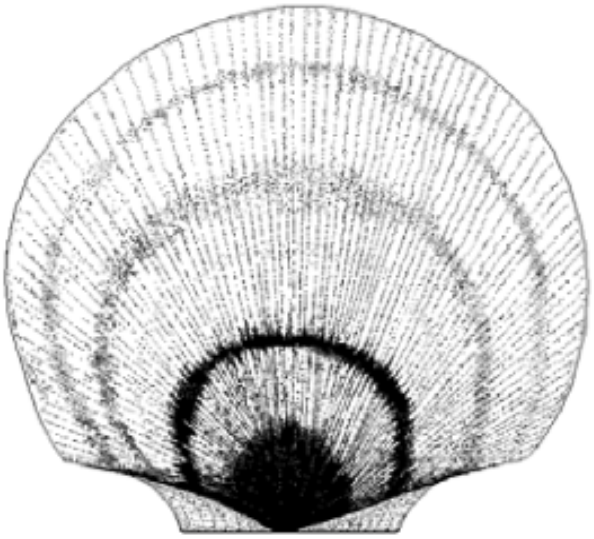
AN ASSESSMENT OF SEA SCALLOP ON ST. PIERRE BANK (SUBDIVISION 3Ps)



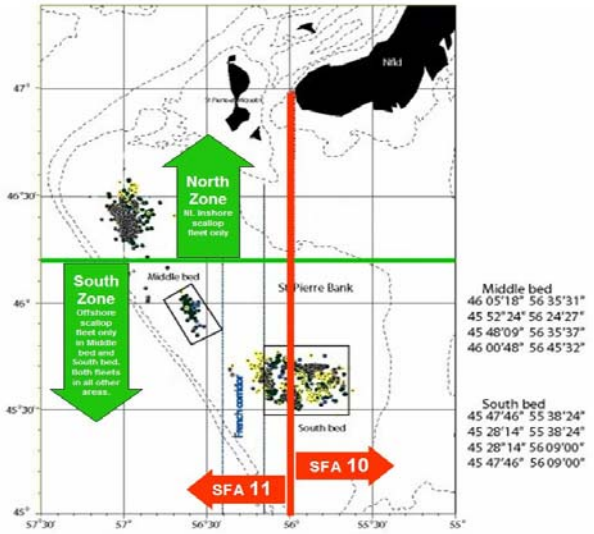


Figure 1: St. Pierre Bank showing the three main Sea Scallop beds and the Hooley recommended fleet separation zones.

Context

The directed fishery for Sea Scallops (Placopecten magellanicus) started on St. Pierre Bank in the late 1970's. Populations on St. Pierre Bank are mainly found in three beds at depths from 40-100m. They are usually found on hard bottom, with variable substrate composition, consisting largely of sand, gravel, shell fragments, and stones. The Sea and Iceland Scallop distributions overlap to varying degrees with complete overlap in the Middle bed, and a high degree of overlap in the North bed. A large area in the southern portion of the South bed, with a sandy substrate, is inhabited only by Sea Scallops.

Prior to 2006 the fishery was managed by TAC and meat count regulations applied to the offshore fleet, but not to the inshore fleet. In 2006, following the recommendations of the Hooley Report, specific fishing areas and TACs were applied to each fleet (Fig. 1). Joint TACs have been in place for the St. Pierre Bank since.

A Canadian research survey was completed in September, 2010. This is the first assessment of the resource under the Regional Advisory Process (RAP). However, the last scientific information was relayed via the Science Special Response Process in 2007. A Regional Advisory Process (RAP) was convened during Feb. 28 - Mar. 11, 2011 in St. John's, Newfoundland and Labrador to assess Sea Scallop on the St. Pierre Bank (Subdivision 3Ps). There is no assessment schedule for this resource.

SUMMARY

- This is a pulse fishery with peaks in 1982, 1988 and 2004. Since 2005 **landings** have ranged between 300 t and 800 t (in 2010).

- A Canadian research survey in September 2010 resulted in a minimum dredgeable **biomass** estimate of 7,500 t, the lowest since 2005. The majority of the biomass is in the North bed.

- The biomass is currently predominated by a modal group of larger scallops (130 mm) in the North and South beds with a secondary mode of smaller recently-recruited scallops (90 mm).

- **Recruitment** prospects are unknown.

- The reduction in biomass was mainly due to a dramatic reduction in the Middle bed after 2005. The Middle bed should be closed until a new recruitment pulse appears and contributes to the exploitable biomass.

- Meat quality in the larger-sized scallop in the North and South beds is expected to deteriorate and natural mortality to increase. Under this scenario the remaining exploitable biomass could be harvested.

INTRODUCTION

Species Biology

The Sea Scallop (*Placopecten magellenicus*) is confined to the Northwest Atlantic, and ranges from the Northern Gulf of St. Lawrence to Cape Hatteras, North Carolina. It is normally found in waters between depths of 10 – 100 m. Fishable aggregations are found from the Virginia Capes to Port au Port Bay, NL with Georges Bank off Nova Scotia being the world's largest producer of Sea Scallops. The Sea Scallop fishery on the St. Pierre Bank is a pulse fishery, largely dependant on sporadic recruitment; they begin to recruit to the fishery at about age 4. Sea Scallops are found on highly variable substrates. On St. Pierre Bank, they are generally found on fine and coarse sand, gravel, small rocks and shell fragments. The Sea Scallop is a filter-feeder, consuming plankton and detritus, and is associated with areas of strong currents. Unlike many species of scallops, this species is gonochoric, having one of two distinct sexes for its lifetime. Sea Scallops can become sexually mature as early as age 1 but their first spawning does not occur until their second year at a shell height ranging from 23–75mm. Spawning in Newfoundland waters begins in July and may be initiated by changes in temperature, food supply and current speed. Eggs are externally fertilized and larvae are planktonic for 35-45 days before settling to the bottom, possibly at considerable distances from the spawning adults, depending on currents. Sea Scallops have been known to live up to 21 years. Adults commonly reach shell heights between 100 – 150 mm, but have been found at sizes greater than 200 mm.

ASSESSMENT

The Fishery

Annual **landings** of Sea Scallop from St. Pierre Bank have been highly variable (Fig. 2), as is typical of 'pulse'-type fisheries. Directed fishing started in the late 1970's and landings peaked twice in the 1980's, at 6,000 tonnes round weight (t) in 1982 and 10,000 t in 1988. Each of these pulses sustained the offshore fleet for three years. Landings further declined through the early 1990's and removals were less than 500 t until 2003. Landings peaked again in 2004 and 2005 at ~4500 t and 2400 t respectively. Since 2005, landings have ranged between 300 t and 800 t (in 2010).

Following the release of the Hooley report (Hooley 2005) in 2006, the Minister assigned fishing areas based on three known fishing beds on the St. Pierre Bank (Fig 1). The offshore sector was allocated a quota of 195 tonnes of meat south of 46º 12' N (South and Middle beds) while the inshore NL sector was allocated a quota of 105 tonnes to the north. Prior to this decision, the inshore NL fleet fished without a quota and Sea Scallop removals were a by-catch in the Iceland Scallop fishery. Since then, the offshore fleet has withdrawn from the St. Pierre Bank and fishing has been restricted to the North bed by NL inshore vessels. Only 4 vessels fished the North bed in 2010 and they took 90% of quota.

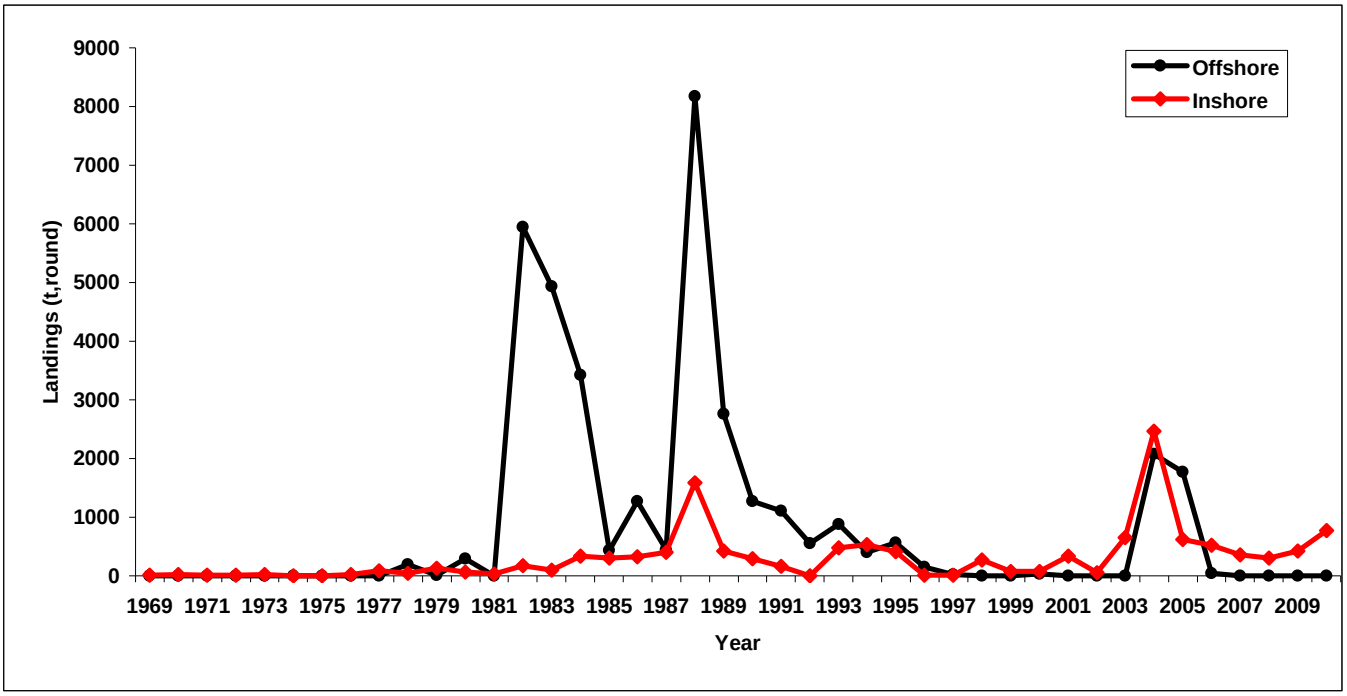


Figure 2: Sea Scallop removals (t,round) from the three main beds on St. Pierre Bank by inshore and offshore fleets

Research Surveys

Resource assessment surveys were conducted in 2003 and 2010 by DFO using the *CCS Wilfred Templeman* and its sister ship the *CCS Alfred Needler* following a stratified random sampling scheme. Stratification was based on beds (Fig. 3). Sets were optimally allocated in proportion to stratum-specific area and variance of the catch rates from previous survey. From

2004 to 2006 the offshore fleet, using the vessel *Cape Keltic,* conducted similar surveys. For this analysis, the survey areas from previous surveys were post-stratified to match the stratification scheme in 2010.

An 8ft New Bedford scallop dredge equipped with 3" rings and interconnected with 2-top and 3-bottom link configuration was used for the five surveys. Standard tow length for the DFO surveys was 0.5nm whereas the Cape Keltic surveys were 0.5 mi. Upon completion of each tow (set) empty scallop shells with non-disarticulated valves ("cluckers") and live scallops were sorted by species. Total catches were enumerated and weighed by species. Biomass estimates were inflated by inclusion of epibionts in the catch weight. However, this bias did not affect trends in biomass. Shell height of scallops was determined from each set based on either the total catch or a sub-sample. In addition, for the DFO surveys, samples were collected from at least one set in each bed to determine biological meat yield (number of meats per 500g) and sea stars were measured and enumerated.

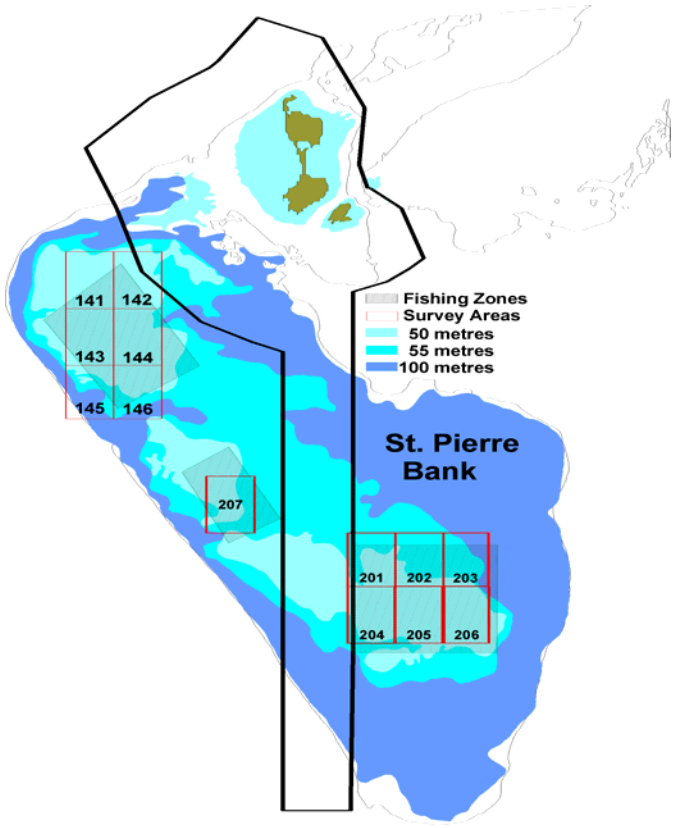


Figure 3: Stratification scheme used in the 2010 DFO survey.

Biomass

A Canadian research survey in September 2010 resulted in a minimum dredgeable biomass estimate of 7,500 t, the lowest since 2005 (Table 1). The North bed made up 55% of the minimum dredgeable biomass (MDB) in 2010 with 40% in the South bed and only 5% in the Middle bed. Biomass estimates over the 5 survey years varied little in the North and South beds, with the exception of the poorly estimated 2004 biomass in the North bed (Table 1). The reduction in overall biomass since 2005 was mainly due to a dramatic reduction (92%) in the

Middle bed. This sharp decrease in the Middle bed cannot be explained by the reported landings of Sea Scallops in 2005 but was associated with a very high level of fishing effort directed for Iceland Scallops by the NL inshore fleet. This likely resulted in high fishery-induced mortality on Sea Scallops. It is believed that a large portion of the fishery removals of Sea Scallops in 2005 was misreported as Iceland Scallops by the NL inshore fleet.

Table 1: Minimum dredgeable biomass estimates and coefficient of variation for the three beds.

Bed/Year	2003		2004		2005		2006		2010	
	Biomass	CV	Biomass	CV	Biomass	CV	Biomass	CV	Biomass	CV
North	2931	0.28	7410	0.52	3635	0.18	4856	0.16	4103	0.35
Middle	1255	0.09	3220	0.26	3047	0.37	243	0.52	330	0.53
South	2119	0.19	3331	0.20	4660	0.17	5223	0.19	3025	0.22
Total	6305		13961		11342		10321		7457	

The biomass is currently predominated by a modal group of larger scallops (130 mm) with a secondary mode of smaller recently recruited scallops (90 mm). This second mode is more evident in the North bed and is reflected in the higher meat count of 21/500g in the North bed versus 12/500g in the south. Future **recruitment** prospects are unknown.

Mortality

The natural mortality index (computed as the proportion of cluckers to live scallops) was relatively low at 5% in 2010. This is associated with low biomass of predatory sea stars.

CONCLUSIONS AND ADVICE

The minimum dredgeable biomass estimate from the 2010 survey was 7,500 t, the lowest since 2005. The majority of the biomass is in the North bed, where there has been some recent recruitment.

The resource has been depleted in the Middle bed. This bed once had comparable biomass levels to the other two beds despite being much smaller in area. The fishery should be closed until a new recruitment pulse appears and contributes to the exploitable biomass. The incentive to misreport has lessened as the inshore fleet is now operating with a quota.

Meat quality in the larger-sized scallop in the North and South beds is expected to deteriorate and natural mortality to increase. Under this scenario the remaining exploitable biomass could be harvested. Reduced fishery-induced mortality on pre-recruits due to reduced fishing effort since 2006 has resulted in a modest improvement in the size structure of the resource.

SOURCES OF INFORMATION

This Science Advisory Report is from the Fisheries and Oceans Canada, Canadian Science Advisory Secretariat, Regional Advisory Meeting of February 28 – March 4 and March 7 – 11, 2011 on Snow Crab in NAFO Divisions 2HJ3KLNO, Subdivision 3Ps and Division 4R; Subdivision 3Ps Whelk and Sea Scallop. Additional publications from this process will be posted as they become available on the DFO Science Advisory Schedule at http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm.

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