



## Fisheries Management Planning for the Canadian Eastern Georges Bank Groundfish Fishery

The aim of oceans management is to govern human activities in a manner that achieves stated objectives. This report is concerned with management of the Canadian groundfish fishery activities on eastern Georges Bank. Management of other human activities on eastern Georges Bank, such as the scallop fishery, the lobster fishery, mineral exploration and shipping are beyond the scope of this report.

In 1984, the International Court of Justice established the maritime boundary between Canada and USA in the Gulf of Maine area that divides eastern Georges Bank. Canada and USA fish in their respective territories on groundfish resources that are considered transboundary. While both Canadian and USA fisheries may impact the achievement of stated objectives, this report is only concerned with the management of Canadian groundfish fishery activities.

The broad aspirations of Fisheries Management Planning are referred to as 'general objectives' and may be classified under a) conservation of the ecosystem, including harvested resources, b) social and economic viability and c) co-management. The ways and means that will be adopted to achieve the general objectives are called 'strategies'. Implementation of the strategies is through 'management measures'. This document deals only with achieving the objectives for conservation of the ecosystem and groundfish resource on eastern Georges Bank.

The general objectives for conservation of the groundfish resource and ecosystem are to ensure that fishing for groundfish does not cause reductions in the productivity of the resources or modifications to ecosystem structure or function that are difficult or impossible to reverse. The strategies that have been identified in order to achieve the conservation objectives on eastern Georges Bank, along with their associated management measures are:

Strategy	Management Measure
Maintain components of populations	<ul style="list-style-type: none"> <li>• Define suitable management units</li> <li>• Partition fishing across political boundaries</li> </ul>
Keep fishing mortality (F) at moderate levels for harvested species	<ul style="list-style-type: none"> <li>• TAC</li> <li>• Prohibit discarding of target species</li> </ul>
Manage size/age of capture	<ul style="list-style-type: none"> <li>• Specify gear characteristics</li> <li>• Prohibit discarding of target species</li> <li>• In-season zone closures</li> </ul>
Prevent disturbance during spawning	<ul style="list-style-type: none"> <li>• Spawning season/area closures</li> </ul>
Minimize incidental mortality on non-quota species	<ul style="list-style-type: none"> <li>• Limit by-catch</li> <li>• Prohibit discarding of non-quota species unless excepted</li> </ul>
Limit physical disturbance of benthic communities	<ul style="list-style-type: none"> <li>• Proposed no-fishing zones around corals</li> </ul>

With the exception of Total Allowable Catch (TAC), the management measures do not require regular adjustment. Annual adjustments to TACs are based on advice contained in Stock Status Reports. The remaining measures have been implemented for indefinite periods. While most management measures may not require regular adjustment, it is appropriate nevertheless to review indicators for all strategies to monitor the effectiveness of the measures employed. This document reviews the basis for each strategy as it applies to the groundfish fishery on eastern Georges Bank. While comprehensive evaluation of the success of strategies towards achieving the objectives is not undertaken, some indications are included. Such strategic reviews are best undertaken during development of a Fisheries Management Plan. The focus of this report rather, is on evaluation of the success of the measures at implementing the strategies.

Cod, haddock and yellowtail are the principal groundfish resources on eastern Georges Bank with directed Canadian fisheries. There is also a directed fishery for pollock and directing for halibut is permitted but not common, though the Canadian management units for these extend beyond Georges Bank. Quota regulation is a principal feature of management plans for these resources. Regulation of the directed pollock and halibut fishing activity is not considered here as it is dealt with as part of the Scotian Shelf fisheries. Other species are caught incidentally while directing for cod, haddock, yellowtail or pollock. However, groundfish fishing activity must be conducted in a manner traditional for fisheries on the directed species. Fishing must not target other species or increase/redirect their activity for these incidental species.

## Maintain Components of Populations

Conserving stock complexity and genetic variability are elements of maintaining the productivity of the groundfish resources. This can be accomplished through suitable definition of management units and sub-allocation by areas that account for substructure within management units. Canada considers unit areas 5Zj and 5Zm as the management unit for cod and haddock on eastern Georges Bank and unit areas 5Zh, 5Zj, 5Zm and 5Zn as the management unit for yellowtail on Georges Bank. These management units are considered to encompass a distinct, fairly homogeneous aggregation for each species, predominantly on the northern edge and northeast peak for cod and haddock and predominantly on the southwest flank for yellowtail. Accordingly, ancillary measures to distribute effort within the Canadian portions of these management units have not been employed.

Accurate reporting and monitoring for area of capture is a requirement for effective management of population components. While all Canadian groundfish fishing activity on eastern Georges Bank is subject to 100% Dockside Monitoring with mandatory hail-out declaring area of operation and hail-in, there are allegations of vessels fishing in the adjacent Division 4X making excursions into Division 5Z and reporting those catches from Division 4X. There are also reports of fishermen avoiding Dockside Monitoring entirely. While the prevalence and extent of such activity has not been established, there is growing concern that this practice has been increasing since 1999 and threatens to compromise both the ability to evaluate stock status and the effectiveness of management.

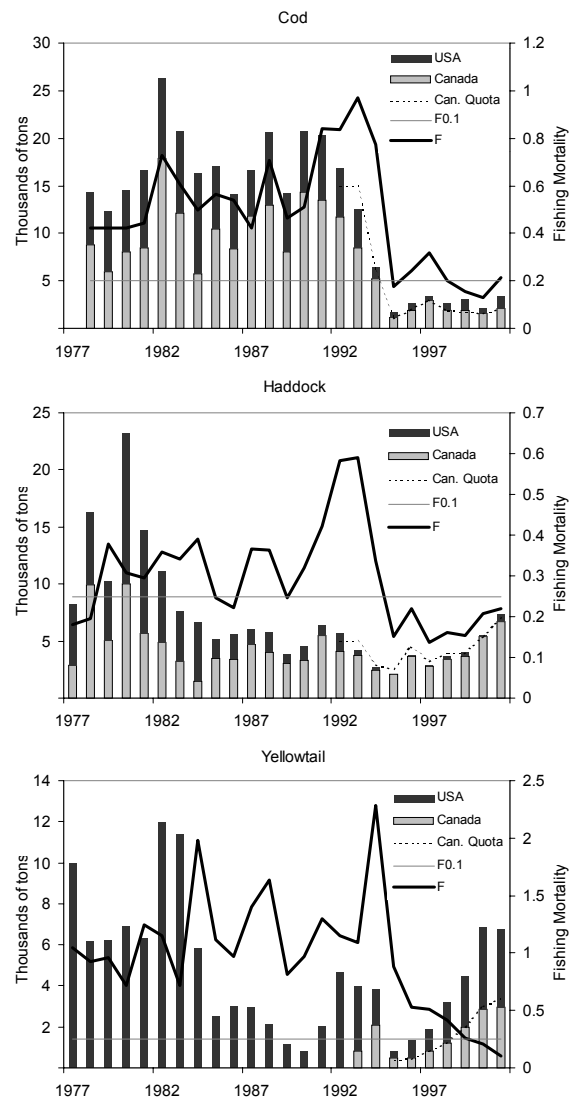
Fishing by Canada and USA is limited to their respective territories. It is desirable to distribute effort across the management unit in relation to biomass patterns. The Transboundary Management Guidance Committee, a joint Canada and USA industry/government consultative body, made a proposal in December 2001 for a sharing formula that respects the biomass distribution across the maritime boundary and recognizes spatial structure. While the proposal would only take effect in 2003 if ratified, Canada may voluntarily adopt the sharing formula for 2002. For 2002, the sharing proposal grants Canada 73%, 70% and 28% of the cod, haddock and yellowtail TACs respectively for the management units described above.

### Keep Fishing Mortality (F) at Moderate Levels

The overall level of fishing mortality on stocks is regulated to moderate levels in order to prevent fishing activities from adversely affecting productivity. In Canada, a strategy has been tacitly adopted of harvesting the resource at a rate no greater than  $F_{0.1}$ . While a constant reference harvest rate is a suitable principle for a harvest strategy, reducing the reference harvest rate is an appropriate response when productivity is thought to be impaired. It is generally considered that recruitment, and thus productivity, is impaired at lower biomass levels. Accordingly, the reference harvest rate may be reduced to rebuild biomass. While the reference harvest rate responds principally to the state of biomass, other characteristics like age composition, geographic distribution and growth rate have also been considered.

TACs are the principle means of regulating F. The current management units employed by Canada were adopted in the early 1990s

when restrictive TACs were introduced. Immediately prior to that, the TACs were largely ineffective. TAC management since the early 1990s have successfully reduced fishing mortality to the desired moderate levels, however, the reduction occurred later for cod and did not reduce F significantly below  $F_{0.1}$ .



The 2002 TACs for cod, haddock and yellowtail on eastern Georges Bank are based on evaluation of the consequences on fishing mortality and biomass for alternative catch options provided in the outlook section of the respective Stock Status Reports.

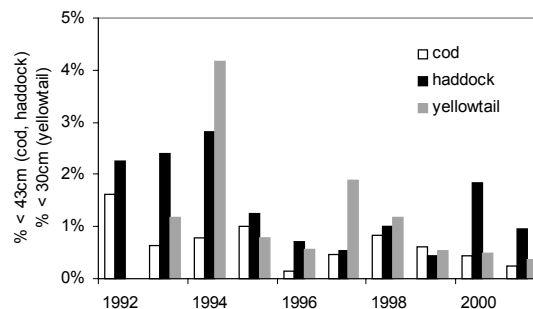
The groundfish fishery is a mixed-species fishery, resulting in a catch composed of more than one species. Managing fishing activities so that species are caught in accordance with catch allocations (before and after quota transfers) is important as failures could result in unreported discarding, and thus a higher and undetected F. Yellowtail directed fisheries require a larger mesh size than those for cod and haddock and therefore only modest catches of cod and haddock are noted. However, quotas for cod have been limiting in recent years while directing for haddock. Evaluation of species composition comparing observed catches to landings is used to detect possible discarding of cod and may trigger in-season zone closures.

A comparison of the species composition of observed and unobserved trips was used to investigate discrepancies and detect possible discarding of cod. The comparisons were done by gear, quarter and zone for 1998 to 2001. Eight zones were defined to account for variation in bottom substrate, species composition and density of trawling and to accommodate the resolution of the catch effort statistics and the full length of the most typical tows observed. Otter trawlers were further partitioned into tonnage class groups and in one zone, accommodation for pollock versus cod/haddock directed fishing was made. The species composition discrepancies, that might be indicative of cod discarding, were most apparent on the shallow grounds of the northern edge and northeast peak of Georges Bank for otter trawlers and in the deeper waters of the northern edge for longline gear. There was some tendency for a reduced discrepancy in more recent years for otter trawl. This may be due to introduction of separator panels that reduce the catch of cod. Further analysis is required to determine if the discrepancies are within the range of natural variation and

to develop estimates of the quantity discarded, as warranted. Observer coverage for the longline and gillnet gear sectors was low and may generally be inadequate to detect discarding by these gears. Otter trawlers have high observer coverage, although there may be some year/quarter/zone combinations, especially for tonnage classes 1 - 3 boats, which have insufficient coverage.

### Manage Size/Age of Capture

Supplementary measures, principally specification of gear construction and utilization, regulate selectivity at size/age to optimize yield at the chosen exploitation rate and/or to satisfy market demand. Fishermen are also expected to move away from grounds dominated by small fish. Since the early 1990s, the minimum hook size for longlines has been a #12 circle hook or equivalent, the minimum gillnet mesh size has been 152mm and the minimum mesh size for otter trawls has been 130mm square mesh when fishing for cod or haddock and 155mm square mesh when fishing for yellowtail. High percentages of cod and haddock below 43cm and of yellowtail below 30cm in the fishery catch are considered undesirable. Present gear regulations appear to be effective at achieving the desired size/age composition in the catch.



Discarding of groundfish, including small fish, is prohibited therefore a minimum fish size is not regulated. Comparison of size composition of at sea observed catches to sampled landings is used to detect excessive catch of small fish or possible discarding and may trigger in-season zone closures implemented through a small fish protocol. The length composition samples from at sea observation and those from landings for the Canadian Georges Bank groundfish fisheries are routinely examined and used, where applicable, in the construction of the fishery catch at age for the assessment. Comparisons of matched length composition obtained from at sea observations to those obtained from the landings did not reveal any persistent patterns to indicate discarding of small fish in 2001.

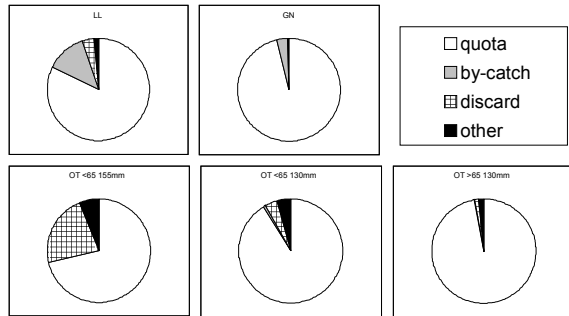
### **Prevent Disturbance During Spawning**

Since 1994, a seasonal spawning area closure from 1 January to 31 May for all groundfish vessels has been used to minimise disturbance during spawning of cod and haddock in case such disturbance might negatively affect spawning success. While the scientific evidence that disturbance during spawning reduces subsequent recruitment success is not conclusive, these measures are supported by fishermen. Surveillance activities monitor the exclusion of groundfish vessels from the area. Regular surveillance patrols are conducted during the period of closure. During 1 January to 31 March 2002, there were no groundfish vessels detected in the area (pers. com. H. Smith, Supervisor Surveillance Operations).

### **Minimize Incidental Mortality on Non-quota Species**

Species other than cod, haddock, yellowtail and pollock are caught in the groundfish fisheries. Of these other species, white hake and cusk are the most commonly caught, but catches include American plaice, winter flounder, witch flounder, dogfish, and skates. Lesser amounts of redfish, halibut, catfish (Atlantic striped wolfish), monkfish, summer flounder, red hake and sculpins are caught. Discarding of other groundfish, with the exception of sculpin, dogfish and skate, is not permitted but is not monitored unless observers are onboard the vessel. Data from observed trips during 1997 - 2001 were used to identify the species and respective proportions caught by the fisheries components on Georges Bank. The fisheries were classified as longline, gillnet, <65' otter trawl-130mm mesh, >65' otter trawl-130mm mesh and <65' otter trawl-155mm mesh. The minimum mesh size for otter trawls is 130mm square mesh when fishing for cod or haddock and 155mm square mesh when fishing for yellowtail. Cod, haddock, yellowtail, pollock and halibut are the directed species that are managed with quotas. Catches of white hake, cusk, dogfish and catfish are managed by regulating overall limits based on historical activity that is assigned to the different fleets over broad areas that include Georges Bank. Closure can be implemented if these levels are reached. Skates, sculpins and dogfish are permissible discards. Catch of all other species was classified as "other". After accounting for quota managed species, species managed on by-catch limits and permissible discards, the percentage of the catch comprised of "other" species ranged from 2% to 6% of the catch weight. Recall that only the impacts of the groundfish fishery on these resources were examined here. Potential mortality of groundfish

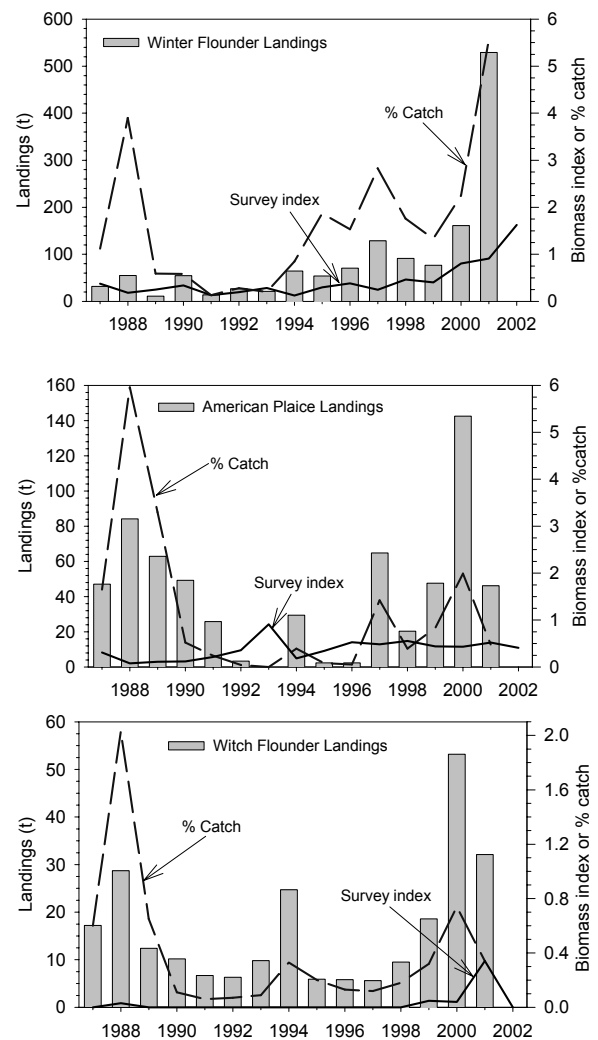
induced by human activity, e.g. yellowtail in the scallop fishery, cusk in the offshore lobster fishery, should be considered during evaluation of those respective management plans.



Despite the low incidental catch of "other" species, continued efforts to avoid their capture should be promoted as any catch of threatened or endangered species could raise concerns. There is concern about the discarding of skate and their prospects for survival, for which little is known. The by-catch limits for white hake, cusk, dogfish and catfish are for broader areas including Georges Bank. The proportion of the total annual landings for 1999-2001 that were attributed to Georges Bank, Division 5Z, is not great, however it has increased for cusk and catfish. Fishing practices have not changed over this time and the increase in incidental catches may reflect an increase in abundance. Closer examination is required to determine if there is any activity directing for these species.

Catches of other species are not strictly enforced with by-catch limits, however groundfish fishing activity must be conducted in a manner traditional for fisheries on the directed species. Some of the other species are managed with percent by-catch allowances, e.g. monkfish, to permit for legitimate incidental catch, but the practice of directing for these species to top up the allowable percentage may be common. Trends in landings of the more

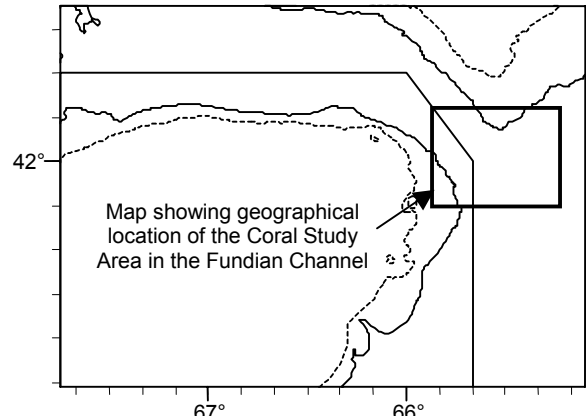
prominent of these other species, winter flounder, American plaice and witch flounder, and as a percentage of total mobile gear catch is used here as an indicator of the efficacy of the current practice towards minimizing incidental mortality. Comparative analysis of landings and observer data to detect possible discarding of these species has not been undertaken and may not be meaningful due to insufficient observer coverage for such infrequently caught species. Catch restrictions for these other species are put in place to guard against high fishery induced mortality. Accordingly, biomass for these species is expected to fluctuate within the range of natural variation.



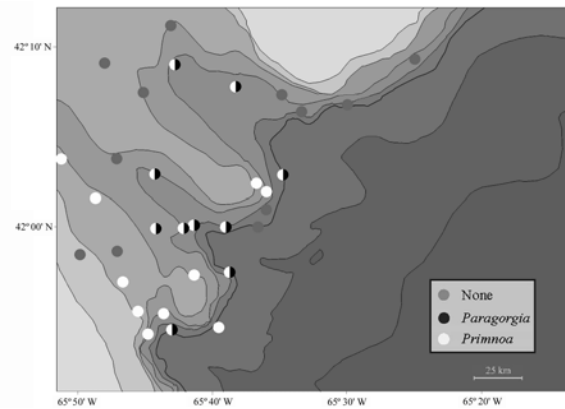
Landings for these incidentally caught species have generally been low in both magnitude and percentage and the fluctuations appear to reflect trends in abundance. While a first concern is to limit potential impacts of the groundfish fishing activity on these resources, severe declining trends that may be caused by natural forces or by other human activities may have implications for the conduct of groundfish fishing.

### Limiting Physical Disturbance of Benthic Communities

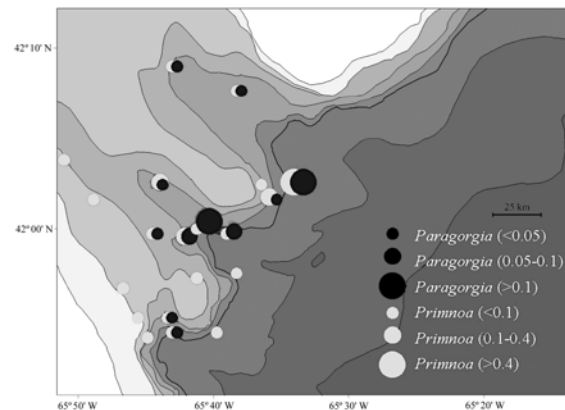
Measures to limit the impact of fishing activities on the physical structure of the benthic ecosystem are currently under development. Specifically, a no-fishing zone around deep sea coral beds in the Fundian Channel is being considered. Knowledge about the location of coral beds has been rapidly accumulating in recent years as a result of concerted research efforts. The occurrence and distribution of corals in Division 5Z suggests that coral beds are prevalent in the deeper waters on the slopes off the northeast peak. While observer coverage suggests that there is limited overlap between the distribution of coral beds and fishing activity, some impact on corals may still occur. Large exclusion zones may displace fishing from productive grounds that do not contain an abundance of corals. Defining fine scale exclusion zones that follow depth contours may effectively protect corals, but current fishery monitoring practices are inadequate for implementation of such measures. New monitoring approaches and technologies may prove useful.



Coral Abundance



Coral Abundance



Fishing activity may impact the ecosystem by adversely affecting benthic communities and habitat. There is a growing awareness of these impacts and increasing acceptance towards adopting ethical codes of conduct for fishing that aim to reduce and minimize these unwanted effects. Management approaches for mitigating the impacts of fishing on the benthic community and

habitat include effort reduction, area restrictions and gear modifications. The substantial reduction of effort by the Canadian fishery on eastern Georges Bank since the early 1990s should be recognized as a positive evolution (see section Keep F at moderate levels). While the impacts on ecosystem functioning and productivity resulting from disturbance caused by fishing cannot be addressed satisfactorily at this time, the locations and amount of fishing activity can be summarized.

Otter trawl, longline and gillnet, are used in prosecuting the Canadian groundfish fishery. Of these, otter trawl and longline are the most prevalent gears in use. Most concern about adverse effects on benthic communities and habitat has been on the impacts caused by otter trawl gear. Bottom otter trawl gear is a complex piece of equipment and the impact to the bottom is a function of which part of the gear is in contact. The principle parts of bottom otter trawl gear that tend the bottom are the trawl doors, the bridles/groundwarp and the footgear of the net. The area of the seafloor on eastern Georges Bank that is fished by the Canadian bottom otter trawl fishery in a year was summarized using observer data and fishery statistics. The area swept was greatest for the Yellowtail Hole area, a gravelly sand bottom, with the northern edge and northeast peak, a gravel pavement bottom, being next highest. The doors generally disturb less than 1% of the bottom. Excepting the Yellowtail Hole area, where the results were higher but suspect, the percent of area swept by the footgear and the bridles/groundwarp ranged between 2% and 18% and between 8% and 55% respectively.

The available data collected from fishery observations are only sufficient to provide a very rough estimate of the area trawled. The results may over-estimate area trawled due

to inadequate accounting of the same grounds being towed and under-estimate area trawled due to assuming that tows are made in straight lines. Reliable estimates of area trawled will require monitoring and recording of position during tow operations from a large fraction, if not all bottom trawling activity. Monitoring only observed trips would not be adequate because of low coverage. Recording start and end position on logbooks would not be adequate because tows are not straight lines. New approaches and technology for monitoring fisheries activity are required to obtain reliable estimates of area trawled.

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