

Bay of Fundy Lobster (LFA 35-38)

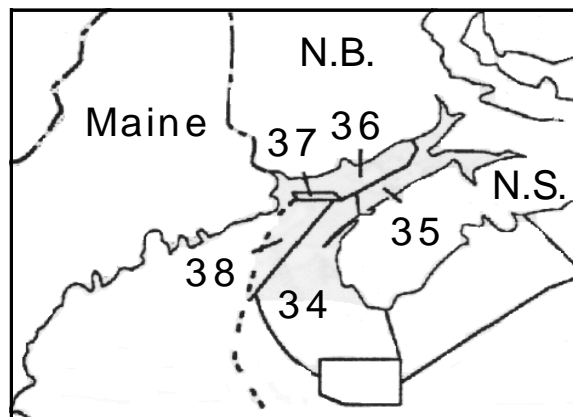
Background

Lobsters belong to a group of animals called Crustaceans. They have their skeleton on the outside of their body and to grow must shed the shell, a process called molting. Very young lobsters molt 3-4 times a year, increasing 50% in weight and 15% in length with each molt. In the waters of the Bay of Fundy lobsters take 8 or more years to reach the legal size of 81 mm carapace length (CL). At that size they weigh 0.45 kg (1 lb.) and molt once a year. Larger lobsters molt less often, with a 1.4 kg (3 lb) lobster molting every 3-4 years

At an estimated 102 mm CL, Bay of Fundy lobsters exhibit the largest average size at maturity across the geographical range of the lobster, due to the colder waters they experience. Mature females mate after molting in midsummer and the following summer produce eggs that they attach to the underside of their tails. The eggs are carried for 10-12 months and hatch in either July or August. The larvae spend 30-60 days feeding and growing near the surface before settling to the bottom and seeking shelter.

For the first 4-5 years of benthic life lobsters remain in or near their shelter to avoid the small fish that feed on them. As they grow, and have less chance of being eaten, they move about and become more catchable by lobster traps.

Lobsters are found in coastal waters from southern Labrador to Maryland, with the major fisheries in the Gulf of St. Lawrence and the Gulf of Maine. Though lobsters are most common in coastal waters, they are also found in warm deep water areas of the Gulf of Maine and along the outer edge of the continental shelf from near Sable Island to off North Carolina. Lobsters make seasonal migrations, moving to shallower waters in summer and deeper waters in winter. Over most of the lobster's range, these movements amount to a few kilometers; however in the Bay of Fundy, Gulf of Maine, offshore regions of the Scotian Shelf, and off New England, lobsters can undertake long distance migrations of 10s to 100s of km. Tagging studies have also shown that at least some of these lobster return to the same area each year.



The Fishery

Lobster fishing began in the mid 1800s in the Bay of Fundy and landings data exist from the 1890s. The fishery is managed under limited entry, size, and effort controls. The number of participants, and trap limits vary between LFA's:

LFA	License details	A licenses (full time)	Partnership (full time)	B licenses (part-time)
35	Number	90	1	3
	Trap limit	300	450	90
36	Number	166	10	10
	Trap limit	300	450	90
38	Number	81	27	1
	Trap limit	375	563	113

Open fishing seasons also vary between LFA's:

LFA	Fall season open	Fall closure	Spring season open	Spring closure
35	Oct. 15	Dec. 31	April 1	July 31
36	2nd Tues. in Nov.	Jan 14	March 31	June 30
38	2nd Tues. in Nov.	Open through winter	Open through winter	June 30

There is a common 81mm carapace length (CL) minimum size, and a prohibition on landing egg-bearing females across LFA's. While historically the fisheries were prosecuted close to shore, fishing grounds have expanded both in the upper Bay of

Fundy, along the New Brunswick shore, and in LFA 38, particularly off southern Grand Manan.

Tagging studies in the Bay of Fundy indicate that there is considerable mixing among LFAs with a general movement into the bay in the spring and out of the bay in the fall. A small number of fishers from LFA 38 have been fishing in deeper waters (to 205 m depths) over the winter months at the entrance to the Bay of Fundy (since the late 1970's), targeting the seasonal migration of mature lobsters.

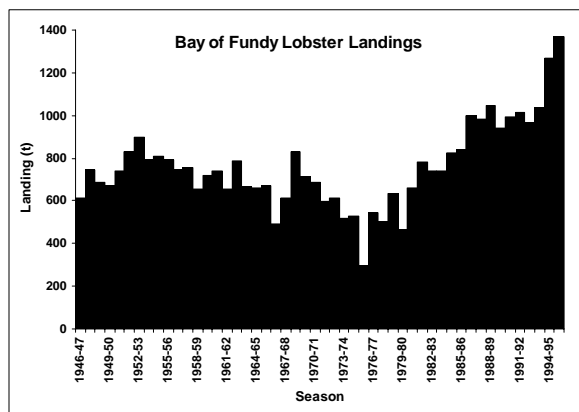
Seasonal* Landings (tonnes)

Season*	71-80 Avg.	81-91 Avg.	91-92	92-93	93-94	94-95	95-96 **
LFA 35	112	226	254	239	241	299	471
LFA 36	128	241	249	257	274	324	332
LFA 38	295	395	512	471	523	647	567
Total	535	862	1015	967	1038	1270	1370

*Fall to subsequent spring fishery; for season dates see table on previous page

** Preliminary data

For the fishing seasons 1986-87 to 1993-94, total **landings** from the Bay of Fundy appeared to have stabilized at approximately 1000 t (range 942-1046 t). Over the last 2 years landings have increased again to 1370 t in the 1995-96 season, representing the highest reported landings this century. However, as a new landings reporting system from sales slip to self reporting logbook was introduced in 1995, these preliminary figures should be regarded with caution, particularly the 57% increase over 1994-95 landings suggested for LFA 35. This recent pattern of overall landings stability, with evidence of further potential increase, matches landings seen in LFA 34 and the US portion of the Gulf of Maine (Maine and Mass.).



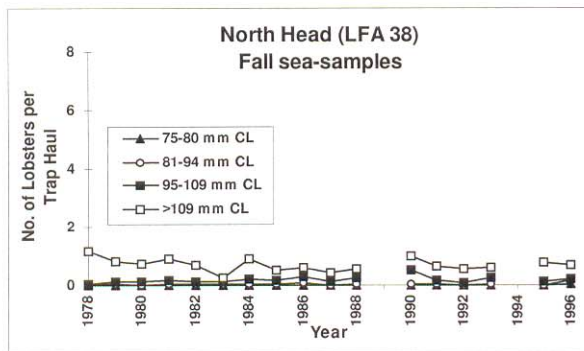
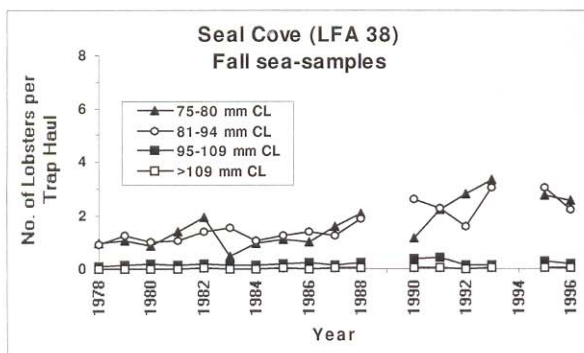
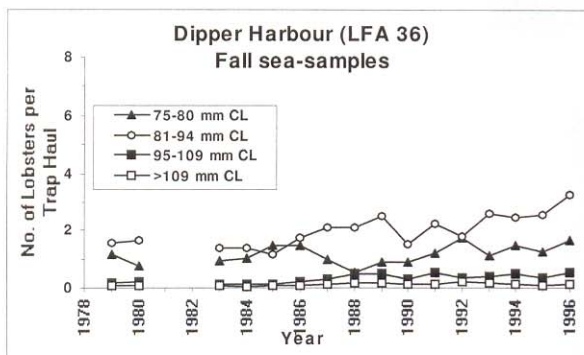
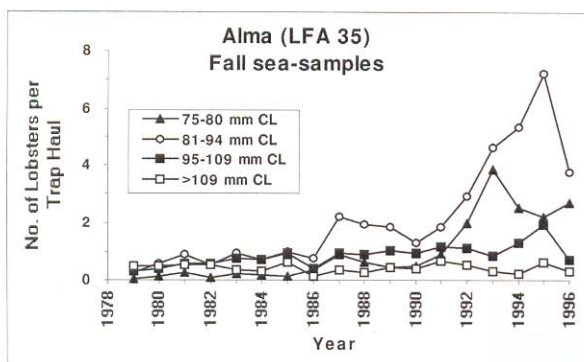
Lobster landings in the Bay of Fundy were first reported on an annual basis in 1892. Landings peaked in 1895 at 1415 t, then subsequently declined, over a 40-year period, to a low of 179 t in 1938. From 1939 onwards, landings generally increased to a second peak of 897 t in 1953. On a seasonal basis, landings were relatively stable (between 491-897 t) from 1946/47 to 1974/75. A post-war low of 296 t was reported in 1975/76; however landings rebounded to 545 t the following year, and began the current expansion phase.

Resource Status

Stock status **evaluation** was based on an assessment of landing statistics trends, catch rates, and size distribution in the commercial catch.

Historical studies on the Bay of Fundy fishery demonstrate that **catch rates** vary greatly over the season being high for the first 1-2 weeks of the fall season, thereafter dropping sharply. Catch rates remain low during the winter, increasing again in the spring as water temperatures increase and lobsters become more active. Annual **at-sea samples** of the catch size frequency are obtained from one or two at-sea samples at representative ports in each LFA during the first two weeks of the Fall season and the last two weeks of the Spring season. Catch rate from at-sea sampling should be interpreted with caution. Through the years trap types gradually changed from wooden trap to wire mesh traps and escape vents were introduced in 1995.

This monitoring indicates either stable or slightly increasing catch per unit of effort (CPUE), with pronounced differences between areas. Seal Cove (LFA 38) and Dipper Harbor (LFA 36) represent fishing areas historically reliant on annual recruitment: they have CPUE's in the 1-2kg/trap haul (th) range. Alma (LFA 35), in the upper Bay of Fundy, and North Head (LFA 38) represent fisheries which developed principally to target the mature, migratory component of the lobster population. CPUE's for North Head are considerably more variable than the other areas, but have remained in the 1-2kg/th range. Conversely, a progressive increase in CPUE has occurred in the Alma fishery with initial CPUE in the Fall fishery now reaching 6kg/th. This is the result of a significant expansion in the representation of new recruits (first molt group in commercial catch; 81-94mm CL) in the trap catches when this fishery opens in mid-October.



Recruitment (based on catch rates of prerecruits and first molt group) increased throughout the 1980's and remains high. The mean sizes of lobsters measured at-sea in Seal Cove, North Head, and Dipper Harbor have not changed substantially since the late 1970's, whereas the mean size in the Alma fishery has

dropped dramatically. This shift is driven by the large increase in numbers of pre-recruit, and first molt group lobsters, rather than a reduction in the presence of lobsters from larger molt groups. Current fishery monitoring in LFA 35 is limited, and it is not yet demonstrated that the apparent surge in recruitment in the Alma index port is fully representative of the upper Bay of Fundy, although anecdotal information from lobster fishers suggest there have been similar effects in other ports.

Sources of uncertainty in this assessment of stock status are related principally to the sampling coverage presently available:

- 1) The relative contributions of increased recruitment and the redistribution and expansion of fishing effort to the pulse in landings, particularly in the upper bay, is unknown;
- 2) At-sea sampling coverage has declined in recent years and is restricted to principal ports in each LFA, where important historical data series exist.

Additionally, the relationship between these Bay of Fundy fisheries and the wider Gulf of Maine is unclear. They may represent a sub-population linked by interchange of lobster larvae and/or migration of benthic animals to a larger Gulf of Maine metapopulation (a group of linked sub-populations). This has implications for estimating fishing mortality, egg per recruit, and the benefits and costs of new conservation initiatives.

Outlook

The short term outlook for the Bay of Fundy lobster fishery is good. Landings are at the highest level observed this century. Large lobsters are still well represented in the catches from many fishing areas in the bay. Recruitment appears to be high in the upper Bay of Fundy, and if verified through the new landing reporting system, represents a possible new dynamic in the general picture of the lobster production system. Hitherto, the upper bay fishery was considered to be principally reliant on the seasonal immigration of larger lobsters, rather than local settlement and benthic production. Whether or not these increased landings are sustainable in the long-term is unknown.

Notwithstanding this recent upsurge, preliminary analyses suggest that exploitation rates are likely too high, and as with other lobster fishing areas outside the Gulf of Maine, there is concern that the current low estimated levels of egg production may not provide sufficient resilience in the population to

environmental or ecosystem changes which may result in less favourable larval and juvenile survival.

For more information

Contact: Peter Lawton or David Robichaud
Department of Fisheries and Oceans
St. Andrews Biological Station
St. Andrews, NB E0G 2X0

Tel: (902) 426-2099
Fax: (902) 426-1862
E-Mail: lawton@sta.dfo.ca
E-Mail: davidr@sta.dfo.ca