

Port Mouton Bay Lobster Trap Survey 2007-2012

Port Mouton Bay fishermen's local ecological knowledge and experience led them to conclude that lobsters will avoid an area they sense to be fouled.

This knowledge was investigated with annual lobster trap surveys by fishermen from 2007 to 2012. In the years during the fallowing of the fish farm (2010-2012), lobster catches generally improved in all areas of the bay except the region of the fish farm regardless of year-to-year variation in bottom water temperatures and weather conditions. This pattern is most obvious with seeded female lobsters.

There is evidence that the zone of degraded lobster habitat continued to shrink during the fallowing period as more market lobsters were caught in the peripheral areas of the region of the fish farm in 2010-2011. In all years to date (2007-12), lobsters were not caught in the immediate area of the fish farm during the survey periods and that area has not returned to its original productive state.

In 2011 and 2012 other ecosystem-based indicators – kelp, eel grass and Irish moss, mackerel, scallops and rock crab - exhibited some recovery in Port Mouton Bay.

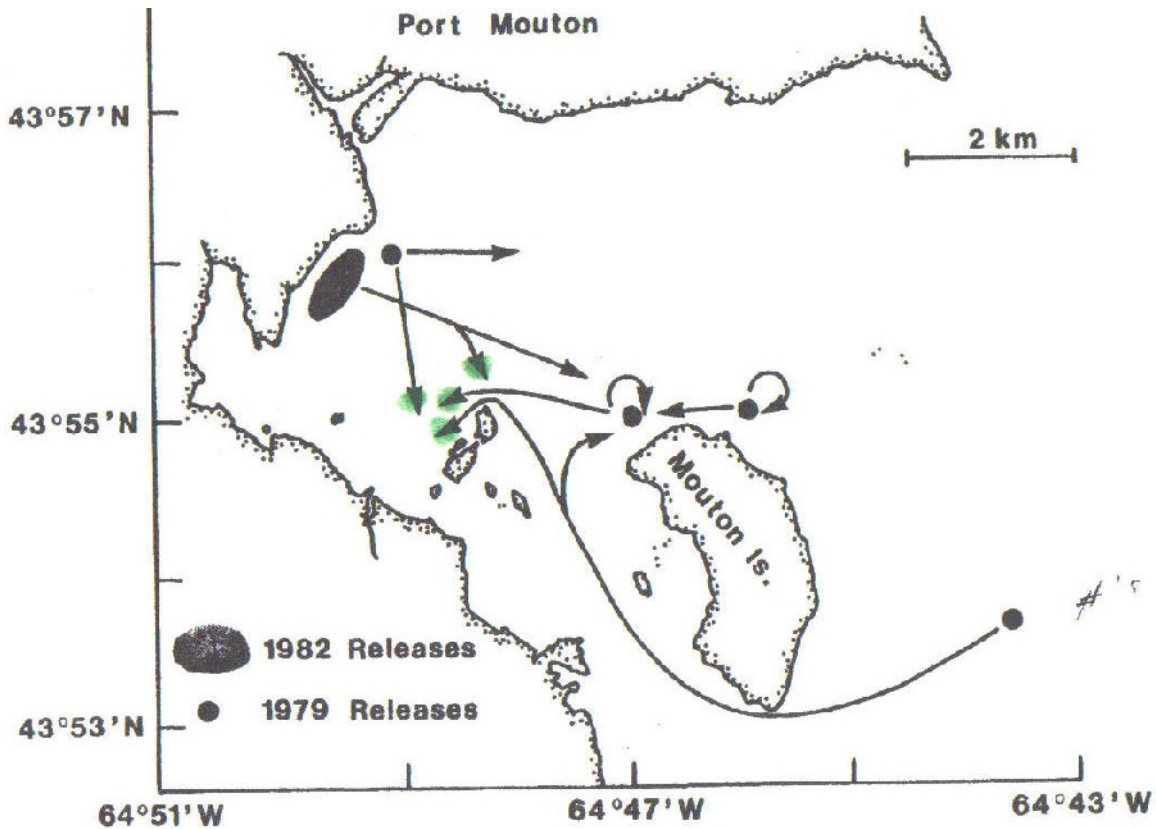
Background

Fishermen of Port Mouton Bay were reporting that they had abandoned historical lobster fishing 'territories' within the bay because of very low catches. This trend had developed for 15 years during the presence of the fish farm. These 'territories' had previously been prime lobster fishing ground and a lobster spawning and moulting area.

Lobster trap surveys conducted by DFO have demonstrated that the inner harbour of Port Mouton Bay historically has been a destination for lobster migration. In 1946-7 (unpublished records in DFO files) and in 1979 and 1982 (Miller et al., 1989¹), surveys showed that a significant portion of

¹ Miller, R.J., R.E. Duggan, D.G. Robinson, Z. Zheng. 1989. Growth and Movement of *Homarus Americanus* on the Outer Coast of Nova Scotia. Canadian Technical Report of Fisheries and Aquatic Sciences, No. 1716, Department of Fisheries and Oceans.

tagged lobsters released within and outside of Port Mouton Bay were recovered in the vicinity of the current fish farm site. (See Figure 1¹ below.)



Release locations of tagged lobsters at Port Mouton. Arrows point toward the locations of most recoveries. Arrows pointing toward the release sites indicate no detectable movement.

Fishermen's Lobster Trap Survey

A lobster trap survey was initiated by Port Mouton Bay fishermen during the last two weeks of the lobster season in May of 2007 and repeated in the following years of 2008, 2009, 2010, 2011 and 2012 and is expected to continue. This survey involves recording all trap locations and lobster yields in five contiguous areas in the bay (Figure 2) and provides the catch-per unit-effort (pounds of market lobster per trap-haul) and numbers of seed lobsters (numbers per 1000 trap hauls) for each region. The 2008 survey reported numbers of seed lobster only.

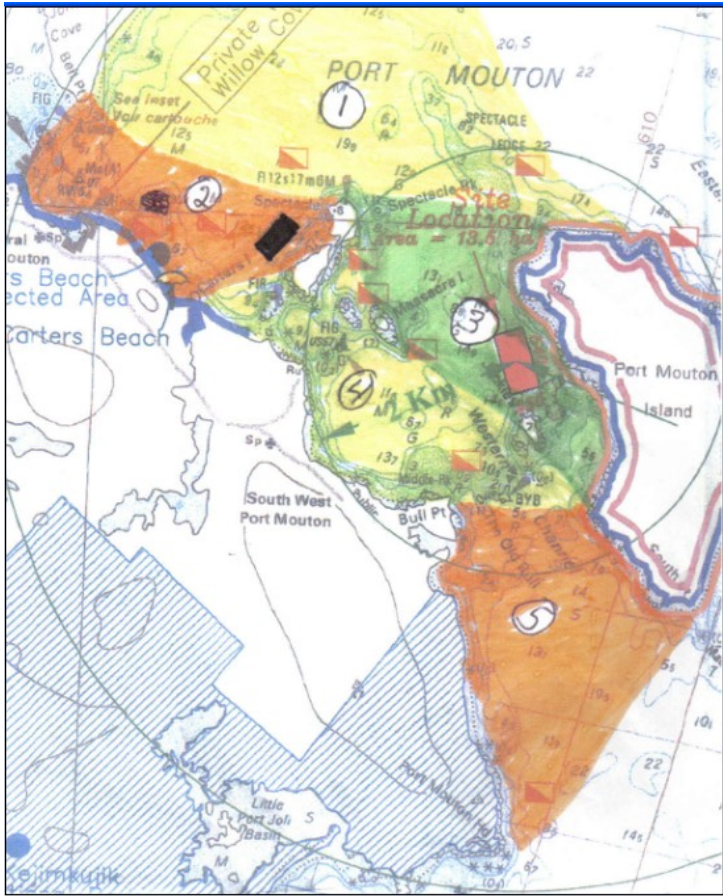


Figure 2. Map showing regions of Port Mouton Bay assigned to lobster catch data. The Spectacle Island fish farm is the black rectangle in Region 2.

The number of boats participating in the survey and the total number of trap hauls in each year are shown in Table 1. Fishermen report their data for analysis on an individual and confidential basis. Poor weather conditions were a contributing factor to the lower number of trap hauls in 2011.

Table 1. Number of boats and number of trap hauls for each year of survey

| Year | # Boats | # Hauls |
|------|---------|---------|
| 2007 | 7 | 6,097 |
| 2008 | 12 | 5,063 |
| 2009 | 15 | 10,034 |
| 2010 | 14 | 13,313 |
| 2011 | 12 | 11,597* |
| 2012 | 13 | 11,717 |

* Poor weather conditions

Bottom temperature data in Port Mouton Bay from a temperature recorder provided by the Fishermen and Scientist Research Society (FSRS) placed in a trap in Region 4 showed higher temperatures for the May 17-31 survey period in 2010 than in 2008 or 2009 and more variable temperatures in 2012. The temperature recorder failed in 2011 but unofficial reports indicate lower temperature records for May in that year.

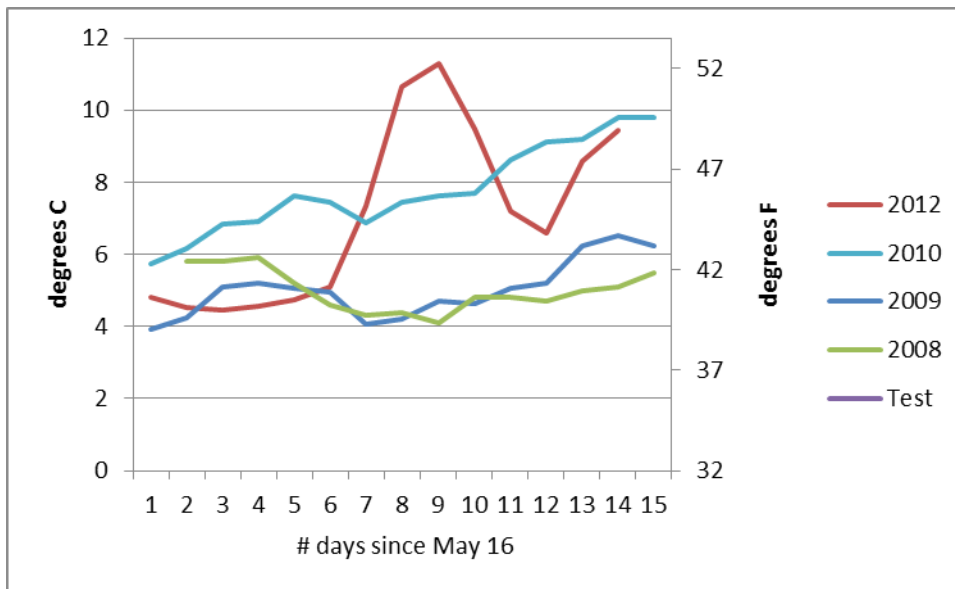


Figure 2. Bottom temperature in Port Mouton Bay, last two weeks of May; 2008 and 2009 before fish farm fallow, 2010 and 2012 during fallow.

Results

Region 2 includes the existing salmon aquaculture farm site west of Spectacle Island which was fallowed from late July 2009 (cessation of fish feeding July 20, 2009) to June, 2012, at which time it was restocked. Historically, before the fish farm, Region 2 had been a prime lobster fishing ground.

In the fallowing period (2010-2012), seed lobsters have noticeably increased in all regions except Region 2, compared to 2007-2009 before fallowing of the fish farm (Figure 3), regardless of bottom temperatures and weather conditions. In 2010 (during fallow) when temperatures were consistently more favorable, numbers of seed lobsters increased everywhere except in Region 2.

Throughout the period 2007 to 2012, market lobsters showed significantly lower abundance in Region 2 than in other regions of the Bay. An exception was the adjacent Region 1 in 2011 (Figure 4). Lobsters were caught in peripheral areas of Region 2, and not near the fish farm.

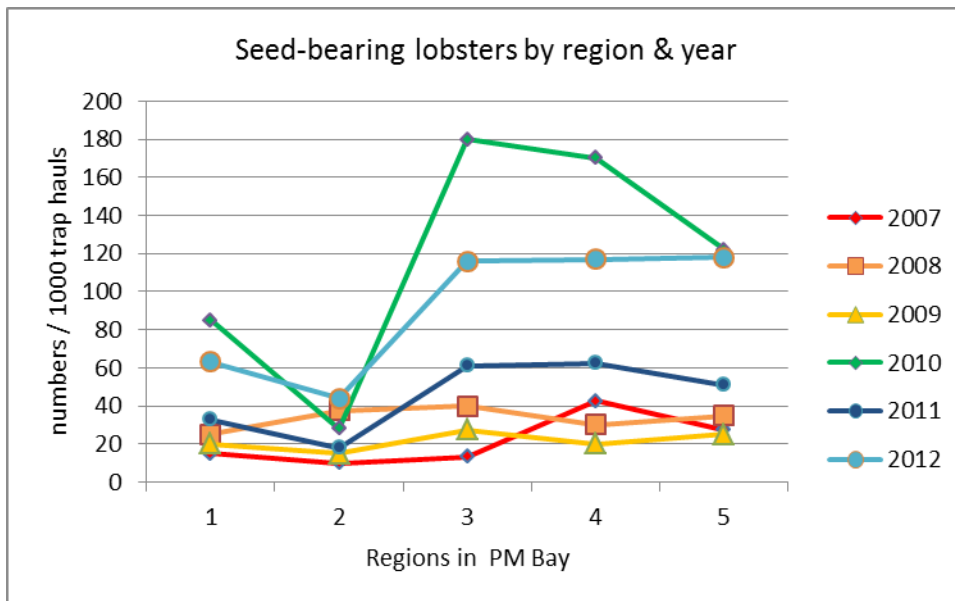


Figure 3. Number of seed lobsters per 1000 trap hauls annually in the last two weeks of May for six years in the five regions of Port Mouton Bay.

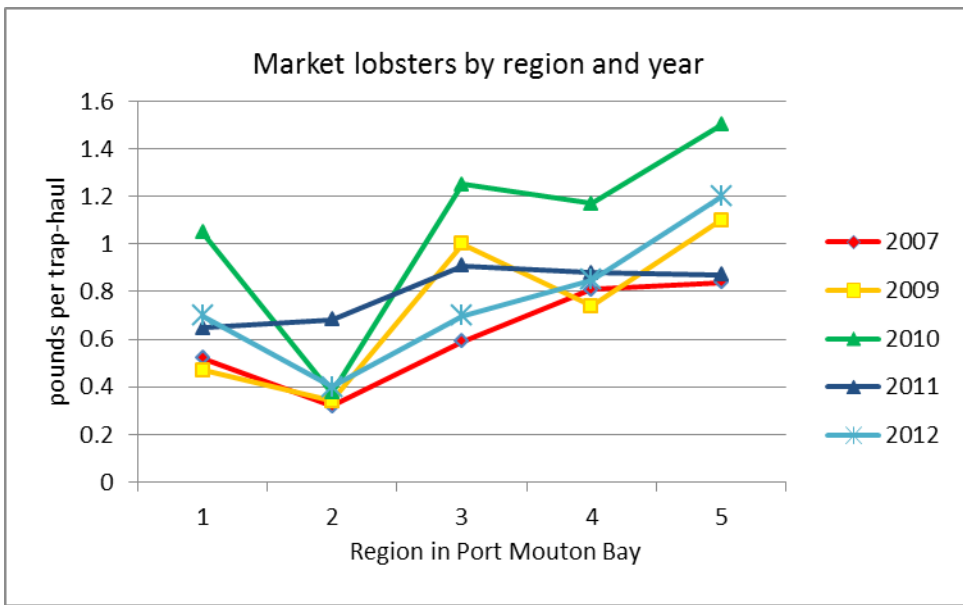


Figure 4. Number of market lobsters per trap haul annually in the last two weeks of May for five years in the five regions of Port Mouton Bay

In Region 2 fishermen reported lobsters caught in areas distant from the fish farm site, but traps set closer to the fish farm site in 2010 and 2011 were removed due to negligible catches, black foul-smelling mud on traps and fouling of traps with nuisance algae. (R. Broome, A. Bush, R. Lawson, M. Roy, D. Roy, pers. comm.)

Factors potentially contributing to absence of lobsters in the area of the fish farm are:

- Absence of prey (e.g. rock crab)
- Foul smell (lobsters have keen sense of smell)
- Nephaloid layer of easily disturbed fine waste sediment (which irritates gills of lobster)
- Nuisance algae (lobsters don't enter traps filled with algae)
- Barren sea floor (absence of refuge in eel grass or kelp)

Fishermen reported in personal communication in 2010 that the degraded lobster habitat zone appears to be shrinking as evidenced by the fact that for the first year in many years lobster fishing took place within the larger Port Mouton Bay area for the entire season. In 2011-12 fishermen report that

conditions continued to improve around the boundaries of the degraded zone but that Region 2 has not returned to its original productive state.

The higher numbers of seed lobsters in 2010 and 2012 in regions except Region 2 support the local ecological knowledge of fishermen that Port Mouton Bay is a lobster spawning, and moulting area to which seed lobsters migrate to moult and discharge eggs.

These survey results are a small subset of DFO statistical lobster landings. Port Mouton Bay landings are not differentiated in the aggregated statistics which represent a much larger area.

Coincidentally, this time-series of surveys spanned periods when the fish farm was operating - 2007 to 2009, and when it was placed in fallow – 2010-2012, and illustrates the value of continuing monitoring programs.

Other Ecosystem-based Indicators

Kelp

In spring 2010, fishermen report flourishing beds of kelp which were previously smothered with sediment in Area 4. (R. Broome, B. Fisher, pers. comm.). Kelp forms important refuge habitat for lobster.

Irish Moss Harvest

Irish moss harvesters report flourishing beds of Irish moss during the first week of July 2010 in areas some 400 to 500 m distant from the fish farm site (near Spectacle Light and in Region 4A). This has not been the case in many years. The Irish moss contained juvenile lobster, scallop and crabs – indicating a nursery habitat (T. Leslie, E. Fisher, pers. comm.).

Eelgrass

Eelgrass became visible after many years in Spectacle Harbour approximately 400 m from the farm site in the summer of 2010 after one year of fallow. In June of 2011, eelgrass at the same location was approximately one-third as high as healthy beds of eel grass at Jackie's Island - near Port Mouton Island

(C. Fisher, pers. comm.). Eelgrass beds were measured in Port Mouton Bay by divers in August 2011 and 2012. Since eelgrass is associated with life stages of 50% of marine species, it is recently recognized as an Ecologically Significant Species (DFO, 2009), and is referred to as the 'coastal canary'.

Mackerel

Historically, mackerel have been abundant in Port Mouton Bay and are fished for food and bait. Mackerel avoided the bay during years of aquaculture but reappeared in 2010, are more abundant in 2011 and 2012 and are now appearing in the inner bay (R. Swim, pers. comm.), but not in the area of the fish farm (B. Fisher, pers. comm.).

Scallops

The recreational scallop fishery in inner Port Mouton Bay disappeared during the active period of the salmon farm and is showing some recovery in summer 2011.

Crab

Rock crab are traditionally fished for lobster bait. A few rock crabs caught near the fish farm site in 2010 were discolored dark brown. No rock crabs were reported caught there during the lobster season of spring 2011, but were first sighted in Spectacle Harbour (400 m from fish farm site) in July 2011 and were caught near Summerville beach in 2011 for the first time in many years (R. Swim, pers. comm.).

Nuisance Algae

Nuisance ('slime') algae which spread within the entire bay during operation of the fish farm persisted in 2011 and 2012 near the farm site at the south-western end of Spectacle Island (R. Broome, B. Fisher, pers. comm.).

Reference

DFO, 2009. Does eelgrass (*Zostera marina*) meet the criteria as an ecologically significant species? DFO Can. Sci. Advis. Sec. Sci. Rep. 2009/018.