

DIGBY SCALLOP

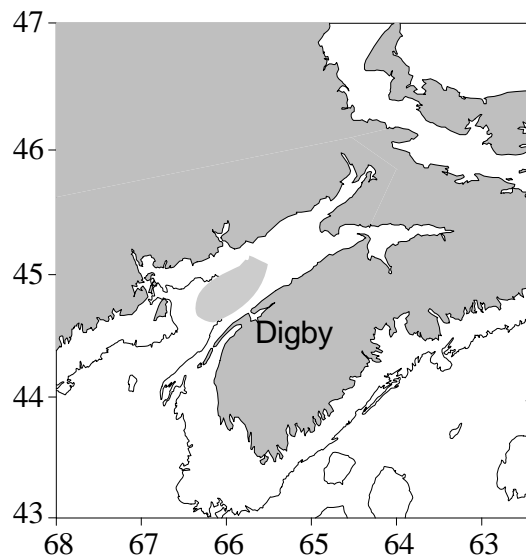
Background

The sea scallop *Placopecten magellanicus* occurs only in the northwest Atlantic Ocean from Cape Hatteras 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 along the Nova Scotian coast. Scallops in different beds, and in different areas of large beds, show different growth rates and meat yields. The Digby beds have been persistent at least since the 1920s and are thought to be self sustaining. Until recently, most of the scallop harvest in the Bay of Fundy came from these beds.

Unlike many commercial scallop species, the sea scallop has separate sexes. Male scallops develop a white gonad in the summer months, while females 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 commercial fishery in the Bay of Fundy, as we know it today, began in 1920. The pioneers of the scallop fishery were Digby fishermen J. W. Hayden, Roland Wormell and Arch Amero, fishing from a 36' sloop, 14' in the beam with 11 horsepower and equipped with one drum and a head for hauling their drag and hoisting it on deck. Today, three license sectors fish the Bay, with the 99 Full Bay license holders landing the bulk of the catch. These vessels are between 45' and 65', and tow 7 to 9 Digby buckets off the starboard side.

This industry is a competitive fishery, with limited entry, gear size, seasonal closures, minimum shell height and meat count restrictions. However, these measures have not effectively controlled effort.

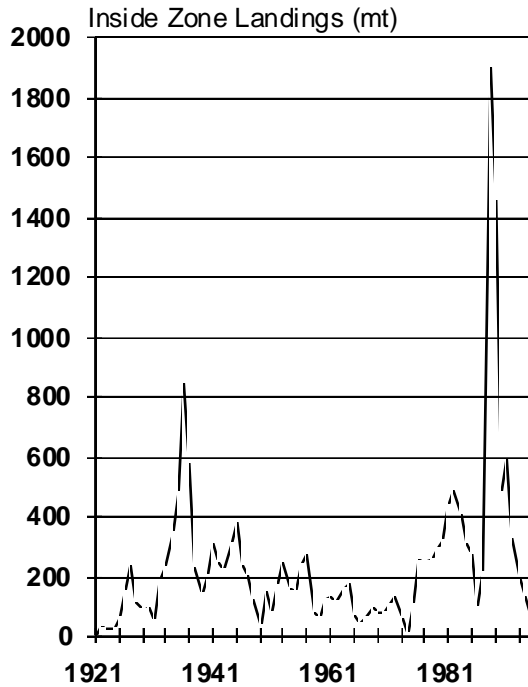


The Fishery

The Digby scallop beds are **managed** according to seasonal zones. The Inside Fishing Zone encompasses an area less than 6 miles from shore, (from Parker's Cove to Centreville) and is closed from May 1 to September 30. The remaining beds are unrestricted and are referred to as the Outside Zone. In 1995, the Inside Zone and an extended area from Parkers Cove to Port Lorne were closed on August 12, to protect broodstock and the pre-recruit scallops. Licenses are limited to 99, however in 1995, only 94 vessels participated in the fishery. Fishing days were restricted to Monday to Friday from August 11, 1995 to October 2, 1995 in all areas. The regulation meat count was 55 meats/500g from October 1, 1994 to April 30, 1995; 72 meats/500g from May 1, 1995 to June 30, 1995; 50 meats/500g from July 1, 1995 to July 1, 1996. The Science recommendation was 30 meats/500g which would target fully recruited scallops. The regulation minimum shell height was 76 mm. These measures have little control on fishing effort, and with 54 license holders having groundfish licenses, effort has increased as a result of changes in that fishery.

Landings decreased each year from 1990 through to 1995 and currently are at a very low level. Historical landings for the Inside Zone are available since 1921, however, landing for the Outside Zone are not reliably estimated prior to 1980.

Available from: Maritimes Regional Advisory Process, Department of Fisheries and Oceans, P.O. Box 1006, Stn B105, Dartmouth, Nova Scotia, Canada B2Y 4A2 Telephone: 902-426-8487 Email: d_geddes@bionet.bio.dfo.ca.

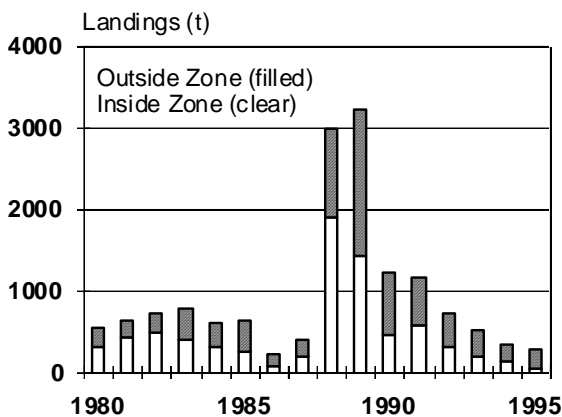


Landings (metric tons meats)

Year	81-87		88-91		1992	1993	1994	1995**
	Avg	Avg	Avg	Avg				
Total*	581.0	2158.7	721.7	531.4	361.4	290.9		

* Full Bay Licenses Only ** preliminary

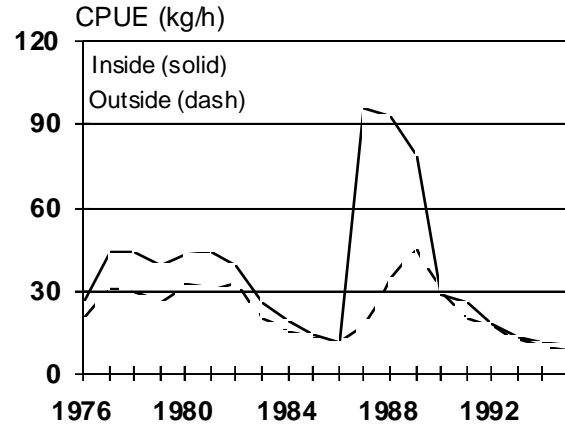
Landings in both the Inside and Outside Zone were lower in 1995, but a large portion of the decline is due to the closure of the Inside Fishing Zone. While Outside Zone landings were relatively stable, Inside Zone landings were only 53% of 1994 values.



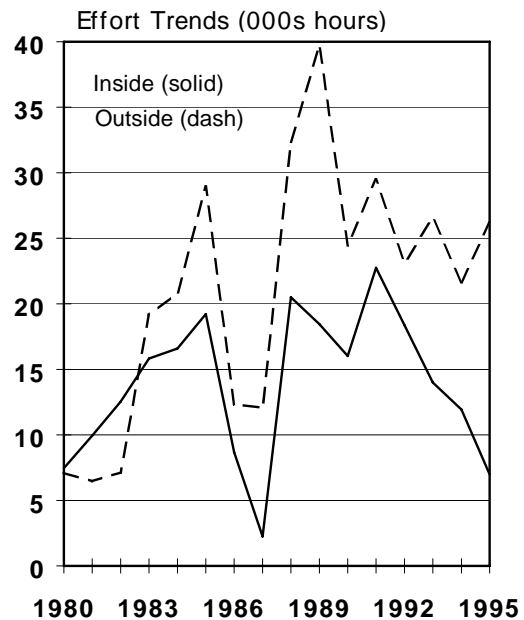
Resource Status

Fleet activity is monitored through logbooks, sales slip records and port sampling information. Logbook compliance has been poor (13%) in the recent past (1990), but is now at 77%, a decrease from 87% in 1995. Data from research vessel surveys are also used to assess scallop stocks.

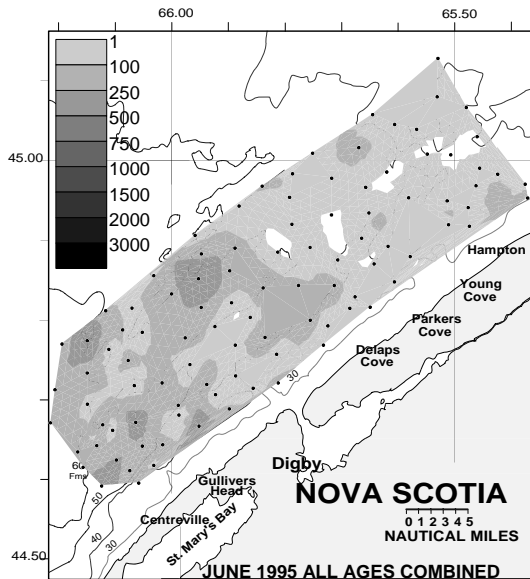
Catch per unit effort (kg meat per hour towed) was the lowest on record in 1995 in both zones.



Effort was higher in the Outside Zone in 1995 compared to 1994, while effort in the Inside Zone fell sharply with the extended closure of this zone. Note that the Inside Zone fishery is normally of 7 months duration, while the Outside Zone is fished year round.



Annual stock assessment **surveys** have been conducted in June, using the research vessel, *J.L. Hart*. Survey stations were randomly assigned according to one of three areas which were originally defined according to commercial catch levels. The number of stations per strata reflect the relative geographic area of each stratum.

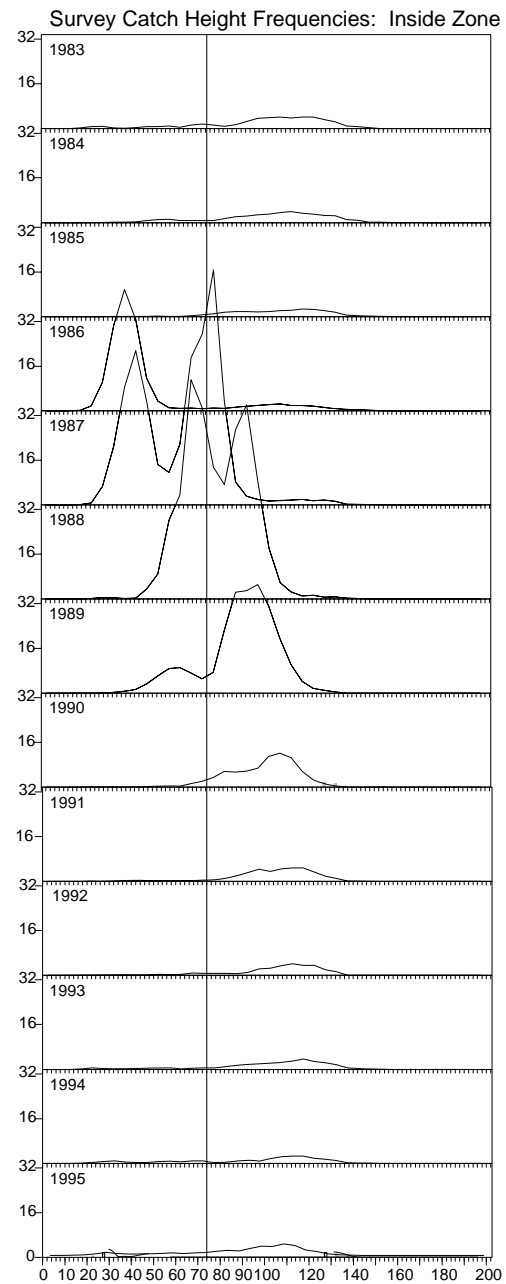


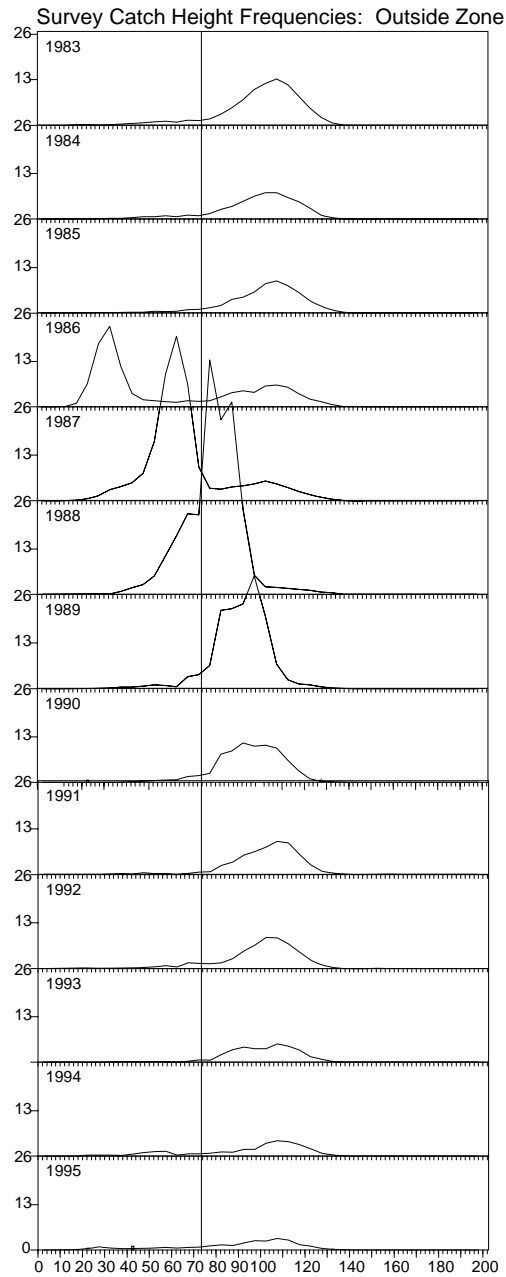
Scallop **abundance** of recruited year classes remains very low, but has not declined substantially from the 1994 survey estimates. The adult scallops are generally more abundant in the Outside Zone. Overall, densities of 1-100 animals per standard tow were common north of Digby Gut, while slightly higher densities (100-250) were found south of Digby Gut. This is in sharp contrast to the peak of the fishery (1989-90) where over 2000 animals per standard tow were harvested.

The number of **pre-recruits** is the largest we have detected since 1990, however, the magnitude and distribution of pre-recruits in the Digby area is not comparable to the large numbers seen from 1986-1989. This pre-recruit year class (1993) is predominant in the Inside Zone off Gullivers Head and Centreville, but extends upstream to Delaps Cove.

High mortalities of these pre-recruit scallops were seen in the Inside Zone from Gullivers Head to Delaps Cove, and in the Outside Zone off Digby. These mortalities, as identified by clapper shells, are attributed to starfish predation, as several fishermen observed the starfish feeding prior to the survey. The concentrations of age three scallops (1992 year class) in the Outside Zone off Digby were detected in the

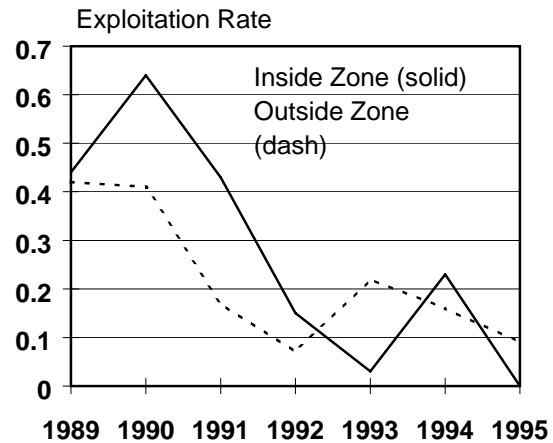
1994 survey. Overall, there is little evidence of pre-recruit scallops above Delaps Cove. The absolute number of scallops caught in the surveys are illustrated below.





Exploitation rates were calculated for each zone (1988-1995) from the survey numbers, assuming a natural mortality of 0.1 throughout. From 1988 to 1992 all animals were included; from 1992 to 1995 only recruited scallops over 80mm were included. Average exploitation rate through this timeframe was 0.22 for the Outside Zone, assuming a natural mortality of 0.1. In 1989, natural mortality was higher than normal in the Inside Zone, and so the average exploitation rate for the Inside Zone was calculated as 0.21 for the years 1990 to 1994 inclusive. Exploitation rate was higher than average in 1988 and 1989 in both zones, with a peak exploitation rate of 0.64 in 1988 to 1989 in the Inside

Zone. In 1995, there was no detectable exploitation of the recruited scallops in the Inside Zone (due to closure) and exploitation rate was 0.09 in the Outside Zone.



Regarding sources of **uncertainty**, there is a low sampling rate of the commercial catch with a bias towards data from only 2 vessels. Log data has also been poor in the recent past and as logbook records are used to assign the catch to fishing area, the landings attributable to different beds have an uncertainty associated with them. Log records were particularly sparse in 1990.

Retrospective analysis of the data shows that error in the current year appears to result in an underestimate of biomass, which would result in a conservative stock estimate. The minimum spawning stock necessary to sustain recruitment is unknown for this species, however the current low densities are of concern in this regard.

Outlook

There is particular concern at this time that all of the Bay of Fundy beds are at low abundance. All of the major spawning aggregations in the Bay of Fundy are at very low population levels. This raises concern for **recruitment overfishing**.

None of the current management regulations have been effective in controlling effort. In order to prevent recruitment overfishing, it is necessary to close large areas of the scallop beds. These closed areas will provide on-going broodstock supply. To prevent growth overfishing, closure of the remaining portion of the beds could be managed on a rotational basis dependent upon the pattern of recruitment.

For More Information

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