

## Eastern Scotian Shelf Scallop

### Background

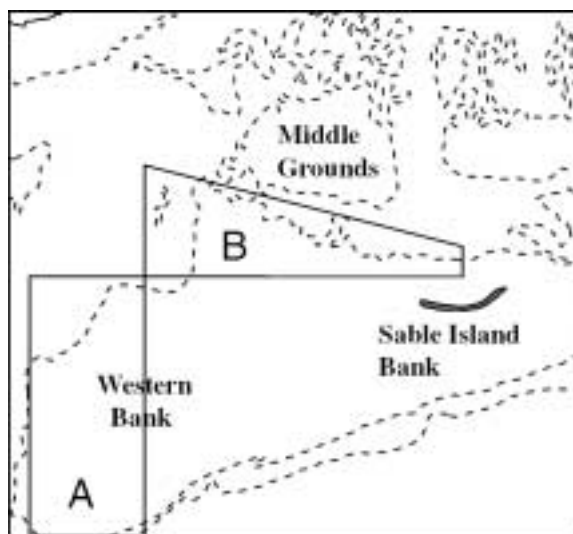
The sea scallop *Placopecten magellanicus* occurs in the Northwest Atlantic from Cape Hatteras to Labrador. Scallops are aggregated in patches and harvestable concentrations are called beds. Major areas of offshore fishing activity are Georges Bank, the Scotian Shelf (Middle Grounds, Sable Island Bank, Western Bank, Browns Bank, and German Banks), and St Pierre Bank. Scallops prefer a sandy, gravel bottom and occur in depths of 35 to 120 m.

The sea scallop has separate sexes. They mature at age 2. Male scallops develop a white gonad, while female gonads are bright red. The major spawning period is August to October. The fertilised eggs develop in the water column until settlement on the bottom within 30 to 60 days.

Growth is estimated from the position of annual rings on the shell. The growth rate varies from one area to another and is influenced by season, depth, and temperature.

Offshore scallop vessels range from 27 to 46 m length overall. The offshore fleet uses a New Bedford offshore scallop rake or drag, 4 to 4.9 m in width. Two drags are fished simultaneously, one on each side of the vessel.

The most recent assessment of this stock was conducted in the spring of 1997 (SSR C3-19(1997)). This assessment is the first update of stock status since then.



### Summary

#### Sable Island and Western Banks

- The total 2000 catch for Sable Island and Western Banks was 195 t, against a TAC of 200 t.
- The effort in 2000 decreased by 57% from 1999.
- The catch rates in 2000 were the highest on record for the Eastern Scotian Shelf but are considered average when compared to other offshore fishing grounds.
- The survey indices indicated a low abundance of prerecruit year-classes, following an average sized pulse of ages 5 - 6 entering the fishery.
- There has been minimal change in the estimated recruited biomass (ages 5+) since 1998.
- Given the modest pulse of recruits entering the fishery in 2001 with little to follow for a number of years, it may be advisable to have the catch limit in 2001 remain at the 2000 TAC of 200 t. This

represents the long term mean productivity of this stock.

Middle Grounds

- The voluntary closure of Middle Grounds since 1997 has not improved the stock status significantly.
- Survey indices showed no improvement in prerecruits (ages 2 to 4) but a modest increase in larger older scallops (age 10+).
- The repeated absence of prerecruits in research survey data suggests there is insufficient productivity to support a sustainable fishery.

***The Fishery***

Landings (tonnes)

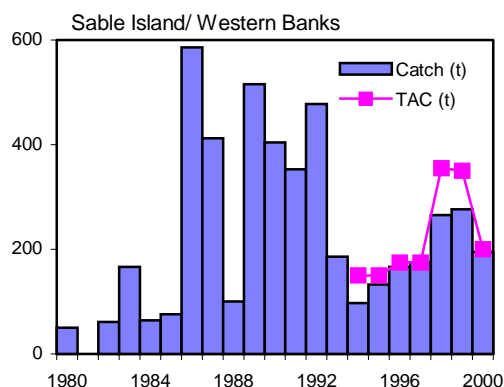
Year	1980-89 Avg.	1992-96 Avg.	1997	1998	1999	2000
TAC*		158	175	355	350	200
Sable/West	230	183	174	265	276	195
Middle	30	28	-	-	-	-

\*TAC for both areas

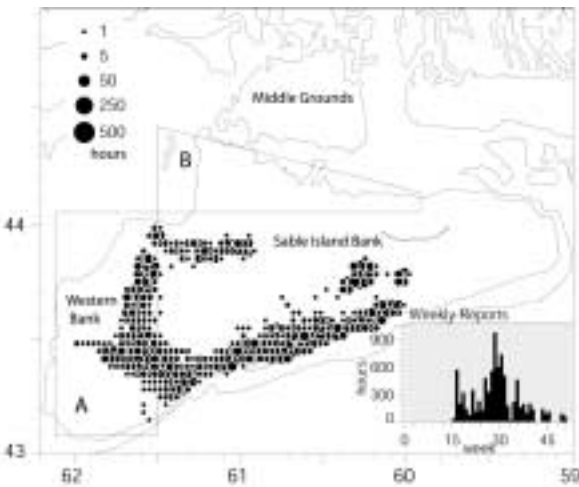
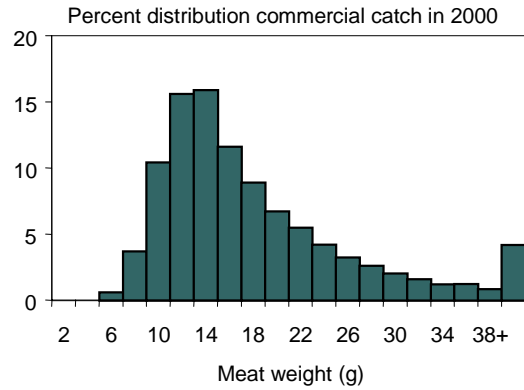
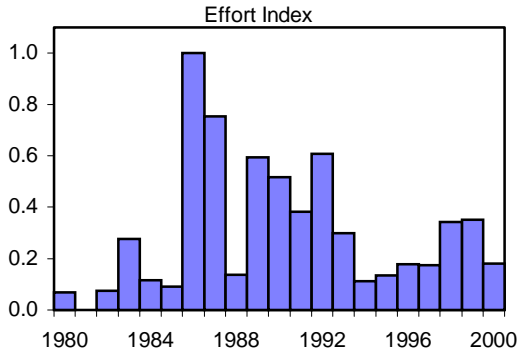
Fishing grounds on the Eastern Scotian Shelf (Middle Grounds, Sable Island and Western Banks) for sea scallops have offered alternatives to Georges Bank for the offshore scallop fleet. This area was fished competitively with limited entry and meat count as management tools until 1994, when a quota system was implemented in an effort to rebuild the stock. A voluntary closure of Middle Grounds initiated in 1997 continued in 2000. In 1998, an industry plan designated Sable Island and Western Banks into three areas; the traditional fishing area, Western 'A' and Western 'B' to promote exploration of areas seldom fished. Western 'A' was the area of Western Bank west of longitude 61°30'. Western 'B' was the fishing area shallower than 100 m and between Middle Grounds and latitude

44°03'. Western 'B' is no longer fished as a separate area due to low yield.

Since the implementation of catch limits, the annual TAC had increased from 150 t in 1994 to 350 t in 1999, with the average slightly above 200 t. Catches followed the increase in TAC but did not exceed 300 t with an annual average of 225 t. 1999 catches were the highest of the 1994-2000 series. In 2000, the TAC for Sable Island and Western Banks was 200 t, a 40% decrease from 1999 due to low incoming recruitment to the fishery. Industry partitioned the TAC into 150 t for the traditional areas and 50 t for Western 'A'. Most of the TAC (98%) was caught in 2000, compared to 80% in 1999. There was a 30% overall decrease in catches from 1999. 80% of catches were landed between July and September.



Fishing **effort** during 1994-2000 followed a trend similar to the catches, with the highest value being in 1999. Effort in 2000 decreased 57% from 1999. Satellite tracking information (see map below) indicated effort in 2000 was concentrated over the traditional area while in 1999, some emphasis had been given to non-traditional areas. Effort was concentrated from July to September (see map insert).



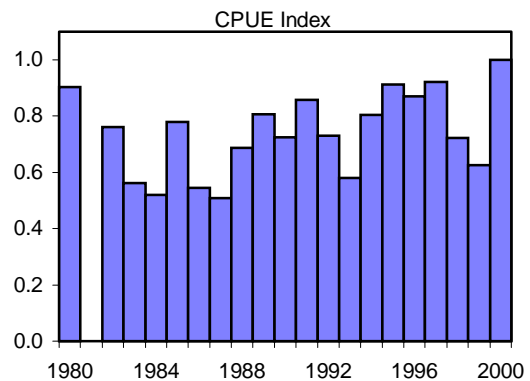
Since 1994, the **average meat weight** has, with the exception of a slight increase in 1998, remained constant. The average meat weight for this time period was 17.3 g (meat count 29/500 g). The meat count regulation for Sable and Western Banks is 45/500g. In 2000, the **meat count** increased from 1999 and 1998 but was close to the average. In 2000, 15% of the meats sampled were under 10 g.

**Resource Status**

Logbooks provided catch and effort data from which catch rates (Catch Per Unit Effort (CPUE)) were estimated. Research surveys provided average numbers-at-age of scallops per standard tow. CPUE, size of meats in the catch and research survey abundance indices are used to determine stock status.

**Sable Island and Western Banks**

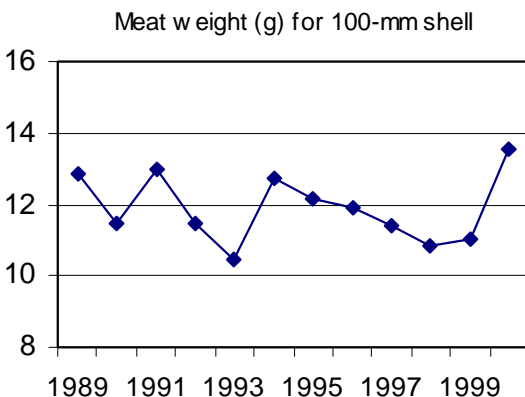
Commercial **catch rates** (kg/hour) from the Sable Island and Western Bank areas have been variable from 1994 to the present. Commercial catch rates in 2000 increased 60% from 1999. 2000 catch rates were the highest of this series and 25% higher than the series average. Catch rates were highest in the second quarter, April to June, declining until December.



## Maritime Region

During periods of high abundance, effort is concentrated on smaller areas. Area fished can be used as an index of stock status. Scallop beds have been found in an area of 3,500 km<sup>2</sup> on Sable Island and Western Banks. The **area fished** had increased from 1,160 km<sup>2</sup> in 1997 to a high of 2,606 km<sup>2</sup> in 1999. In 2000, the area fished was 1,020 km<sup>2</sup>, which was a 60% decrease from 1999 and the lowest in recent years.

A **meat weight index** from the research survey data can be used in monitoring the stock status. It corresponds to the weight of a scallop meat in a standard shell of 100 mm height at survey time. The long term average meat weight index for this area is 12g, with a meat count of 42/500g. The index increased 23% from 1999 to 2000. It has reached one of the highest levels observed since 1989.

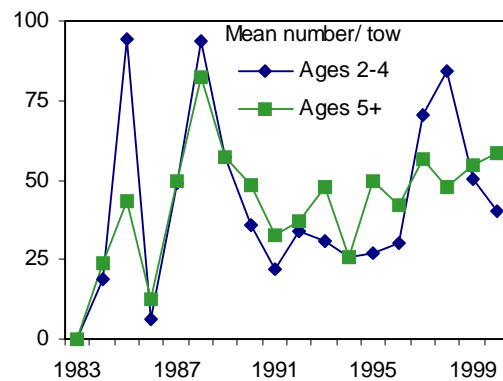
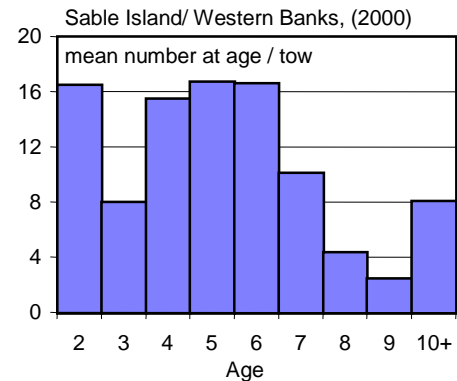


Industry-funded research surveys were conducted annually. A new vessel started to conduct surveys in 1994. Survey results given here represent the traditional area and Western 'A' combined.

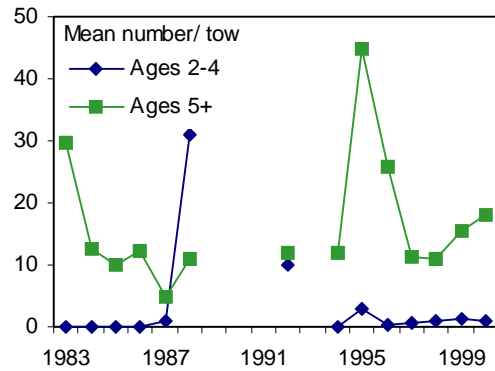
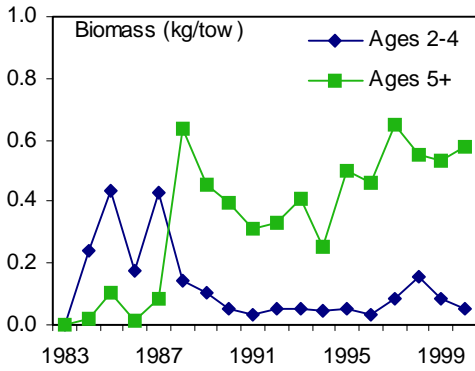
There has been minimal change in the numbers of recruited age 5+ scallops since 1994. The 2000 survey indicated that the 1994 and 1995 year-classes (ages 6 and 5) although the most abundant year-classes in the 2000 survey, were only average in strength. Since 1994, the age 4 recruit index has been variable. The 2000 age 4 recruit

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numbers were below the series average. Survey indices indicated that prerecruit (ages 2 to 4) numbers were improving to 1998 only to decline in 1999. Prerecruit densities in the 2000 survey continued to be low with the exception of the small pulse of the 1998 year-class at age 2.



The **recruited biomass** (kg/tow) from the research survey for ages 5+ had increased 10% from 1999 due to the average pulse of ages 5 to 6 scallops entering the fishery. Biomass estimates of ages 5+, similar from 1998 to 2000, were 15% less than 1997. Biomass age 4 recruits declined 37% from 1999, a further decline from the series high in 1998. There was a decrease of 40% in **prerecruit biomass** (ages 2 to 4) from 1999. The prerecruit biomass has been declining since 1998.

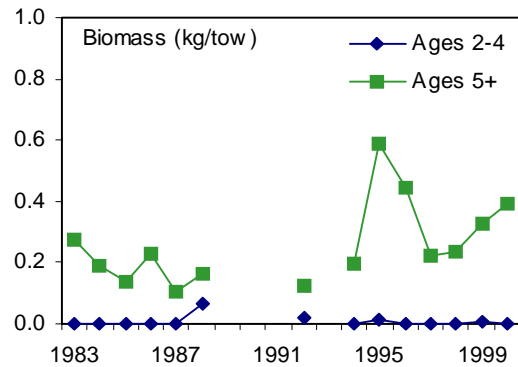


Middle Grounds

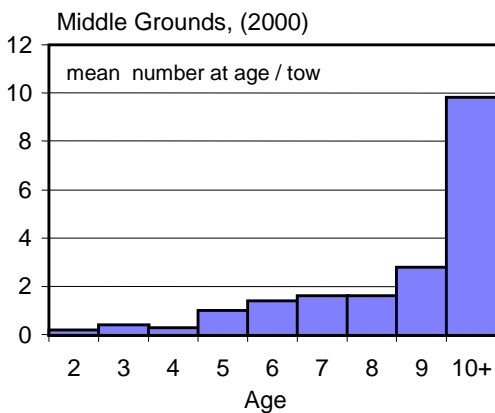
Although there has been a voluntary closure of Middle Grounds since 1997, the industry-funded research surveys have been conducted annually in this area.

Survey indices since 1997 indicated varying abundance of recruits at age 5+, and age 4. The 2000 survey indices indicated an increase in the number of commercial-size scallops, ages 5+, which can be attributed to large numbers of older, age 10+, scallops. Such densities are very low compared to the more productive grounds on the Western Scotian Shelf. Age 4 recruit numbers had been gradually increasing (1997 to 1999) only to decline in 2000. There was a 60% decrease in age 4 scallops in the survey from 1999. Prerecruit, age 2 to 4, numbers have been decreasing since 1997. The most recent survey indicated low numbers of prerecruits, down from 1999 values.

There was a 20% increase in recruited biomass (ages 5+) from the 2000 research survey due to an increase in larger older scallops (age 10+). Recruited biomass has been improving over the last four years. The survey indicated a 44% decrease in prerecruit biomass (ages 2 to 4) from 1999.



This assessment of the scallop fishing grounds of Sable Island and Western Banks and Middle Grounds includes a table of stock attributes to facilitate comparison and assist decision-makers.



**Sable Island and Western Banks**

Attribute	Recent Trend	Current Status
Commercial effort	average	low
Commercial catch rates	varying	highest in the series
Meat count in catch	stable	stable
Area fished (km <sup>2</sup> )	varying	lowest in the series
Survey biomass index ages 5+	stable	average
Recruitment survey index age 4	varying	average
Prerecruit survey index ages 2-4	declining	low
Meat weight index	decreasing	improved

**Middle Grounds**

Attribute	Recent Trend	Current Status
Commercial effort	n/a	n/a
Commercial catch rates	n/a	n/a
Meat count in catch	n/a	n/a
Area fished (km <sup>2</sup> )	n/a	n/a
Survey biomass index ages 5+	varying	improving
Recruitment survey index age 4	improving	improving
Prerecruit survey index ages 2-4	low	low
Meat weight index	n/a	n/a

**Sources of Uncertainty**

The survey indices carry a certain degree of uncertainty that can be related to how well year-class strengths are estimated. Abundance estimates rely mainly on survey observations. The same age/shell height model was assumed for all years.

Variations in weight at age, partial recruitment, or systematic errors in data reporting could be other sources of uncertainty.

**Outlook**

The 2000 TAC for Sable Island and Western Banks was all caught in the traditional area and 90% caught in Western 'A'. The effort decreased substantially. Although the catch rates experienced in 2000 are the highest on record for the Eastern Scotian Shelf, they are considered average to below average when compared to other offshore fishing grounds. The survey indices indicated a low abundance of prerecruit year-classes following an average pulse of ages 5 to 6 entering the fishery. There has been minimal change in the estimated recruited biomass (ages 5+) since 1998. Given the modest pulse of recruits entering the fishery in 2001 with little to follow for a number of years, it may be advisable to have catch limits remain at the 2000 TAC levels for 2001, near the historical average of 200t. This average represents the long term mean productivity of this stock. Fishing at levels higher than the productivity of the resource would lead to decreased catch rates and a concurrent increase in meat count.

The voluntary closure of Middle Grounds since 1997 has not improved the stock status significantly. Survey indices indicated no improvement in prerecruits (ages 2 to 4) but a modest increase in larger scallops (age 10+) contributing to a slightly improved biomass estimate. The repeated absence of prerecruits in research survey data suggests there is insufficient productivity to support a sustainable fishery at this time.

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***References***

Robert, G., and M.A.E. Butler. 1997. Scallop stock status for 1996 – Eastern Scotian Shelf and German Bank. DFO Canadian Stock Assessment Secretariat Res. Doc. 97 / 49.

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