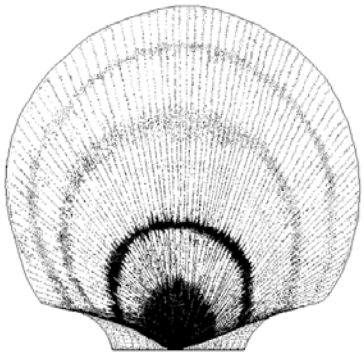


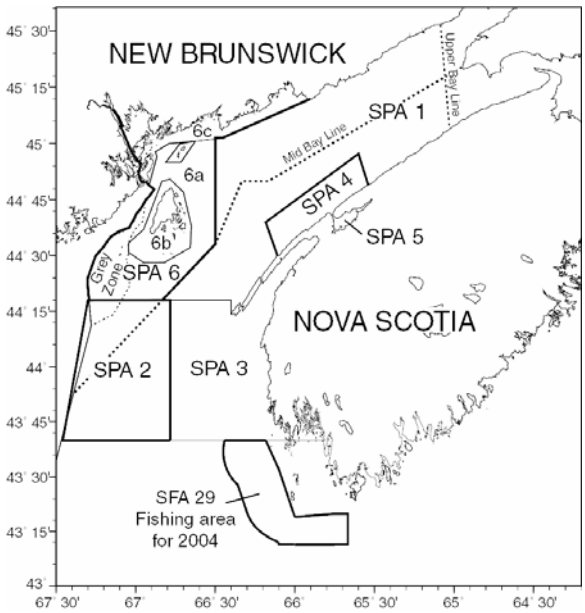
Scallop Production Areas (SPAs) in the Bay of Fundy

Background

The sea scallop Placopecten magellanicus occurs only in the northwest Atlantic Ocean from Virginia north to Labrador. Within this area, scallops are concentrated in persistent, geographically discrete aggregates or "beds", many of which support valuable commercial fisheries. The larger beds are found offshore and in the Bay of Fundy. Scallops in different beds, and in different areas of large beds, show different growth rates and meat yields.

Unlike many commercial scallop species, the sea scallop has separate sexes. Male scallops develop a white gonad in the summer months, while female gonads are bright red. Eggs and sperm are released into the water and fertilization takes place in the sea. Spawning begins in late August to early September, and the larvae drift in the water for almost a month before settling to the bottom in October.

The Bay of Fundy area is fished by the Full Bay and the Mid-Bay licensed fleets. Full Bay vessels are 45' to 65' and Mid-Bay vessels are generally between 30' to 45'. Full Bay licensed vessels are permitted to fish all the Bay of Fundy. The Mid-Bay license holders have access to the New Brunswick side and portions of the Nova Scotia side of the Bay of Fundy to the Mid-bay line and a portion of SPA 2. There are also 16 Upper Bay Licences restricted to the upper reaches of the bay. The fishery has been managed using limited entry, gear size limits, seasonal closures, minimum shell height, meat count and individual meat weight restrictions. The gear width limit is 5.5 m with ring size of not less than 82 mm inside diameter. Quotas were introduced in 1997. Total allowable catches (TACs) are set and landings are reported in terms of meat weights (adductor muscles).



Refer to full detail map on page 19 for place names.

Summary

All SPAs

- Objectives and associated reference points are beginning to be developed for these fisheries. Discussions between the fishing industry and DFO to develop reference points for the scallop fisheries in the Bay of Fundy need to be continued.
- In order to maximize yield-per-recruit, the impact of fishing practices on the mortality of recruits and pre-recruit scallops needs to be investigated.
- Implement research and monitoring to establish the relationship between scallop biomass and future recruitment success.
- Implement research and monitoring to determine the conditions leading to episodic die-offs.

SPA 1

- Landings were 674 t for the 2003/2004 season for the full Bay Fleet and 261 t for the 2004 season for the Mid and Upper Bay fleets.
- Commercial catch rates for all three fleets have declined from 2003, but remain above long term averages.

- The large 1998 year-class that recruited to the 8–16 mile Digby area, has been fished down and this area shows the largest drop in catch rate within SPA 1 in 2004.
- Due to research vessel problems the SPA 1 survey only covered the 8–16 mile Digby and Cape Spencer areas.
- A revised form of the population model for the 8–16 mile Digby area has resulted in population biomass estimates that are considerably lower than from the old model.
- Commercial catch rates are expected to continue to decline in SPA 1.

SPA 2

- This area is considered to be marginal for scallop habitat.
- There is no scientific advice available for this area.

SPA 3

- Landings in 2004 were 151 t against a TAC of 300 t.
- Commercial catch rates in 2004 declined from 2003, but were still above average.
- The 2004 Research Vessel (RV) survey index indicated that the biomass of commercial size scallops declined after 2002, but remains near or above the average for the nine-year survey series.
- There appears to be little sign of recruitment for 2005
- Based upon the survey trends, the population appears to be stable at the 150 to 200 t catch level with the possibility of a large 2003 year-class that could recruit to the fishery in 2007.

SPA 4

- Landings in 2003/2004 were 945 t against a TAC of 1000 t. An interim TAC of 400 t has been set for the 2004/2005 season which opened 1 October 2004.
- Commercial catch rates in 2004 declined from 2003 but were still above average.
- Meat yields had declined in 2002 and 2003 but have improved in 2004 to be above average.
- The survey index for numbers of commerciall size scallops in 2004 was less than one half of the 2003 index.
- Subsequent year-classes have been less than 10% of the size of the 1998 year-class.
- Concerns about large increases in natural mortality as occurred in 1989/1990, are continuing to be addressed by a joint monitoring program conducted with industry. To date the natural mortality rate continues to be low.
- A revised form of the population model has resulted in population biomass estimates that are considerably lower than from the old model.
- Population biomass and commercial catch rates are expected to decline over the next two years as there is expected to be below average recruitment over this time period.

SPA 5

- Preliminary landings in 2004 were 20.4 t against a TAC of 25 t.
- Commercial catch rate in 2004 was lower than in 2003 but still above average.
- RV survey estimates indicate that the stock is healthy but little recruitment is expected for the next two years.
- The TAC for 2005 should not exceed the average over the low abundance periods (1997 to 1999) of 10 t.

SPA 6

- Preliminary landings to Nov 2004 were 81 t against a TAC of 195 t.
- Commercial catch rates for both fleets have remained steady the last 4 years, but effort is down significantly.
- Due to research vessel problems there was no DFO survey in SPA 6 in 2004.
- The population appears to be stable with removals in the range of 80 to 160 t per year.

SFA 29

- No advice was available for this area at this time. A formal stock assessment will be presented in 2005.

SPA 1 – Inner/Upper Bay of Fundy

The Fishery

Landings in SPA 1 have shown two large peaks in recent years; one in 1989 and another in 2002–2003. The recruitment pulse causing the 1989 peak was seen throughout the Bay of Fundy while the more recent one was confined to the Digby area. Landings declined to low levels between these recruitment events.

The Mid-Bay and Upper Bay vessels were not required to keep logbooks until 1996, so their earlier catches cannot be broken down by fishing area using only logbook data. Landings by Statistical District for Districts 24, 40, 43, 44, 48 and 79, (coast of Bay of Fundy from St. John, N.B. to Mordon, Nova Scotia) were used to estimate landings by Mid-Bay and Upper Bay vessels for SPA 1 prior to 1997.

The 2004 **landings** are down from the 2003 level, mainly due to the drop in SPA 1A. Landings by all fleets remain above long term median levels.

Preliminary landings to November 15th were 674 t for the Full Bay licence holders (2003/2004 fishing year), 175 t for the Mid Bay, and 86 t for the Upper Bay fishers (2004 fishing year).

Landings (meats, t) Full Bay

Year	Avg. 96-00[1]	2001	2001/ 02[2]	2002/ 03[2,3]	2003/ 04[2,3]
TAC (t)	240	240	700	A: 1200 B: 100	A: 700 B: 200
Landings	201	279	745	A: 913 B: 33	A: 464 B: 210

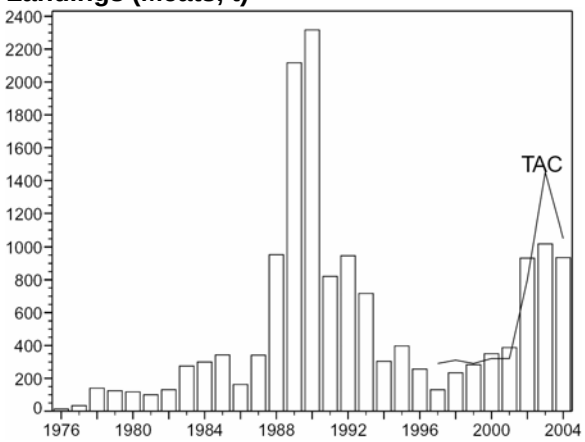
1 TACs have only been in effect since 1997, so average TAC is for 1997-2000 instead of five years.
2 To November 15, 2004. Starting Oct. 1 2001 the Full Bay Fleet fishing season changed from a calendar year to Oct. 1 to Sept. 30.
3 Full Bay TAC was split into SPA 1A and SPA 1B in 2002/03.

Landings (meats, t) Mid and Upper Bay

Year	Avg. 96-00[1]	2001	2002	2003	2004
TAC (t)	63	80	100	150	150[2]
Landings	49	102	186	212	261

1 TACs have only been in effect since 1997, so average TAC is for 1997-2000 instead of five years.
2 Remaining quotas in SPA 1 and 6 combined Aug. 2, 2004.

Landings (Meats, t)



The 2003/2004 quota for Full Bay licence holders was down from 2002/2003, but still well above the long term average. The Mid and Upper Bay fishers had a quota of 150 t in 2004, the same as last year. In 2001 the Full Bay fleet quota year was changed. It now runs from October 1 to September 30. The Mid and Upper Bay fleets remain on a calendar year. In 2002 the SPA 1 Full Bay quota was split into one for SPA 1A and SPA 1B to handle the large recruitment pulse seen in the 8-16 mile Digby grounds, but not elsewhere in the Bay.

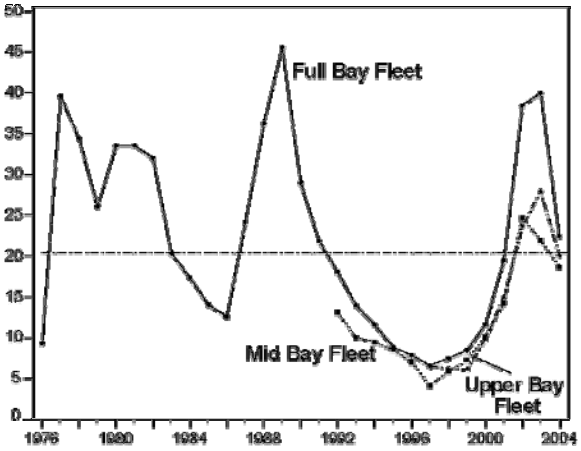
The quota for the Mid and Upper Bay fleets was split into two seasons, Jan 13 to April 30, and August 2 to December 31. On August 2, 2004 the remaining TACs for SPAs 1 and 6 were combined, and fishing was restricted to Monday to Friday. Most of the combined quota was taken in SPA 1.

Resource Status

Catch per unit effort (CPUE) for the Full Bay fleet declined from a high in the late 1980's to a low in 1996-1997. With the large 1998 year-class recruiting to the Digby area, it has had another peak, and is now declining. The CPUE can only be

calculated for the period since 1992 for the Mid Bay fleet, and since 1997 for the Upper Bay fleet. The increase was not as dramatic for these fleets, but their CPUEs track that of the Full Bay fleet, and are also showing a decline.

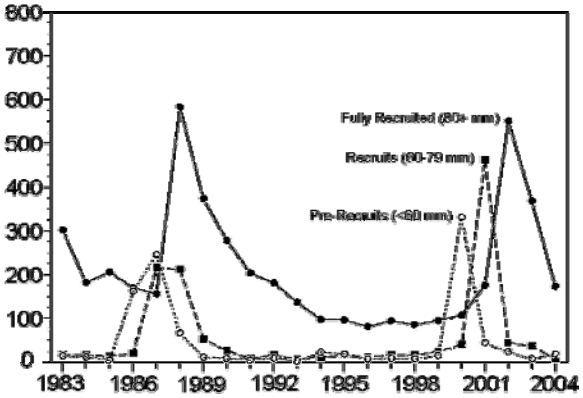
Catch per unit effort (kg/h)



Research vessel (RV) surveys have been conducted annually since 1981 in the **8 to 16 mile area** off Nova Scotia. Up to 2003 the surveys have been conducted in May-June every year, but the expanding distribution of lobster traps in the area necessitated rescheduling the survey to August-September in 2004. However, survey vessel mechanical problems resulted in a shortened survey being conducted in September-October.

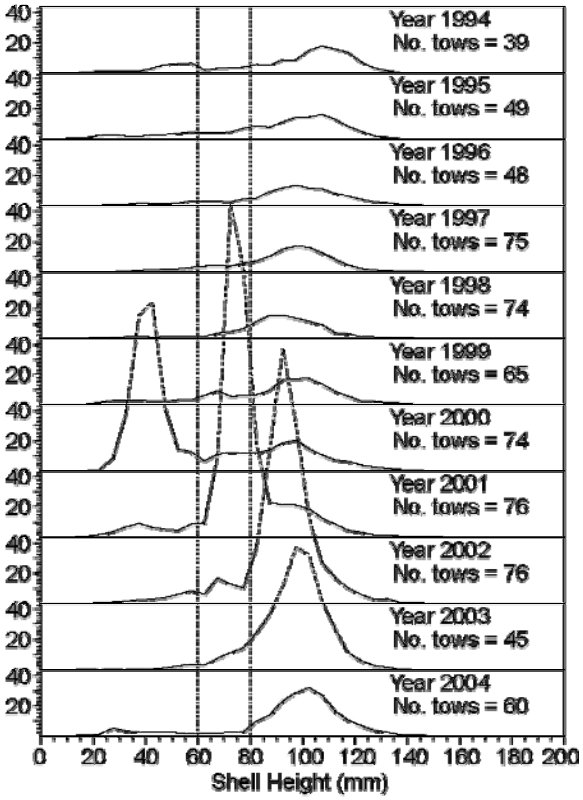
The mean catch per standard tow in this area showed a decline in both commercial numbers and weight from the peak in 1989 to a low in 1997, it climbed to another peak in 2002/2003 as the large 1998 year-class recruited to grounds overlapping SPA 1 and SPA 4.

Survey indices, 8-16 miles, (mean no./tow)



The size frequency distribution from the surveys shows the 1998 year-class in the 2000-2004 surveys as the scallops recruited to the fishery and they were fished down. Since it started to recruit to the fishery in late 2001, this year-class has supported the fishery in this area. It has been fished heavily and the abundance of scallops > 80 mm shell height is now declining to the low levels seen in the 1994 to 2000 period.

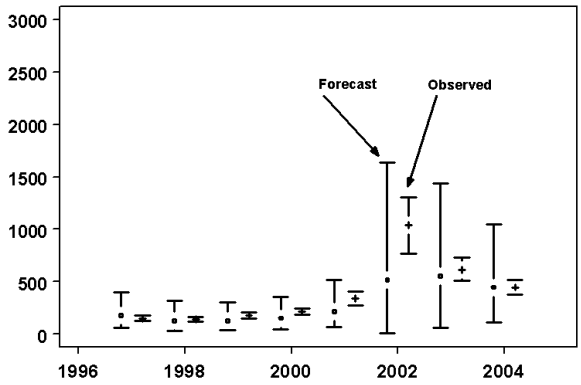
Survey indices, 8-16 miles (mean no./tow)



The population model developed two years ago was used to analyze the survey and

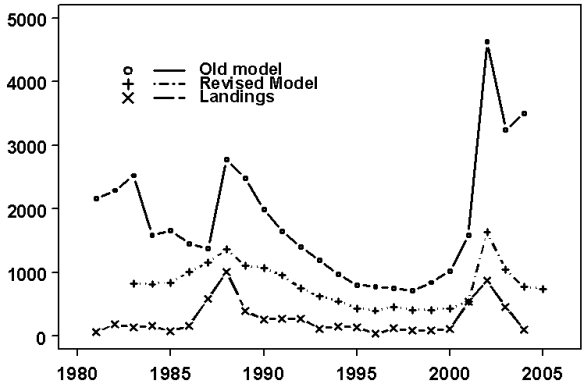
commercial catch data and estimate natural mortality and population biomass. The model was revised in 2004 improving its ability to forecast population size for the following year.

Forecast of next year's survey index (revised model; meats t)



The revised model has resulted in population biomass estimates that are considerably lower for the peak periods than the old model. The two models provide very similar estimates of population biomass during low abundance periods.

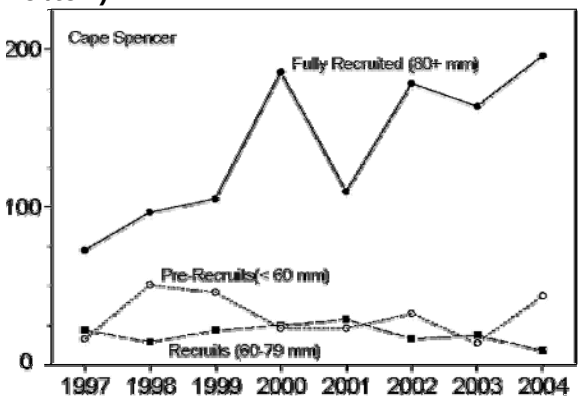
Population biomass (commercial size; meats,t)



The TAC's in SPA 1A the last few years have resulted in the large recruitment pulse being fished down sooner than anticipated.

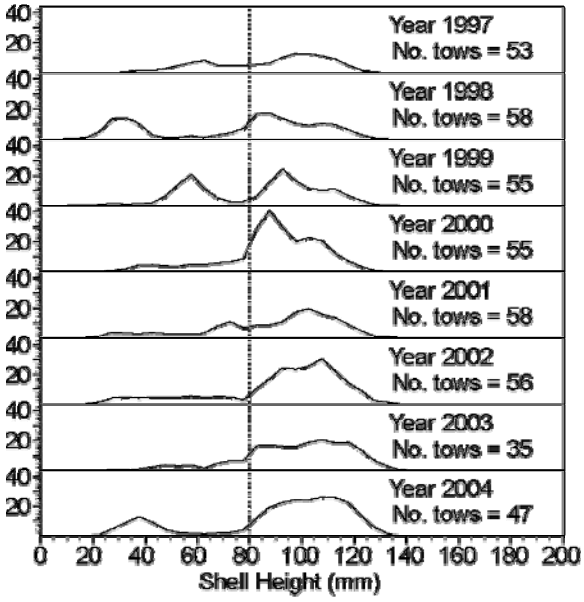
Surveys with a consistent design have been conducted in the **Cape Spencer** area since 1997. Mean numbers per tow of commercial-sized scallops in this survey have gradually increased as moderate year-classes entered the fishery. Recruitment in this area has remained relatively constant over the last five years, with little sign of the 1998 year-class observed in the 8–16 mile area.

Survey indices, Cape Spencer (mean no./tow)



The height frequencies show the moderate year-class that recruited to the fishery in 2000. Recruitment and growth have exceeded removals from the stock, and allowed for an increase of commercial-sized scallops. The 2004 survey height frequencies show a mode of small (approx. 35 mm shell height) scallops in the Cape Spencer area.

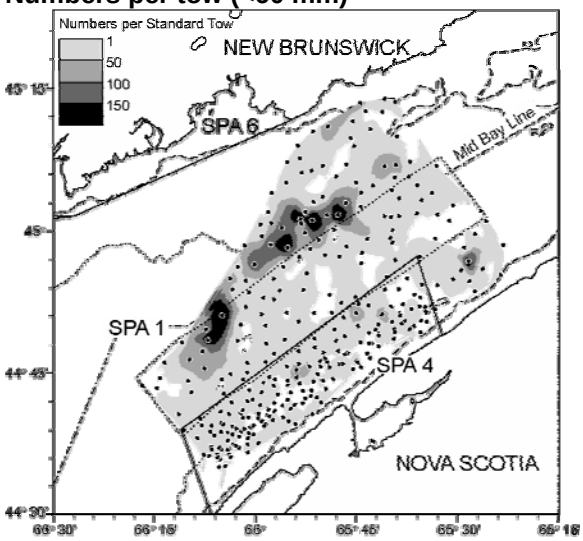
Survey indices, Cape Spencer (mean no./tow)



The 2002 year-class is located in a band along the Mid Bay line, and should recruit to the fishery in 2006. For 2005 the fishery will

be dependent on the same year-classes it fished in 2004, as there is little sign of scallops that will recruit to the fishery next year.

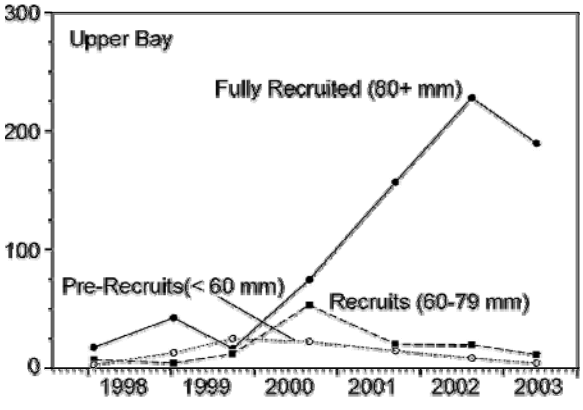
Numbers per tow (<60 mm)



Surveys have been conducted in the **Upper Bay area** at varying times of year since 1998. Due to research vessel problems, the survey did not cover the Upper Bay grounds in 2004.

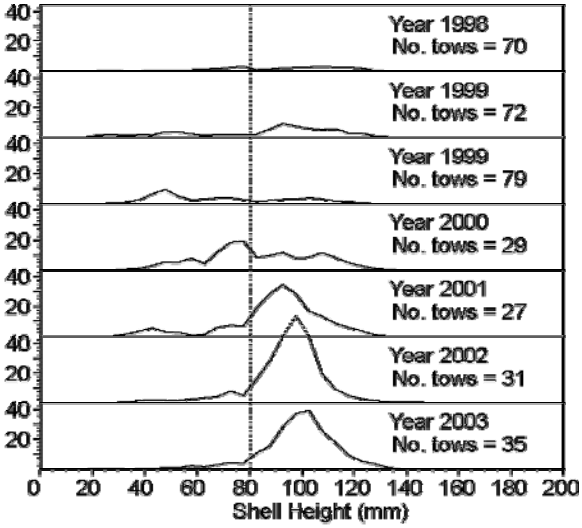
The 1998-2003 surveys had shown a recruitment pulse resulting in the abundance increasing to a peak in August 2002, and a decline in May 2003.

Survey indices, Upper Bay (mean no. /tow)



The 2003 survey height frequencies showed an above average abundance of fully recruited scallops in the survey area.

Survey indices, Upper Bay (mean no./tow)



Outlook

Catch rates are expected to continue to decline in SPA 1 in 2005.

For the area along the Mid Bay line, there are signs of an above average year-class that will recruit to the fishery in 2006.

Management Considerations

Delayed reporting (logbooks) by the Mid and Upper Bay fleets continues to be a problem.

Objectives and associated reference points are being developed through discussions between DFO and industry. Acceptance of a reference level biomass as a management strategy implies a positive relationship between that reference level and future recruitment success. Such a relationship has not yet been satisfactorily established. Industry considers that such a strategy can increase the risk of episodic die-offs, especially at high scallop densities. Implementing research and monitoring aimed at establishing the relationship between scallop biomass and recruitment both within current SPAs and within the Bay of Fundy meta-population as a whole is essential. In addition research and monitoring focussing on determining the

conditions resulting in episodic die-offs is warranted.

In order to maximise yield-per-recruit, the impact of fishing practices on the mortality of recruits and pre-recruit scallops needs to be investigated.

SPA 3 – Brier Island, Lurcher Shoal and St. Marys Bay

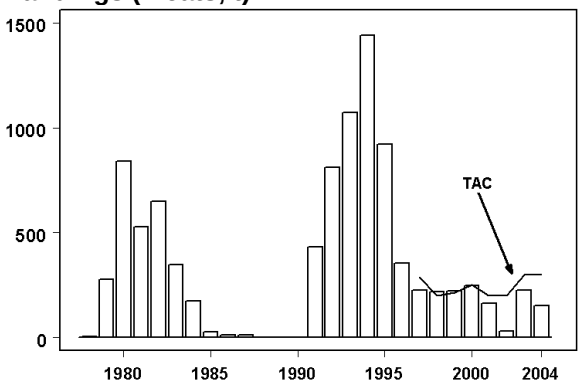
The Fishery

There are three main beds in this area, those around Lurcher Shoal, those below Brier Island, and in St. Marys Bay, although scallops can be found throughout most of the area. St. Marys Bay (formerly SPA 7) was combined with SPA 3 in 1999 for management purposes with a single TAC. The lobster fishery influences the scallop-fishing season throughout this area.

In the 1950's and 1960's, this area was heavily exploited but subsequently, fishing was minimal until 1980, when both the inshore and offshore fleets fished the area until 1986. In 1986, an agreement was reached between the two fleet sectors to establish separate inshore and offshore grounds, north and south of latitude 43˚40'N, respectively. This agreement excluded the offshore fleet sector from the area now defined as SPA 3.

Landings in SPA 3 increased each year from 1991 to 1994, reaching a high of 1439 t. Landings declined from 1995 until 1998. However, there is uncertainty about the landings from 1991 to 1996, due to misreporting.

Landings (meats, t)



The landings for SPA 3 and 7 have been combined since 1999. There were serious doubts raised about whether all of the landings reported in 1999 for SPA 3 came from this area. There does not appear to be any reason to suspect that landings reported to SPA 3 in subsequent years were from other areas.

Landings (meats, t)

Year	Avg. 1997–00	2001	2002	2003	2004
TAC 3+7	238	200	200	300	300
Landings 3+7	229	163	31	225	151

In recent years effort has been redirected from SPA 3 to other areas. The TAC had originally been set to 200 t for 2003 but high catch rates in June and July led to a request from industry for more quota. The final TAC was set to 300 t and a total of 225 t was landed. A total of 151 t was landed in 2004 against a TAC of 300 t.

Resource Status

Commercial catch per unit effort (CPUE) averaged 21 kg/h in 2004, compared to 51 kg/h in 2003 and is above average.

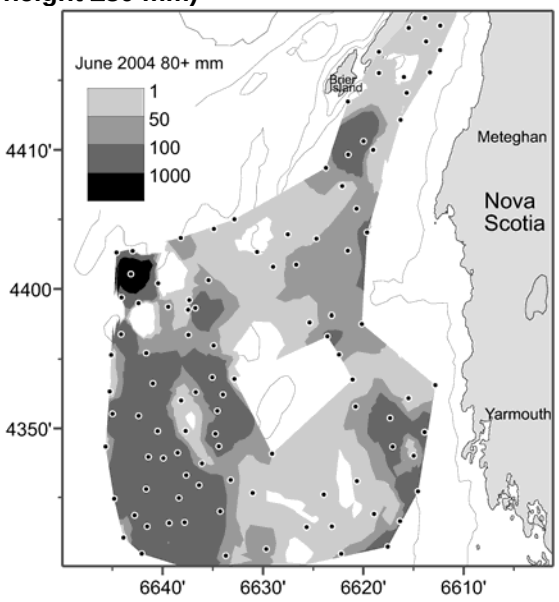
Catch rate (kg/h)

Annual **research vessel (RV) surveys** have been conducted in Brier Island and Lurcher Shoal area each August from 1991 to 2003. Surveys in SPA 1 and 4 were rescheduled to August in 2004 to avoid problems with lobster gear in June. As a result, the surveys in SPA 3 were conducted in June in 2004. Due to coverage and design, only the results from the 1996 to 2004 surveys are comparable.

Surveys of St. Marys Bay have been conducted from 1999 to 2001 inclusive. No surveys were conducted for St. Marys Bay in 2002 and 2003 due to limited research vessel time. Eighteen stations were completed in St. Marys Bay in 2004.

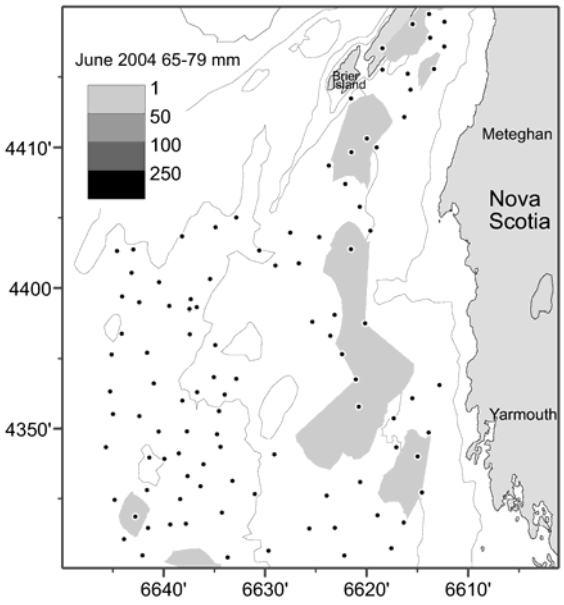
The largest concentrations of **commercial-size** scallops (shell height ≥80 mm) continue to be mainly in the southwest area of Lurcher Shoal. The scallops in this area usually have smaller meat weight-at-shell height than those caught elsewhere in SPA 3.

Survey no./tow (commercial size: shell height ≥80 mm)



The distribution of **recruits** (shell height 65–79 mm) was patchy and mainly in the eastern part of the area.

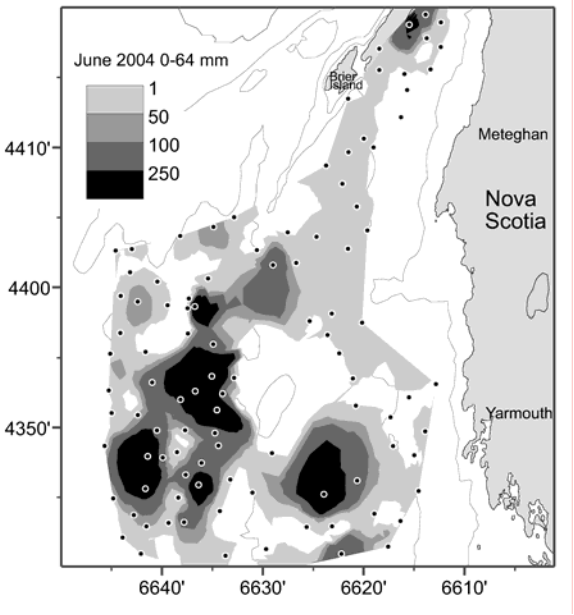
Survey no./tow (recruits: shell height 65 to 79 mm)



Pre-recruits (shell height <65 mm) occurred in relatively high densities in St. Marys Bay and the Lurcher shoal area. These scallops were mainly 10 to 25 mm in shell height and had the highest catch per tow for this size range in the 9-year time series. Estimates of year-class strength from this size range

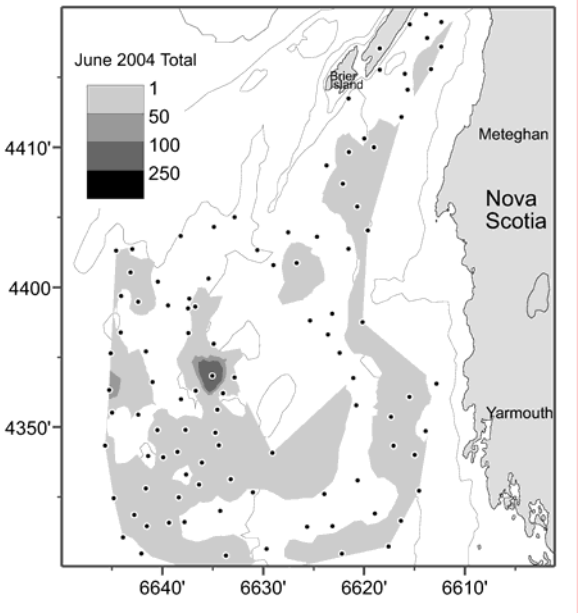
(approximately 1–2 year-olds) are not very reliable indicators of future year-class strength.

Survey no./tow (pre-recruits: shell height <65 mm)



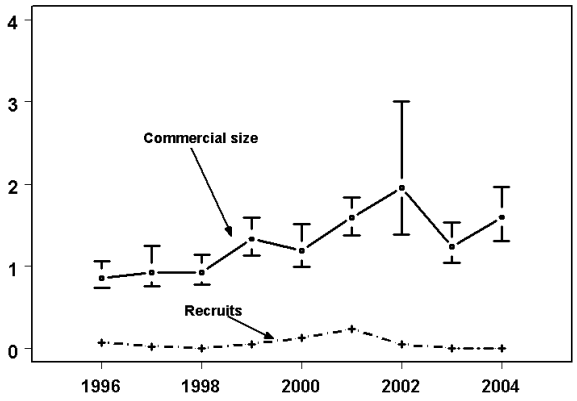
One tow with a large number of clappers was made in the Lurcher Shoal area just to the north of the area where a similar large tow was made in the 2003 survey. Fewer clappers were caught in the 2004 survey for SPA 3 than in the 2003 survey.

Survey no./tow of clappers (all sizes)



Mean weight per tow from the **RV survey** indicated that the biomass of commercial size scallops declined after 2002, but remains near or above the average for the nine-year series (1.3 kg/tow). There appears to be little recruitment for 2005.

Survey biomass index (kg/tow with 95% confidence intervals)



A population model similar to that used for the 8–16 mile Digby Area of SPA 1 and SPA 4 was used to analyze survey biomass and commercial catch data from SPA 3. However, with such a short time series, the model lacks the precision to provide reliable forecasts of future population sizes for a given catch in the current year. This model was not used to evaluate stock status. Stock status was determined by survey indices.

Outlook

There are no reference points for this fishery. Based upon the survey trends, the population appears to be stable at the 150 to 200 t catch level with the possibility of an above average 2003 year-class that could recruit to the fishery in 2007.

Management Considerations

Objectives and associated reference points are being developed through discussions between DFO and industry. Acceptance of a reference level biomass as a management strategy implies a positive relationship between that reference level and future recruitment success. Such a relationship

has not yet been satisfactorily established. Industry considers that such a strategy can increase the risk of episodic die-offs, especially at high scallop densities. Implementing research and monitoring aimed at establishing the relationship between scallop biomass and recruitment both within current SPAs and within the Bay of Fundy meta-population as a whole is essential. In addition, research and monitoring programs focussed on determining the conditions resulting in episodic die-offs is warranted.

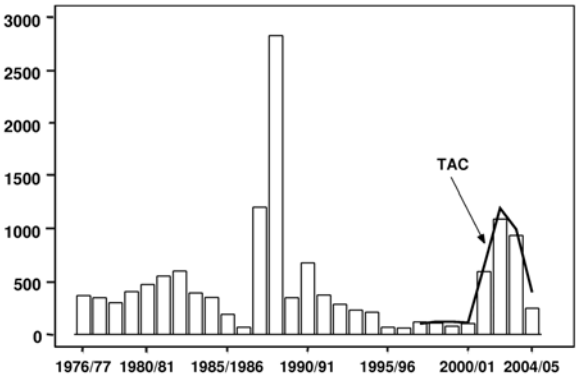
In order to maximise yield-per-recruit, the impact of fishing practices on the mortality of recruits and pre-recruit scallops needs to be investigated.

SPA 4 – Digby

The Fishery

Landing data in what is now SPA 4 are available from 1976 to 2004. The season extends from 1 October to 30 April. In 2004, the season was temporarily extended to May 14.

Landings (meats, t)



Landings steadily declined from 1991 to 1995 as the remnants of large year-classes (1984, 1985) were fished down. Portions of what is now SPA 4 were closed in 1995 and 1996. The increase in landings starting in 2001 was due to the strong 1998 year-class recruiting to the fishery. A total of 945 t was landed against a TAC of 1000 t in 2003/2004. Reasons for the total TAC not being caught include unallocated quota due to ongoing negotiations with First Nations.

An interim TAC of 400 t was set in September 2004 for the 2004/2005 season. Landings as of 29 November were 278 t.

Landings (meats, t)

Season	Avg. 1997–00	2001-2002	2002-2003	2003-2004	2004-2005
TAC	112	650	1200	1000	400[1]
Landings	100	598	1097	945	278*

[1] Interim TAC.
* preliminary as of 29 November 2004.

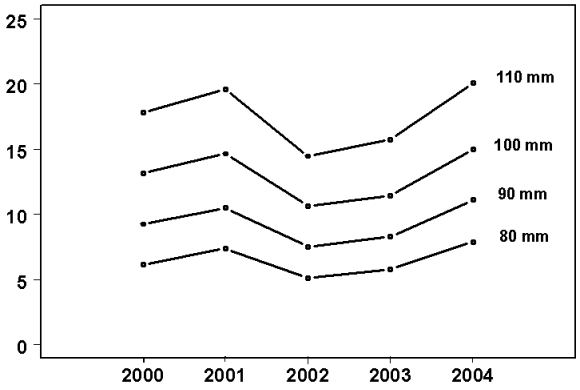
Total **effort** (hours) was low in 1995/96 and 1996/97, due to the closures in the Inside Zone, but effort in SPA 4 increased thereafter until 1998/1999. In 2000/01, effort was at its lowest level in 26 years. Current levels of effort are at the second highest in the series.

Effort ('000 h)

In October 2001 fishing was restricted to the Digby Gut up the Bay to Parkers Cove to protect the abundant 1998 year-class. As this year-class grew and recruited to the fishery, fishing occurred throughout area 4.

Average meat weights in the catch increased from 14.2 g in October 2003 to 17.3 g in April 2004. The average percentage of meats from port samples weighing less than 8 g averaged around 2% over this time period. Meat yields had declined in 2002 and 2003, but have improved in 2004 to be above average.

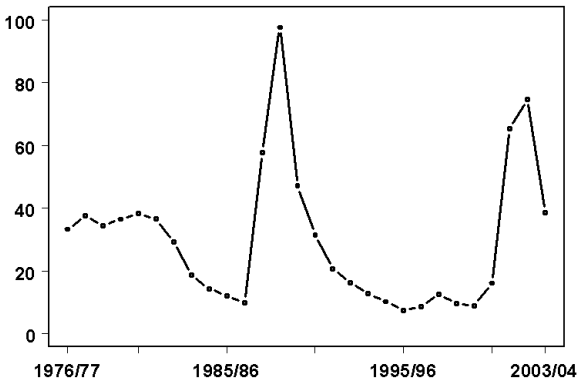
Meat yield (g)



Resource Status

The average **commercial catch rate** decreased in the 2003/2004 season (38.6 kg/h) over the 2002/2003 season (74.7 kg/h), but was still above average for the time series. Catch rates from October 2004 averaged 28.9 kg/h.

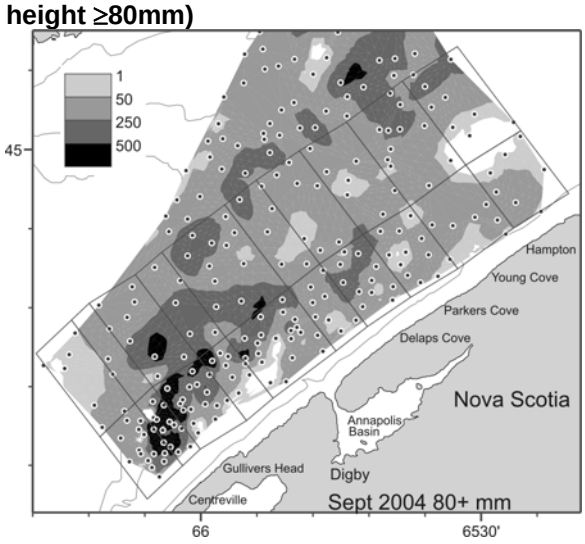
Catch rate (kg/h)



Research vessel (RV) surveys, using a consistent stratified random design, have been conducted since 1991. Prior to 1991, surveys had been stratified according to the spatial pattern of the current year's commercial catch rate. Up to 2003 the surveys have been conducted in June every year, but the expanding distribution of lobster traps in the area necessitated rescheduling the survey to August in 2004. However, survey vessel mechanical problems resulted in the survey being conducted in September.

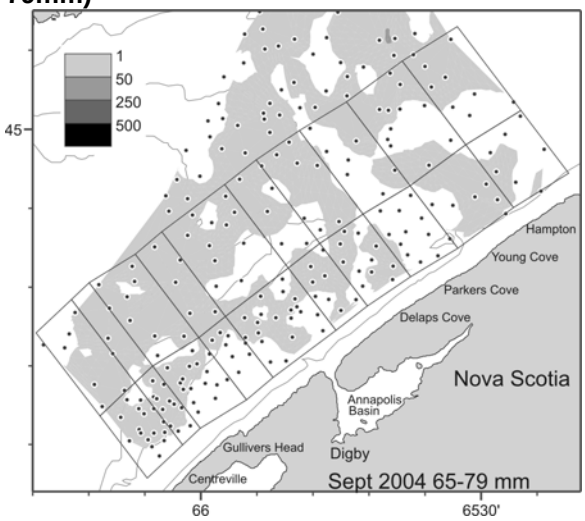
In 2004, densities of commercial size scallops (shell heights ≥80 mm) in the survey decreased as the 1998 year-class was fished down. The highest densities continue to be in the Gulliver's Head to Delaps Cove area and extend into SPA 1.

Survey no./tow (commercial size: shell height ≥80mm)



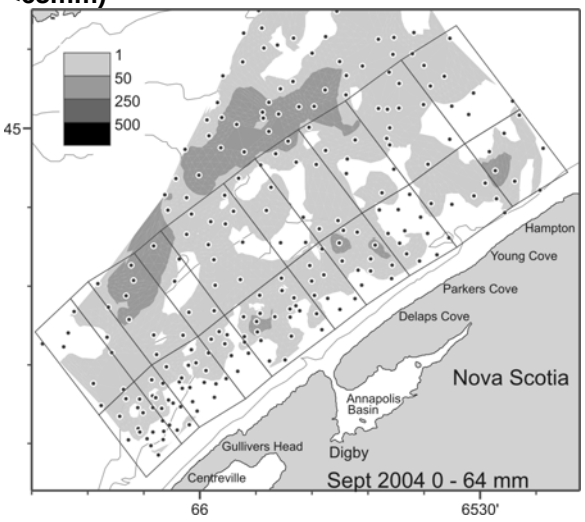
In the 2004 survey, scallops expected to recruit (shell heights 65 to 79 mm) in the 2004/2005 season occurred in most places at below average densities.

Survey no./ tow (recruits: shell height 65 to 79mm)



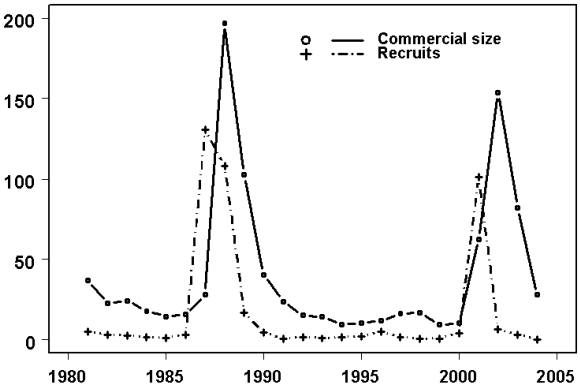
Densities of pre-recruits (shell height < 65 mm), expected to recruit in 2005/2006) were found in below average densities throughout the area. Survey estimates of this size class are qualitative at best because of catchability problems.

Survey no./tow (pre-recruits: shell height <65mm)



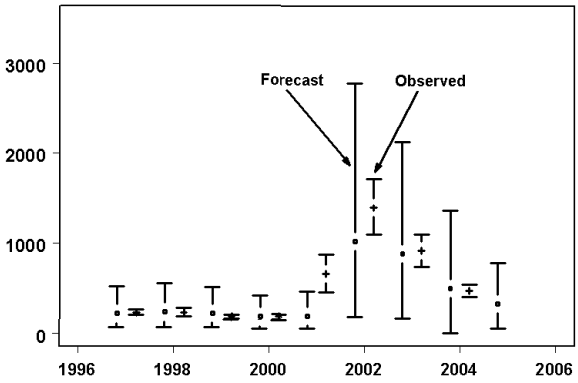
The survey index for numbers of commercial size scallops in 2004 was less than one half of the 2003 index. Subsequent year-classes have been less than 10% the size of the 1998 year-class.

Survey population numbers (millions)



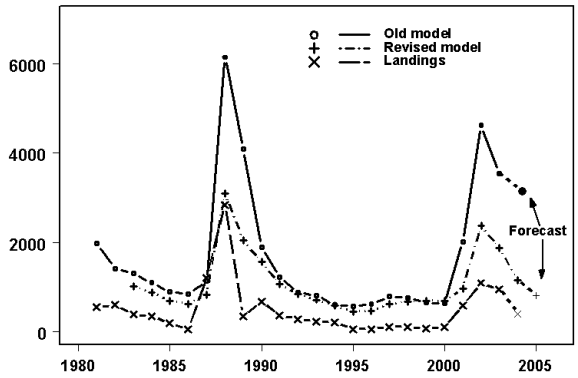
The population model developed two years ago was used to analyze the survey and commercial catch data and estimate natural mortality and population biomass. The model was revised in 2004 improving its ability to forecast population size for the following year.

Forecast of next year's survey index (new model; meats t)



The revised model has resulted in population biomass estimates that are considerably lower for the peak periods than the old model. The two models provide very similar estimates of population biomass during low abundance periods.

Population biomass (commercial size; meats, t)



This population has seen catastrophic natural mortality in the past, but current estimates of natural mortality remain low.

Sources of Uncertainty

Joint industry/DFO monitoring of clapper trends on a bimonthly basis was initiated in the fall of 2000 and no signs of increasing natural mortality have been detected. However, the underlying reasons for mortality events are unknown.

Projections of biomass require estimates of natural mortality for the following year which is impossible to predict and instead estimates from the current year are used.

In 2001, scallops of all sizes exhibited higher than expected growth rates, resulting in the projected biomass for 2002 being underestimated. However, this growth rate declined over all size classes in 2002 and 2003. Growth rates in 2004 were similar to those in 2001 and higher than the average over the series for which data is available (1996 to 2004). At this time it is not possible to predict growth rates into the next year and hence, biomass projections have to assume average growth based on the available data.

Outlook

Currently, an interim TAC of 400 t has been set for the 2004/2005 season. Population biomass and commercial catch rates are expected to decline over the next two years as there is expected to be below average recruitment over this time period.

Management Considerations

Objectives and associated reference points are being developed through discussions between DFO and industry. Acceptance of a reference level biomass as a management strategy implies a positive relationship between that reference level and future recruitment success. Such a relationship has not yet been satisfactorily established. Industry considers that such a strategy can increase the risk of episodic die-offs, especially at high scallop densities. Implementing research and monitoring aimed at establishing the relationship between scallop biomass and recruitment both within current SPAs and within the Bay of Fundy meta-population as a whole is essential. In addition research and monitoring focussed on determining the conditions resulting in episodic die-offs is warranted.

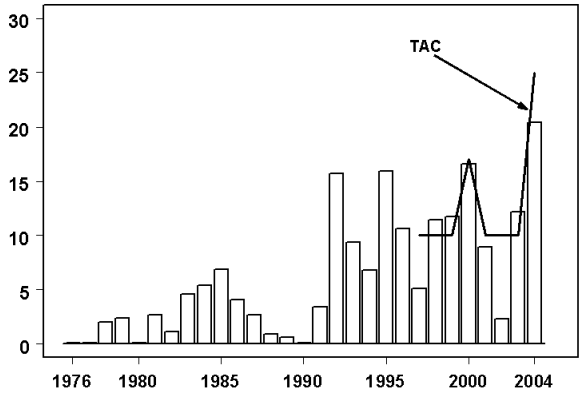
In order to maximise yield-per-recruit, the impact of fishing practices on the mortality of recruits and pre-recruit scallops needs to be investigated.

SPA 5 – Annapolis Basin

The Fishery

This is a small fishery with a season running from 1 January to 31 March. In recent years, landings have varied between 2 and 20 t.

Landings (meats, t)



Landings dropped in 2002 to 2.3 t mainly due to increased effort directed to SPA 4 in the winter. Increased landings in 2003 and 2004 were due to strong recruitment of 1999 and 2000 year-classes.

Landings (meats, t)

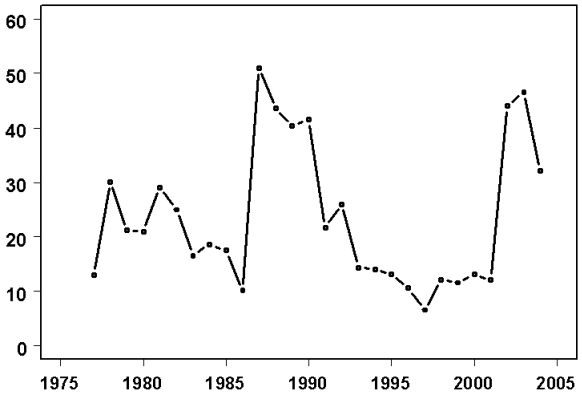
Season	Avg. 1997–00	2001	2002	2003	2004
TAC	11.8	10	10	10	25
Landings	11.2	8.9	2.3	12.2	20.4

Meat weights remained high (>21 g) during the 2002 and 2003 seasons despite the strong recruitment occurring at the same time. No samples were collected during the 2004 season.

Resource Status

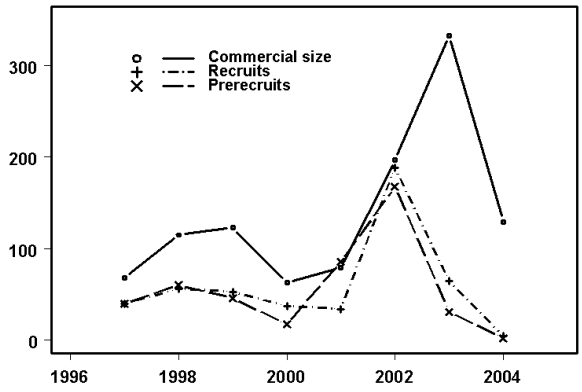
Average **catch rate** in 2004 (32.1 kg/h) was lower than that observed in 2003 (46.5 kg/h), but was still above average relative to the time series since 1991.

Catch rate (kg/h)



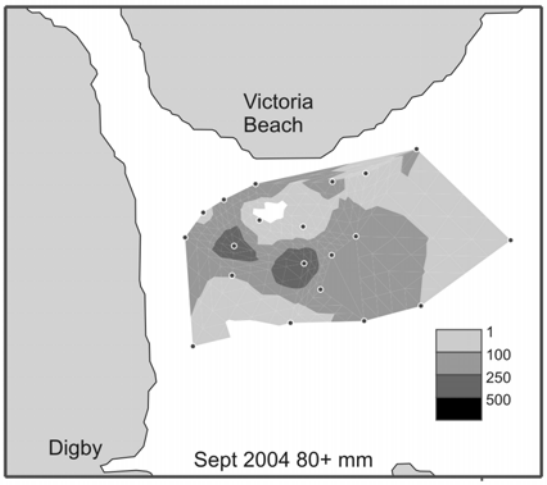
Research vessel (RV) surveys have been conducted on a regular basis in Annapolis Basin every June in conjunction with the SPA 1 and 4 surveys since 1997. The rescheduling of these surveys in 2004 to August and then to September resulted in the SPA 5 survey also being conducted in September. The mean numbers per tow for commercial size scallops in the 2004 survey indicated that the population had declined from 2002 and 2003 as the strong 1999 and 2000 year-classes were fished down. The survey indices for the recruits from the 2001 and 2002 year-classes are below average and at the lowest level seen in the survey series.

Survey mean no./tow



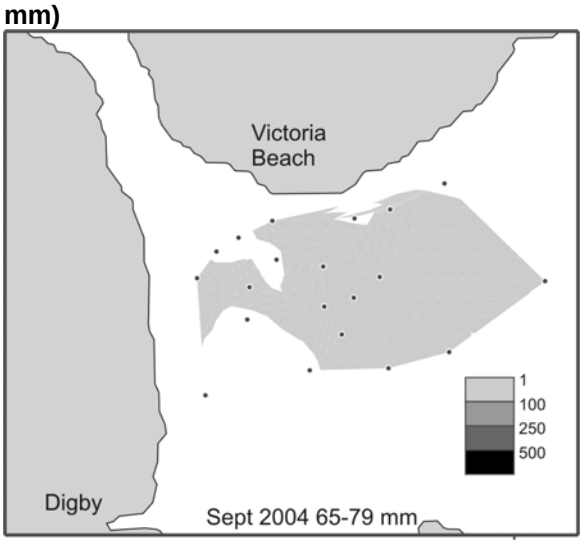
Small concentrations of medium densities of commercial size scallops were observed, but densities were below average over most of the area.

Survey no./tow (commercial size: shell height ≥80 mm)



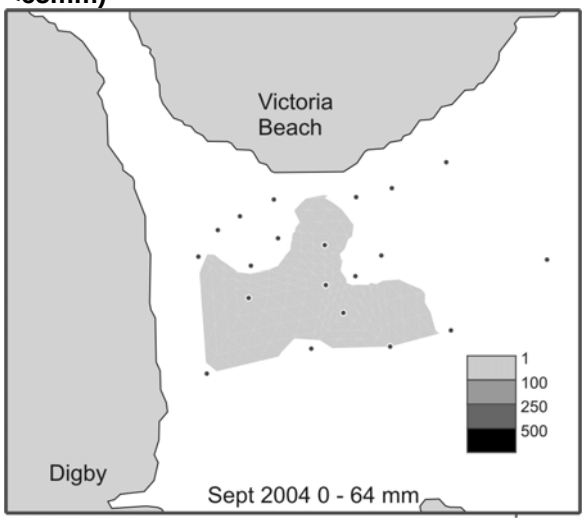
Scallops of the 2001 year-class were widespread but no areas of average to above average densities were observed in the survey.

Survey no./tow (recruits: shell height 65 to 79 mm)



The distribution of prerecruits (shell height <65mm, probably 2002 year-class) was limited and they were not caught in most of the survey tows.

Survey no./tow (pre-recruits: shell height <65mm)



Outlook

Currently no population model has been developed for this SPA. Based on the survey the stock is relatively healthy, but there is expected to be little recruitment for the next two seasons. The TAC for 2005 should not exceed the average over the low abundance periods (1997 to 1999) of 10 t.

Management Considerations

Objectives and associated reference points are being developed through discussions between DFO and industry. Acceptance of a reference level biomass as a management strategy implies a positive relationship between that reference level and future recruitment success. Such a relationship has not yet been satisfactorily established. Industry considers that such a strategy can increase the risk of episodic die-offs, especially at high scallop densities. Implementing research and monitoring aimed at establishing the relationship between scallop biomass and recruitment both within current SPAs and within the Bay of Fundy meta-population as a whole is essential. In addition research and monitoring focussed on determining the conditions resulting in episodic die-offs is warranted.

In order to maximise yield-per-recruit, the impact of fishing practices on the mortality of recruits and pre-recruit scallops needs to be investigated.

SPA 6 – Grand Manan and Southwest New Brunswick

The Fishery

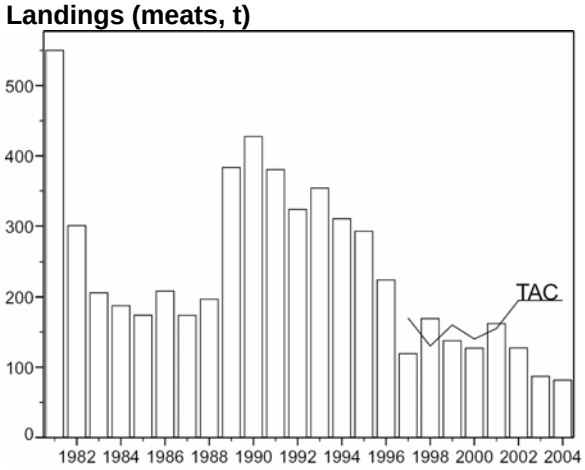
The areas around Grand Manan and off southwest New Brunswick are designated SPA 6. This area is further divided into the Grand Manan Island inside zone (SPA 6B), the New Brunswick inside zone including the Wolves and Campobello Island (SPA 6C), and the outside zone (SPA 6A).

Landings (tonnes of meats)[1]

Year	Avg. 1997-00	2001	2002	2003	2004
TAC	150	155	195	195	195
Landings	150	161	128	89	81

1. Landings not available by SPA prior to 1997

Landings (meats, t)



The 2004 SPA 6 quota for the Full Bay fleet was 50 t. Full Bay landings by area for 2004 were 3.9 t, 0.6 t and 3.70 t for SPA 6 A, B and C respectively. This fleet had not caught its quota because it had redirected its effort to the other areas in 2004.

The 2004 quota for the Mid Bay fleet was 145 t. This was split 105 t for the winter fishery (Jan–Mar), and 40 t for the summer fishery (Aug–Dec). Mid Bay landings for 2004 by area were 35.2 t, 14.5 t and 23.6 t

for SPA 6A, B and C, respectively. There are still problems with late submissions of monitoring documents.

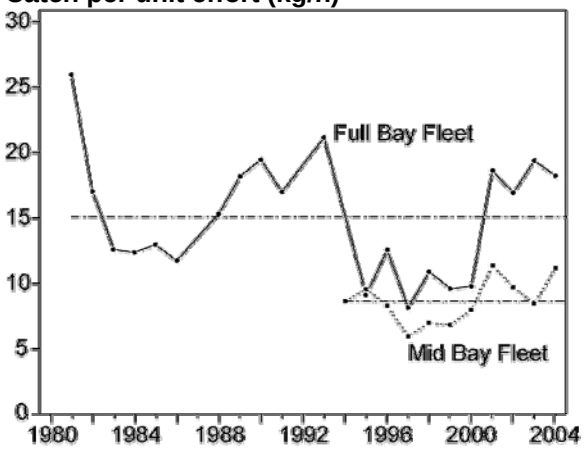
On August 2, 2004 the remaining Mid Bay quota for SPA 1 and 6 were combined and allowed to be taken in any part of the two SPAs that were open. SPA 6 was also restricted to fishing between 6 AM and 6 PM Monday to Friday. It was closed to Mid Bay vessels on August 31 and to Full Bay vessels on October 1. All but 0.5 t of the 70 t of SPA 6 quota remaining on August 2 was taken in SPA 1.

The meat weight sampling program provided information on the sizes of scallops being landed, and is used to monitor the proportion of meats less than 8 and 11 g in the catch. Port samples in 2004 indicated that the fishery had less reliance on scallops with meats less than 8 g than it has had in the past.

Resource Status

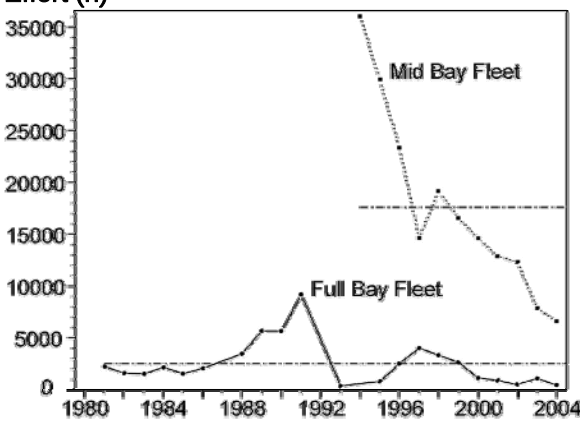
Due to research vessel problems there was no DFO survey in SPA 6 in 2004. Without a **RV survey**, the only basis for advice is catch rates and meat weight sampling. **Commercial catch rates** for both fleets remain above median levels.

Catch per unit effort (kg/h)



However, the relationship between CPUE and abundance may be biased by the continuous decline in effort.

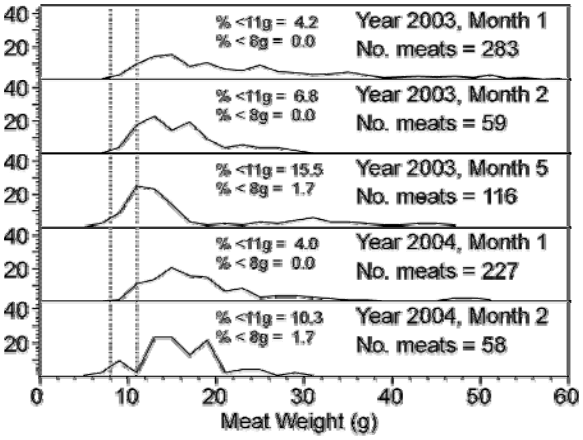
Effort (h)



Neither the meat weight samples to 2004 nor the RV survey to 2003 show any signs of an above average recruitment in SPA 6.

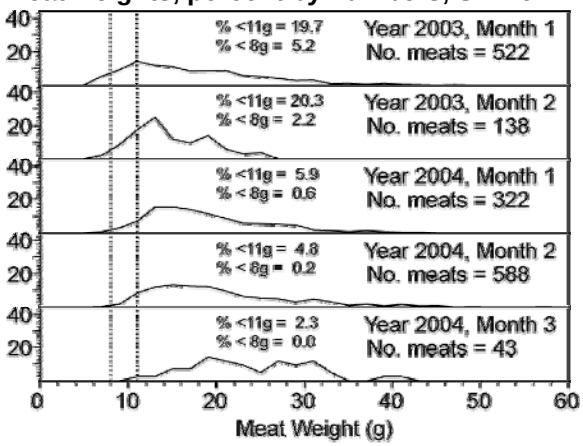
Meat weight sampling in 2003 and 2004 showed that the fishery in 6A is mainly relying on scallops with meat weights larger than 11g.

Meat weights, percent by numbers, SPA 6A



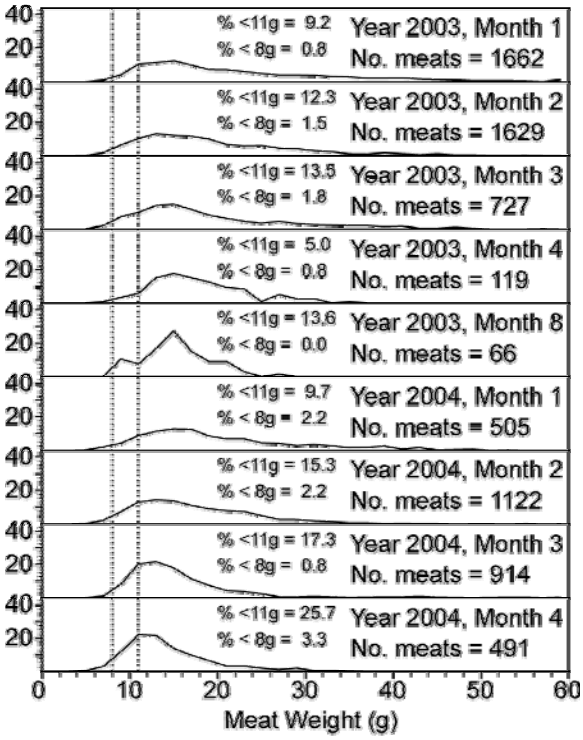
There were scallops with meat weights less than 8 g being taken in SPA 6B by the fishery early in 2003, perhaps the year-class observed later in the year in the 2003 survey, but in 2004 the fishery relied on larger scallops.

Meat weights, percent by numbers, SPA 6B



The fishery in 6C has had a higher percentage of scallops with meats less than 11g than in the other areas, and this percentage increased in the landings in March and April of 2004.

Meat weights, percent by numbers, SPA 6C



Outlook

Meat weight sampling and the research vessel surveys to 2003 show little signs of good recruitment and a stock of fully recruited scallops that is being fished down. The lack of effort in these areas during the summer fishery suggests that recruitment during 2004 was not significant. Catch rates will remain steady in 2005 if effort remains low.

The population appears to be stable with removals in the range of 80 to 160 t per year.

Management Considerations

Improvements should be made so the non-ITQ fleet monitoring documents are received and entered in the quota monitoring system in a timelier manner.

Objectives and associated reference points are being developed through discussions between DFO and industry. Acceptance of a reference level biomass as a management strategy implies a positive relationship between that reference level and future recruitment success. Such a relationship has not yet been satisfactorily established. Industry considers that such a strategy can increase the risk of episodic die-offs, especially at high scallop densities. Implementing research and monitoring aimed at establishing the relationship between scallop biomass and recruitment both within current SPAs and within the Bay of Fundy meta-population as a whole is essential. In addition research and monitoring focussed on determining the conditions resulting in episodic die-offs is warranted.

In order to maximise yield-per-recruit, the impact of fishing practices on the mortality of recruits and pre-recruit scallops needs to be investigated.

For more Information

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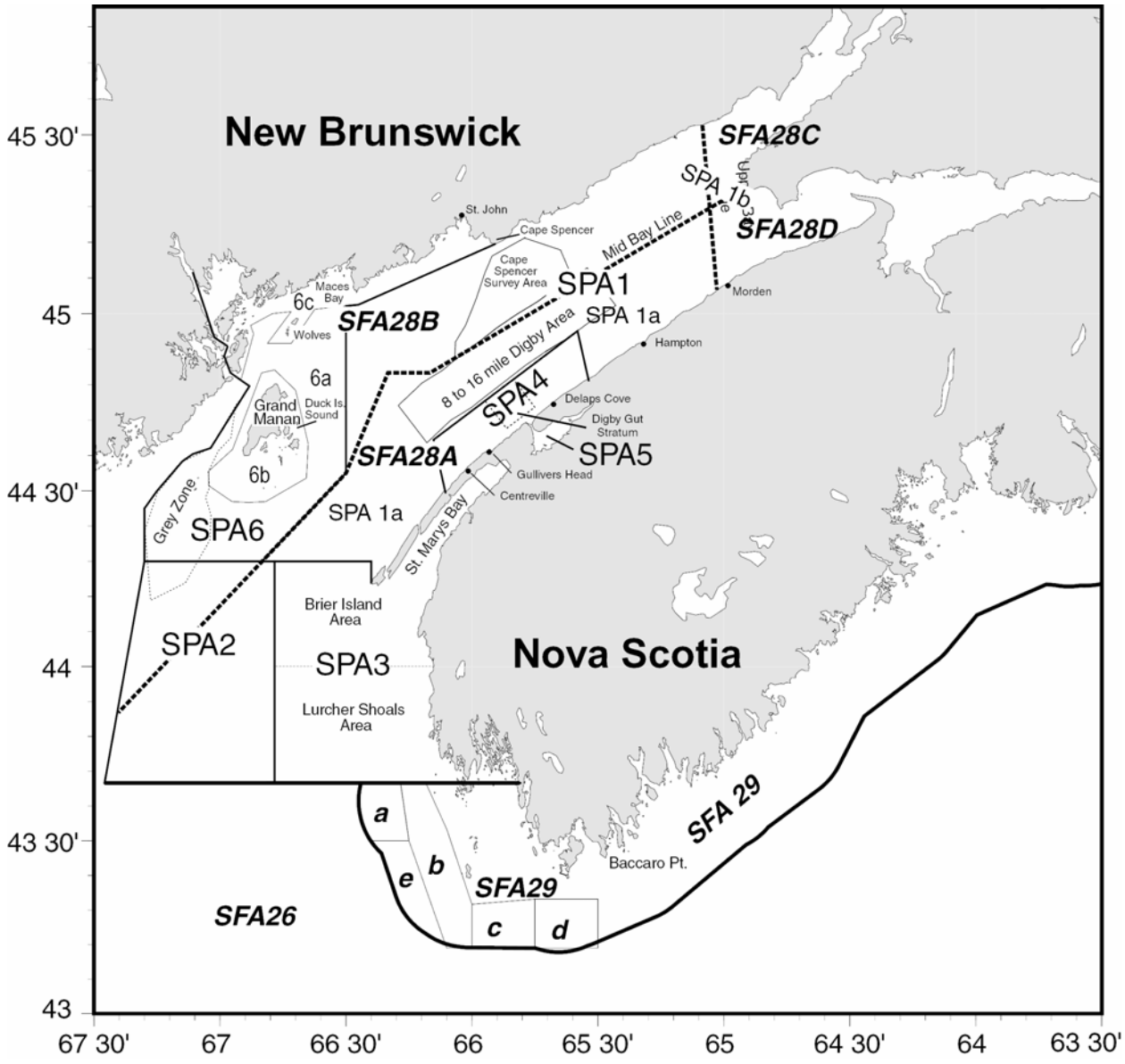

Locations and Place Names used in this Stock Status Report