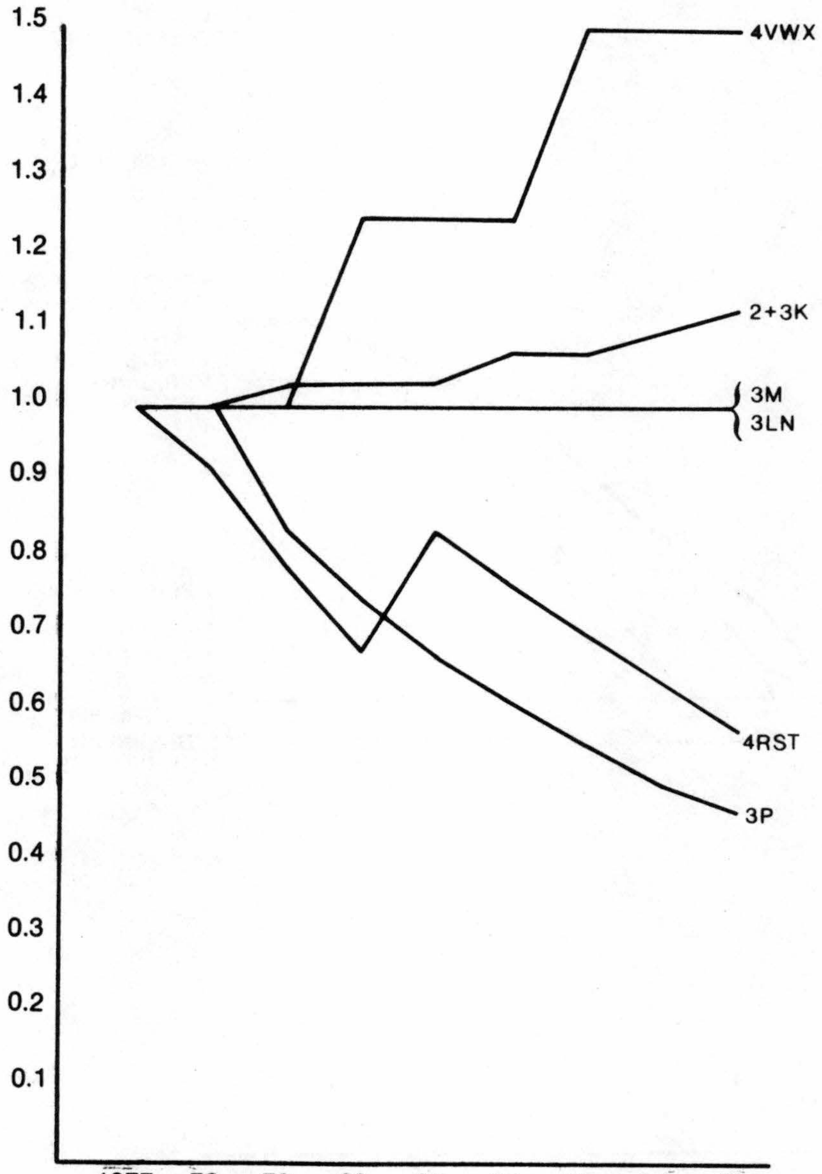


Figure 31.

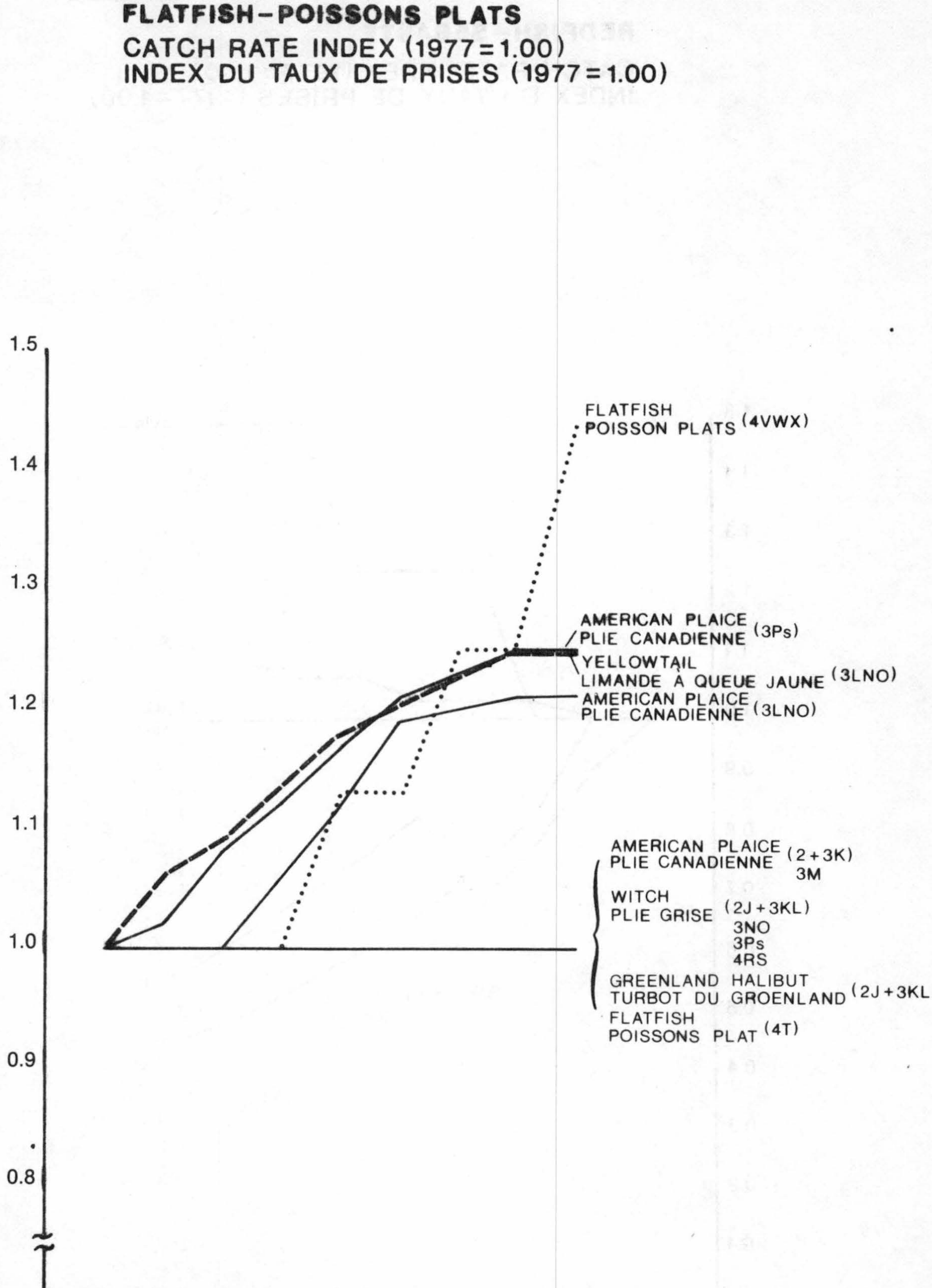

FLATFISH-POISSONS PLATS
CATCH RATE INDEX (1977=1.00)
INDEX DU TAUX DE PRISES (1977=1.00)
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
1977
78
79
80
81
82
83
84
85
FLATFISH
POISSON PLATS (4VWX)
AMERICAN PLAICE
PLIE CANADIENNE (3Ps)
YELLOWTAIL
LIMANDE À QUEUE JAUNE (3LNO)
AMERICAN PLAICE
PLIE CANADIENNE (3LNO)
AMERICAN PLAICE
PLIE CANADIENNE (2+3K)
3M
WITCH
PLIE GRISE (2J+3KL)
3NO
3Ps
4RS
GREENLAND HALIBUT
TURBOT DU GROENLAND (2J+3KL)
FLATFISH
POISSONS PLAT (4T)

Figure 32.

HERRING - HARENG

CATCH RATE INDEX (1977=1.00)
INDEX DU TAUX DE PRISES (1977=1.00)