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Resource Prospects for Canada's Atlantic Fisheries 1980-1985

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RESOURCE PROSPECTS FOR CANADA'S
ATLANTIC FISHERIES

1980 - 1985

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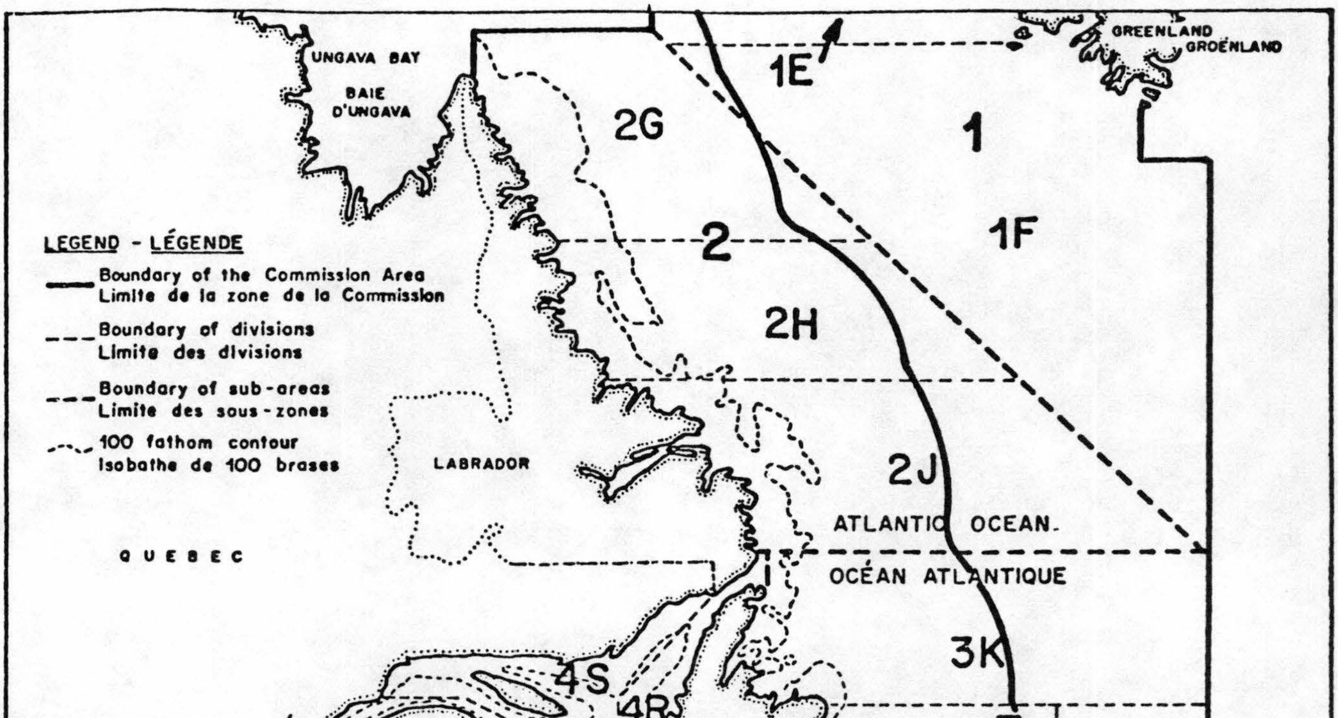
RESOURCE PROSPECTS FOR CANADA'S ATLANTIC FISHERIES 1980-1985

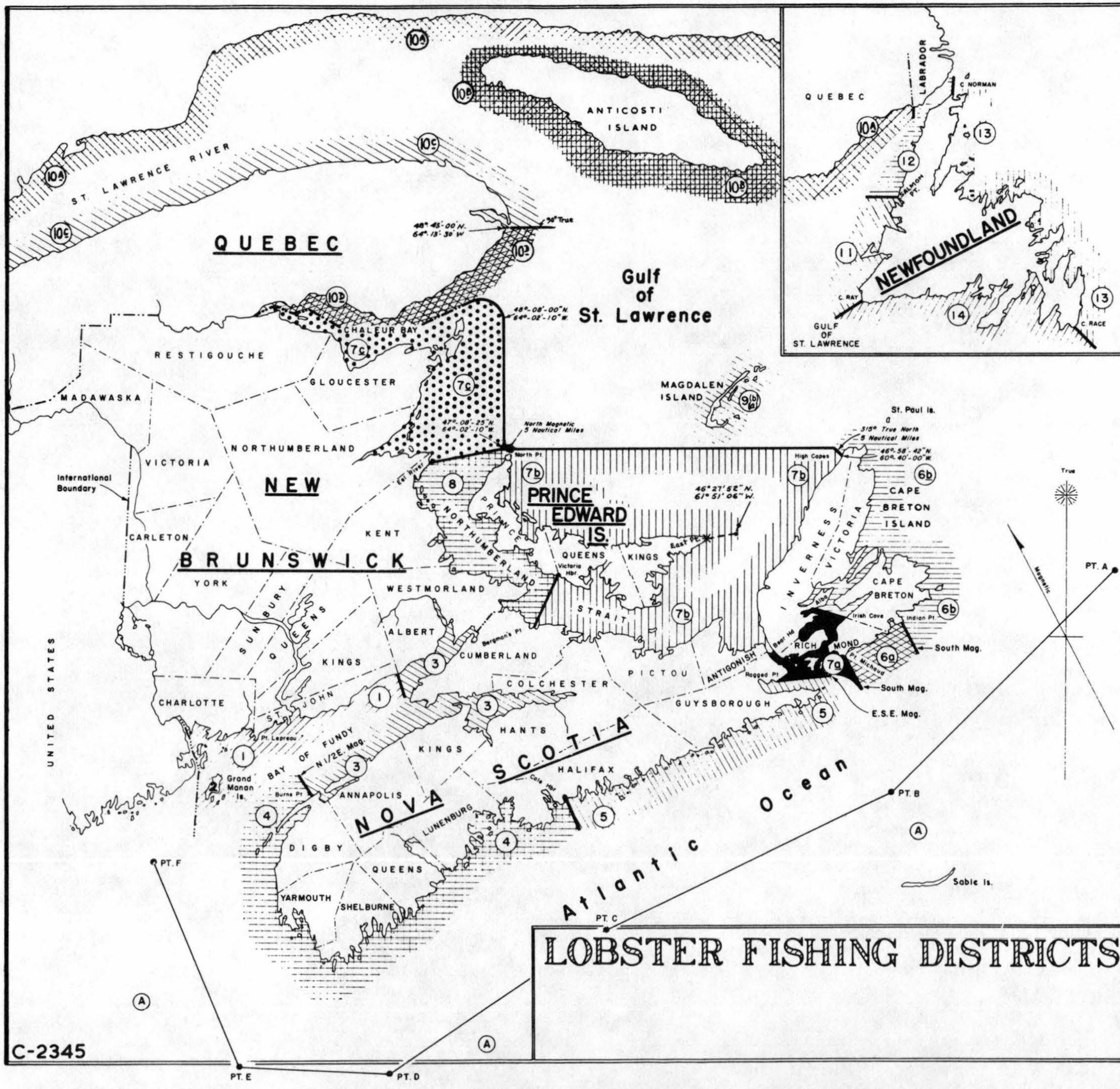
TABLE OF CONTENTS

Figure 1



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 regime 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 revision for the 1980 fishing year.

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 1980 predictions are based largely on formal calculations, and actual events should not differ widely from those predicted, projections of stock status in latter years are to a considerable extent best guesses, based on inadequate knowledge. The precision of these estimates varies greatly depending on whether they are based on known 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". Accurate predictions of the 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. Indeed forecasts will change from year to year as our information increases and as we take into account the strengths of the succeeding year-classes which are, by the very definition of "average", likely to be different from the average value assumed in previous projections. The significant changes between the forecasts contained in last year's edition of this document are given later in this introduction and illustrate the degree of variability inherent in the projections.

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* Including shellfish, marine mammals and marine plants.

To develop these resource projections, certain assumptions have been made about management objectives in the 1980s. There has been a major change in fisheries management approach within the past few years, particularly 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 increases 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.

Since 1977, most of the major fish stocks within the Canadian Atlantic zone have been 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-1980s. 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-1980s. A change in management strategy for

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

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, where provided, are based upon a relative index of stock size (in weight) with a 1978 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 1978. In general, if no catch rates are given, the rate is likely not to change, or the estimates of future catch levels are not based on a sufficiently adequate base to justify such projections.

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 regime implemented over the next few years.

It may be useful in considering forecasts of total catches to note that these may seem suprisingly low in comparison with catches seen briefly in the past. These earlier peak catches were, however, obtained by the sudden imposition of very high effort levels upon stocks that had not been fished to any great extent in the past. The abundance of these stocks was thus very high, with little more than natural mortality and environmental factors controlling the numbers. The imposition of fishing effort leads to reduction in abundance but it takes several years for the numbers to come into equilibrium with any change in the level of fishing effort. Indeed the recovery of catches envisaged in this document represents the recovery of the stock abundances to come into equilibrium with the reductions in fishing effort implied by fishing at the "$F_{0.1}$" point.

CHANGES IN THE FORECASTS

Increased knowledge about the individual stocks and about the interrelationships between species will improve the accuracy of forecasts with time and indeed there are at present many stocks for which great improvements in the data base are necessary. One very important aspect of attemping projections is, however, likely to remain extremely difficult to improve and this is the forecasting of recruitment, i.e. the strength of new year-classes. In the previous edition of this document a number of stocks were projected to remain at present levels since the recruitment, at least to the fishable component of the stock, had remained very low for several years and thus provided no basis for suggesting improvement in the future. Since the preparation of that version, however, new data have indicated strong recruitment to some of these stocks, e.g. the central Scotian Shelf (4VsW) cod and haddock (4VW) stocks and the St. Pierre Bank (3P) redfish stock.

The significance of the recruitment in these stocks showing a return to levels that must have existed before the period of heavy fishing in the late 1960s, is that the stocks should now recover to levels of abundance considerably higher than those seen since that period. The increased forecast for the southern Gulf of St. Lawrence cod stock (4TVn) reflects additional knowledge about the most recent year classes, which have continued to be average or better than average (and exceptional in the case of the 1975 year-class). Since these year-classes will support the stock through the period of the projections, the forecast has been increased considerably.

The table below provides a summary of the major changes in the forecasted 1985 TACs

		Present forecast	Previous forecast
Cod	2J3KL	365	402
	3M	24	33
	3NO	30	67
	4T+Vn	65	33
	4VsW	66	7
Redfish	3LN	25	18
	3P	20	5
	4VWX	30	23
Haddock	4VW	25	2
Herring	4WX	90	120

The table shows that a number of the forecasts have been reduced reflecting assessments of the strengths of the most recent year-classes (e.g. cod 2J3KL) and reassessment of the present status of the stocks (e.g. cod 3NO and 3M). These reassessments include new estimates of the levels in recruitment that form the average level used in the projections.

These changes serve to illustrate the uncertainties inherent in these forecasts and to emphasise that the forecasts cannot be considered as prediction, since they are projections based on present conditions and in many cases on inadequate knowledge.

They will, therefore, be subject to further changes in subsequent years. It should be noted, however, that these uncertainties apply to individual stocks so that increases in some stocks may be offset by decreases in other stocks of the same species. Thus in the table above despite a decrease in the forecast for 2J3KL cod in 1985 of 37,000 MT the balance of the changes is in fact an overall increase in the forecast for cod of 8,000 MT between the present forecast and that made previously. The comparable totals for all cod stocks are 711,000 MT (current) and 697,500 MT.

SPECIES OVERVIEW

Groundfish

Cod. Total allowable catches in 1980 sum to 458,000 MT[2,3] 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 1960s and early 1970s. If cod stocks in general are managed at a fishing mortality of $F_{0.1}$ with certain exceptions (e.g., 2J3KL in northeast Newfoundland - Labrador) to provide for rapid stock rebuilding or greater availability to inshore fishermen, TACs[3] of 521,000 MT, 619,000 MT and 711,000 MT are projected for 1981, 1983 and 1985 respectively. Stock recovery is already evident for the northeast Newfoundland-Labrador (2J+3KL), the southern Gulf of St. Lawrence (4T+4VN (January-April)) and Eastern Scotian Shelf cod stocks.

Haddock. Haddock catches have recently been 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 1960s. Stock levels in 4VW are now rebuilding and catches from this stock are forecast to increase to 25,000 MT. Some slight increase in the 4X TAC is anticipated in the early 1980s 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 1960s.

Redfish. 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, (including the Gulf) add to 164,000 MT for 1980. Overall, little change is anticipated with TACs of 167,000 and 170,000 MT, forecast for 1982 and 1985 respectively. The status of the Gulf of St. Lawrence stock is uncertain and is subject to reassessment.

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[2] MT = metric ton(s)

[3] Including cod caught in 4X, estimated at 17,000 MT for 1980.

Flatfish. Present estimates of yield at $F_{0.1}$ in the Newfoundland-Labrador area sum to 140,000 - 150,000 MT. TACs for the area in 1980 total 150,000 MT, and thus are not expected to change significantly.

On the Scotian Shelf, the current TAC is for plaice, witch and yellowtail stocks combined. The 1978-80 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 18,000 MT in 1983 and 23,000 MT 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 1980s compared with the 17,000 MT taken in 1978.

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 per cent of the catch has been taken from the Scotian Shelf. The 1977 and 1978 TACs were set at 30,000 MT, but the TAC was increased to 40,000 MT for 1980, which may approximate the long-term yield.

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 and reduced to 30,000 MT for 1980 due to declining catch rates.

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 1980 for the traditional major groundfish species* in Subareas 2, 3 and 4 (Labrador to Nova Scotia, including the Gulf of St. Lawrence) sum to 884,000 MT, the Canadian share of which is 688,000 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 474,000 MT in 1977 and 549,000 MT in 1978. These

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

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.

The 193,000 MT of such traditional groundfish species allocated to countries other than Canada in 1980 consist of 99,000 MT of cod, 61,000 MT of redfish, 20,000 MT of flatfish, an estimated 10,000 MT of pollock (a transboundary stock shared with the U.S.A.) and 4,000 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), allocations of stocks straddling the 200-mile limit, allocations for France in the area of St. Pierre and Miquelon and in the Gulf, the latter under Treaty rights, and allocations to the U.S.A. (subject to ratification of the bilateral Fisheries Agreement).

TACs of the major groundfish species traditionally fished by Canada are expected to increase from 884,000 MT in 1979 to 1,062,000 MT in 1983 and 1,166,000 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 1,129,000 MT in 1980 to 1,297,000 MT in 1983 and 1,406,000 MT in 1985.

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 fluctuation on a stock-by-stock basis is expected as a result of variable recruitment, the overall TAC is forecast to increase gradually to 230,000 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 per cent of the TAC.

Capelin. Offshore fisheries for the species began in 1972 with the catch reaching 367,000 MT in 1975 from a TAC of 500,000 MT. More recently the recruitment to the stocks in SA 2 and 3 has been extremely poor and TACs have tumbled to less than five per cent of this figure. Rebuilding should occur once good year-classes occur, but these cannot be predicted. Furthermore, 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 will decrease. Thus, the TAC in the mid 1980s, even assuming rebuilding, is likely to be no more than 225,000 MT including the Gulf of St. Lawrence.

Finfish Summary

The overall finfish TAC is projected to increase between 1980 and 1985 from 1.45 to 1.98 million MT. This compares with a 1978 Canadian catch of 877,000 MT and a 1980 Canadian share of 1,116,000 MT.

Invertebrates

Lobsters. In the Newfoundland area, catches are expected to fluctuate between 1,100 and 2,000 MT. In the Maritimes area, 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 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 per cent can be expected over recent average catches of 16,000-19,000 MT.

Scallops. The predicted declines in Georges Bank and Bay of Fundy landings commenced as the older, above-average age classes became depleted. Recent localized recruitment on Georges Bank and on German Bank is being exploited at a level well above that which optimizes yield-per-recruit; and with the absence of abundant older age classes, future recruitment can be expected to suffer similar over-exploitation. Wide fluctuations in catches will continue to reflect recruitment success, which will be predictable no more than two years in advance.

Catches in the next few years can be expected to be at or below the long-term sustainable yield of 9,000 MT, although with the increase in effort by the expanding combined American and Canadian fleet, catches may remain somewhat higher while CPUE decreases.

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 1979 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 only now started to fish this stock. A fishery is being developed in the deep holes on the eastern part of the Scotian Shelf, with a TAC of 2,000 MT in 1979.

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 western Gulf of St. Lawrence are projected to average between 5,000 and 6,000 MT with an additional 2,000 MT from around Cape Breton Island. Other crab species of potential commercial importance are rock crabs, jonah crabs and deep sea red crabs.

Oysters. Landings still depend heavily on the production of Caraquet Bay, New Brunswick, and Summerside Harbour, Prince Edward Island. The output of private oyster culture in Cape Breton Island could raise Nova Scotia landings substantially in the next few years. The general outlook is positive, as Maritime landings could increase from the 1,484 MT produced in 1978 to 1,900 to 2,600 MT by 1983.

Squid. Abundance of squid in Canadian waters fluctuates widely from year to year although catches have been increasing progressively from 11,000 MT in 1975, when an offshore fishery was started and total catches in 1979 reached 153,000 MT. A TAC of 150,000 MT has been established for 1980. 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.

Clams. Soft-shell clams continue to represent the most significant component of clam landings, accounting for 2,450 MT of the total 3,540 MT. Increases beyond this level are not anticipated until under-utilized stocks of contaminated soft-shell clams can be harvested or a hydraulic harvesting fishery develops for deeper water species such as the ocean quahaug.

Marine Plants. The harvest of Irish moss for 1979 increased substantially, in the two major harvesting districts, over the landings of 1978 (15,000 MT). However, the landings for southwest Nova Scotia are down markedly over 1978 (11,000 MT) as is the rockweed harvest for this area; severe winter weather is likely responsible. The increase in landings in areas of the Gulf may be due, in part, to resource management programs. Kelp (Laminaria) landings increased to 1,000 MT but are far below optimum sustainable yield; the dulse harvest rarely varies and is likely to be 50 MT.

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 per cent above the 1980 TAC level of 180,000 animals. The Canadian allocation in 1980 is 148,000 animals (plus the unregulated take by northern natives). The hooded seal is also under quota (15,000 animals in 1977-80) 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, 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 somewhat increased catches, with the latter particularly offering possibilities for development. The major invertebrate species, however, appear to be fully exploited, although some small increases are possible for shrimp.

Scotian Shelf

Catches of groundfish on the Scotian Shelf which have increased rapidly very recently as stocks rebuild are projected to continue to increase, although gradually. The moderate recovery will be reflected in improved catch rates. Thus, the Scotian Shelf does not offer opportunity for any increase in effort for traditional groundfish beyond that expended in 1977. 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 potential for expansion of the Canadian mackerel fishery, particularly if 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 conservation measures are respected, particularly for cod, and provided the by-catch of the cod fishery does not significantly impact unpon the flatfish stocks. Redfish TACs, in 3LN and 30 are not currently being fished fully, due to practical problems rather than problems with stock status. Among the pelagic species, herring are fully exploited, but with some improvement in catch rates likely. Although the capelin stocks are depressed at present, this species provides a future 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 365,000 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 situation is similar to that on the Grand Banks; there is potential for expansion of Canadian effort despite the presently depressed state of the stock. 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 3,000 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 1960s had significantly reduced the stock and catches declined from an average of 40,000 MT (1965-74). A TAC of 20,000 MT has been maintained from 1974 to the present. Catches declined to 3,600 MT in 1977 and were 4,858 MT in 1978. Ice conditions are a major factor affecting catches from this area. The TAC was set below MSY in an attempt to rebuild this stock. While there is little evidence that this has occurred as yet, it appears that the 1973 year-class is substantially stronger than previous ones. Since the stock is related to the 2J3KL stock, it may well follow the pattern of this latter stock and perhaps double by 1985. The projected long-term TAC, however, should at present be considered as 20,000 MT until some increase in the stock becomes evident.

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 0.240 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 is projected to be 365,000 MT. Catch rates are expected to triple over the 1978 level with a substantial increase in availability the inshore fishery predicted. Inshore catches have already increased from 41,000 MT in 1975 to more than 80,000 MT in 1978; a further doubling can be expected within the next few years. The TAC for 1980 has been set at 180,000 MT with 155,000 reserved for Canada.

Cod: Flemish Cap (3M)

At past levels of recruitment, the MSY for this stock has been estimated at 40,000 MT and the 2/3 F_{MSY} level at 34,000 MT. A TAC of 25,000 MT was established for 1977. The TAC was increased to 40,000 MT in 1978 and 1979 to take into account an apparent increase in the stock resulting from the entry to the fishery of the very strong 1973 year-class. It was cautioned in 1978 that, if the 1979 TAC were set at 40,000 MT, the 1980 yield would likely have to be reduced as the absolute abundance of the 1973 year-class declined. However, a reassessment in 1979 indicated that the size of the 1973 year-class was previously overestimated and, furthermore, it appeared that considerable numbers of this year-class have been taken as two-year-olds in 1975. Thus, it was apparent that the 40,000 MT in 1979 was too high and might even be impossible to achieve, and that in any case the 1980 TAC would have to be severely reduced. Based on this advice, a TAC of 13,000 MT has been set for 1980.

Cod: Southern Grand Banks (3NO)

At past levels of recruitment, the MSY for this stock has been estimated at about 100,000 MT and the 2/3 F_{MSY} level as 85,000-90,000 MT. The TAC has been reduced from about 100,000 MT in 1973-74 to 15,000 MT in 1978 to arrest the decline in the stock as evidenced from commercial catch rates and biomass surveys. The TAC for 1979 was set at 25,000 MT. However, a reassessment in 1979 indicated that the stock was in a very depressed state resulting from extremely high fishing mortalities in past years. As a result of this the scientific advice was to hold the 1980 catch as low as possible. Consequently, it was agreed through NAFO that no directed fishing for cod in Divisions 3NO be allowed in 1980; since by-catches in other fisheries would amount to perhaps 10,000 MT being taken. A review of the scientific assessments in February 1980, indicated some recovery and the TAC for 1980 was set at 26,000 MT (Canada 9,800 MT).

Cod: St. Pierre Bank (3Ps)

Nominal catches from this stock have declined from 60,000 MT in 1971 to 27,000 MT in 1978 and fell short of the TAC in 1973-76, even though the TAC was reduced yearly. The calculated MSY catch is approximately 60,000 MT and the 2/3 F_{MSY} catch is about 50,000 MT. The 1978 and 1979 TACs of 25,000 MT were set somewhat above the level which corresponds to $F_{0.1}$. Catch rates are improving and there are indications that the stock is showing signs of improvement under recent management strategies. The TAC for 1980 is 28,000 MT (the projected catch at $F_{0.1}$) and, if this level of fishing is maintained the catch should increase to about 36,000 MT by 1985 with catch rates increasing by 60 per cent.

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 per cent 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 of the presence of a number of average and above average year-classes. The 1979 and 1980 TACs were established at 75,000 MT.

It is projected that catches from this stock will remain at this level to 1985 and catch rates will increase by 25 per cent.

Canada, France, Portugal and Spain conducted the main fisheries on this stock; Portugal and Spain were phased out of the fishery in 1976, but France has treaty rights of access to this stock until 1986.

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 4VsW. 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, although there is 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. With the recovery of these stocks and indications of increases in the local 4Vn stock, this quota is being relaxed in 1980. It is likely that landings from the local stock will be about 5,000 MT.

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. The TAC was reduced to 30,000 MT in 1976 with a further reduction in 1977 to 15,000 MT. Since then, the TAC has been increased to 38,000 MT to take account of improved recruitment and has been set at 63,000 MT for 1980. 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 70,000 MT by the mid-1980s and it is expected that this stock should continue to sustain average catches of over 60,000 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 have been a consequence of recruitment reduction caused by cod by-catch in small mesh fisheries (e.g. for silver hake). This led to TACs of 7,000 MT in 1977 and 1978. With increasing controls on small mesh gear fisheries, more young cod are surviving to the recruitment age of the traditional Canadian fisheries. This has resulted in stock rebuilding and quotas have been raised to 30,000 MT for 1979 and 45,000 MT for 1980. It is projected that TACs could reach 60,000 MT by the mid-1980s.

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 total catch in 1976 was 16,657 MT, the lowest since 1962. The stock structure in 4X is complex and the 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 1980 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 catches which increased to 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 1977 TAC 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. Total 1978 catches are estimated at 38,000 MT (including in this case a U.S. estimated recreational catch of only 1,000 MT) but discarding and misreporting create uncertainty in this figure. The stock biomass has increased in recent years due to good recruitment, particularly from the 1975 year-class. Recruitment prospects are also fairly good and it appears that total removals of about 35,000 MT can be sustained, at least for the next few years.

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. The TAC was reduced to 30,000 MT for 1977-79. While fisheries trends are difficult to interpret, due to changes in catchability in recent years, the stock appears to be fairly stable at present. The TAC in 1980 has been raised to 40,000 MT. Management and allocation of this boundary area stock is, however, subject to agreement between Canada and the U.S.A.

Silver Hake: Scotian Shelf (4VWX)

Exploitation of silver hake on the Scotian Shelf has been almost entirely by 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, increased to 81,000 MT for 1978, reduced to 70,000 MT again for 1979, and raised further to 90,000 MT for 1980, the variation reflecting pronounced fluctuation in recruitment. 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.

Difficulty in predicting recruitment limits the usefulness of resource projections of more than one year for this species. Research programs are under way and it is hoped realistic recruitment estimates can be obtained for the assessments of the early 1980s. For the purpose of this document, it is assumed that a TAC of 70,000 MT will be sustainable through 1985. The Canadian share of the 1980 TAC is 20,000 MT.

Haddock: Browns Bank (4X)

Long-term average catches 1931-1962 were 17,000 MT, split roughly equally between the U.S.A. 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. All data show that the stock has been recovering since 1973. Total reported landings for 1977 to 1979 were 21,000, 27,000 and 25,000 MT from TACs of 15,000, 19,000 and 26,000 MT respectively. The 1980 TAC is 28,000 MT (Canada 25,200 MT). Data from the recent fishery present a confusing picture of stock status; this may be due in part to misreporting of haddock as other species.

Haddock: Sable Island-Banquereau (4VW)

Catches averaged 28,000 MT annually in the 1950s and 1960s. 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). Biomass estimates from research vessels show that the stock is increasing and there is evidence that by-catches in the small-mesh fisheries have been greatly reduced. This results in a much healthier picture than in the recent past. The TAC for 1980 is 15,000 MT (Canada 13,500).

Haddock: Georges Bank - Gulf of Maine (SA 5)

Nominal catches from Subarea 5 were very stable between 1930 and 1960, ranging between 50,000 MT and 60,000 MT. However, heavy exploitation by the U.S.S.R. fleet in 1965-66 (1965 nominal catch was 155,000 MT), based primarily on the exceptionally large 1963 year-class, decimated the population. This, combined with subsequent recruitment failure, has required severe restrictions on allowable catch since 1970 and nominal catches reached a low of 5,000 MT in 1974. However, the 1975 year-class was a strong one and nominal catches increased to 27,000 MT in 1978. These 1978 catch data are preliminary and do not include estimates of discards or under-reporting. Catches in the order of 30,000 MT were projected for 1979 and, if the 1978 year-class proves as good as first indications from research surveys suggest, similar or higher catches could be supported in 1980. However, comparison of these catch levels with the historical average indicates clearly that the stock has not yet recovered fully. The encouraging signs of recovery should be taken as an indication that caution in management now will most likely pay high rewards in future.

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

Recent catches have declined from 39,000 MT in 1973 to 17,400 MT in 1977 but increased to 29,100 MT in 1978. Fishing effort has remained stable over the last decade but catch per hour has increased since 1975. Sustainable yield at 2/3 F_{MSY} has been estimated at 35,000 MT. The stock has shown some improvement since the depressed condition of the 1960s and early 1970s and prospects for recruitment appear to be good. The TAC for 1980 has been set at 35,000 MT (Canada 30,000 MT), a level expected to be sustained in the 1981-85 period.

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 estimated at 15-17,000 MT. The 1978 TAC was 16,000 MT and catch per unit effort has been increasing. The 1979 and 1980 TACs are 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. The TAC for 1979 was set at 18,000 MT, and that for 1980 increased to 25,000 MT (12,900 MT allocated to Canada); this level may 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 7,000 MT in 1978. Based on evidence of some stock recovery, the TAC was raised to 20,000 MT (the MSY) for 1978 - 1980. Some future adjustments may be necessary, but TACs are anticipated to remain at this level in the 1980s. The Canadian share of the 1980 TAC is 7,500 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 continued to decline to 1977 and the advice given for the 1979 TAC at $F_{0.1}$ in 1978 was 11,000 MT. However, good recruitment showed up in both the research surveys and the commercial fishery in 1978 as several relatively strong year-classes appeared. The 1979 TAC advice was subsequently modified to 16,000 MT at $F_{0.1}$. The 1980 TAC has been set at the $F_{0.1}$ point (18,000 MT - Canada, 16,000 MT) and this should increase slowly to 20,000 MT by 1985.

Redfish: Gulf of St. Lawrence (4RST)

Nominal catches decreased 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 and subsequent year-classes enter the fishery in the early 1980s. These year-classes are stronger than preceeding areas but their contribution cannot be quantified at present. The TAC for 1980 has been set at 16,000 MT. Further scientific analysis will be carried out in May.

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). Fishing mortality in the early 1970s is believed to have substantially exceeded the level which would give the MSY yield. However, catches in the late 1970s have been held well below the long-term average yield (recent TACs were 20,000 MT) and there are indications from research surveys that the stock size has increased during this period. The basis for assessment of this resource is weak but the available evidence suggests that catches could be sustained at close to the long-term average, and the 1980 TAC is set at 30,000 MT (Canada 18,500).

White Hake: Southern Gulf of St. Lawrence (4T)

Catches from 1960-77 averaged 5,100 MT annually, with catches from 1974-77 averaging 3,900 MT annually. Trawls and gillnets accounted for about 70 per cent of the catch from 1972 - 1977. Based on the catch from 1974 - 1977, the average sustainable catch is about 4,000 MT.

White Hake: Scotian Shelf (4VWX)

Catches from 1970 - 1976 averaged 4,700 MT annually, with U.S.A. catches accounting for one per cent of the total. Division 4V accounted for eight per cent, Division 4W 25 per cent, and Division 4X 67 per cent of the total catch. Based on the catches from 1970 - 1976, the sustainable catch is about 4,700 MT annually.

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-catches in the trawl fishery. However, in 1977, there was a significant offshore fishery by Canadian otter trawlers which took two-thirds of the catch; this trawl catch declined again in 1978. 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 1980.

American Plaice: Grand Banks (3LNO)

Catches declined from a peak of 94,000 MT in 1967 to 43,000 MT in 1975 (50,000 MT in 1978). Under a TAC of 47,000 MT in 1976-80 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 1980 TAC is 46,200 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 was reduced to 2,000 MT again for 1979 and 1980.

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 increased cod catches could result in reductions in stock biomass for this species also. The Canadian allocation for 1980 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 1975-77 was 4-5,000 MT. Since 1974, the stock has been regulated by quota; an initial TAC of 11,000 MT was reduced progressively to 4,000 MT for 1978 and 1979 to assist in stock rebuilding. The stock appears to be in fairly good condition with recent fishing mortalities somewhat lower than $F_{0.1}$. Therefore the 1980 TAC was increased to 5,000 MT which is projected to be sustainable in the 1980s. (Canada 4,450 MT).

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 6,900 MT in 1978. 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 1980 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 and as low as 3,500 MT in 1978, 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 and 1980 was 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 1980 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, and fell again to 1,000 MT in 1978. The information presently available indicates that the long-term average yield from the stock should be about 3,000 MT (the 1980 TAC). The 1980 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 1973-78 (1978 - 4,300 MT). The TAC in 1977 and 1978 was 3,500 MT but was raised to 5,000 MT for 1979 following some excellent, although localized, winter fishing success. This TAC has been continued in 1980 (Canada 4,700 MT) but may have to be reduced in future as the virgin stock is fished up.

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

Plaice and witch make up 85-90 per cent 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 (1978 catch 6,200 MT); 60-70 per cent 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 variation in the reported U.S.S.R. catch. The 1978 catch was 1,800 MT.

(c) Yellowtail. Catches decreased from 9,400 MT in 1963 to 1,000 MT in 1976 and 1,500 MT in 1978. 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 species is taken in an inshore small boat fishery yielding between 700 and 3,100 MT per year (1,200 MT in 1978).

The TACs in 1978-1980 for all flatfish except winter flounder are 14,000 MT, half of the TACs 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 TACs for 1978-80 of 14,000 MT (Canada 13,250 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, Yellowtail, Greenland and Atlantic Halibut).

American Plaice. The fishery in the Gulf has maintained an almost constant level of landings since the early 1960s. The plaice fishery concentrates on two groups in the Magdalen Shallows, one near the Miscou Islands and the other near Cape Breton. The groups are combined for assessment purposes and managed as a unit stock. The fishery effectively commences only after the cod quota in the same area has been taken. Before that plaice is caught mostly as a by-catch in the directed cod fishery.

The yield per recruit and projected biomass indicate that, at the present level of fishing (and high discard practices), the plaice stock is in a stable situation and can continue to support 10,000 MT TAC until 1985. Yield could be increased if the substantial discard of small fish at sea (estimated as up to 40 per cent by weight) could be eliminated.

Winter Flounder. The long-term catch has averaged 2,500 MT from a complex of local stocks. No detailed assessment is feasible, 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-plaice fishery, as well as in other fisheries. Recent catches have, however, declined below the long-term average, and are expected to continue to fluctuate at around 1,000 MT.

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

Atlantic Halibut. Yearly catches have been averaging 150 MT.

Greenland Halibut. The Greenland halibut (or turbot) fishery has been developing rapidly in the Gulf for some years. Landings in 4S, 4R and 4T in 1970 of about 1,100 MT declined in 1972 and then increased by stages to 2,000 MT in 1976. In 1977 landings doubled to 4,000 MT. Most of this increase in catch was due to the fishery in 4S since 1974 and 4R since 1976. The catches in 4T have been relatively stable with a yearly average of 200 MT. Since the fishery is a relatively new one, the stock relationships of 4RST fish are not yet fully known, and since there is evidence that catches in 4S comprise mostly immature fish, expansion of this fishery should be closely monitored.

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 15,500 MT in 1978. 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 17,500 MT from a TAC of 18,000 MT for 1980.

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

From 1972 to 1975 catches averaged 29,000 MT, with a 1978 catch of 38,500 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 was maintained from 1976 to 1979 at 30,000 MT but has been increased to 35,000 MT for 1980, and subject to additional information, could continue at this level through the early 1980s. The Canadian share of the 1980 TAC is 34,000 TAC.

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 and increased to 20,700 MT in 1978. Catches of 28,000 MT at 2/3 F_{MSY} and 30,000 MT at $F_{0.1}$ have been estimated. Catch rates have declined somewhat in recent years. Despite the fact that a lightly exploited portion of this stock may exist in very deep water, in view of the estimates of sustainable yield for the present fishery and the declining catch rates, the TAC for 1980 was reduced to 30,000 MT from the 35,000 MT level established for 1977-79. The Canadian reserve for 1980 is 1,000 MT.

Argentine: Scotian Shelf and Georges Bank (4VWX+5)

The centre of distribution of this resource is in the Fundian Channel area between Georges and Browns Banks but it also occurs along the slope of the Scotian Shelf and Georges Bank in depths of about 200-500 metres. Catches have been sporadic, and have ranged from over 40,000 MT to as low as 1,000 MT, depending on whether or not the U.S.S.R. fleet conducted a directed fishery. In most recent years, fishing effort has been reduced since the resource has its centre of distribution close to the U.S.A.-Canada disputed zone, thus limiting fishing opportunities for third parties. Sustainable yield for the whole resource is probably no more than 15,000-20,000 MT, which is the level of the TAC established in recent years for divisions 4VWX.

Other Finfish: Southern Gulf of St. Lawrence and Scotian Shelf (4TVWX)

Catches of finfish other than those reported on in detail above were in the order of 60,000-70,000 MT annually, prior to extension of fisheries jurisdiction. Canadian catches of these species, predominantly cusk (5,000 MT) and wolffish (1,000 MT), are not expected to vary greatly. However, the bulk of these other finfish was taken by foreign fleets, predominantly in the form of anglers (11,000 MT), skates (11,000 MT) and dogfish (5,000 MT). Stringent licensing and by-catch limitations have reduced foreign catches of these species. There is, as yet, no indication of an interest in these species by the Canadian fleet and, hence, catches of other finfish can be expected to remain low for the foreseeable future.

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

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

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 8,000 MT in 1981, with a recovery to 20,000 MT by 1985.

West Newfoundland. Yields from these stocks are expected to decrease from 16,000 in 1978 to 10,000 in 1980 and then to recover to 15,000 MT by 1983-85.

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 1985 compared with 4,500 MT taken in 1978.

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 1970s, 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. Tagging results and analysis of the biological characteristics of the overwintering herring in 4Vn do not permit clear association of this fishery with other management units, the Gulf of St. Lawrence (4T) or the Scotian Shelf (4W and 4X). 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, (Sydney Bight) as had been done in the past. Some mixing between stocks in 4X (Bay of Fundy) and the Gulf of Maine (5Y) is also indicated by tagging results.

Catches in 4V have declined from over 15,000 MT in the early 1970s to less than 4,000 MT in 1978. There has been very poor recruitment since the 1970 year-class, which has supported the declining fishery in recent years. To protect local stocks, but yet to provide some information on catch rates and possible new recruitment, the 1979 TAC was set below the level of the 1978 catch. Future catch levels for this management unit are unpredictable due, in part, to the unclear stock interrelationships.

In 4WX the adult stock is at a historical low point. The 1978 catch of 89,000 MT was under the quota by 20,000 MT, while the catch in 1979 fell short of the TAC by 33,000 MT. However, there is strong evidence of a good year-class (that of 1976) entering the fishery. As this year-class maximizes its biomass during 1980 and 1981 the catches should approximate 90,000 MT. If future recruitment is similar to that since the early 1960s a sustained yield of around 140,000 MT is possible. The catches are presently lower than this level since recently recruiting year-classes (1971 to 1975 inclusive) have been weaker than average. These projections do not, however, include the substantial juvenile herring catches made by New Brunswick weir fishermen (between 15,000 and 30,000 MT per year).

Herring: Georges Bank, Gulf of Maine and South (5+6)

The Gulf of Maine stock (5Y) has traditionally been managed separately from that on Georges Bank and south (5Z + 6). Both adult stocks have been at seriously depleted levels for several years due to overfishing in the late sixties and early seventies. The Georges Bank fishery has shown no evidence of recovery and thus the projected future catches are uncertain. Essentially no herring were caught on Georges Bank in 1978, compared to a high of 370,000 MT in 1968. The Gulf of Maine adult catch was 19,000 MT in 1978 down from a maximum of 43,000 MT in 1972. In contrast to Georges Bank, however, there appears to be rebuilding of the stock in the Gulf of Maine due to the strong 1976 year-class. If there is appropriate regulation of the U.S. fishery on juvenile herring in the Gulf of Maine it should be possible to return to the historical adult catch levels of about 30,000 MT.

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 -- their degree of mixing and relative contributions to the fishable stock are not yet known. Considerable difficulty exists in determining population sizes and mortality rates for this stock but all indices are showing an increase in abundance as was expected following reduction of fishing effort on the overwintering stocks off southern New England. Depending on where and when the fish are caught, the TAC could go as high as 300,000 MT in the early 1980s. Since this is a transboundary stock, management measures will depend on Canada/U.S.A. agreements.

Canadian coastal fishing effort on this stock has depended largely on market conditions, while inshore catches were dependent on local availability of the fish rather than on overall abundance levels Total catches in 3+4 during 1970-78 ranged from 21,000 to 45,000 MT, with an average catch of 30,000 MT. The Canadian catch was 24,400 MT in 1978, but the average has been about 18,000 MT.

Capelin: Labrador and Grand Banks (2+3)

The lack of refined estimates of capelin biomass levels, together with substantial fluctuations in recruitment, and the complexity of relationships with predator species of fish and marine mammals render yield predictions extremely difficult. However, progress in research in these areas is evident and estimates of yield should improve in the future. 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 a long-term average of 200,000 MT. Large fluctuations in recruitment which affect total biomass levels will result in large variations in the TAC on an annual basis. This was evident in 1979-80; poor recruitment in capelin stocks in Subareas 2+3 resulted in TAC levels being reduced to 91,000 MT for 1979 and even further for 1980, when there will be no offshore fishing from either component. In view of the very great uncertainties about recruitment no projections have been provided for the years 1981-84, and a long-term TAC of 200,000 MT in SA2+3 has been assumed for 1985.

Capelin: Gulf of St. Lawrence

Annual catches of approximately 8,000 MT have been realized in the Gulf of St. Lawrence in 1978 and 1979, and, provided that fishing is not concentrated on local spawning groups, could be increased to 20-25,000 MT.

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.

The Canadian fisheries currently depend almost entirely on older and bigger fish that migrate into Canadian waters during the summer. There is a debate as to whether there are separate stocks in the eastern and western Atlantic or whether there is only one stock, with limited mixing of fish between the two sides. Large scale diversion of foreign effort from the eastern to the western Atlantic in recent years has increased the catches of fish of the large sizes. It has also increased the danger of an adverse effect on the reproductive potential of the stock spawning in the Gulf of Mexico, far south of the Canadian fisheries zones. In addition, the effectiveness of measures designed to protect year-classes, after they have passed through the purse seine fishery for very small fish in the mid-Atlantic Bight, has yet to be demonstrated.

Future Canadian catches will depend critically on the degree and effectiveness of management control exercised over the next few years on all age groups.

In the meantime, the decline of catches of large fish from the 1977 level of 670 MT to about half this figure in 1979 is expected to continue.

Swordfish

At full potential the annual total allowable catch of swordfish along the North American coast is estimated at about 5,000 MT (at an average weight of 70 kg). In 1978, Canadian vessels were estimated to have caught 2,300 MT which was transferred at sea to U.S. vessels. In 1979, permits were issued to Canadian vessels to land fish in Canada as well. It is at least possible that a total of more than

3,000 MT was either landed or trans-shipped at sea in 1979. In addition, however, U.S.A. fisheries have developed in recent years off the Carolinas, Florida and in the Gulf of Mexico; these probably take as much fish by weight caught as the Canadian fisheries but include greater numbers of small fish. This may reduce the potential long-term yield. Canadian catches in the future are likely to depend on agreements reached with the U.S.A. as to joint management of this migratory species. It is unlikely that catch levels of Canadian fisheries will exceed 2,500 MT in the 1980s, since the total catches by U.S.A. and Canada in 1979 probably exceeded the optimum catch levels.

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 hydro-electric projects.

Newfoundland and Labrador. Long-term catches in all areas of Newfoundland and Labrador will potentially decrease due to habitat reduction caused by hydroelectric development, industrial, municipal and recreational development. The threat of habitat degradation can be averted with improved habitat preservation practices and supplementary enhancement programs.

It is estimated that commercial fisheries catches in 1980 for Newfoundland and Labrador will approximate 2,000 MT. The high abundance of one sea-winter salmon (grilse) in 1979 indicates that there will be a significantly greater proportion of large salmon in 1980 than in previous year.

Maritimes. From 1967 to 1971, commercial catches of salmon in the Maritimes fell to 155 MT - 20 per cent 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 Quebec 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.

Arctic Char

Current trends indicate that char landings will remain relatively stable during the next few years. Landings for 1980 should approximate 210 MT. Long-term catches in northern Labrador will depend primarily on year to year variations in environmental conditions. There exists, however, the potential to substantially increase landings if current fishing patterns are altered and effort is subsequently directed to unexploited areas along the Labrador coast.

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

Landings in Canada (Figures 1 and 3) have increased to about 19,000 MT in 1978 from the recent lows of around 15,000 MT in 1972-1974. In the Maritimes, the trends by area (Figure 29) show an increase in the southern Gulf of St. Lawrence from a near all-time low in 1975, a decline to all-time lows along the outer coast of Nova Scotia, and relatively stable landings in the Fundy to S.W. Nova Scotia region. Catches from the other 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 1960s which limited the number of licences 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 licence buy-back program may eventually lead to a reduction in levels of fishing mortality.

National and international assessments of Atlantic lobster fisheries indicate that increases in minimum legal size and reduced rates of removal not exceeding 30 per cent to 50 per cent per year are required to maximize yield. In several Canadian inshore lobster fisheries, rates of removal of 80 per cent to 90 per cent per annum have been documented, while size limits are at or below the size at which most females mature. This combination must eventually lead to major stock declines such as have already 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, leading to greater annual fluctuations in landings. It also makes it difficult to predict catches much in advance of the fishing season.

Southern Gulf of St. Lawrence (Lobster Districts 7+8)[1]
Starting in 1975, after a long decline through the 1960s and early 1970s (Figure 29), landings have been recovering. The 10,413 MT catch in 1978 is close to the 60-year average, but below potential levels. To achieve the potential requires an increase in minimum legal size and reduction of fishing effort. The existing licence buy-back program and special protection programs are a good start, but by themselves are as yet inadequate to prevent future declines of landings.

In the Southern Gulf, fishing mortalities are very high and minimum size limits are such that most lobsters caught have not reproduced even once. In District 8, the late summer fishing season creates an additional pressure on the stock, since most females that have matured during the summer have not extruded eggs before the start of fishing and thus are not protected. By contrast in District 7, where the fishing season is in the spring, some females would have extruded eggs by late summer and would be protected as berried females during the next spring fishery.

District 8 has the potential for greatest gains from improved management. An increase in minimum legal size in District 8 from 63.5 to 76.2 mm (2.5 to 3.0 inches) would result in a gain in yield per recruit of about 50 per cent in the year after implementation, although catches could be reduced during the season of implementation itself. There would also be a 350 per cent increase in the average number of eggs produced per lobster entering the fishery. To reduce the impact of the short-term disbenefits during the period of transition, the increase in minimum legal size could be achieved in steps

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1 See Figure 2 (Lobster Fishery Districts)

over several years. Short-term disbenefits would be avoided entirely if this coincided with a period of improved recruitment.

S. and S.E. Nova Scotia (Baccaro Pt. to Scatari I.) The eastern end of this area is in the terminal stages of a major stock decline which began 25 years ago, the third such decline this fishery has experienced since 1900 (Figure 29). The initial signs of what is hoped will be a generalized recovery were seen in the Chedabucto Bay region in the spring of 1979. Effort has been much reduced from the 1960s levels, and the licence buy-back program has now reached such levels (30 per cent of 1978 licences) that there is potential for this reduction in effort to be sustained as stocks recover. This stock, as a whole, is seen to be the one most vulnerable to overfishing under the current lobster fishery regulations.

Bay of Fundy, S.W. Nova Scotia, and Offshore Fisheries in this area are dependent on several major lobster concentrations. The main fisheries are: 1) Grand Manan (Lobster District 2), with recent landings around 300 MT; 2) southwestern Nova Scotia inshore fishery (Lobster District 4), with landings declining to 3,653 MT in 1978; and 3) since 1971, an offshore fishery beyond 50 miles from the southwestern Nova Scotia mainland (Browns Bank area and N.E. Georges Bank), with landings levelling off at 674 MT in 1978. The area harvested by the U.S. southwest of the international boundary must be viewed as part of the general area. The diverse nature of the various fisheries and uncertain interrelationships between lobsters of the several areas make yields from this region difficult to forecast.

In the Bay of Fundy, landings have remained good at Grand Manan (Lobster District 2) at around 300 MT, have declined along the N.B. coast (Lobster District 1) from around 300 MT in the early 1960s to less than 90 MT since 1976, and have declined in Lobster District 3 from highs of over 150 MT in the mid 1960s to around 100 MT since 1974. The continuing good landings in District 2 are in part due to increasing numbers of very large lobsters caught in deep water off Grand Manan. If these constitute a brood stock for the traditional, mostly juvenile lobster fishery at Grand Manan, then future reductions in landings can be expected, especially if the deep-water fishery spreads to other parts of the Bay of Fundy.

Off S.W. Nova Scotia, landings have been relatively stable at around 4,000 MT since the late 1940s. The 1976-1978 localized decline in close-to-shore landings in the Wedgeport to Clarks Harbour area rebounded in the spring of 1979. Recent larval surveys and tagging studies suggest that there may be some interrelationships of unknown magnitude between the S.W. Nova Scotia inshore and offshore stocks. In recognition of this, an area around Browns Bank (part in District 4, part in offshore area A) was closed to lobster fishing in 1979 as a preventative measure to assure an adequate supply of larvae, since in the inshore areas the combination of small minimum legal size and high fishing pressure results in removal of most females before they have had a chance to reproduce.

The offshore fishery beyond 50 miles from shore shows no signs of overexploitation as yet with landings of 674 MT in 1978. As long as the fishing effort is not increased, landings should remain relatively stable. Landings in offshore District A (North of Fundian Channel) are limited by quota to 408 MT. On Georges Bank, the U.S.A. fishery will effect recruitment more than will Canadian boats.

Lobsters: Newfoundland: Newfoundland lobster landings increased from 2,097 MT in 1977 to 2,471 MT in 1978. Landings dropped sharply to 703 MT in 1979. This represents the sharpest drop that has occurred from one year to the next during the recent (post 1950) history of this fishery. A general decline occurred along the entire west coast (Cape Ray to Cape Norman) and along the entire east coast (Cape Norman to Cape Race) except for Trinity Bay where landings increased slightly. In contrast, however, a general increase occurred along the south coast (Cape Race to Cape Ray).

The licensing policy implemented in 1976, which also restricted licence holders to the number of traps they had indicated on their 1975 licence applications that they planned to use that year, resulted in a drop in the number of licensed fishermen from approximately 7,200 in 1975 to approximately 4,800 in 1978. The 1972 effort figure (from licence applications) was 418,801 traps; however, the 4,800 fishermen licensed in 1978 were registered to fish 695,000 traps and this may be an underestimate.

The dramatic increase in landings that occurred between 1972 and 1978 (following the decline from 2,498 MT in 1955 to 1,237 MT in 1972) now appears to have resulted from increased effort; however, the possibility that a natural increase in abundance also occurred over that period cannot be ruled out.

At the current level of exploitation and the current size limit, landings can be expected to decline more rapidly and to a lower level than occurred between 1955 and

1972. Ten lobster management areas have been established for Newfoundland and the Newfoundland Lobster Advisory Committee has recommended a trap limit and a total allowable level of effort (traps in use) that would have the number of licences reduced to 2,124 and the number of traps reduced to 420,000 for the island as a whole over the long term. Also recommended is an increase in size limit from 3 3/16" to 3 1/2" carapace length.

Future landings will depend on whether or not these recommendations are implemented and can be enforced. A sustainable yield in excess of 1978 landings appears to be potentially possible. The recommended increase in size limit would increase yield per recruit by 15-20 per cent. In addition, something approaching a 40 per cent increase in egg-production would result and this should lead to increased recruitment. If effort can be reduced to the recommended level, exploitation rates should decrease appreciably and an additional small increase in yield per recruit (depending on the magnitude of the decrease in exploitation rate) as well as a long-term increase in abundance would result.

Shrimp: Gulf of St. Lawrence (4RST)

Four major shrimp concentrations are presently being exploited:

Esquiman Channel North of 50 N, with projected sustained catches from 1,000 to 2,600 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;

Esquiman Channel south of 50 N is underexploited. Catches rose from nothing in 1977 to 110 MT in 1978 and 170 MT by the end of August, 1979. Long-term yield is expected to be 4,000 MT, based on a 1977 survey. However, the resource has to be tested to give confidence in the forecast.

Sept-Iles area, with projected yields around 3,500 MT, depending on relative effort.

The North-Anticosti area is underexploited, with landings averaging 1,000 MT from 1973-1978. Long-term yield is estimated to be at least 3,500 MT, based on surveys in 1976-1977. In 1979, landings were lower than average, since part of the fleet shifted to south of Cape Breton Island.

Shrimp: Nova Scotian Shelf (4V)

The fishery started in 1977 and the stock is still under-exploited. Catches increased from 144 MT in 1977 to 307 MT in

1978 and 540 MT by the end of August, 1979. Catch rates have increased from 122 kg/h in 1978 to 189 kg/h in 1979. This is twice the highest average rate in any area in the Gulf of St. Lawrence. The Scotian Shelf stock is expected to yield at least 2,000 MT, based on a 1978 survey. About 700-800 MT will be caught in 1979.

Shrimp: Labrador (2)

Estimates of minimum trawlable biomass provided the basis for a TAC of 7,100 MT in 1979. Although recruitment is uncertain, long-term catches should range in the order of 4,000-10,000 MT.

Shrimp: Ungava Bay and Baffin Island

Research surveys and some exploratory fishing have indicated commercial concentrations of shrimp (mostly *Pandalus montagui*) in the Ungava Bay-Hudson Strait area. Sustainable levels of fishing have not yet been determined.

Baffin Island (0) west of the large northern international fishery (0+1) has shown little potential in terms of commercial concentrations; low catch rates rather than low biomass is the main reason. Research off Baffin Island north of 67^{0}N and west of the international fishery zone, has been impeded by ice. In the international fishery a TAC of 29,500 MT has been established for 1980 with a Canadian allocation of 3,000 MT. It is difficult to determine exactly the proportion of the shrimp stock in the Canadian zone and estimates range at 15 per cent to 27 per cent.

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

The fishery developed rapidly and reached peak landings of about 8,000 MT in 1977 and 1978. The increase in landings resulted from increasing numbers of traps fished, with a resulting decrease in catch per unit efort. The long-term potential is estimated at 6,000 - 7,000 MT. Provided the current practice of harvesting only large male crabs is continued, recruitment should not be affected.

Snow Crabs: Cape Breton Island

Landings off N.W. Cape Breton Island doubled in 1977 - 1978 to about 2,000 MT as a result of increase in number of licences. In 1979, a quota was set at 1,406 MT. Off N.E. Cape Breton Island the fishery appears relatively stable with landings of 729 MT in 1978. Off S.E. Cape Breton Island the fishery begun in 1977 reached 498 MT and appeared to be maintained at the same level in 1979.

Snow Crabs: South and East Newfoundland and Labrador

Catches peaked in 1978, reaching 7,000 MT. Landings were expected to increase in 1979, possibly exceeding 10,000 MT. At present, the fishery is concentrated off the east coast of the Avalon Peninsula and Bonavista Bay, however, significant catches are being made in the White Bay and Western Notre Dame Bay areas.

It should be remembered that much of the catch around the Avalon Peninsula is being harvested from what must be considered virgin stock and that landings from these areas will likely decline from present levels. The sustainable yield is projected at 7,000 MT.

Other Crabs

Rock crabs (*Cancer irroratus*) continue to be fished at a low level as a by-catch to lobsters mostly in the Gulf of St. Lawrence (4 MT in 1978). An increase to over 1,000 MT appears possible. The fishery is limited by the expense of processing, and increases in the fishery are subject to improvements to meat extraction technology or the economics of hand processing.

Jonah crabs (*Cancer borealis*) could probably support a small fishery off S.W. Nova Scotia, especially as a by-catch to lobster fishing some distance from shore.

Deep-sea red crabs (*Geryon quinquedens*) may be available in commercial quantities along the edge of the continental shelf on N.E. Georges Bank and the western end of the Scotia Banks.

Sea Scallops

Georges Bank (5Z) Landings by Canadian and American fishermen in 1978 remained high (17,595 MT) but began a predicted decline in 1979 as a result of poor recent recruitment. Recruitment has improved slightly in 1979 but heavy exploitation of these new recruits at below the age of optimal first harvest is expected to decrease the long-term potential yield of this 1976 year-class. Considerable mixing of the small scallop meats from new recruits with the larger meats from older age classes has been noted as the fishermen attempt to land scallops below the maximum 40 meat per pound (10 per cent tolerance) regulation. There is, as of yet, no indication of future above-average recruitment and so the long-term resource forecast is for declining landings.

Bay of Fundy and Browns Bank (4X) Landings from the Bay of Fundy in 1978 (485 MT) remained well above the long-term average of 325 MT but as on Georges Bank, landings began to decline in 1979 as a result of poor recent recruitment. There is no indication of future above-average recruitment.

Landings from Browns Bank in 1978 were 27 MT, all taken by the offshore scallop fleet. Landings from this area increased considerably in 1979, but very heavy exploitation of new recruits by both the inshore and offshore fleets at an age below their optimal age of first harvest is expected to rapidly deplete these two sporadically productive grounds.

Prospects for continued high landings by the inshore scallop fleet remain good because this fleet has been allocated a portion of the overall Canadian Georges Bank landing (2.9 per cent of the previous year's Canadian Georges Bank landing). With long-term average catch levels on Georges Bank of 10,000 MT, and with a Canadian share of 7,360 MT, this would represent 213 MT annually above that expected from traditional grounds.

Gulf of St. Lawrence (4RST) Landings from the Northumberland Strait declined slightly in 1978 to 167 MT, in part a result of a two-month summer closure period but also owing to poor recent recruitment and a depletion of the older age-classes. Landings for 1979 remained poor and future prospects are poor until recruitment improves.

Newfoundland (3P) Peak production in southwest Newfoundland (including St. Pierre Bank) was 430 MT of meats in 1974 in comparison with the long-term (1965-73) average of 125 MT. Only one small catch is known to have been taken since 1973. Small landings seem possible in the foreseeable future.

Iceland Scallops: Eastern 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 and only sporadic activity has been seen in this even in recent years.

Squid: Canadian Atlantic (2-4)

Short-finned squid (Illex) is the major commercial cephalopod species in Canadian Atlantic waters. The Arctic squid (Gonatus) usually found in Newfoundland-Labrador waters (SA 2+3) and the long-finned squid (Loligo) found in southern Scotian Shelf waters (SA4) are sometimes taken as by-catch in other fisheries. In recent years (1976-78) increased catches of Illex both offshore and inshore (SA 3+4) were due to both increased abundance and increased fishing in response to foreign market demand. Catches of Illex fluctuated widely in the inshore domestic fishery, ranging from less than 100 MT to 11,300 MT prior to 1977. The inshore landings, primarily in Newfoundland (SA3) increased dramatically to 30,000 MT in 1977 and 39,000 MT in 1978 and approximately 80,000 MT in 1979. A substantial foreign offshore trawl fishery has developed in the 1970s (primarily in SA 4) with catches of 30,500 MT in 1976, 49,300 in 1977 and 60,000 MT in 1978.

In SA3+4, an open-ended TAC was in effect during 1975-77 which allocated 10,000 MT to Canada and 15,000 MT to U.S.S.R. while permitting other countries to take up to 3,000 MT annually.

TACs of 100,000 MT in 1978 and 120,000 MT in 1979 were set with a restriction on fishing effort for the offshore fishery to guard against overfishing if abundance declined. Catches during recent years in the Newfoundland inshore fishery have only been limited by lack of shore-based processing capabilities in certain localities. This situation has been alleviated somewhat by Canadian fishing companies contracting foreign factory ships for use as "extended plant" processing facilities. Canada reserved 76,000 MT for its fleet and inshore fishery in 1979 and for 1980. Since offshore fishing for squid by the Canadian fleet is a recent development, Canadian companies, with the aid of the federal government, have negotiated developmental charters with foreign nations in order to gain valuable knowledge and experience from foreign fishermen as well as to fully utilize Canada's portion of the TAC.

It is virtually impossible to forecast future levels of catch of Illex from year to year since the lifespan is only 12-18 months and abundance is highly variable. However, an annual pre-season recruit survey during June in offshore Newfoundland (SA3) has allowed forecasts to be made of relative abundance in inshore Newfoundland during the same year.

Oysters - Gulf of St. Lawrence

New Brunswick Caraquet Bay is the main oyster producing area of the province and will likely remain so for some time. As anticipated, the 1978 production of 221 MT was down from the 237 MT landed in 1977, despite increased fishing effort triggered by excellent demand and high prices. The 1973 and 1975 abundant year-classes should contribute heavily to the standing stock from 1979 to 1982. In 1979 and 1980, landings from Caraquet Bay should range between 350 and 500 MT, while total New Brunswick landings should be between 500 and 600 MT. Depending on production of private leases, landings could reach 800 to 1,000 MT by 1983.

Nova Scotia In 1978, reported oyster landings amounted to 107 MT. The Northumberland Strait area is not expected to show substantial increases in the near future, as a seed shortage still persists. Future production increases from Cape Breton depend almost totally on the success of various aquaculture developments and on marketing strategy. From a partial survey of the 1979 marketing intentions of some important producers, it would appear that total Nova Scotia landings may have increased again in 1979, perhaps to 200 MT. It is possible that landings could reach 250 to 300 MT per year by 1983.

Prince Edward Island With landings of 1,059 MT in 1978, the province remains the main oyster producer. A successful oyster spat collection project, conducted by the provincial government in 1977, could start having a positive effect in 1981 and 1982 but that effect cannot be quantified at this time. For the next few years, landings are expected to range between 900 and 1,300 MT annually.

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 was 2,448 MT. A further increase is possible: by exploiting marginally contaminated areas, by canning or by the development of facilities for shellfish cleansing, particularly in the Bay of Fundy; and through the wider use of hydraulic harvesting in Nova Scotia and New Brunswick.

Other Clams - Maritimes

Other clams (bay quahaug, ocean quahaug, bar, razor, and other species) have provided roughly 1,000 MT in recent years. There is little likelihood of significantly increased landings for any of these species except ocean quahaugs. While there appears to be some potential for increasing landings of this latter species, there is little indication that such expansion will take place in the short term.

Irish moss (Chondrus)

The mean annual harvest of Irish moss for the past ten years is 33,000 MT. The bulk of this harvest was raked either by hand (southwest Nova Scotia - Marine Plant Harvesting District 12) or dragraked (southern Gulf). Since 1975, the annual harvest has fluctuated between 23,000 MT (1976) and 30,000 MT (1978). These fluctuations were caused in part by decreased standing crops in the Gulf. The five-year mean annual landing in District 12 is 11,000 MT. Fluctuations in yield from this district have not been resource-based in the recent past. The harvest for 1979, however, will be down by at least one-third due to a decreased standing crop. The cause of this marked decrease is being investigated but it has been suggested that the extreme cold in February may have been responsible. Conversely, the landings in District 1 (western Prince Edward Island) will rise markedly from the 6,500 MT landed during 1978. The increase substantially surpassed that forecast. Effort and gear have been tightly controlled during the past two seasons, but other factors as well are likely responsible. The landings for 1979 have suggested that environmental factors may cause dramatic annual shifts in the standing crop which, if proven true, will make it difficult to project standing crops without pre-season surveys.

Other species

The bulk of the rockweed (Ascophyllum) harvest takes place in District 12; and, like the Irish moss harvest from this district, the harvest per unit effort decreased markedly during 1979. If extreme winter temperatures adversely affect the productivity of benthic algae during the growing season then rockweed will be more vulnerable than Irish moss because of its intertidal location.

Furcellaria landings for 1979 were up over 1978. This is a storm-tossed harvest along the shores of District 4 in eastern Prince Edward Island; hence, landings are difficult to forecast. Dragraking trials should be carried out to determine whether the productivity can be increased.

Kelp (Laminaria) is an under-utilized species in Districts 12 and 14. Potential yields have not been calculated, but are likely to be considerably higher than the 1979 harvest of 1,000 MT.

MARINE MAMMALS

Harp Seals

A total of approximately 170,000 harp seals (from a TAC of 180,000 for the entire NW Atlantic) was allocated for the Gulf of St. Lawrence and "the Front", (northeast of Newfoundland) in 1978-1980. The present TAC is less than the estimated sustainable yield of 205-237,000 and will allow the recent population increase to continue. Present policy is to allow the population to grow from its present level of 1.3 - 1.4 million animals age one and over to an interim target of 1.6 million animals. Canada's share of the TAC in 1980 was 150,000.

Hooded Seals

In 1977-1980 the TAC of hooded seals was 15,000. The kill of adult females is restricted to five per cent of the daily catch. Hooded seals are more scattered in distribution and require powerful and maneuverable vessels to hunt them effectively. Canada and Norway are each allocated a quota of 6,000 with the additional 3,000 being open to either country. In 1979 a total of 15,125 hooded seals were taken, compared with 10,223 in 1978. The population is currently being exploited near the sustainable level.

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 1979. 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.

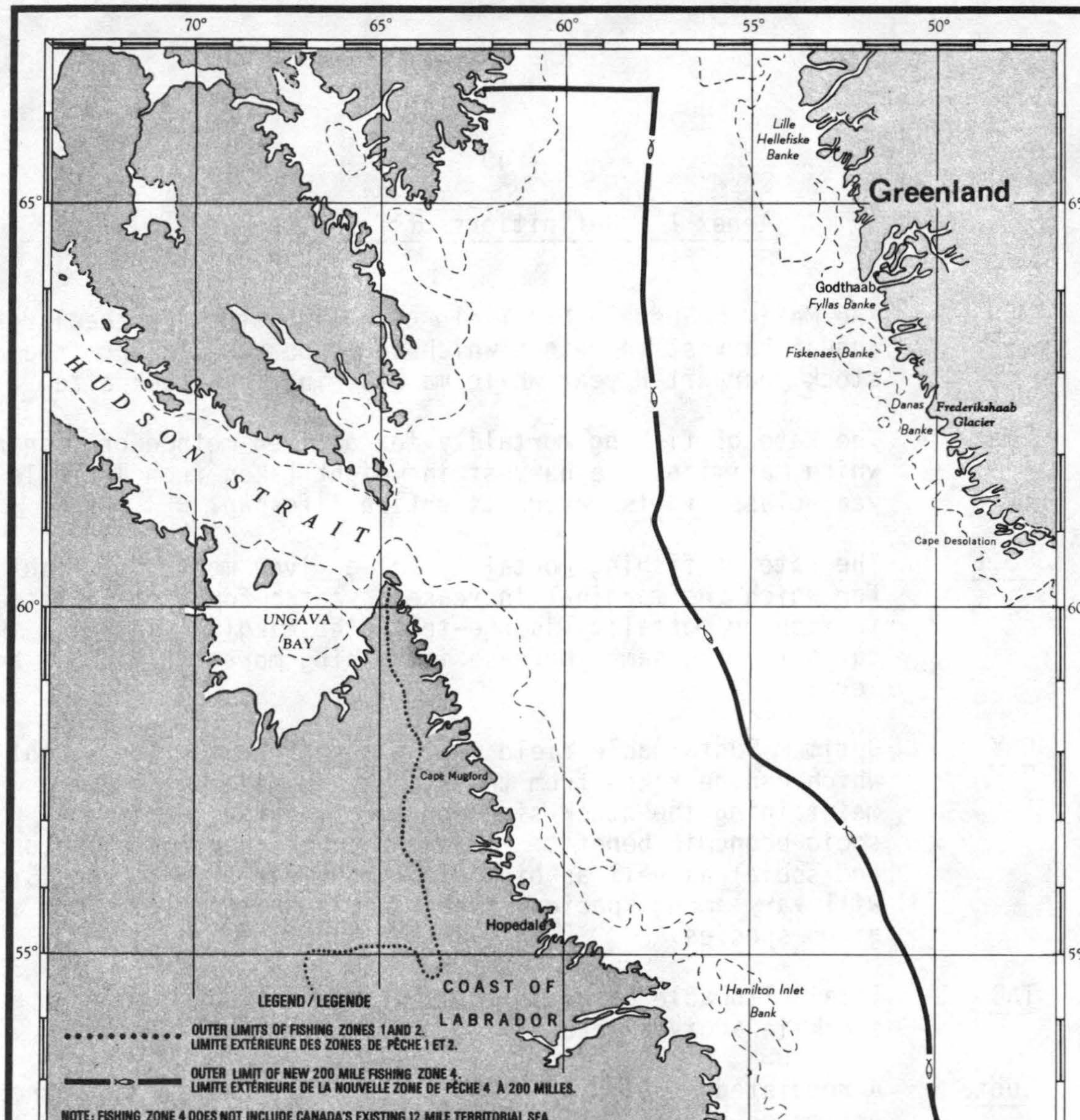
$F_{0.1}$ — The rate of fishing mortality for a given method of fishing for which the marginal increase in catch for a small increase in fishing mortality is one-tenth the marginal increase in catch for the same increase in fishing mortality from a zero level.

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 Catch is 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 — 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	31	24	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	1,486	546	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 CATCH			1979 TACs			1980 TACs			1981	1982	1983	1984	1985
	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TOTAL	CANADA	%	TAC	TAC	TAC	TAC	TAC
Cod	393	233	59	390	282	72	461	336	73	458	364	79	521	571	619	669	711
Redfish	113	67	59	110	73	66	140	93	66	164	106	65	165	167	168	169	170
Haddock	25	23	92	34	32	94	28	28	100	43	39	91	44	45	47	48	50
(American Plaice (Witch (Greenland Halibut (Yellowtail	150	125	83	160	135	84	160	135	84	179	149	83	178	186	188	191	195
Pollock (4VWX+5)	39	25	65	46	27	59	30	22	73	40	30	75	40	40	40	40	40
TOTALS	721	474	66	740	549	74	819	614	75	884	688	78	948	1,009	1,062	1,117	1,166

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 1976-78 between Table 1 and Table 2 reflect catches of these species from stocks not subject to to quota in these years. Projected catches from these stocks are included in "other groundfish" in Table 2, except for cod in 4X see note 1 Table 2.

TABLE 2: PROJECTIONS OF TACs 1981-85 WITH CATCHES IN 1976-1978, AND TACs FOR 1979 AND 1980
SUBAREAS 2, 3 AND 4 (000's METRIC TONS)

Species	Area	Catch 1976		Catch 1977		Catch 1978		1979 TACs		1980 TACs		TACs	TACs	TACs	TACs	TACs
		Total	Canada	Total	Canada	Total	Canada	Total	Canada	Total	Canada	1981	1982	1983	1984	1985
Cod	2+3	312.2	94.6	260.9	120.6	218.6	131.2	290.0	187.0	262.0	189.7	306.0	347.0	389.0	435.0	475.0
Cod (1)	4VWX	46.8	31.2	41.8	40.5	54.5	53.3	49.5	48.9	67.0	65.8	72.0	78.0	85.0	91.0	96.0
Cod	4RST	102.2	64.5	90.0	71.6	116.4	97.2	121.0	100.3	129.0	108.5	143.0	146.0	145.0	143.0	140.0
Haddock	4VWX	18.8	17.6	24.7	22.9	32.6	31.0	28.0	27.7	43.0	38.6	44.0	45.0	47.0	48.0	50.0
Redfish	2+3	98.0	39.3	80.2	37.0	80.0	46.3	104.0	60.4	118.0	71.9	119.0	120.0	120.0	120.0	120.0
Redfish	4VWX	18.4	12.6	18.4	15.2	16.1	13.6	20.0	18.0	30.0	18.5	30.0	30.0	30.0	30.0	30.0
Redfish	4RST	38.0	37.4	14.5	14.3	13.6	13.5	16.0	14.6	16.0	15.4	16.0	17.0	18.0	19.0	20.0
Silver Hake	4VWX	97.2	-	37.6	1.8	48.2	0.1	70.0	10.0	90.0	20.0	85.0	70.0	70.0	70.0	70.0
Pollock	4VWX+5	37.6	23.6	38.7	25.0	45.3	26.8	30.0	22.3	40.0	29.8	40.0	40.0	40.0	40.0	40.0
American Plaice	2+3	65.1	56.4	57.9	54.0	58.5	55.4	59.0	54.2	70.0	56.4	65.0	71.0	71.0	71.0	71.0
Flatfish (2)	4T	16.0	15.9	12.7	12.7	12.5	12.5	10.0	10.0	10.0	10.0	14.0	14.0	14.0	14.0	14.0
Witch	2+3	19.6	7.1	19.0	12.2	11.4	4.2	27.0	15.4	27.0	13.5	27.0	27.0	27.0	27.0	27.0
Witch	4RS	5.3	5.1	2.4	2.4	4.3	4.3	5.0	4.7	5.0	4.7	5.0	5.0	5.0	5.0	5.0
Yellowtail	2+3	10.5	10.2	12.0	11.7	15.5	15.1	18.0	17.1	18.0	17.5	18.0	18.0	18.0	19.0	20.0
Greenland Halibut	2+3	24.7	9.4	31.9	18.2	38.5	24.7	30.0	24.7	35.0	34.0	35.0	35.0	35.0	35.0	35.0
Flatfish	2+3	119.9	83.1	120.8	96.1	123.9	99.4	134.0	111.4	150.0	121.4	145.0	151.0	151.0	152.0	153.0
Flatfish	4VWX	17.8	10.0	11.7	11.4	10.7	10.4	14.0	13.3	14.0	13.3	14.0	16.0	18.0	20.0	23.0
Flatfish	4RST	21.3	21.0	15.1	15.1	16.8	16.8	15.0	14.7	15.0	14.7	19.0	19.0	19.0	19.0	19.0

TABLE 2: PROJECTIONS OF TACs 1981-85 WITH CATCHES IN 1976-1978, AND TACs 1979 and 1980
SUBAREAS 2, 3 AND 4 (000's METRIC TONS)

Species	Area	Catch 1976 Total	Catch 1976 Canada	Catch 1977 Total	Catch 1977 Canada	Catch 1978 Total	Catch 1978 Canada	1979 TACs Total	1979 TACs Canada	1980 TACs Total	1980 TACs Canada	TACs 1981	TACs 1982	TACs 1983	TACs 1984	TACs 1985
Roundnose Grenadier	2+3	20.6	-	15.4	-	20.7	0.0	35.0	1.0	30.0	1.0	30.0	30.0	30.0	30.0	30.0
Argentine	4VWX	7.0	-	2.5	-	1.9	0.0	20.0	1.0	20.0	1.0	20.0	20.0	20.0	20.0	20.0
Other groundfish (3)	2+3	19.2	7.6	17.7	8.6	14.0	8.7	20.0	10.0	20.0	12.0	20.0	20.0	20.0	20.0	20.0
Other groundfish (3)	4VWX	29.2	12.2	18.9	15.4	17.1	16.2	35.0	30.0	58.0	50.0	62.0	62.0	66.0	66.0	70.0
Other groundfish (3)	4RST	12.1	11.6	19.4	19.2	16.2	16.2	20.0	18.0	27.0	25.0	28.0	28.0	29.0	29.0	30.0
Groundfish (4)	2+3	569.9	224.6	495.0	262.3	457.2	285.6	583.0	369.8	580.0	396.0	620.0	668.0	710.0	757.0	798.0
Groundfish (4)	4VWX	272.8	107.2	194.3	132.2	226.4	151.4	266.5	171.2	362.0	237.0	367.0	361.0	376.0	385.0	399.0
Groundfish (4)	4RST	173.6	134.5	139.0	120.2	163.0	143.7	172.0	147.6	187.0	163.6	206.0	210.0	211.0	210.0	209.0
Mackerel	3+4	33.0	15.7	22.9	22.3	25.9	25.4	110.0	100.0	94.0	90.0	98.0	96.0	94.0	105.0	122.0
Herring	2+3	30.0	30.0	29.9	29.9	28.3	28.3	26.6	26.6	14.8	14.8	12.8	18.0	22.0	26.0	29.0
Herring (5)	4VWX	147.5	143.6	143.8	143.5	148.5	148.5	123.0	123.0	103.0	103.0	107.0	108.0	110.0	110.0	110.0
Herring	4RST	51.1	51.1	55.8	55.8	68.8	68.8	67.5	67.5	85.0	85.0	87.0	88.0	90.0	90.0	90.0
Capelin	2+3	360.4	9.5	224.3	12.0	84.9	15.3	85.0	14.8	15.0	15.0	-	-	-	-	200.0
Capelin	4RST	0.5	0.5	1.9	1.9	9.7	9.7	8.0	8.0	12.0	12.0	15.0	20.0	25.0	25.0	25.0
Cod Total		461.2	190.3	392.7	232.7	389.5	281.7	460.5	336.2	458.0	364.0	521.0	571.0	619.0	669.0	711.0
Haddock Total		18.8	17.6	24.7	22.9	32.6	31.0	28.0	27.7	43.0	38.6	44.0	45.0	47.0	48.0	50.0
Redfish Total		154.4	89.3	113.1	66.5	109.7	73.4	140.0	93.0	164.0	105.8	165.0	167.0	168.0	169.0	170.0
Silver Hake Total		97.2	-	37.6	1.8	48.2	0.1	70.0	10.0	90.0	20.0	85.0	70.0	70.0	70.0	70.0
Pollock Total		37.6	23.6	38.7	25.0	45.3	26.8	30.0	22.3	40.0	29.8	40.0	40.0	40.0	40.0	40.0

TABLE 2: PROJECTIONS OF TACs 1981-85 WITH CATCHES IN 1976-1978, AND TACs FOR 1979 AND 1980
SUBAREAS 2, 3 AND 4 (000's METRIC TONS)

Species	Area	Catch 1976		Catch 1977		Catch 1978		1979 TACs		1980 TACs		TACs	TACs	TACs	TACs	TACs
		Total	Canada	Total	Canada	Total	Canada	Total	Canada	Total	Canada	1981	1982	1983	1984	1985
Flatfish Total		159.0	114.1	147.6	122.6	151.4	126.6	163.0	139.4	179.0	149.4	178.0	186.0	188.0	191.0	195.0
Roundnose Grenadier Total		20.6	-	15.4	-	20.7	0.0	35.0	1.0	30.0	1.0	30.0	30.0	30.0	30.0	30.0
Argentine		7.0	-	2.5	-	1.9	0.0	20.0	1.0	20.0	1.0	20.0	20.0	20.0	20.0	20.0
Groundfish Total (4)		1016.3	466.3	828.3	514.7	846.6	580.7	104.5	688.6	1129.0	796.6	1193.0	1239.0	1297.0	1352.0	1406.0
Capelin (7)		360.9	10.0	226.3	13.9	94.6	25.0	93.0	22.8	27.0	27.0	15.0	20.0	25.0	25.0	225.0
Herring Total (5)		228.6	224.7	229.5	229.2	245.6	245.6	217.1	217.1	202.8	202.8	206.8	214.0	222.0	226.0	229.0
Pelagics (7)	2+3	395.7	44.7	262.1	49.8	126.9	57.3	130.6	58.4	45.8	44.8	28.8	34.0	38.0	44.0	249.0
Pelagics (5)	4VWX	172.1	151.0	156.1	155.2	157.5	157.0	178.0	173.0	150.0	148.0	156.0	156.0	157.0	162.0	171.0
Pelagics	4RST	54.7	54.7	60.5	60.5	81.7	81.7	111.5	108.5	125.0	127.0	135.0	140.0	146.0	150.0	156.0
Pelagics Total (5) (7)		622.5	250.4	478.7	265.5	366.1	296.0	420.1	339.9	323.8	319.8	319.8	330.0	341.0	356.0	576.0
Finfish	2+3	956.6	269.3	757.1	312.1	584.1	342.9	713.6	428.2	625.8	440.8	648.8	702.0	748.0	801.0	1047.0
	4VWX	444.9	258.2	350.4	287.4	383.9	308.4	444.5	344.2	512.0	385.0	523.0	517.0	533.0	547.0	570.0
	4RST	228.3	189.2	199.5	180.7	244.7	225.4	283.5	256.1	315.0	290.6	341.0	350.0	357.0	360.0	365.0
Finfish Total (6) (7)		1638.8	716.7	1307.0	780.2	1212.7	876.7	1441.6	1028.5	1452.8	1116.4	1572.8	1569.0	1638.0	1708.0	1982.0

(1) For 1979-85 includes anticipated catches of inshore cod in 4X not subject to quota.
(2) TAC 1979-80 refers to American plaice only.
(3) Groundfish species not subject to quota
(4) Includes items 1 and 3 above
(5) For 1979-1985 includes estimated annual catch (20,000 MT) of sardine herring in N.B. weirs which is not subject to quota.
(6) Includes (1), (3) and (5) above
(7) In view of extreme uncertainties about recruitment no projections are given for capelin in SA2+3 for 1981-84.

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 PROJECTION ARE NOT INTENDED TO DEFINE ESTIMATES OF THE POTENTIAL CANADIAN CATCH. For further explanation, see text page 3.

TABLE 3. PROJECTIONS OF CATCHES FOR ALL STOCKS AND INDEX OF CATCH PER UNIT OF EFFORT FOR SELECTED STOCKS, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE (4RS) 1981-85, WITH 1978 CATCH, 1979 TACS AND 1980 TACS

Species	Stock	Catch/Catch Rate Index	1978	1979	1980	1981	1982	1983	1984	1985
Groundfish										
Cod	2GH	Catch	4,900	20,000	20,000	20,000	20,000	20,000	20,000	20,000
	3NO	Catch	14,700	25,000	26,000	30,000	31,000	31,000	31,000	30,000
	2J3KL	Catch	138,600	170,000	180,000	217,000	254,000	287,000	327,000	365,000
		Catch Rate Index	1.00	1.29	1.49	1.87	2.17	2.43	2.70	2.95
	3M	Catch	33,200	40,000	13,000	8,300	12,100	16,000	21,100	24,500
	3Ps	Catch	27,200	25,000	28,000	31,000	30,000	35,000	36,000	36,000
		Catch Rate Index	1.00	1.15	1.29	1.40	1.49	1.55	1.58	1.58
	4RS 3Pn	Catch	78,500	75,000	75,000	75,000	75,000	75,000	75,000	75,000
		Catch Rate Index	1.00	1.12	1.13	1.18	1.20	1.22	1.22	1.24
Redfish	SA 2+3K	Catch	29,100	30,000	35,000	35,000	35,000	35,000	35,000	3,500
	3M	Catch	16,800	20,000	20,000	20,000	20,000	20,000	20,000	20,000

TABLE 3. PROJECTIONS OF CATCHES FOR ALL STOCKS AND INDEX OF CATCH PER UNIT OF EFFORT, FOR SELECTED STOCKS, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1980-85, WITH 1978 CATCH, 1979 TACS AND 1980 TACS

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1978	1979	1980	1981	1982	1983	1984	1985
Redfish	3LN	Catch	12,000	18,000	25,000	25,000	25,000	25,000	25,000	25,000
	30	Catch	6,900	20,000	20,000	20,000	20,000	20,000	20,000	20,000
	3P	Catch	15,200	16,000	18,000	19,000	20,000	20,000	20,000	20,000
		Catch Rate Index	1.00	1.03	1.06	1.07	1.08	1.08	1.08	1.07
	4RST	Catch	13,600	16,000	16,000	16,000	17,000	18,000	19,000	20,000
Am. Plaice	SA 2+3K	Catch	3,500	6,000	6,000	6,000	6,000	6,000	6,000	6,000
	3LNO	Catch	50,000	47,000	47,000	52,000	58,000	58,000	58,000	58,000
		Catch Rate Index	1.00	1.01	1.04	1.07	1.08	1.08	1.08	1.08
	3M	Catch	1,300	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	3Ps	Catch	3,700	4,000	5,000	5,000	5,000	5,000	5,000	5,000

TABLE 3. PROJECTIONS OF CATCHES FOR ALL STOCKS AND INDEX OF CATCH PER UNIT OF EFFORT, FOR SELECTED STOCKS, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1980-85, WITH 1978 CATCH, 1979 TACS AND 1980 TACS

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1978	1979	1980	1981	1982	1983	1984	1985
Witch	2J3KL	Catch	6,900	17,000	17,000	17,000	17,000	17,000	17,000	17,000
	3NO	Catch	3,500	7,000	7,000	7,000	7,000	7,000	7,000	7,000
	3Ps	Catch	1,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
	4RS	Catch	4,300	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Greenland Halibut	SA 2+3KL	Catch	38,500	30,000	35,000	35,000	35,000	35,000	35,000	35,000
Yellowtail	3LNO	Catch	15,500	18,000	18,000	18,000	18,000	18,000	19,000	20,000
		Catch Rate Index	1.00	1.06	1.09	1.12	1.13	1.13	1.14	1.14
Roundnosed Grenadier	SA 2+3	Catch	20,700	35,000	30,000	30,000	30,000	30,000	30,000	30,000
Other Groundfish	SA 2+3 +4RS	Catch	24,300	30,000	30,000	30,000	30,000	30,000	30,000	30,000

TABLE 3. PROJECTIONS OF CATCHES FOR ALL STOCKS AND INDEX OF CATCH PER UNIT OF EFFORT, FOR SELECTED STOCKS, NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1980-85, WITH 1978 CATCH, 1979 TACS AND 1980 TACS

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1978	1979	1980	1981	1982	1983	1984	1985
Pelagic Fish										
Herring	South Nfld.	Catch	4,500	4,800	3,800	3,800	5,000	6,000	7,000	8,000
	East Nfld.	Catch	22,100	20,800	10,000	8,000	12,000	15,000	18,000	20,000
	West Nfld.	Catch	15,900	12,500	10,000	12,000	13,000	15,000	15,000	15,000
	Labrador	Catch	300	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Gulf (3Pn-4T)	Catch	52,500	55,000	75,000	75,000	75,000	75,000	75,000	75,000
Capelin[1]	SA 2+3K	Catch	55,000	75,000	5,000	-	-	-	-	150,000
	3LNOPs	Catch	29,900	10,000	16,000	-	-	-	-	50,000
	3Pn-4R	Catch	9,700	8,000	12,000	15,000	20,000	25,000	25,000	25,000

1 Due to uncertainties concerning recruitment no projections are given for SA 2 and 3 stocks in 1981-4.

TABLE 3. PROJECTION OF CATCHES FOR ALL STOCKS AND INDEX OF CATCH PER UNIT OF EFFORT, FOR SELECTED STOCKS NEWFOUNDLAND-LABRADOR (SUBAREAS 2+3) AND PART OF GULF OF ST. LAWRENCE, 1980-85, WITH 1978 CATCH, 1970 TACS and 1980 TACS

INVERTEBRATES

Lobster	Nfld.	Catch	Fluctuate between 1,100 and 2,000 MT with average of 1,400-1,600 MT.
Squid	SA 3+4	Catch	(99,000) MT. Impossible to predict annual catches because depend heavily on fluctuation in squid abundance.
Scallop	Nfld.	Catch	Catches will fluctuate depending on effort and abundance.
Snow Crab	Nfld.	Catch	Catches will fluctuate in the range of 5,000-12,000 MT.
Shrimp	Esquiman Channel Gulf of St. Lawrence	Catch	Landings should fluctuate between 1,000 and 2,600 MT depending on recruitment and relative effort.
	Labrador	Catch	4,000-10,000 MT depending on recruitment.
	SA 3	Catch	Unknown
	Ungava Bay	Catch	Unknown
	SA 0	Catch	3,000 MT provided the declining trends in catch rates for the international fishery is averted and pending results pertaining to the proportion of shrimp in Canadian waters.
	SA 0 (N of 67^{o} N, W of the international fishery zone)	Catch	Unknown

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., Greenland, 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 1981-85 FOR
STOCKS IN THE GULF OF ST. LAWRENCE (4T) AND SCOTIAN SHELF (4VWX) WITH 1978 CATCHES AND TACS FOR 1979-1980

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1978	1979	1980	1981	1982	1983	1984	1985
Cod	4T+4Vn (Jan.-Apr.)	Catch	44,000	46,000	54,000	68,000	71,000	70,000	68,000	65,000
	4Vn (May-Dec.)	Catch	6,000	4,000	5,000	5,000	5,000	5,000	5,000	5,000
	4VsW	Catch	25,000	30,000	45,000	49,000	53,000	58,000	62,000	66,000
	4X	Catch	16,000	16,000	17,000	18,000	20,000	22,000	24,000	25,000
Haddock	4VW	Catch	6,000	2,000	15,000	17,000	19,000	21,000	23,000	25,000
	4X	Catch	27,000	26,000	28,000	27,000	26,000	26,000	25,000	25,000
Redfish	4VWX	Catch	16,000	20,000	30,000	30,000	30,000	30,000	30,000	30,000
Silver Hake	4VWX	Catch	81,000	70,000	90,000	85,000	70,000	70,000	70,000	70,000
Flatfish	4T	Catch	16,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
	4VWX	Catch	14,000	14,000	16,000	18,000	18,000	20,000	20,000	23,000

TABLE 4: PROJECTIONS OF CATCHES 1981-85 FOR
STOCKS IN THE GULF OF ST. LAWRENCE (4T) AND SCOTIAN SHELF (4VWX) WITH 1978 CATCHES AND TACS FOR 1979-1980

SPECIES	STOCK	CATCH/CATCH RATE INDEX	1978	1979	1980	1981	1982	1983	1984	1985
Pollock	4VWX+5	Catch	45,000	30,000	40,000	40,000	40,000	40,000	40,000	40,000
Other Groundfish	4TVWX	Catch	23,000	45,000	75,000	80,000	80,000	85,000	85,000	90,000
Herring (Excl. NB Weirs 20,000 mt/yr)	4WX	Catch	89,000	99,000	83,000	87,000	88,000	90,000	90,000	90,000
Mackerel (i.e., Northwest Atlantic)	3-6	Catch	232,000	293,000	236,000	244,000	239,000	236,000	262,000	306,000

TABLE 5. PROJECTIONS OF CATCHES IN THE DAVIS STRAIT-BAFFIN BAY AREA

SPECIES	STOCK	CATCH 1977(MT) 1978(MT)	TAC 1979(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	29,500	

These stocks occur in both the Canadian and Greenlandic 200-mile zones. 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	CATCH 1978 (MT)	TAC 1979 (MT)	1980(MT)	PROJECTED TAC 1980's (MT)
Cod	3M	33,200	40,000	13,000	20,000
Redfish	3M	16,800	20,000	20,000	20,000
American Plaice	3M	1,300	2,000	2,000	2,000

These stocks occur entirely beyond the 200-mile zone and 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 1978(MT)	Projected TAC 1980's (MT)
Cod	5Y	12,810	No information available
	5Z	34,334	No information available
Haddock	5	27,518	No information available
Silver Hake	5Y	6,195	No information available
	5Ze	10,005	No information available
Red Hake	5Ze	965	No information available
Redfish	5	14,084	No information available
Pollock	4VWX+5	-	See Table 4
Yellowtail	(E69^{o})	88,000	No information available
Flounders	5+6	51,617	No information available
Mackerel	5+6	1,975	Perhaps 306,000 MT including SA3+4
Herring	5Y	48,998	Perhaps 25,000
	5Z+6	2,104	Perhaps 109,000
Squid (Loligo)	5+6	9,041	No information available
Squid (Illex)	5+6	14,799	No information available
River Herring	5+6	5,762	No information available
Butterfish	5+6	4,909	No information available

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

TABLE 8 - Foreign allocations in 1980 in Subareas 2, 3 and 4 of Traditional Groundfish species by various Stock Categories

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

Cod 3M	12,900
Redfish 3M	14,500
American Plaice 3M	1,750
Subtotal	29,150

B. Overlapping stocks:

Cod 3NO	16,200
American Plaice 3LNO	800
Yellowtail 3LNO	500
Witch 3NO	2,100
Redfish 3LN	12,100
Subtotal	31,700

C. U.S.A. - neighbouring coastal state excluding categories A&B*

Cod 4Vn	70
Cod 4VsW	630
Redfish 4VWX	10,500
Haddock 4VW	1,500
4X	2,800
Pollock 4VWX 5	10,240
Flounders 4VWX	140
Subtotal	25,880

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

Cod 2GH	130
2J3KL	880
3Ps	4,400
4TVn	8,540
4Vn (May-Dec.)	100
4RS3Pn	12,000
Redfish 3P	2,000
30	600
4RST	600
4VWX	500
American Plaice 3Ps	550
Witch 3Ps	410
4Rs	300
Flounders 4VWX	250
Subtotal	31,230

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

Cod 2GH		18,870
	2J3KL	24,120
Redfish	2-3K	5,000
	30	14,400
	4VWX	500
American Plaice 2-3K		500
Witch 2J3KL		11,000
Greenland Halibut 2J3KL		1,000
Flounders 4VWX		360
Subtotal		75,750

* Subject to ratification of Agreement on East Coast Fishery Resources.

Total Finfish all areas (no Capelin 1981-85)
Toutes les espèces Tous endroits (sans Capelan 1981-85)

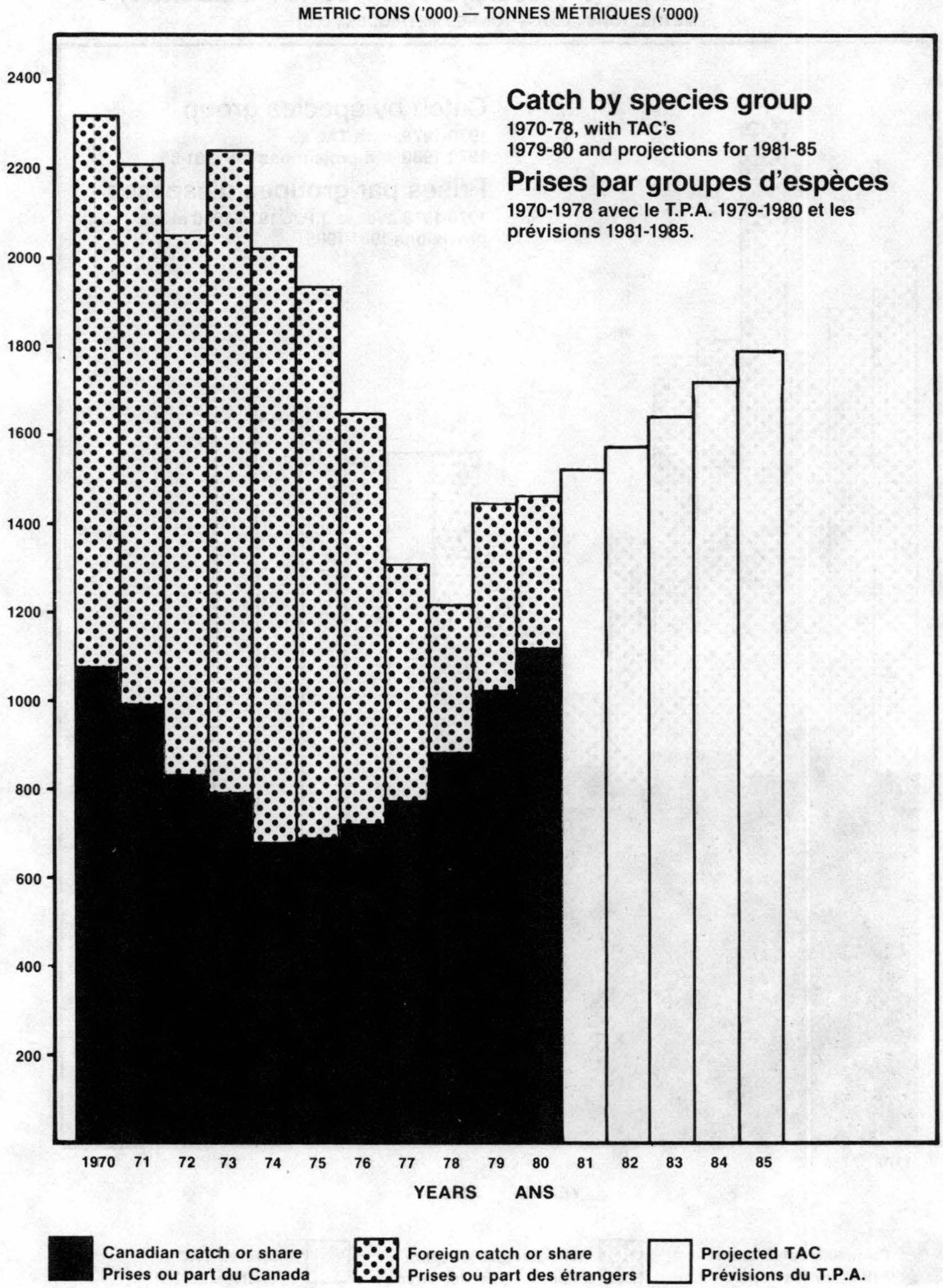


Figure 5

Scotian Shelf Finfish
Toutes les espèces (Plateau continental Scotian)

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

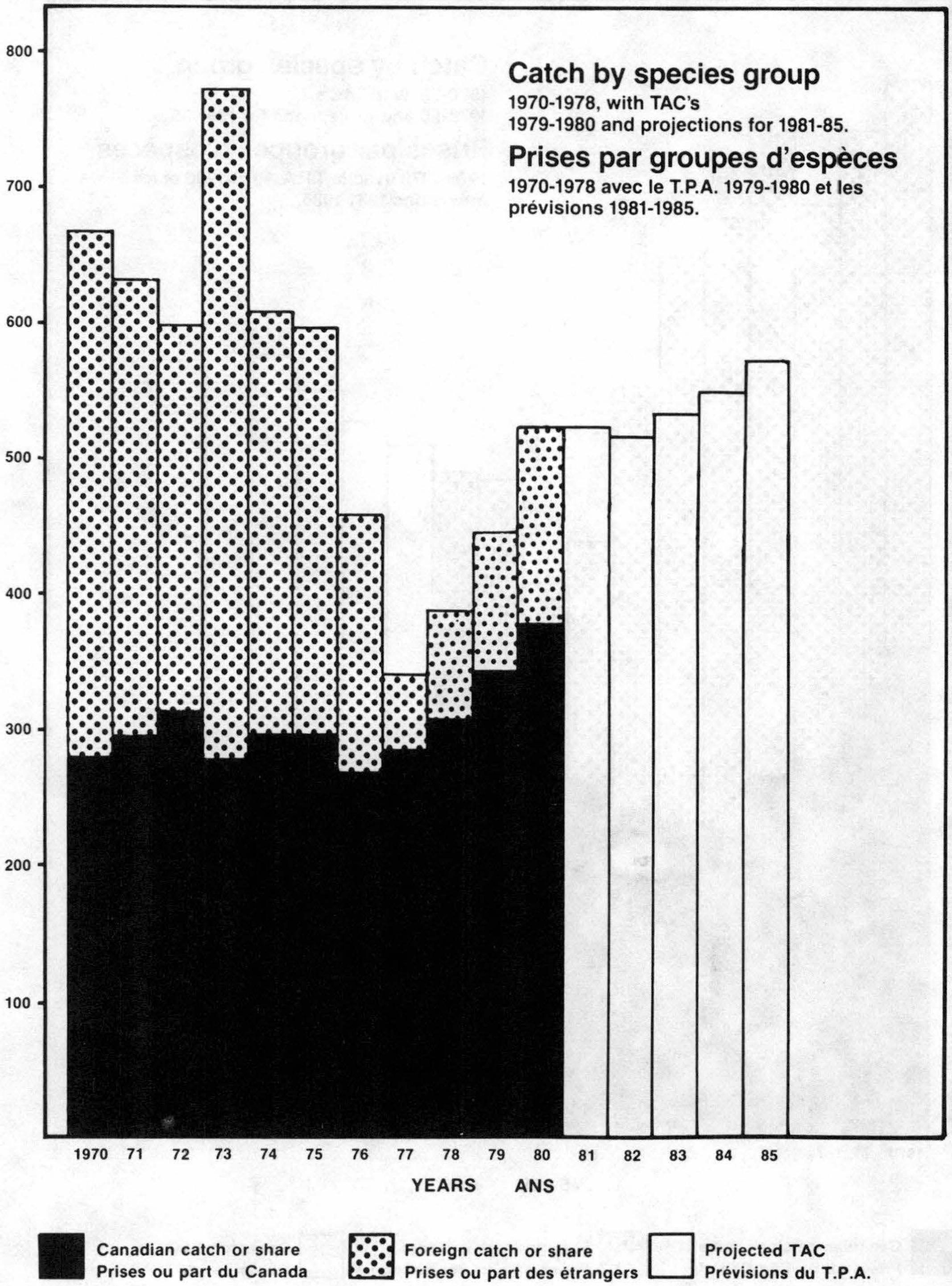
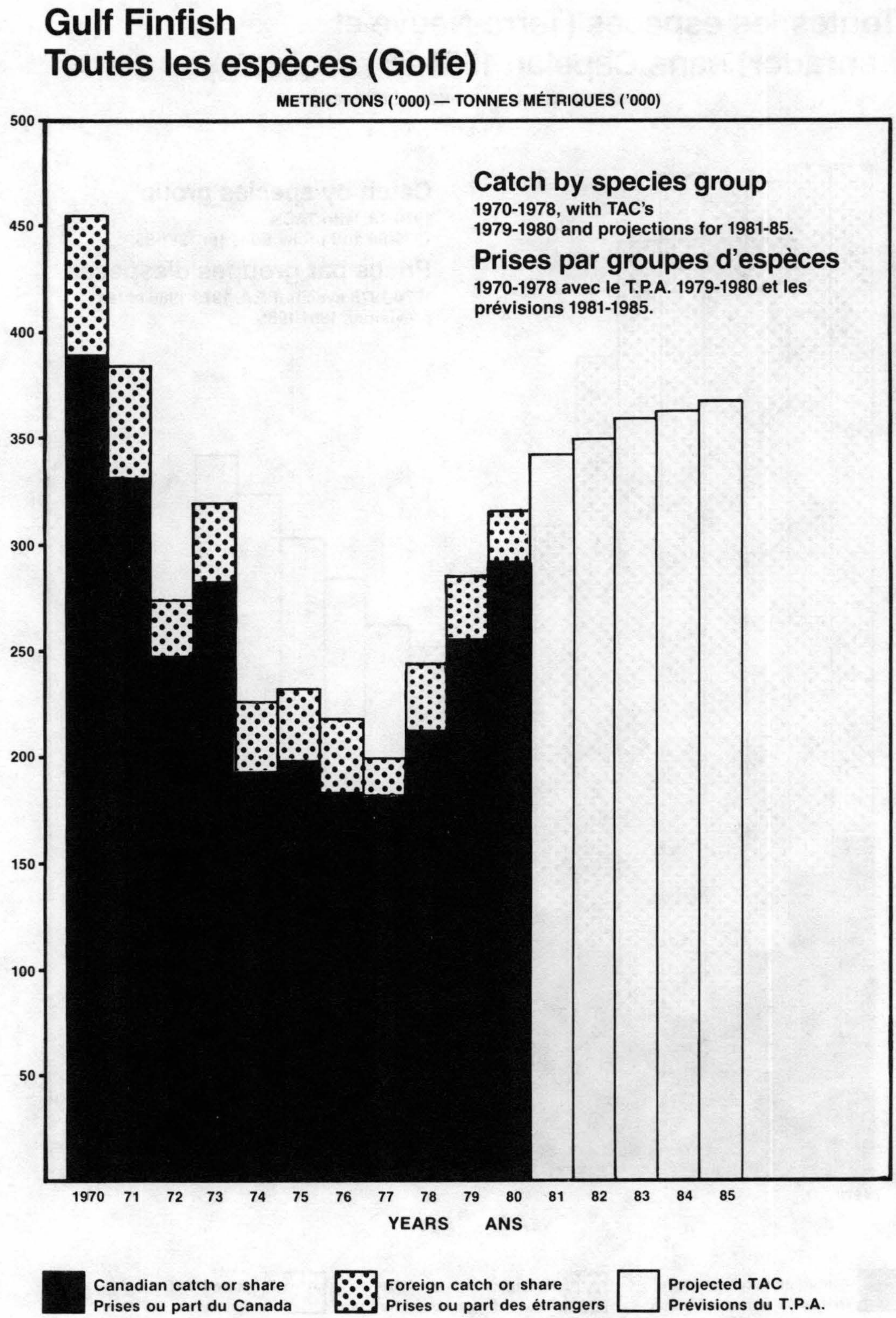
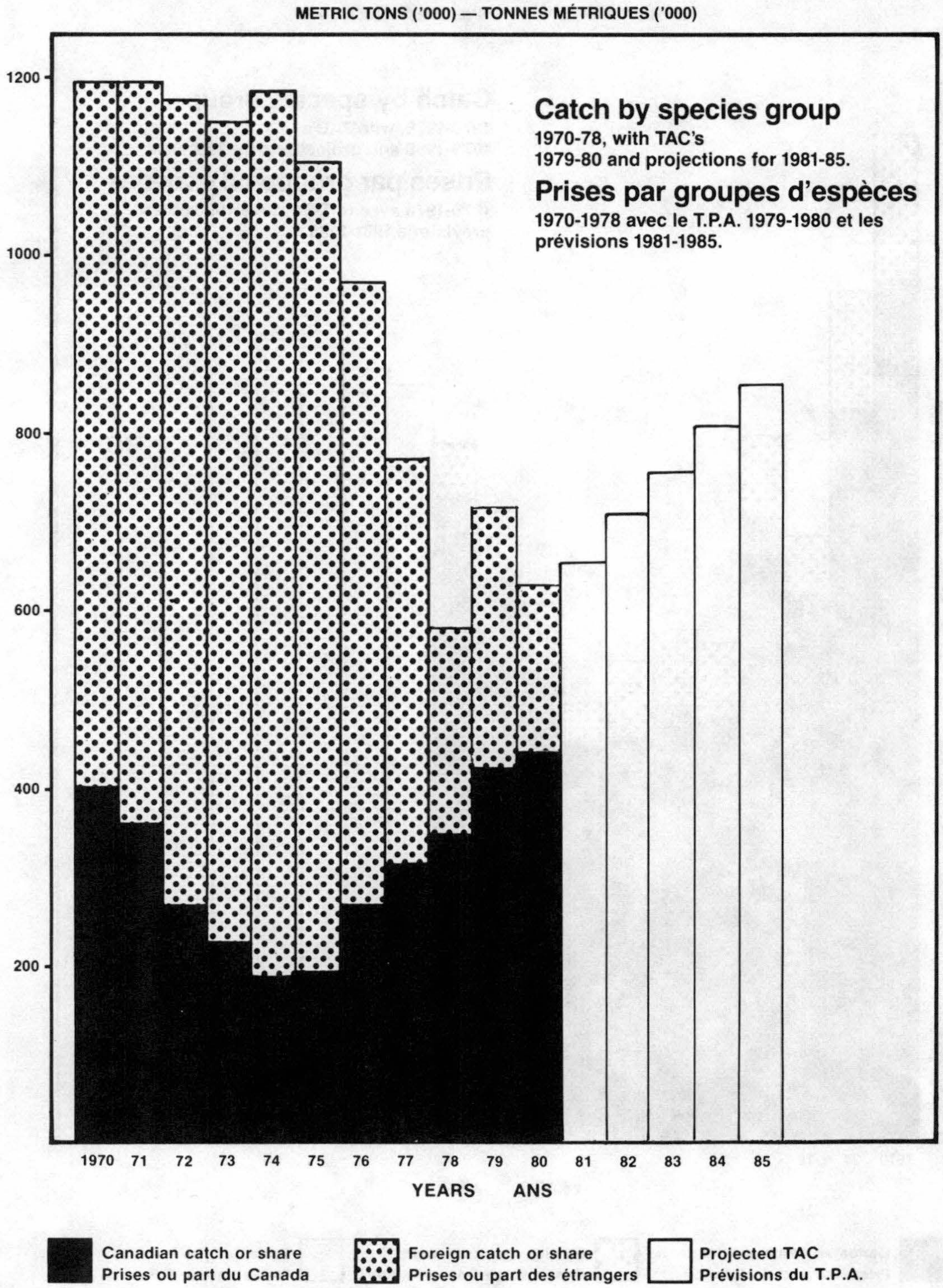


Figure 6


Gulf Finfish
Toutes les espèces (Golfe)
METRIC TONS ('000) — TONNES MÉTRIQUES ('000)
500
450
400
350
300
250
200
150
100
50
Catch by species group
1970-1978, with TAC's
1979-1980 and projections for 1981-85.
Prises par groupes d'espèces
1970-1978 avec le T.P.A. 1979-1980 et les
prévisions 1981-1985.
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.

Newfoundland and Labrador Finfish excluding Capelin 1981-85
Toutes les espèces (Terre-Neuve et Labrador) sans Capelan 1981-85



Total Groundfish
Poisson de fond (Tout endroits)

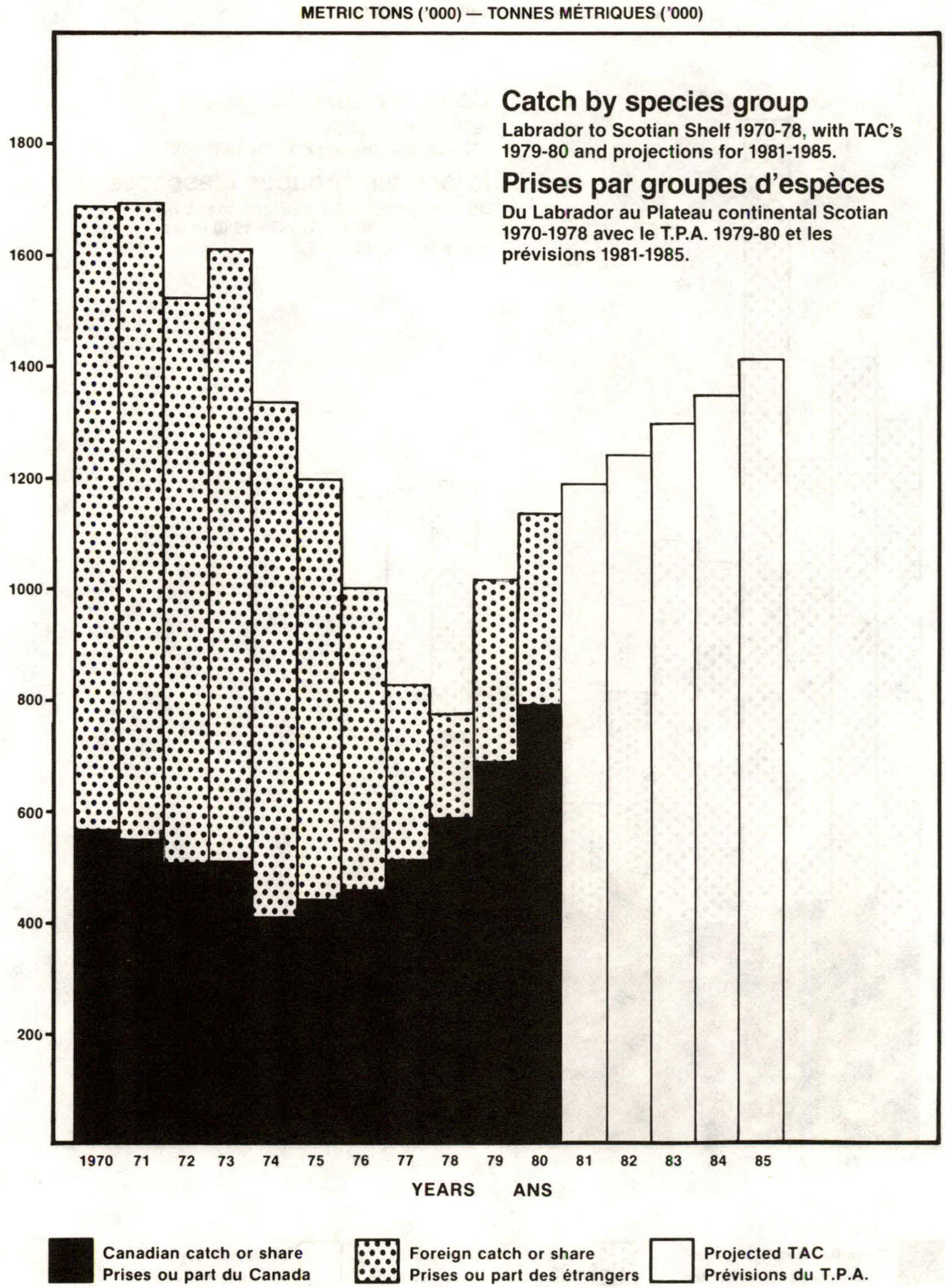
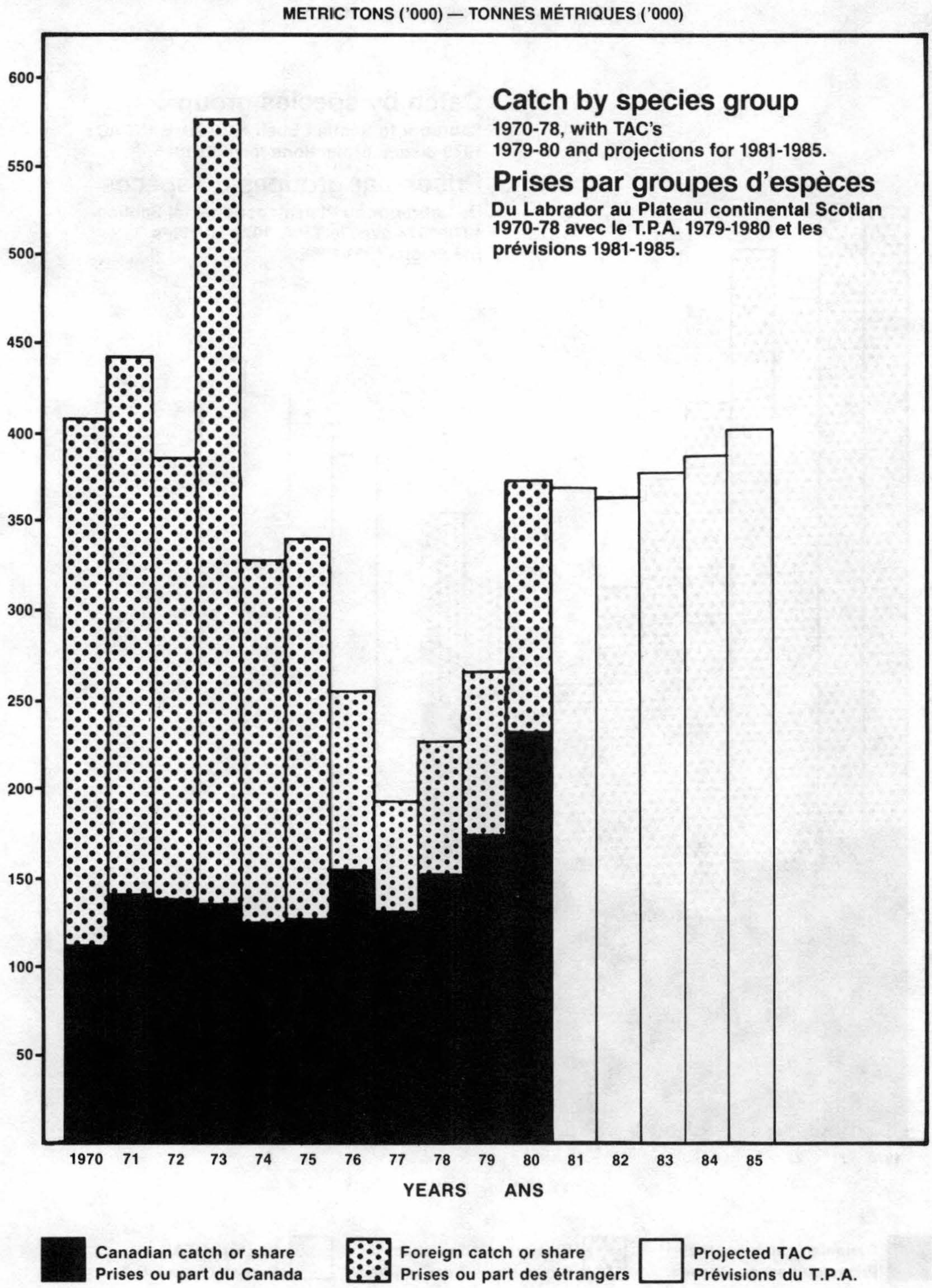


Figure 9

Scotian Shelf Groundfish
Poisson de fond (Plateau continental Scotian)



Gulf Groundfish
Poisson de fond (Golfe)

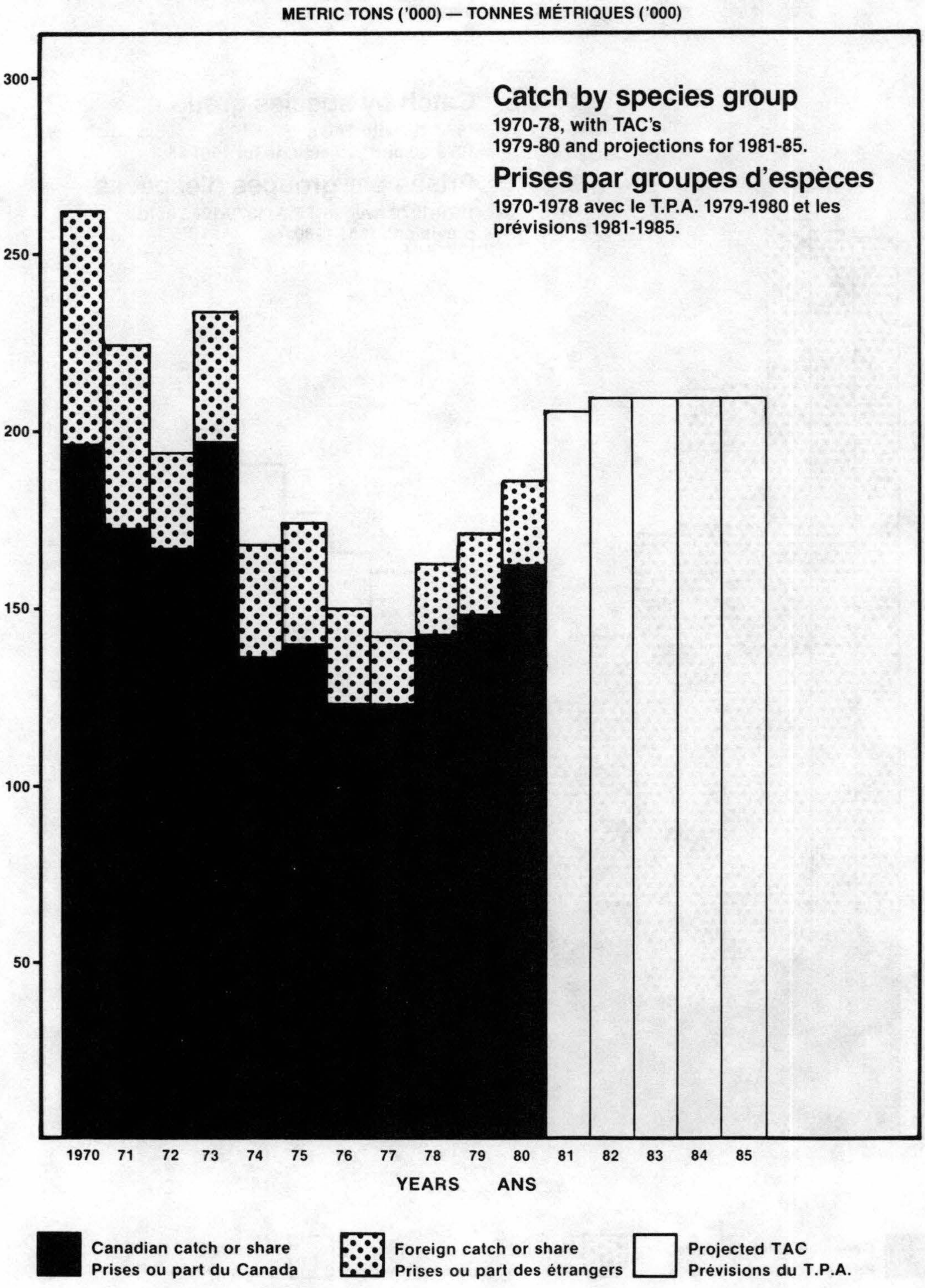
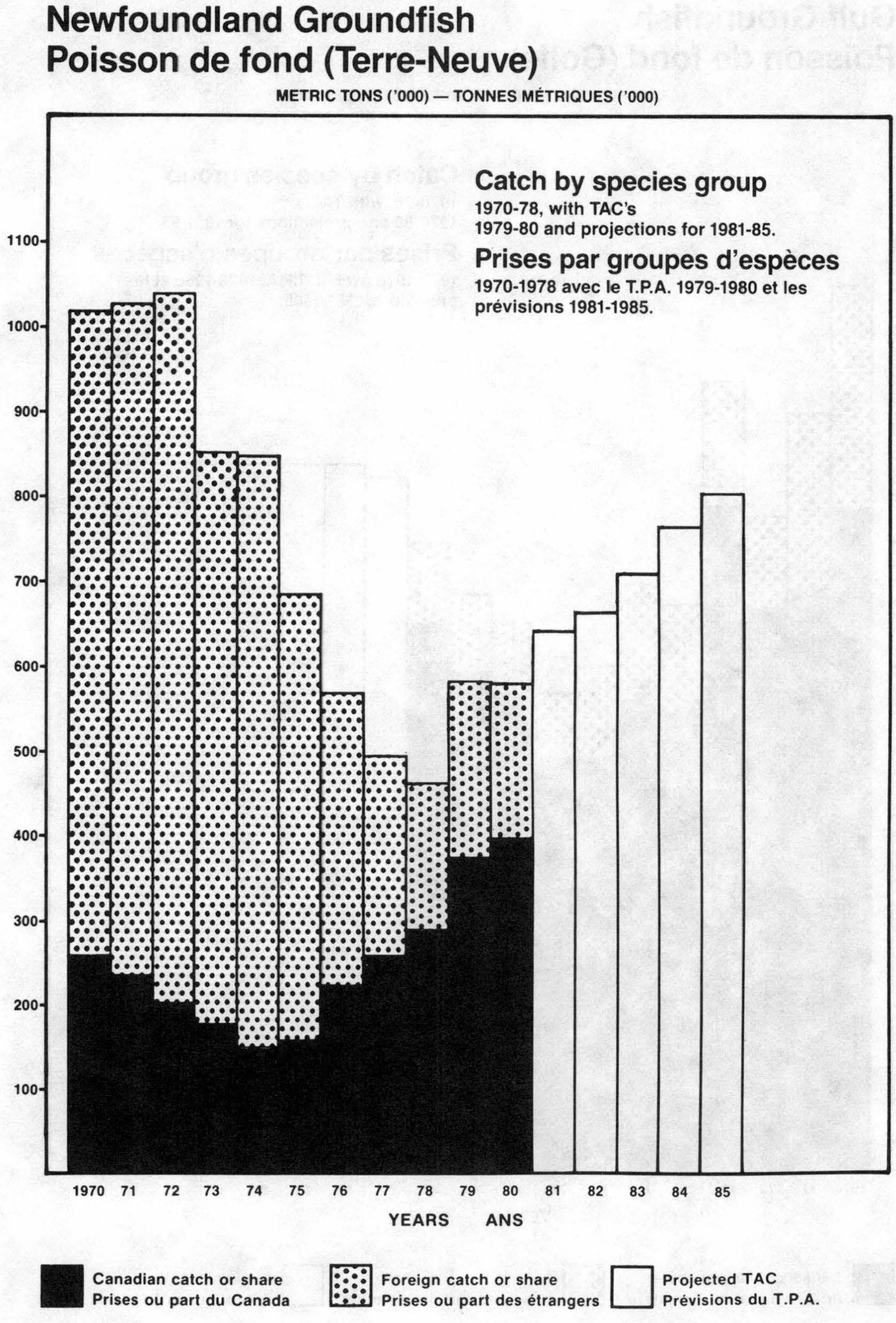
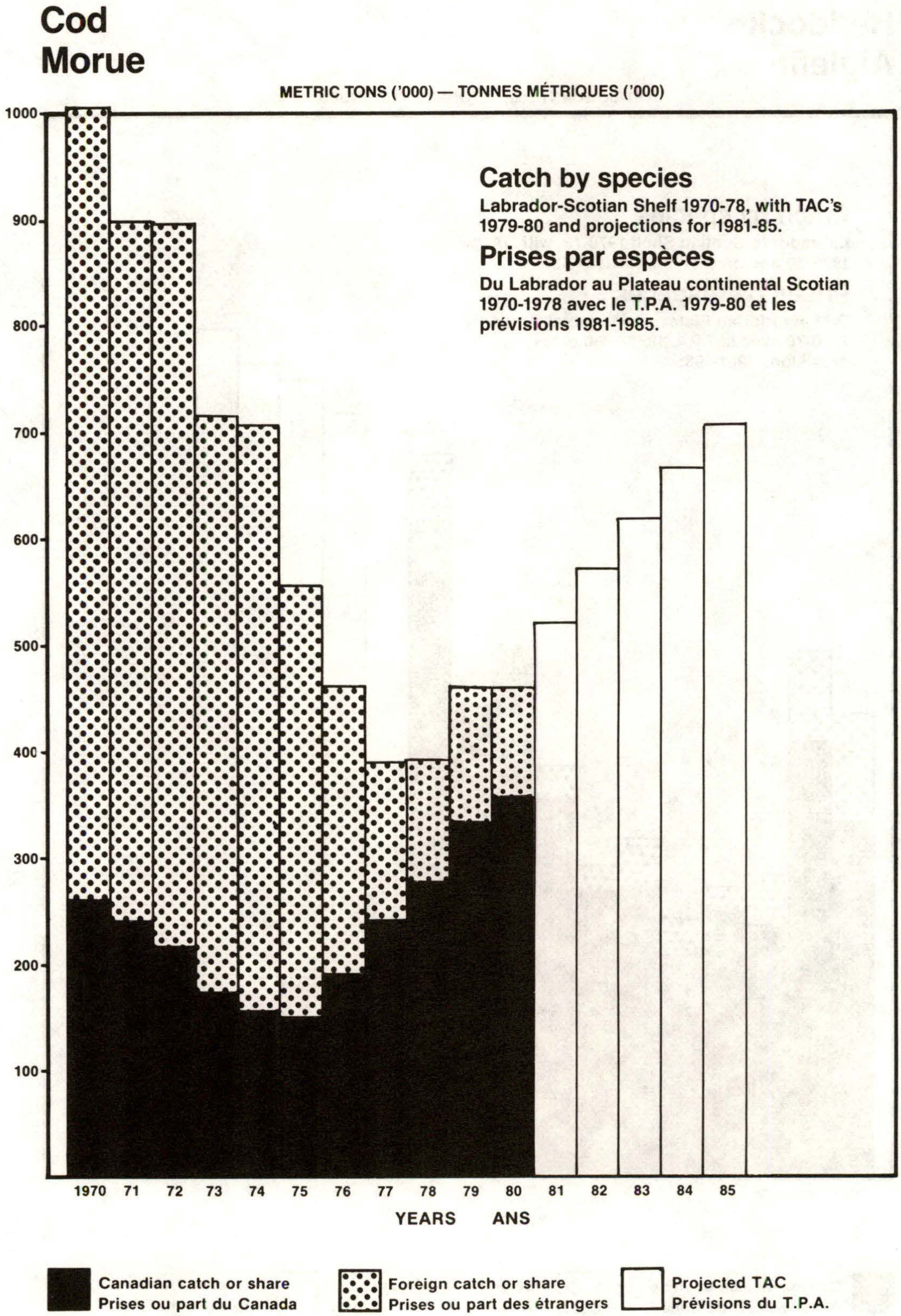


Figure 11



Newfoundland Groundfish
Poisson de fond (Terre-Neuve)
METRIC TONS ('000) — TONNES MÉTRIQUES ('000)
Catch by species group
1970-78, with TAC's
1979-80 and projections for 1981-85.
Prises par groupes d'espèces
1970-1978 avec le T.P.A. 1979-1980 et les
prévisions 1981-1985.
1100
1000
900
800
700
600
500
400
300
200
100
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 12



Cod
Morue
METRIC TONS ('000) — TONNES MÉTRIQUES ('000)
1000
900
800
700
600
500
400
300
200
100
Catch by species
Labrador-Scotian Shelf 1970-78, with TAC's 1979-80 and projections for 1981-85.
Prises par espèces
Du Labrador au Plateau continental Scotian 1970-1978 avec le T.P.A. 1979-80 et les prévisions 1981-1985.
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

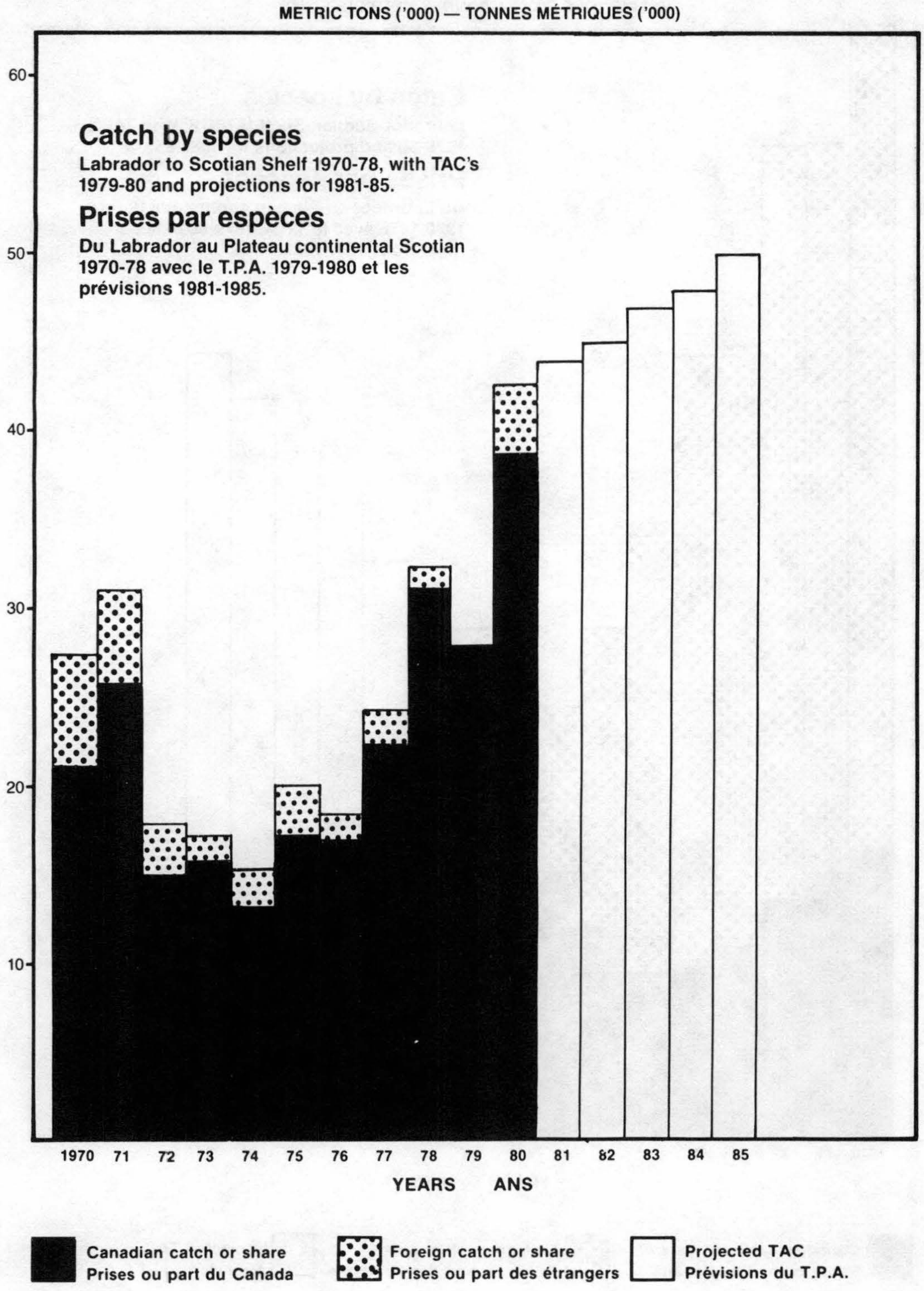
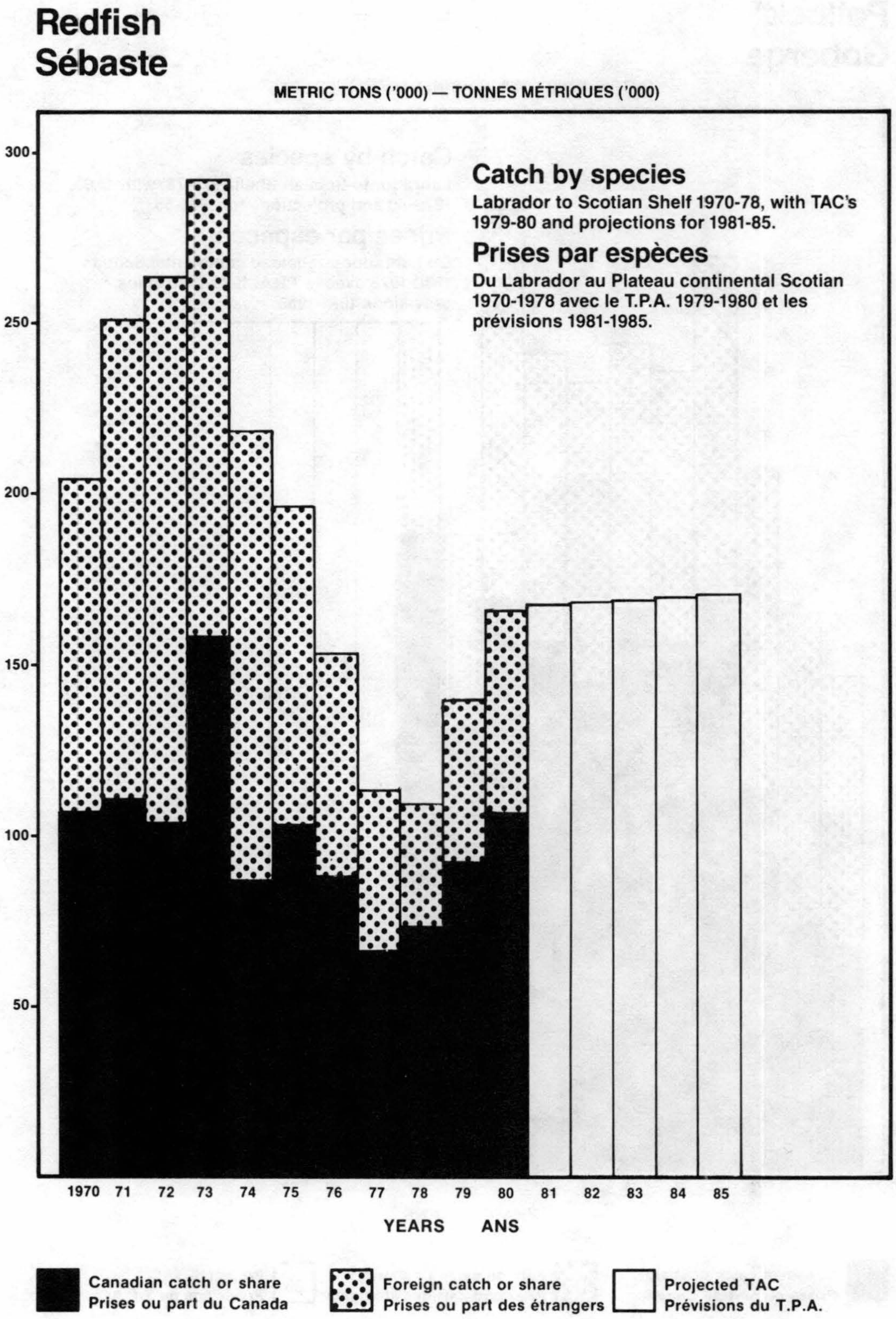
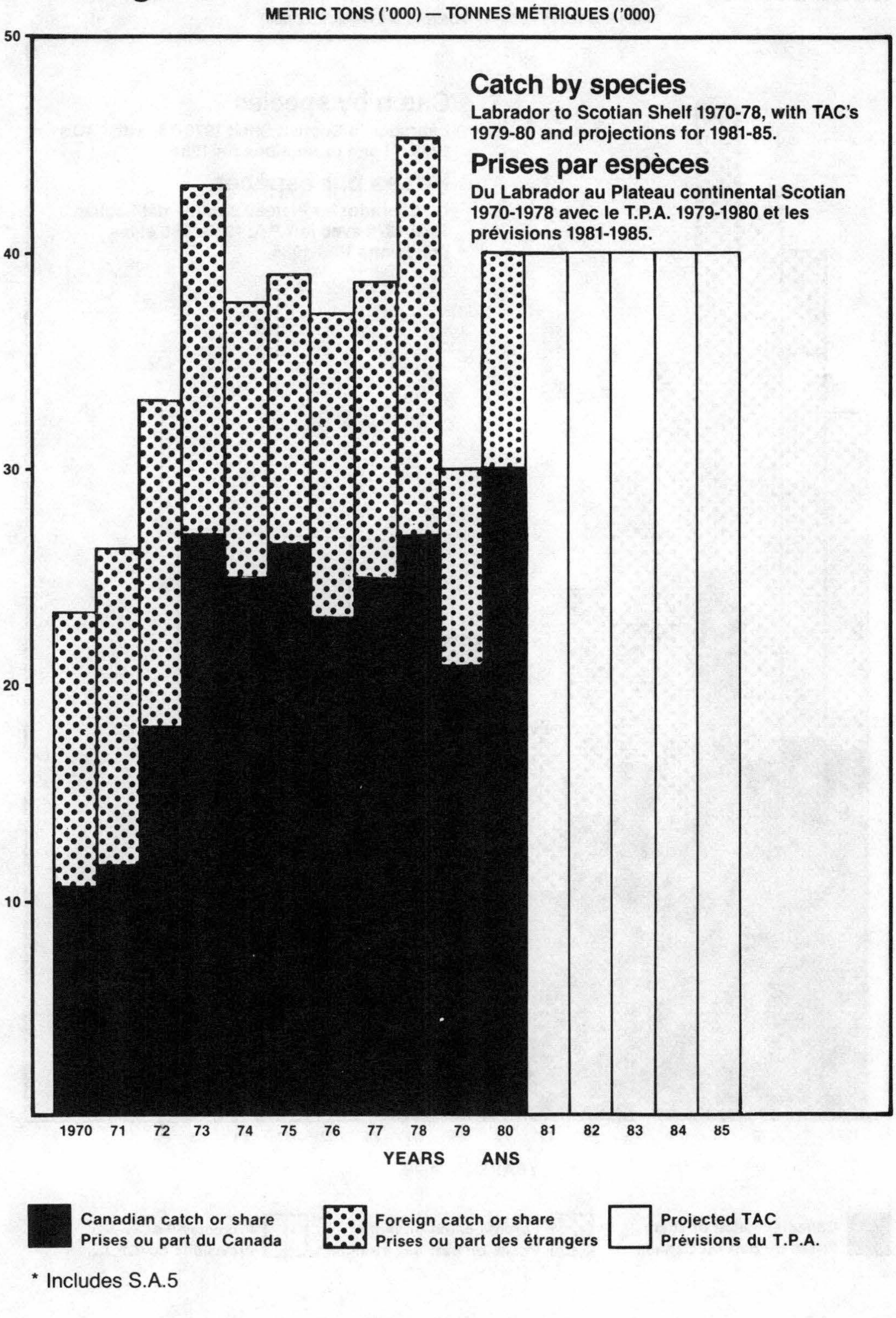


Figure 14



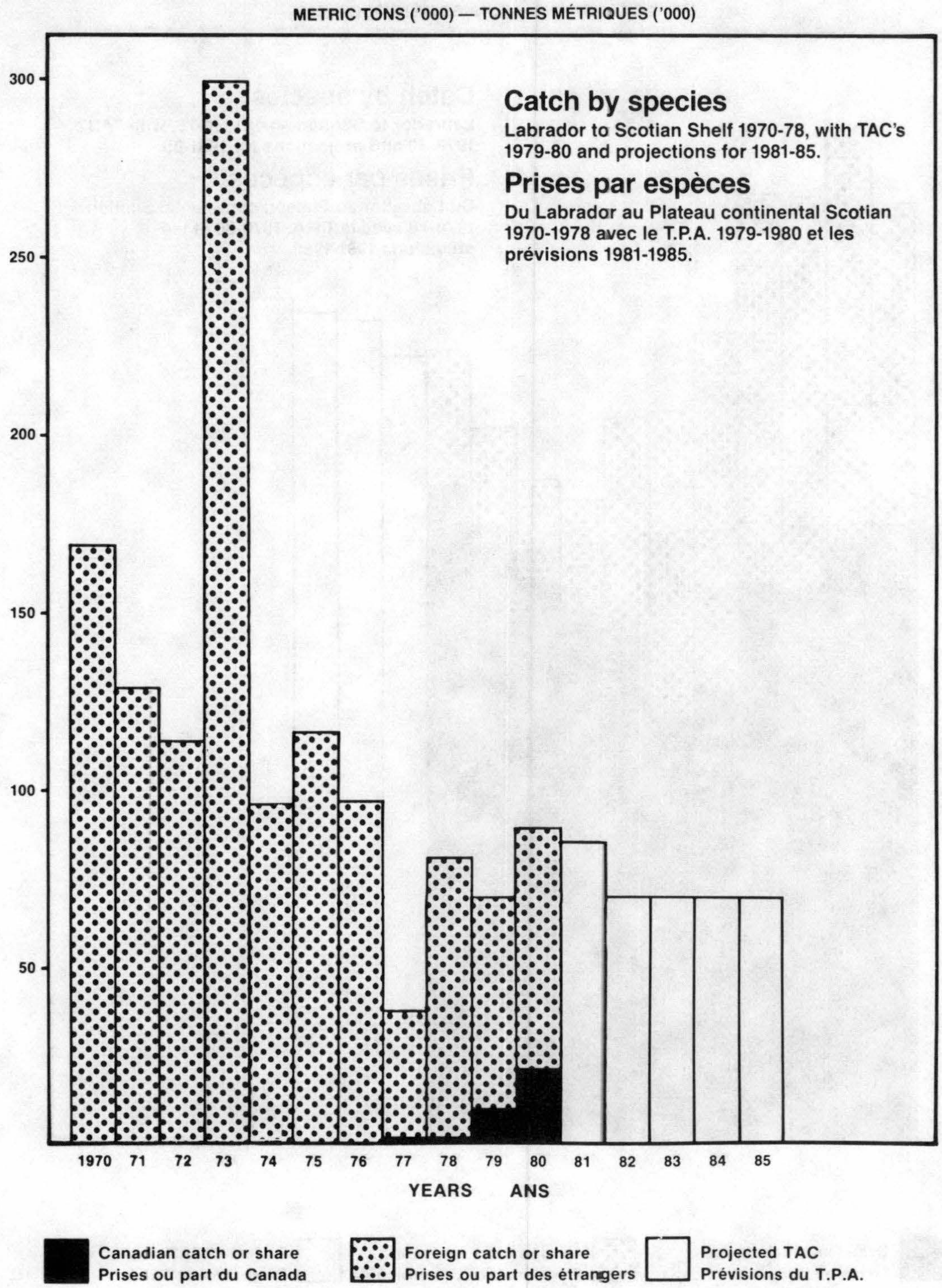
Redfish
Sébaste
METRIC TONS ('000) — TONNES MÉTRIQUES ('000)
Catch by species
Labrador to Scotian Shelf 1970-78, with TAC's 1979-80 and projections for 1981-85.
Prises par espèces
Du Labrador au Plateau continental Scotian 1970-1978 avec le T.P.A. 1979-1980 et les prévisions 1981-1985.
300
250
200
150
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.

Pollock*
Goberge

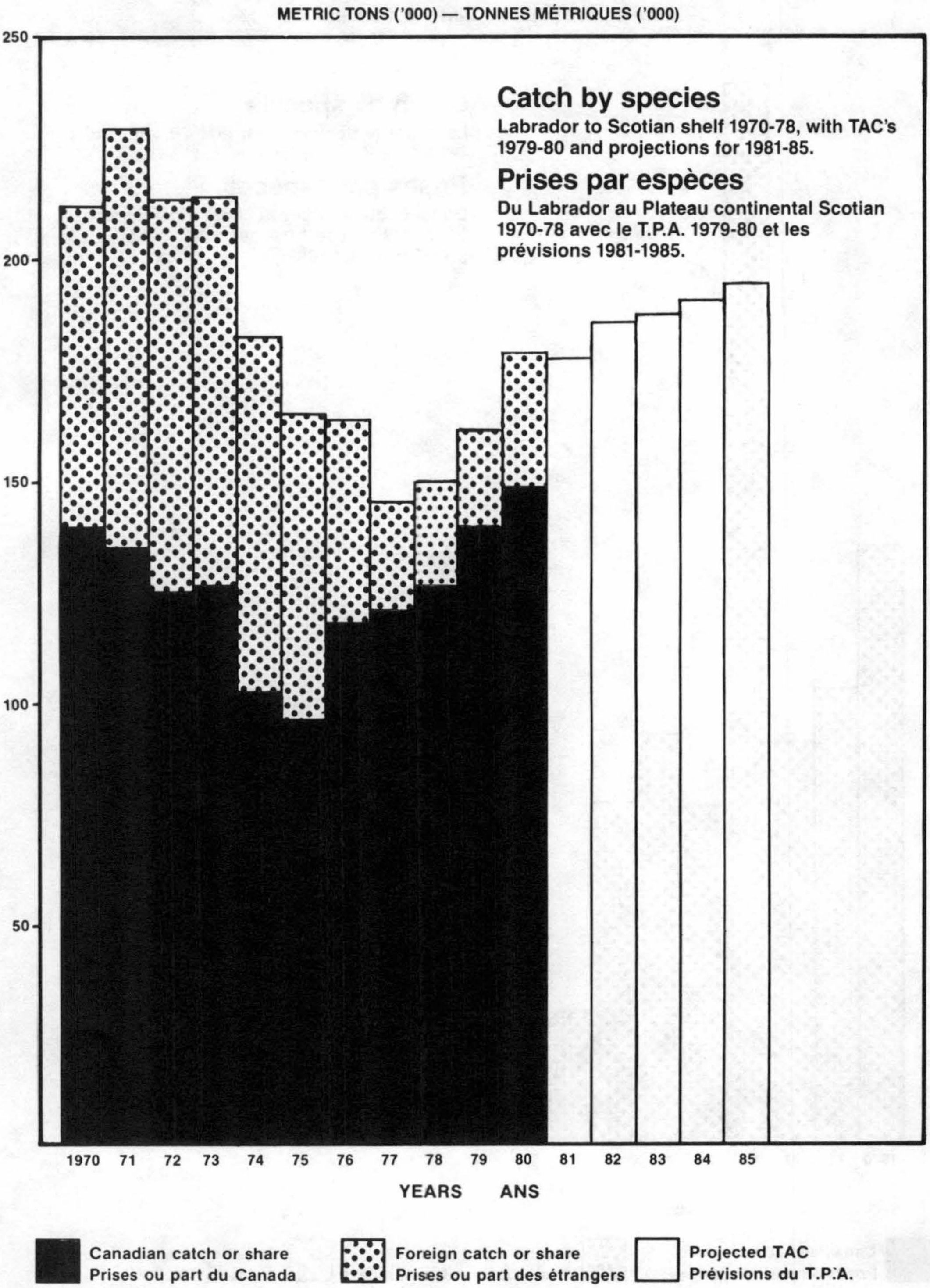


* Includes S.A.5

Silver Hake
Merlu argenté



Flatfish
Poissons plats



Round Nose Grenadier
Grenadier de roche

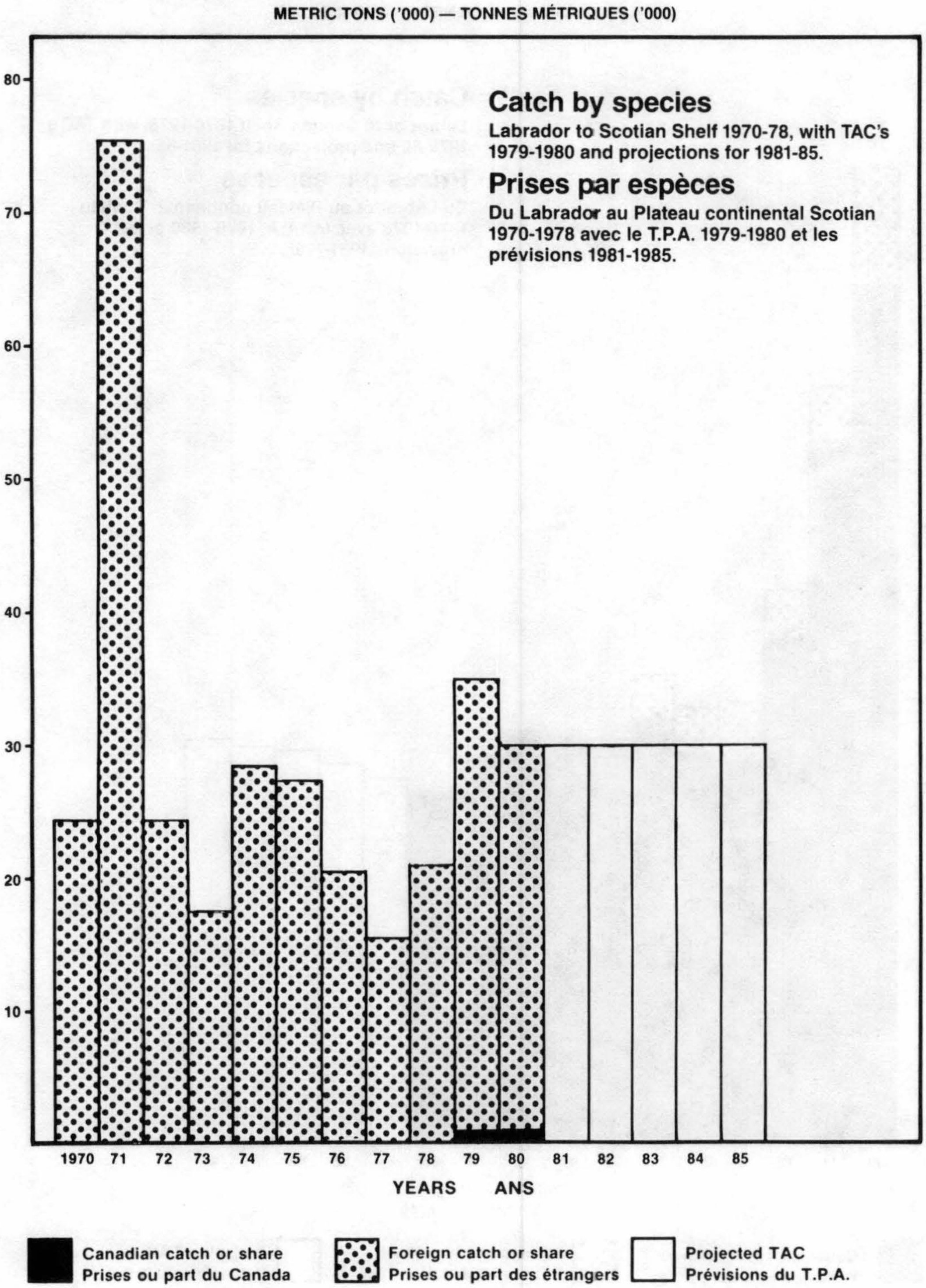


Figure 19

Herring
Hareng

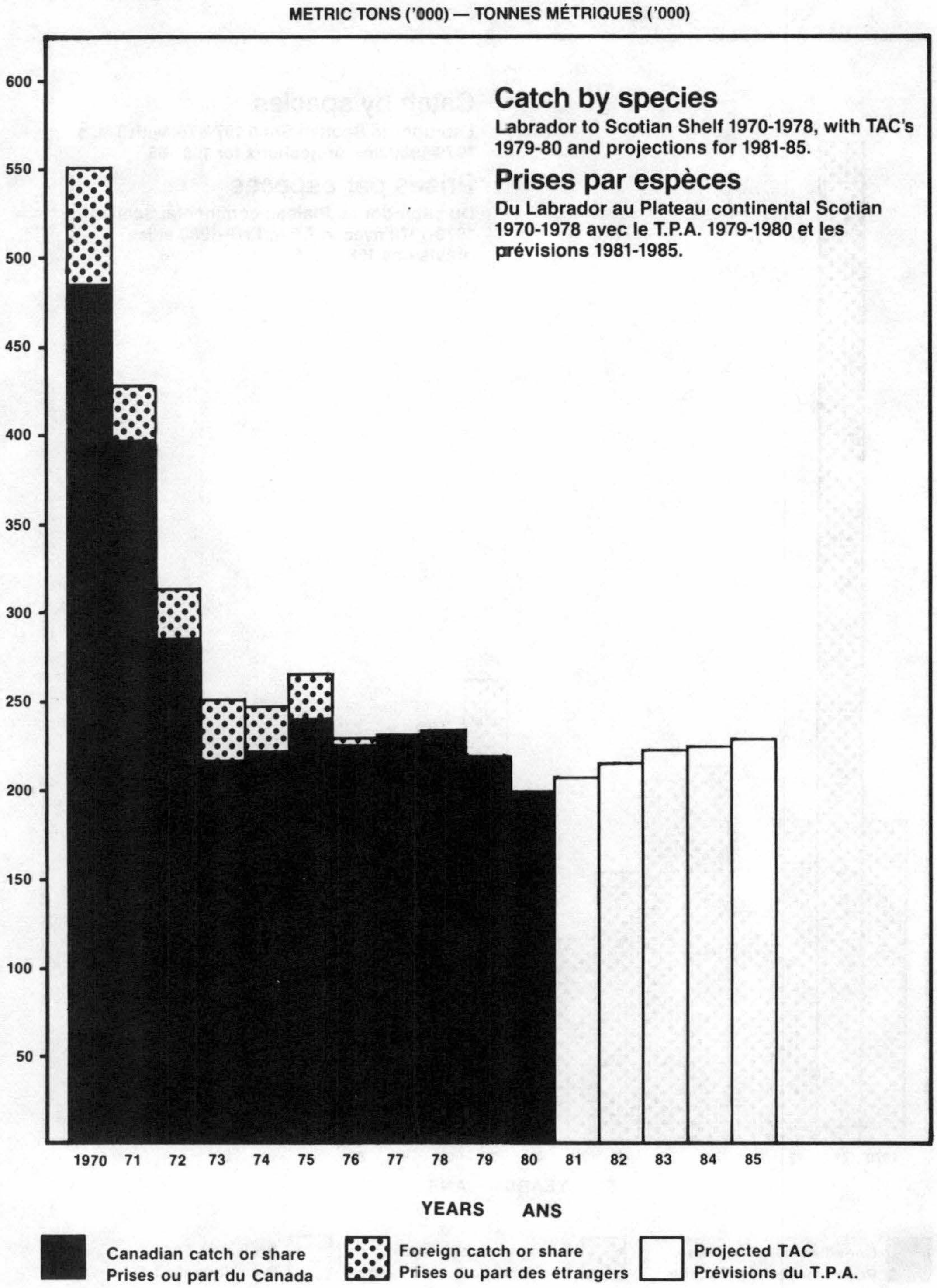
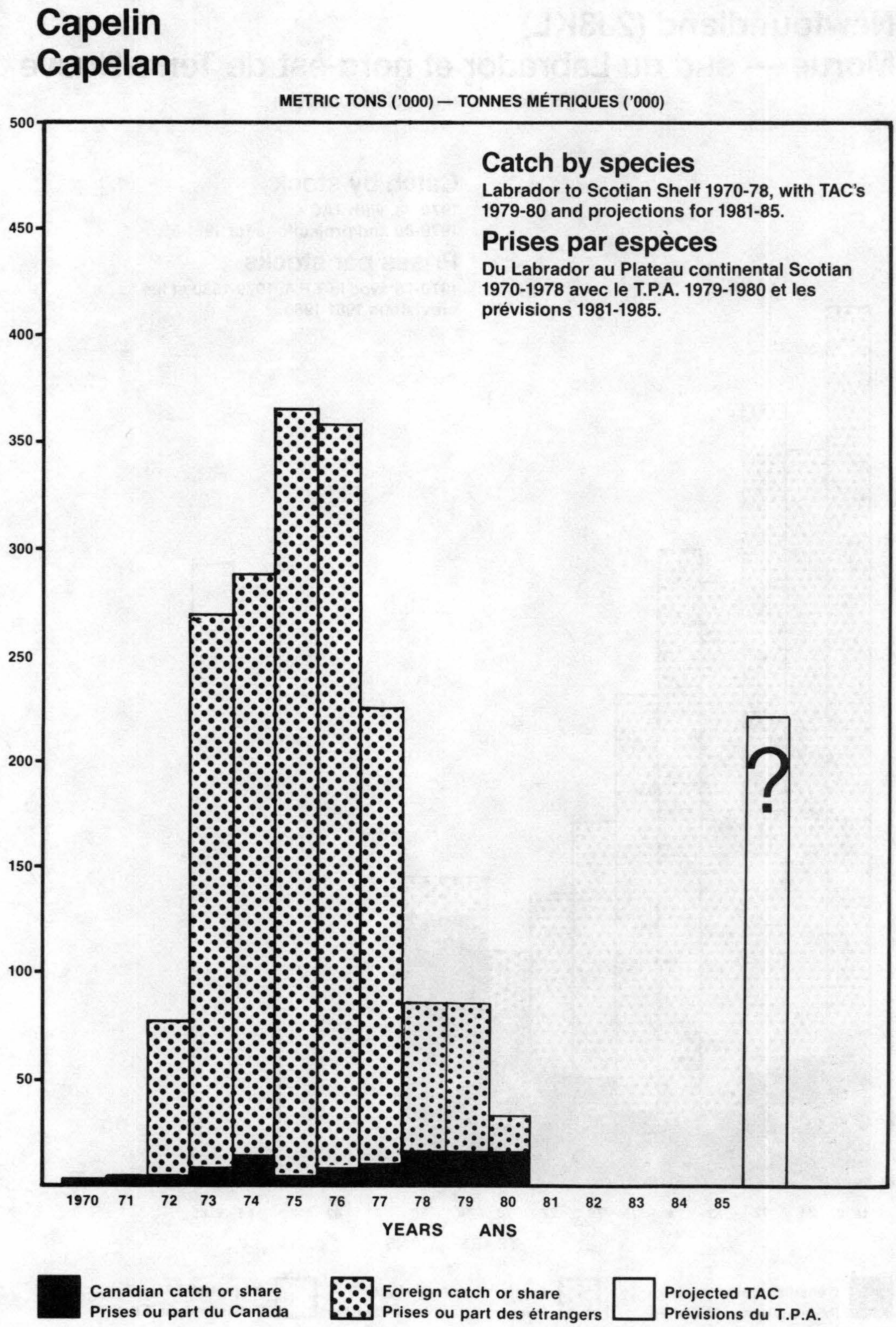
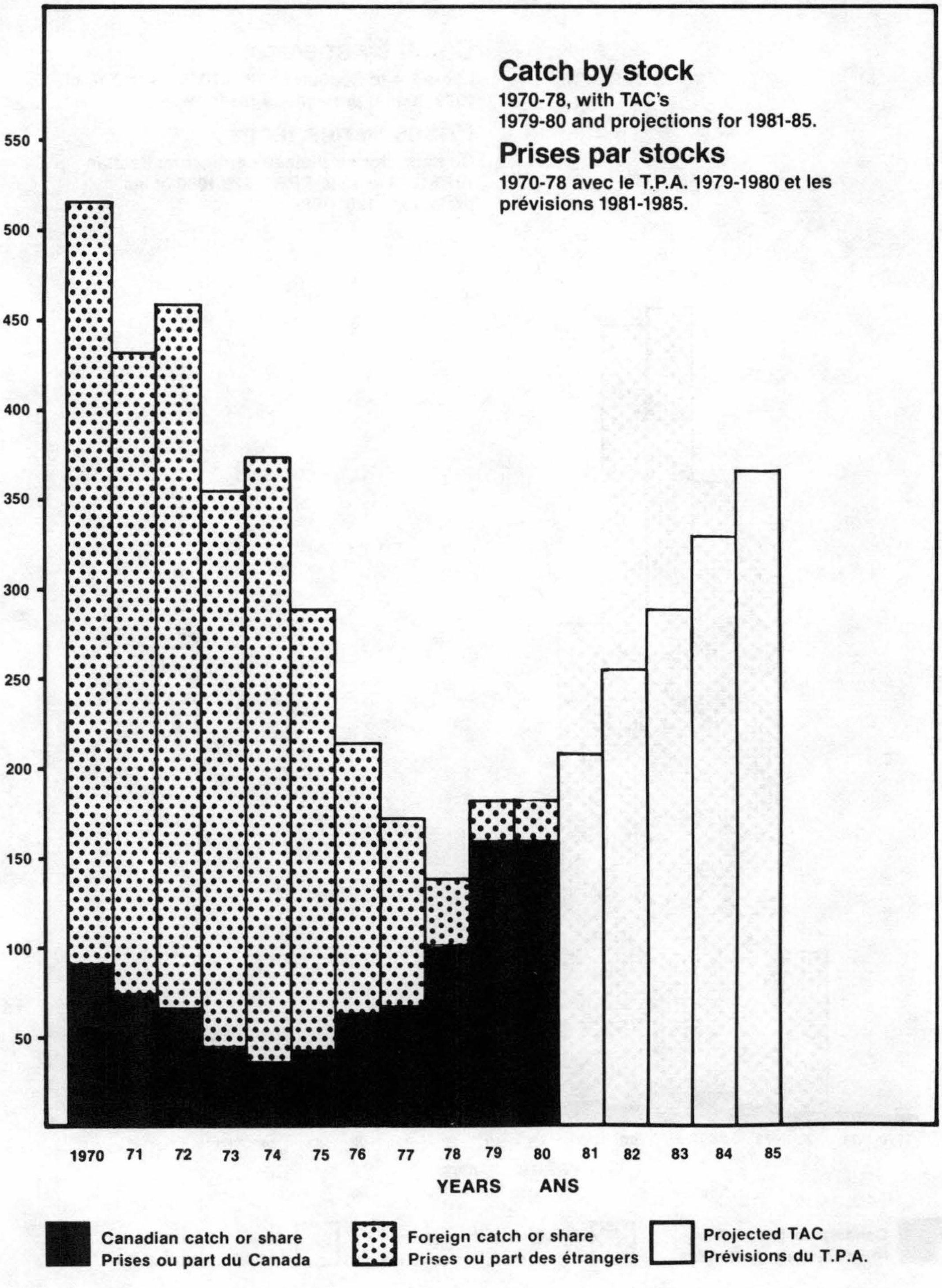


Figure 20

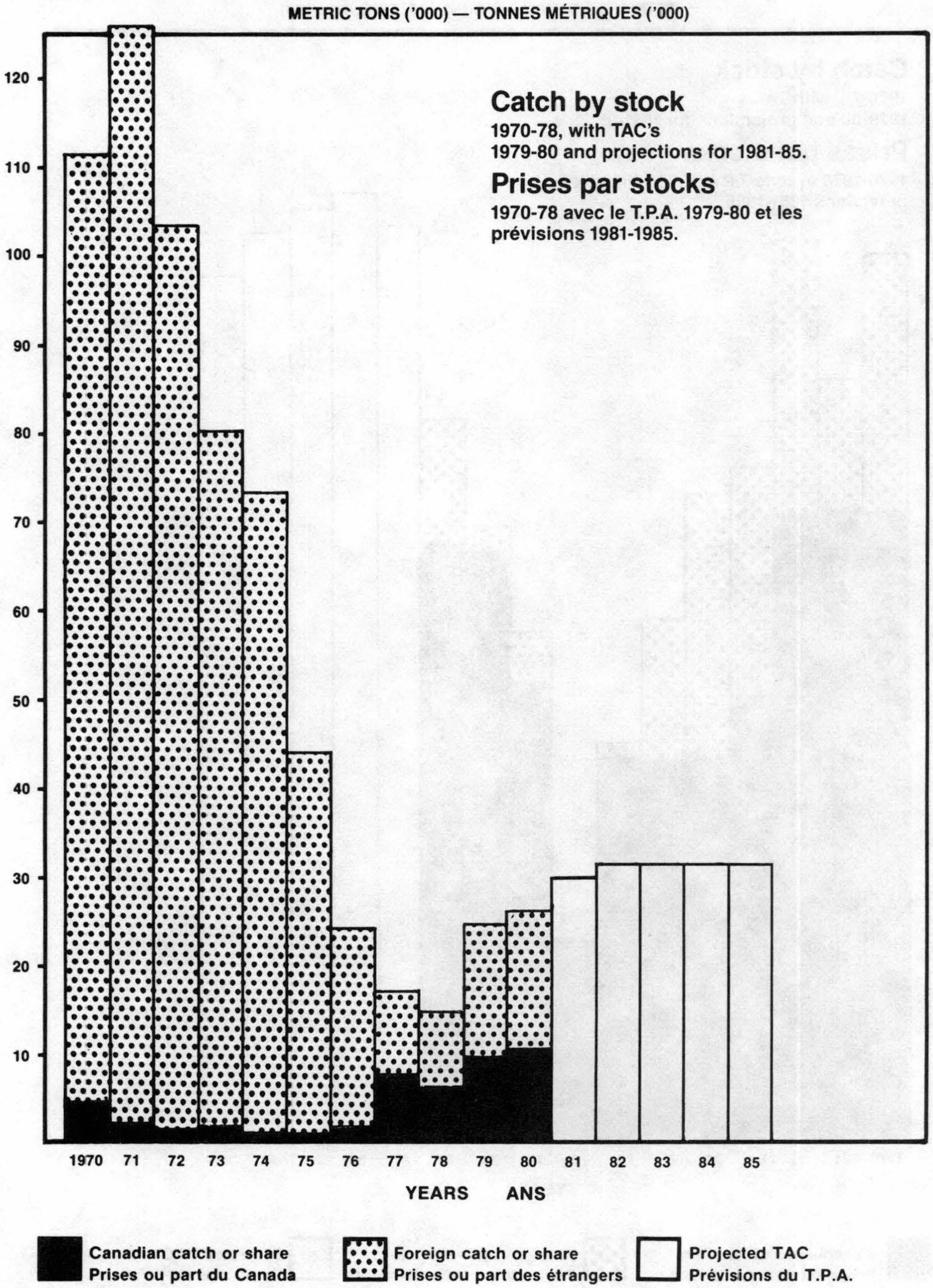

Capelin
Capelan
METRIC TONS ('000) — TONNES MÉTRIQUES ('000)
500
450
400
350
300
250
200
150
100
50
Catch by species
Labrador to Scotian Shelf 1970-78, with TAC's 1979-80 and projections for 1981-85.
Prises par espèces
Du Labrador au Plateau continental Scotian 1970-1978 avec le T.P.A. 1979-1980 et les prévisions 1981-1985.
?
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.

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

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



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



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

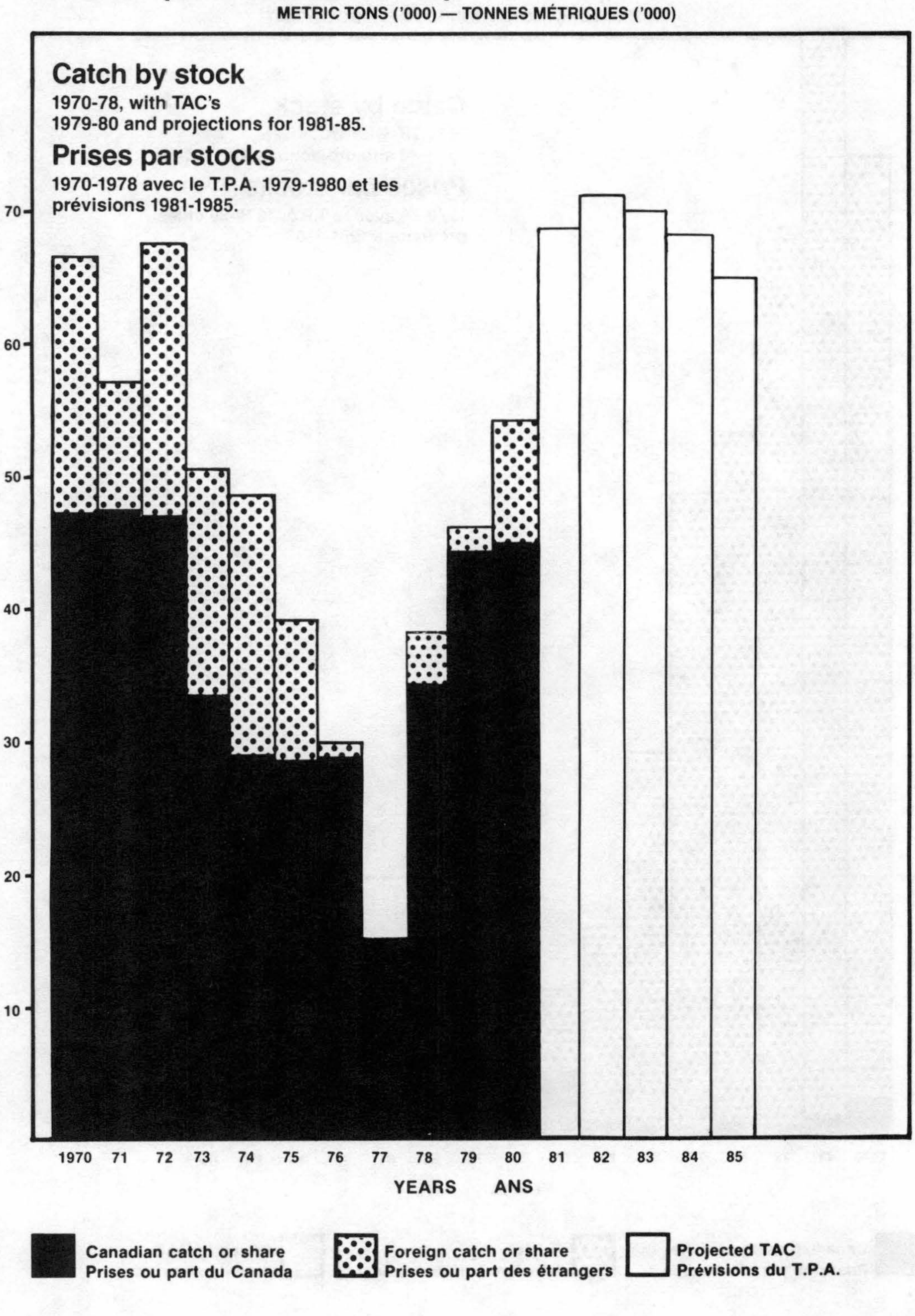
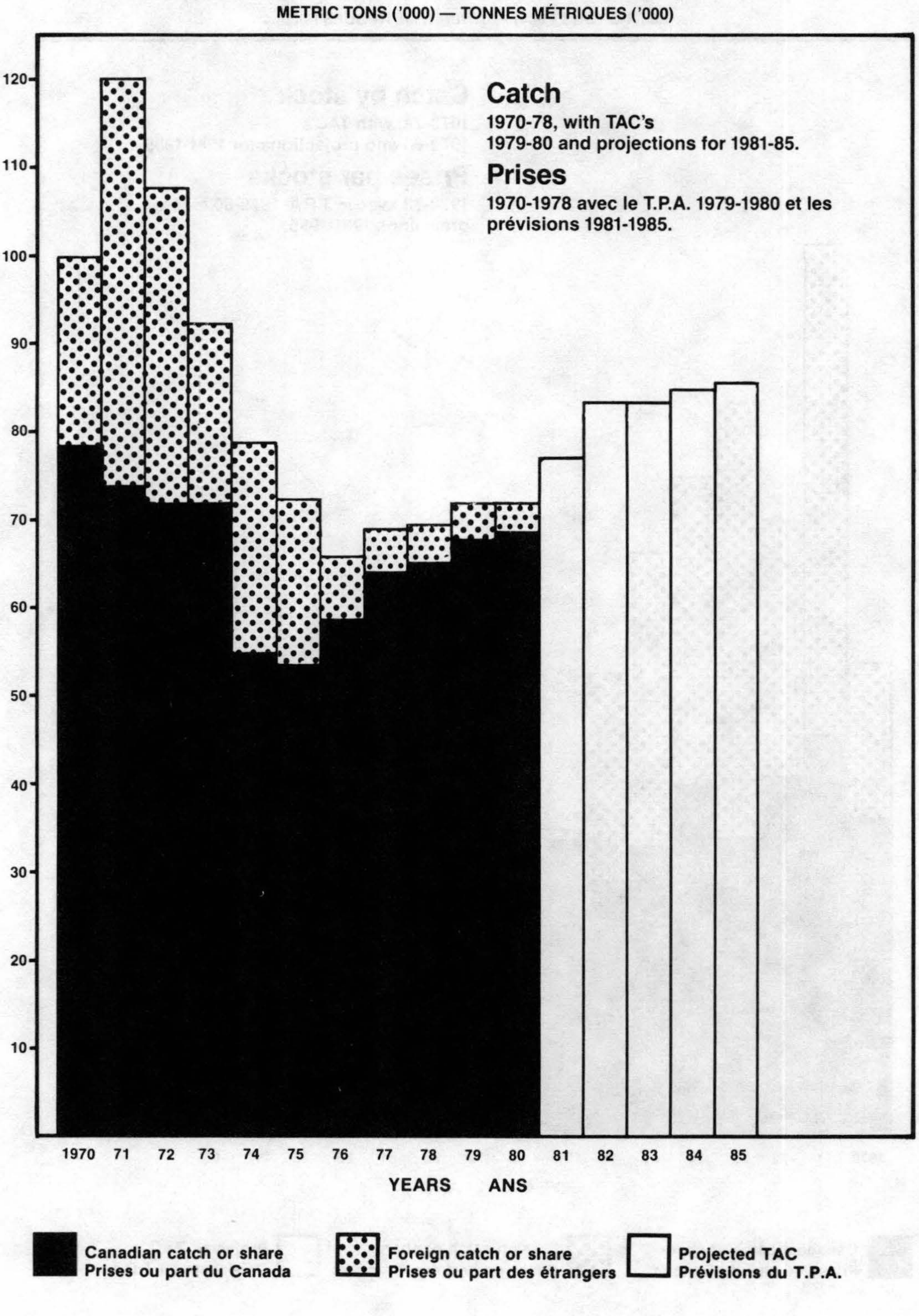


Figure 24

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



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

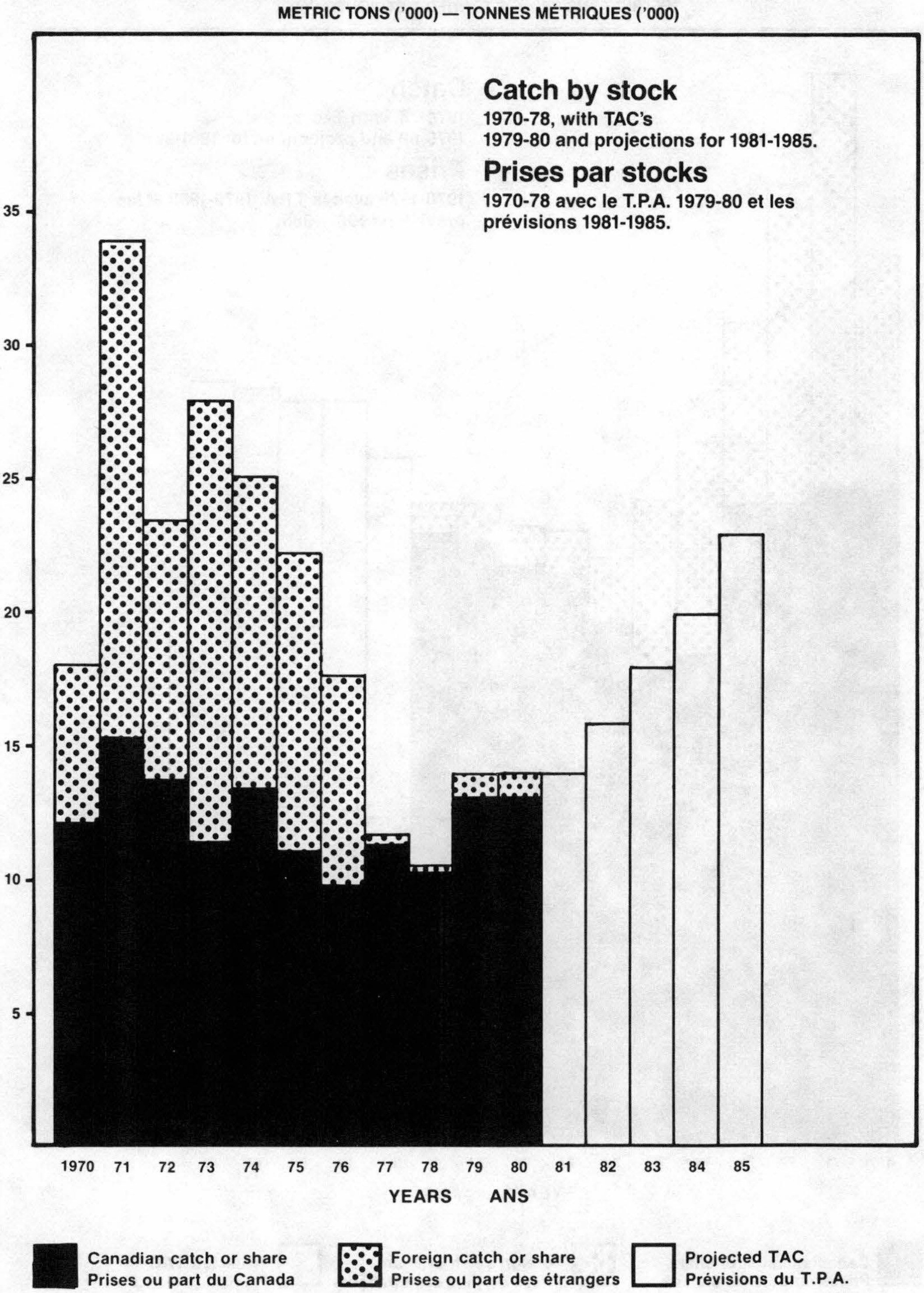
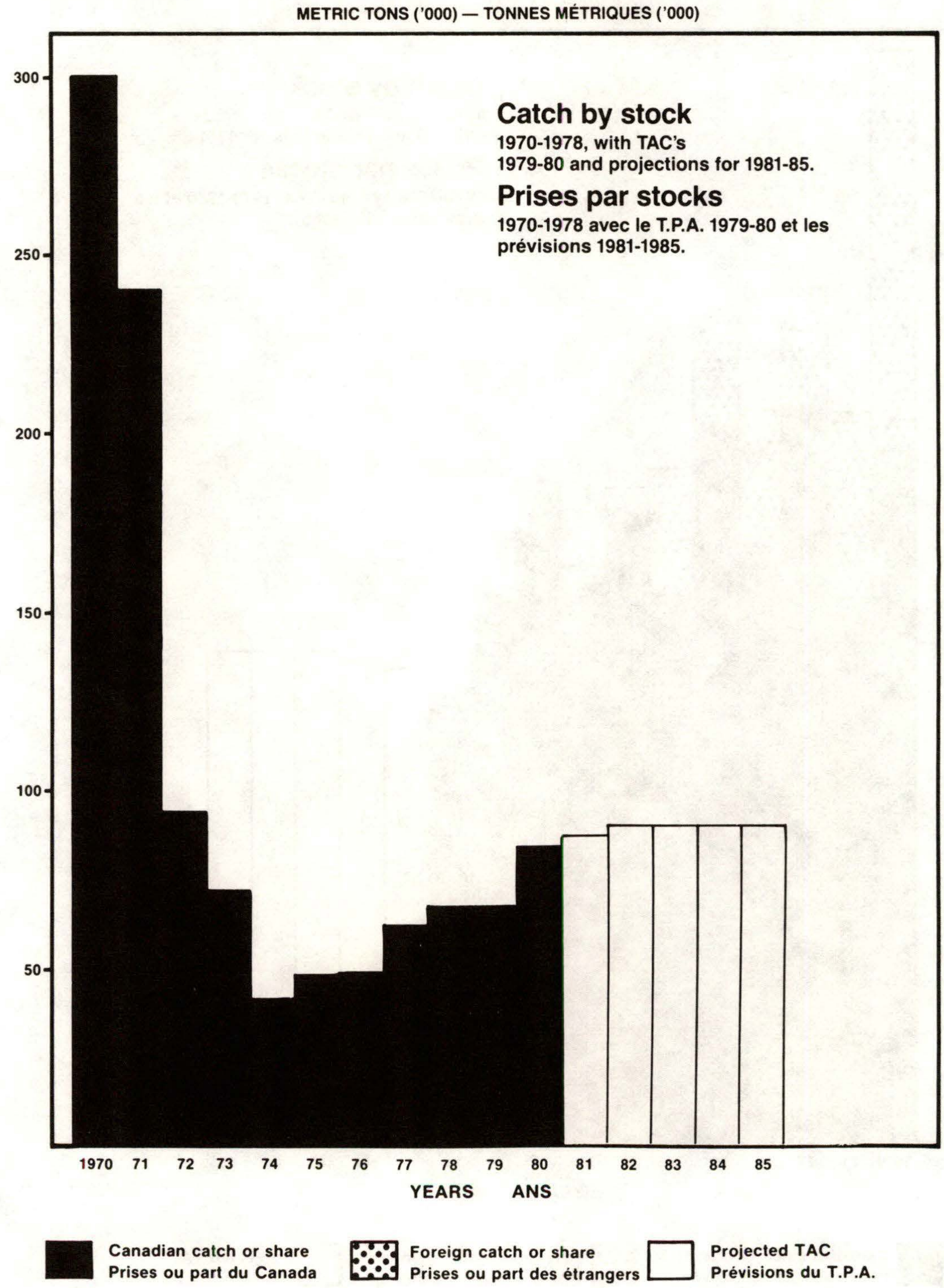


Figure 26

Herring, Gulf
Hareng (Golfe)



Herring, Nova Scotia and Bay of Fundy
Hareng, Nouvelle-Écosse et Baie de Fundy

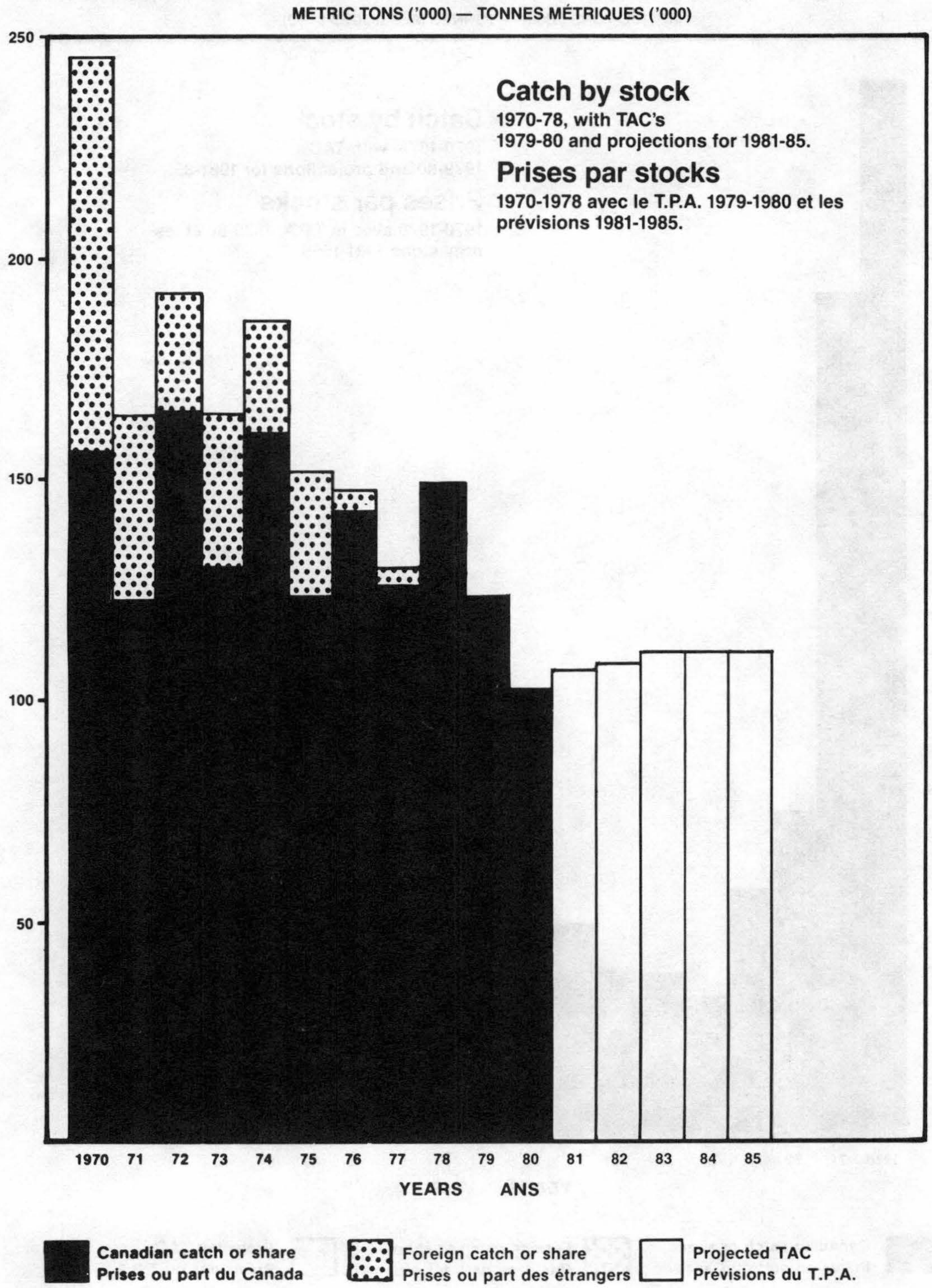
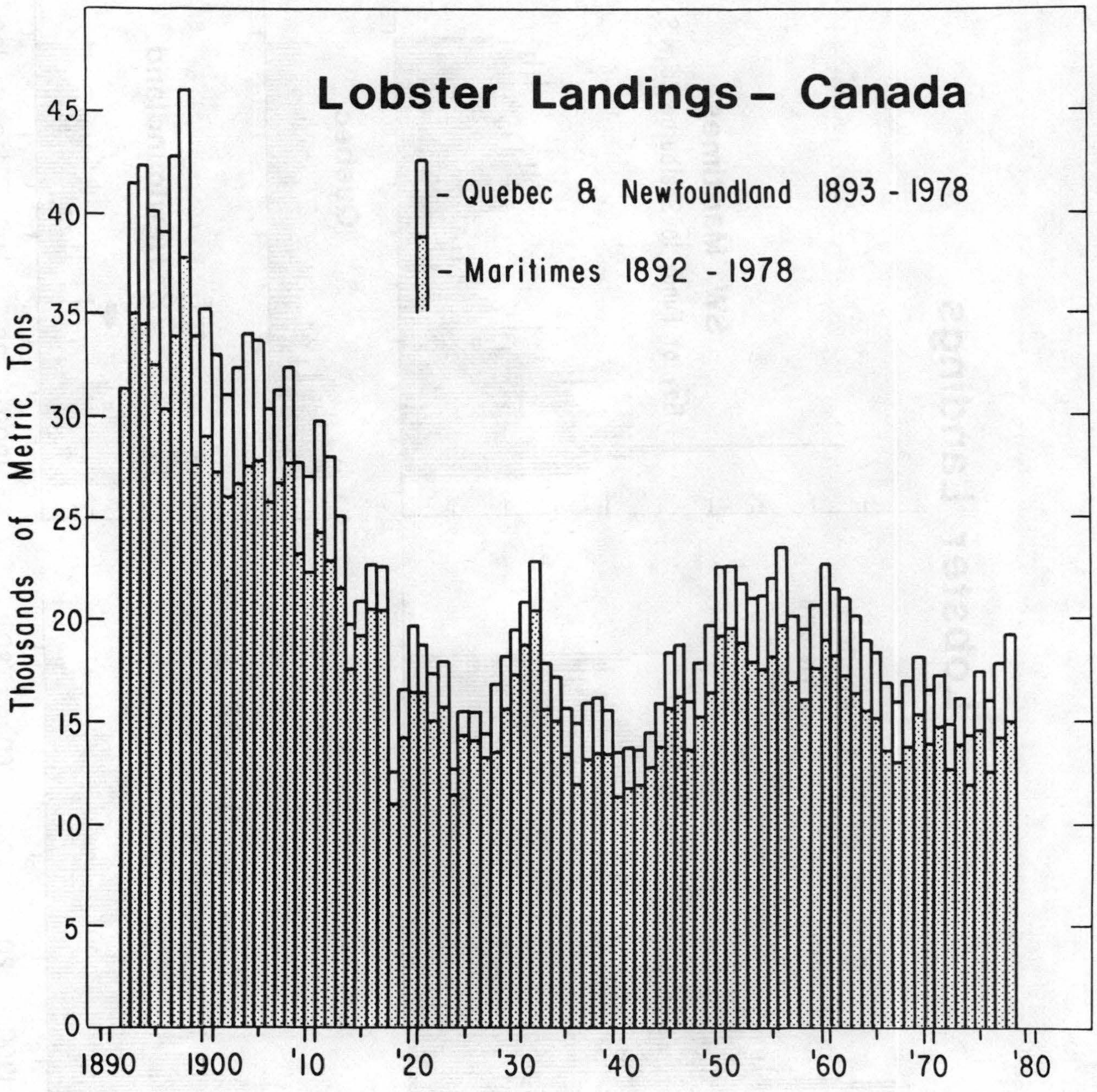


Figure 28



Lobster Landings - Canada
- Quebec & Newfoundland 1893 - 1978
- Maritimes 1892 - 1978
Thousands of Metric Tons
0
5
10
15
20
25
30
35
40
45
1890
1900
'10
'20
'30
'40
'50
'60
'70
'80

Figure 29

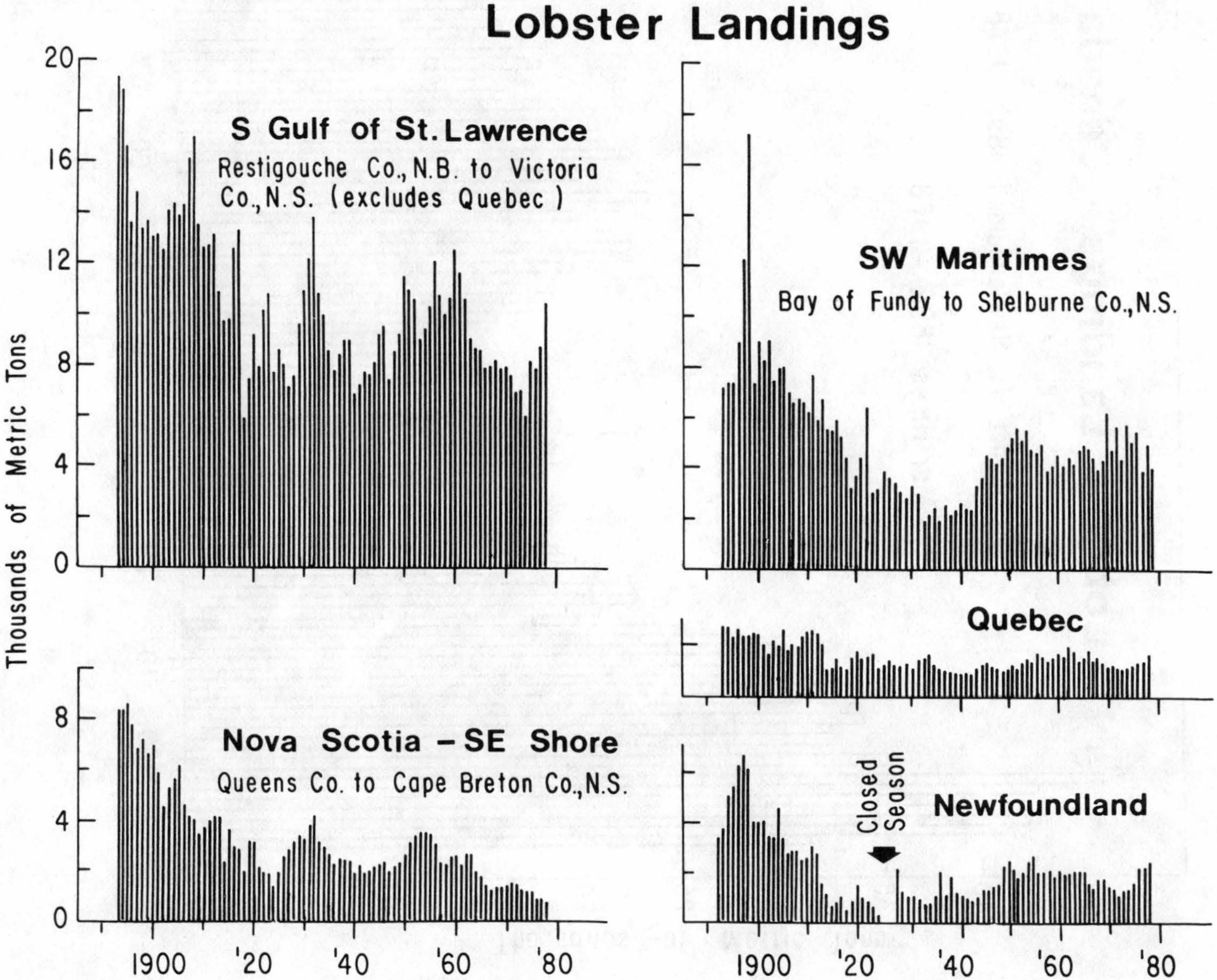
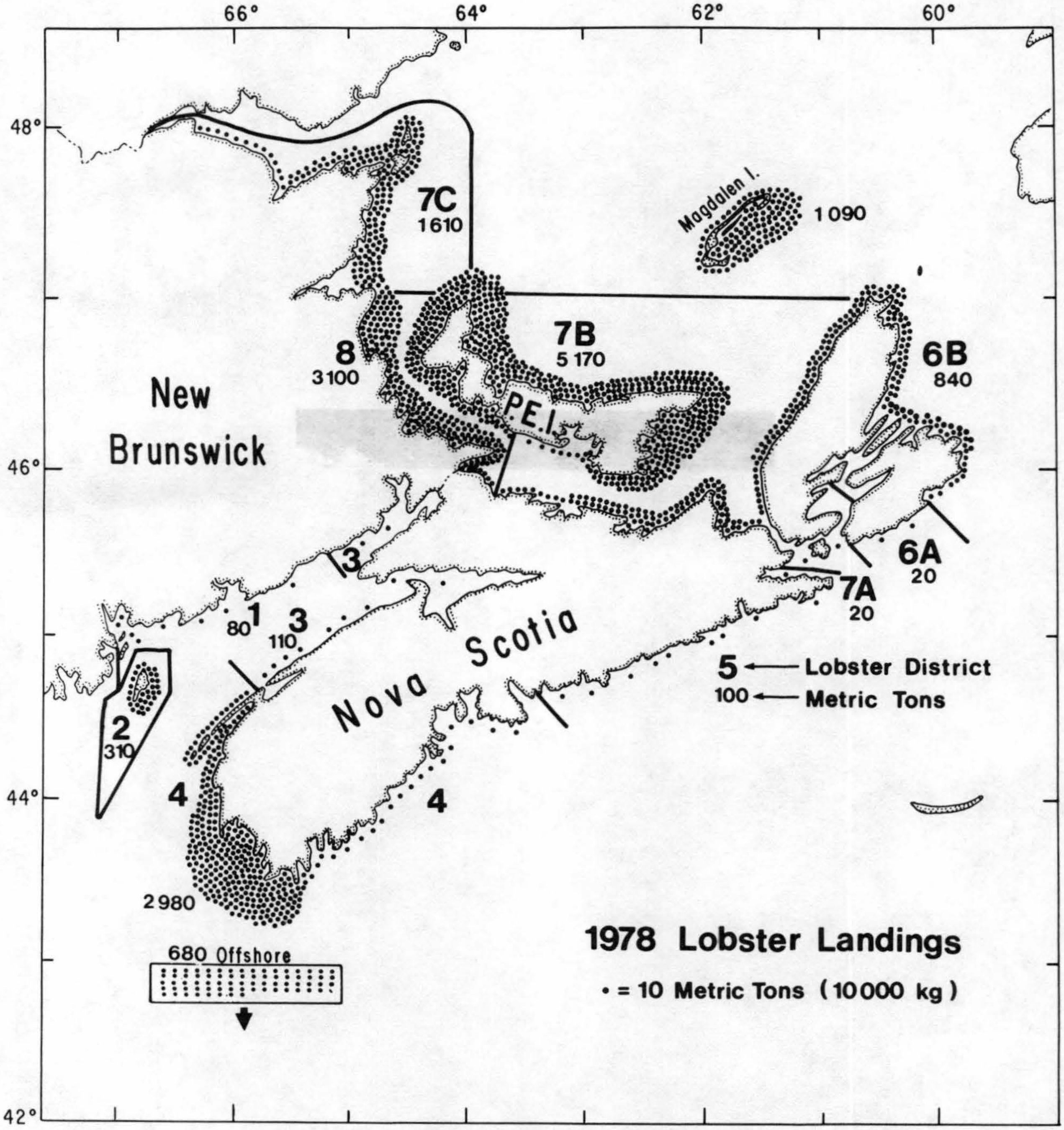

Lobster Landings
Thousands of Metric Tons
S Gulf of St. Lawrence
Restigouche Co., N.B. to Victoria Co., N.S. (excludes Quebec)
SW Maritimes
Bay of Fundy to Shelburne Co., N.S.
Quebec
Nova Scotia – SE Shore
Queens Co. to Cape Breton Co., N.S.
Closed Season
Newfoundland
0
4
8
12
16
20
1900
'20
'40
'60
'80

Figure 30


66°
64°
62°
60°
48°
46°
44°
42°
7C
1610
Magdalen I.
1090
8
3100
7B
5170
6B
840
New
Brunswick
P.E.I.
3
6A
20
7A
20
80 1
3
110
Nova Scotia
5 Lobster District
100 Metric Tons
2
310
4
4
2980
1978 Lobster Landings
• = 10 Metric Tons (10000 kg)
680 Offshore