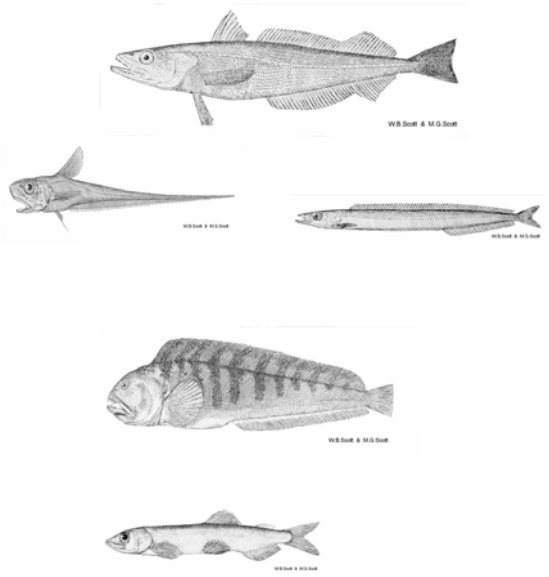

Finfish Community Trends

The fisheries of the East coast of Canada exploit multispecies assemblages with more or less emphasis on particular species of interest. Although we monitor the abundance and age structure of a small number of commercially exploited species, we have not as a rule examined the changes occurring in the non-commercial species. Examining the changes in abundance of all of these species over time may reveal patterns of increase and decrease in the overall production of organisms, particularly finfish, in the ecosystem. Once we establish the nature of these large scale patterns, we may be able to better predict changes in abundance of commercially exploited species. Therefore, this report provides overviews of the biomass changes, as determined by DFO Science surveys, for groups of species, including both commercial and non-commercial forms.

Trends in Fish Biomass

The following section describes trends in the survey catches of finfish species in the southern Gulf of St. Lawrence, the eastern Scotian Shelf, and the southern Scotian Shelf. These three areas are presently considered as separate ecosystems with as yet undefined linkages to each other or to other adjacent ecosystems. The southern Gulf of St. Lawrence is essentially a shallow inland sea joined to the coastal ocean by the Laurentian Channel. The Scotian Shelf is a continental shelf which can be subdivided into an eastern portion and a southern portion on the basis of both the general temperature regime and fish species composition and abundance.

Trawlable biomass is calculated from the average weight of a species caught per standardised survey tow multiplied by the number of tows it would take to cover the entire ecosystem in question. Trawlable biomass is not necessarily an estimate of the absolute biomass of any species, but it is assumed to be a constant proportion of the total. This means that if in any given year a trawlable biomass of 1,000t is equal to a total or true biomass of 10,000t, this ratio would remain the same, that is, an estimate of trawlable biomass of 500t in the following year would mean a total of 5,000t. Trawlable biomass is therefore an index of total biomass. A drawback of using trawlable biomass to determine the dynamics of fish in these ecosystems is that the estimates are not strictly comparable between species because species differ in their catchability by the survey gear. For example, a trawlable biomass of 1000t of

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cod might translate into a true biomass of 3000t, while an estimated 1000t of trawlable herring biomass might translate into a true biomass of 100,000t. Herring are far less catchable by bottom trawl than are cod. In addition, since the current herring fishery is outside the distributional range of the groundfish survey, the survey may greatly underestimate the true abundance of herring. Therefore the relative composition of species groups must be interpreted with caution.

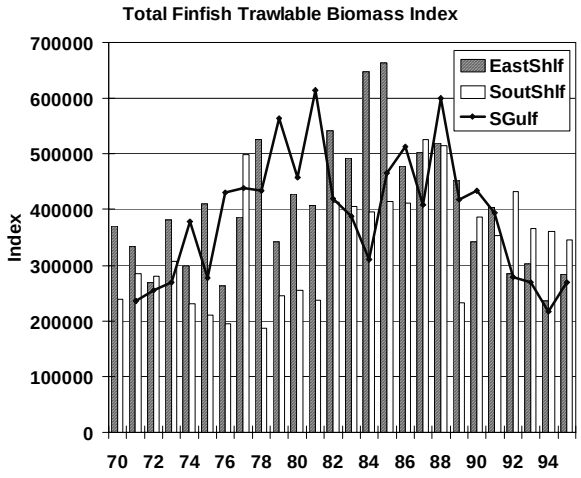
Total Finfish Biomass

In the Gulf of St. Lawrence (the Gulf), finfish trawlable biomass increased throughout the 1970s to relatively high values in the early 1980s. Biomass decreased from a peak in 1981 to a relatively low value in 1984, and then increased to a second peak in 1988. Biomass decreased from 1988 to 1994. Present finfish biomass in the Gulf is comparable to that estimated in the early 1970s.

On the eastern Scotian Shelf (Eastern Shelf) finfish trawlable biomass increased throughout the 1970s and early 1980s and reached a peak in 1986. Since then it has declined reaching its lowest value in 1994 at a level slightly below that observed during the early 1970s, the previous low.

Finfish biomass on the southern Scotian Shelf (Southern Shelf) increased abruptly in 1982 and continued to increase gradually until 1987. From 1987 until the present, the Southern Shelf finfish biomass has shown a somewhat more gradual decline than either the Eastern Shelf or the Gulf with present biomass estimates remaining above those of the previous low values of the 1970s. It is notable that the finfish biomass on the Southern Shelf has been higher than the other two systems since 1992. In previous years, the Southern Shelf has generally had lower estimates of total finfish biomass.

The estimated trawlable finfish biomass for each of these three systems is similar with total biomass in each presently ranging from 250,000 to 350,000t.

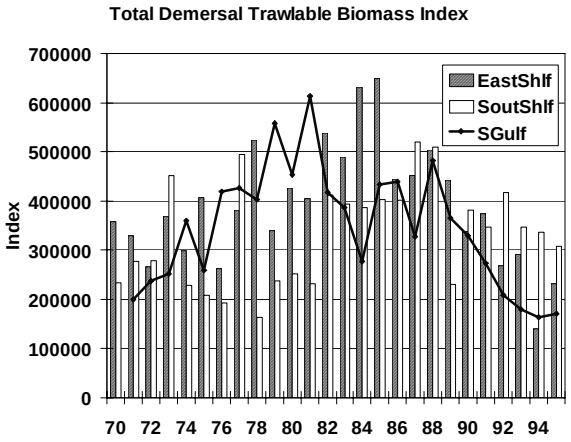


Demersal Biomass

The following section describes changes in the abundance of demersal fishes, those which live on or near the bottom. For the Gulf, trends in demersal biomass are similar to those described for total finfish biomass. Demersal biomass increased throughout the 1970s to a peak in 1981. Demersal biomass declined steadily from 1988 to 1993, and has been stable and low since then. Current demersal biomass is the lowest observed in the 25 year. history of this survey, somewhat below the previous low observed in the early 1970s.

Demersal biomass on the Eastern Shelf increased from 1970 to 1984 and declined to a low in 1994. Present estimates remain below those of the early 1970s.

As with the trend in total finfish biomass, demersal biomass on the southern Shelf shows a more gradual decline than the other two systems. Present demersal biomass levels on the southern Shelf still remain above those estimated in the 1970s.



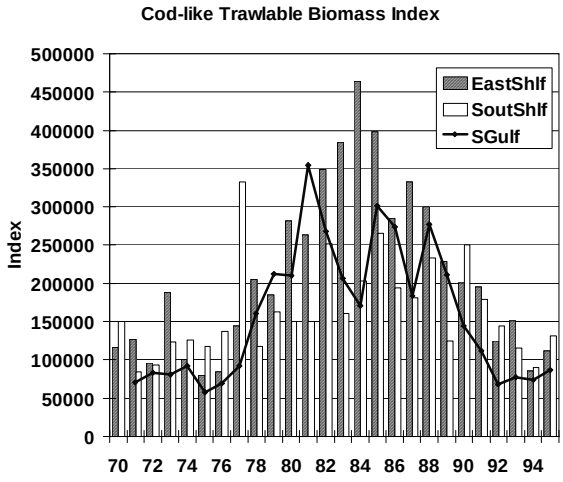
Cod-like Fishes

Cod-like fishes (gadids) in general make up a variable and generally large (20 - 80%) proportion of the demersal biomass in each of these systems. In the Gulf and on the Eastern Scotian Shelf, gadids made up between 15 and 30% of demersal biomass through most of the early 1970s. From the mid-1970s to the early 80s this proportion increased to between 55 and 80%. From the early 1980s to 1992 the proportion of gadid biomass declined but in the last three years it has increased to the point where it now represents approximately 50% of demersal biomass. In both of these systems the proportion of gadids is presently higher than was observed during the 1970s.

On the southern Shelf, the proportion of gadid biomass fell to a low in the early 1970s and then increased rapidly to about 70% of total demersal biomass in 1976. Since then gadid biomass has declined. In 1994, the proportion of gadid biomass was again as low as had been estimated for the early 1970s. It is also notable that the proportion of gadid biomass on the Southern Shelf is more variable than in the other systems, likely as a result of the influence of spiny dogfish biomass (see below).

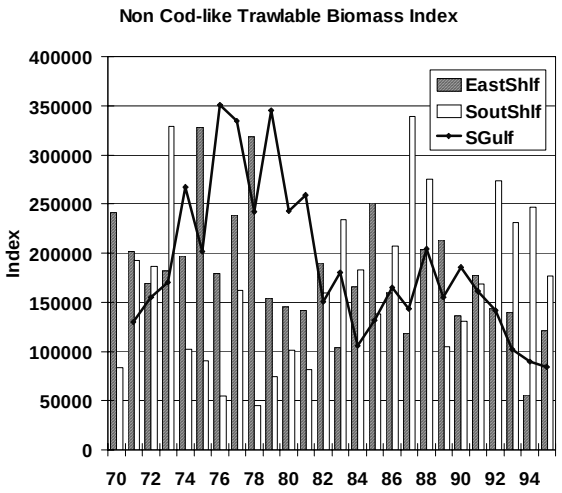
In the Gulf, trawlable biomass of gadids was relatively low in the early to mid 1970s and increased rapidly to a peak in 1981. Gadid biomass remained relatively high throughout the 1980s, and then declined steadily from 1988 to 1992. Since 1992, it has remained stable and low at about the level of the early 1970s.

Gadid biomass on the Eastern Shelf follows much the same pattern as the Gulf with the exception of the decrease in abundance seen in the Gulf over the period 1981 - 1984. The pattern on the Southern Shelf differs from the other two systems in that gadid biomass increases slowly from the early 1970s through the mid to late 80s, however since 1990 it has declined at a rate comparable to that observed on the Eastern Shelf. At present gadid biomass in all three systems is at about the level estimated for the early to mid 1970s.

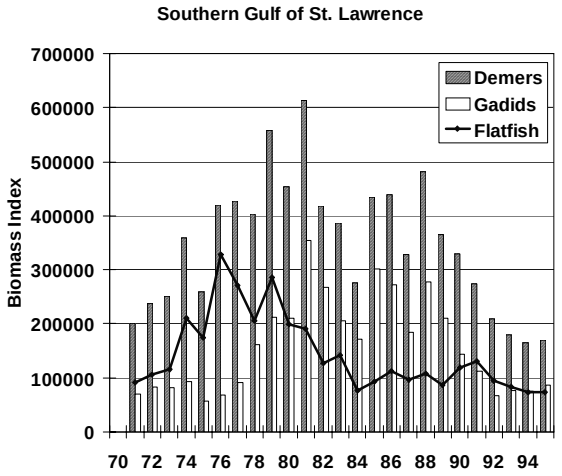


Other Demersal Fishes

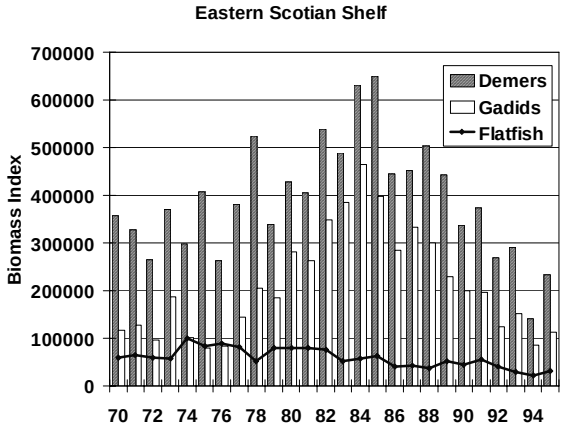
Non-gadid demersal biomass in both the Gulf and the eastern Shelf have shown significant declines since the 1970s, while on the southern Shelf it has generally increased since the late 1970s. At present non-gadid demersal biomass on the southern Shelf is 2 to 3 times that estimated for each of the other systems.



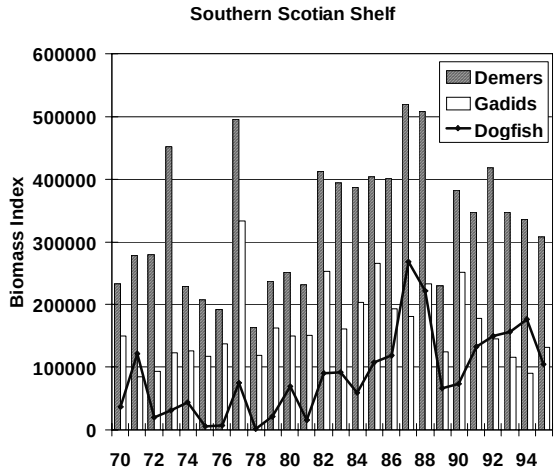
The bulk of the demersal biomass in the Gulf consists of flatfish and cod-like fishes. The flatfishes are predominately American plaice, and the cod-like fishes are almost entirely Atlantic cod. These two dominant species groups show different biomass trends in the southern Gulf. Flatfish trawlable biomass increased in the early 1970s to high levels in the mid to late 1970s, and then decreased to 1984. Since 1984, flatfish biomass has been relatively stable. There is some indication of a gradual decline since 1991. Flatfish biomass in 1995 is the lowest in the survey's history.



Like the Gulf, the bulk of demersal fish biomass of the eastern Shelf is comprised of gadids with a significant contribution by flatfish, Atlantic cod and American plaice being the major contributors to each group. Flatfish biomass has shown a steady decline since the mid 1970s.



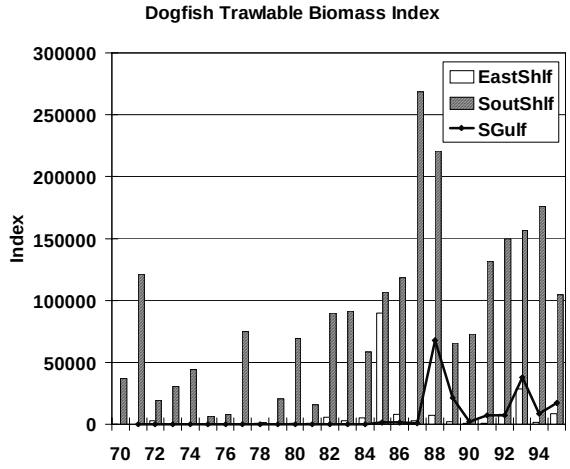
On the southern Shelf although gadids still make a up a significant proportion of total demersal biomass, flatfish biomass is negligible. Since the early 1980s spiny dogfish have been a significant proportion of demersal biomass. In the early 1990s they represented an equal or greater proportion of demersal biomass than the gadids.



Cartilaginous Fish Biomass

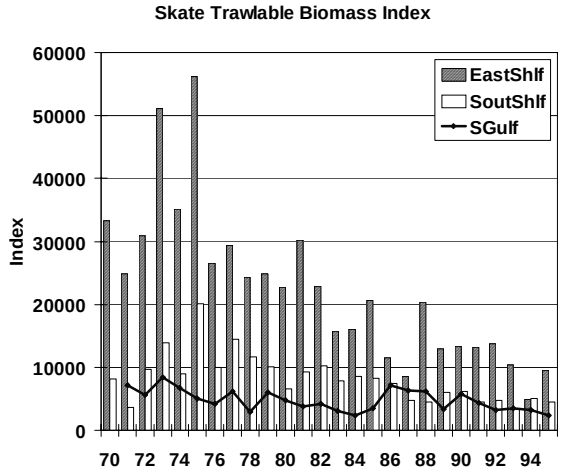
This section describes changes in abundance of the shark-like or cartilaginous fishes.

Spiny dogfish were not caught in the southern Gulf survey before 1984 and they constitute only a small proportion (less than 10%) of total finfish biomass both here and on the eastern Shelf. On the southern Shelf, however, spiny dogfish biomass increased throughout the 1980s and early 1990s. At present spiny dogfish make up 30 to 50% of trawlable demersal biomass in this system.



Skate were more prevalent on the Scotian Shelf in general and on the eastern Shelf in particular than in the Gulf. During its maximum in the mid 1970s, skate biomass on the eastern Shelf represented 10 - 15% of demersal biomass. Since then this skate biomass has declined steadily and now represents only about 5% of demersal biomass.

Skate biomass on the southern Shelf has also declined over this same period but the decline has been slower than observed on the eastern Shelf. Skate biomass in the Gulf is presently at the level estimated for the mid 1980s.



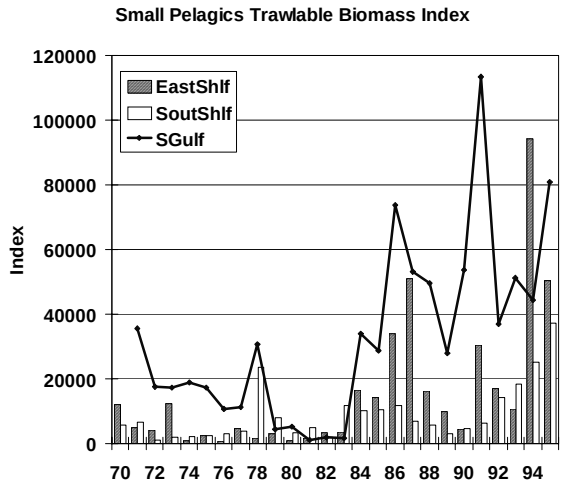
Pelagic Finfish Biomass

The following section describes changes in abundance of pelagic fishes, those fish which are not associated with the bottom.

In the Gulf, trawlable biomass of pelagic fishes tended to be low before 1984. The lowest biomass levels occurred in the 1979-1983 period. Pelagic biomass has been high since the mid-1980s, with peak biomass estimates in 1986, 1991, and 1995. Pelagic trawlable biomass has consisted almost entirely of herring in all years except 1973

and 1974, when gaspereau and smelt contributed strongly. This trend of increasing pelagic biomass is also evident in the other two systems. This is at odds with recent herring assessments of the Scotian Shelf resources and may be related to problems in survey coverage and fish catachability as discussed earlier.

Prior to 1984, trawlable finfish biomass consisted almost entirely of demersal fishes. In recent years, small pelagic fishes have begun to make up an increasing proportion of this biomass. In 1995, in the Gulf, nearly one-third of the trawlable biomass estimated from the survey consisted of pelagic fishes. On the eastern Shelf the small pelagic biomass estimate now represents on the order of 15 to 30% of total biomass, while on the southern Shelf small pelagics make up about 10% of total finfish biomass.



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