

Two studies in Atlantic Canada

Where were the studies done?

Port Mouton Bay, Nova Scotia

Grand Manan, New Brunswick

What did the studies examine?

Number of market-sized and berried female lobsters caught per traps hauled by fishers during the last two weeks of the fishing season each year for 11 years (2007-2017) in five traditional adjacent fishing regions, one of which contained a fish farm. Water temperature effects on catch were also examined.

Number (all sizes) and sex of lobsters within a fish farm lease and reference sites recorded by divers using transects and spot-dives from August to September each year (2010-2015). Combined 8-year abundance data from all lobster surveys (farm and reference sites) were compared with catch per unit effort (CPUE) statistics for lobster fishing area (LFA 38) for the same time period.

What was the fish production history at each study site?

A fish farm near Spectacle Island in Port Mouton Bay has existed since 1995. From 2007-2009, the 8 hectare lease site was stocked with ~ 400,000 Atlantic salmon, fallowed from June 2009 to August 2012, stocked with ~400,000 rainbow trout in 2012-2014, and fallowed from March 2015 to the end of 2017.

The 26.5 hectare Cheney's Head lease site was first stocked in 2010 with 100,000 Atlantic salmon. Salmon were grown until 2011 then the site was fallowed. The site was restocked in 2013 with ~336,000 salmon until 2014 then fallowed in 2015.

What were the oceanographic conditions at each fish farm?

Water depth at the fish farm at low tide was 10-12 metres. Tidal current speeds were 2 - 3 cm/second. The traditional fishing areas are a mix of sand, gravelly sand and mud.

Water depth at the fish farm at low tide was 14 - 16 metres. Tidal current speeds were ~ 50 cm/second. The farm and reference sites had gravel-cobble bottom.

What were the benthic conditions reported at each fish farm?

Nova Scotia Environmental Monitoring Program results indicated that during fish production periods (2007-2009; 2013-2014) mean sediment sulphides were $>4000\mu\text{M}$ with some stations reporting 5000-10000 μM . During the 2010 fallow period, mean sediment sulphides were 2205 μM .

New Brunswick Environmental Monitoring Program results indicated that during the production periods (2010, 2011, 2013, 2014) mean sediment sulphides were 349 μM , 705 μM , 144 μM , and 160 μM respectively. During the fallow periods (2012, 2015) mean sediment sulphides were 0 μM and 4 μM respectively.

What were the findings of each study?

Average market lobster catch per unit effort (CPUE) was significantly reduced by 42% and berried lobster counts reduced by 56% in farm production compared to fallow periods with CPUE being lowest in the region of the fish farm and highest in the region furthest from the fish farm. Differences in catch between feed and fallow periods were not driven by water temperature, and berried lobsters may be more sensitive to both aquaculture and temperature than market lobster.

Abundance of lobster inside the salmon farming area versus nearby reference sites were not significantly different and no significant difference in the number of berried females inside or out of the farm lease area. Study concluded inshore lobster abundance trend at the farm/reference site was similar to catch per unit effort (CPUE) trend in LFA 38.

Source: Milewski et al. 2018. Sea-cage aquaculture impacts market and berried lobster (*Homarus americanus*) catches. *Marine Ecology Progress Series* 598:85-97.

Source: Grant et al. 2019. Long-term studies of lobster abundance at a salmon aquaculture site, eastern Canada. *Canadian Journal of Fisheries and Aquatic Sciences* 76(7):1096-1102