

LFA 41 Offshore Lobsters

Background

Lobsters belong to a group of animals called crustaceans that also includes shrimp, and crab. They have their skeleton on the outside of their bodies and must shed it to grow, a process called molting. Very small lobsters molt 3-4 times a year, increasing 50 % in weight and 15 % in length with each molt. In the waters off southwestern Nova Scotia, lobsters take 7-8 years to reach the legal size of 81 mm carapace length (CL). At this 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 2-3 years. The largest size reported was a 20 kg (44 lb.) giant and estimated to be 40-65 years old.

Off southwestern Nova Scotia, lobsters mature between 90 and 100 mm CL at an average weight of 0.7 kg (1.5 lb.). The mature female mates after molting in midsummer and the following summer produce eggs that attach to the underside of her tail. 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 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 spend more time outside the shelter. At that time they become more catchable by the lobster traps.

Lobsters inhabit 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 to shallower waters in summer and deeper waters in winter. Over most of their range, these movements range from a few kilometres to 30 km. However in the Gulf of Maine, the outer continental shelf lobsters 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.

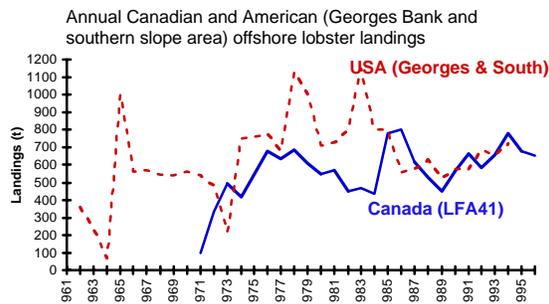
Present thinking is that the Gulf of Maine lobster population can be viewed as a metapopulation, meaning that there are a number of subpopulations linked by movements of larvae and adults. The number and distribution of these subpopulations remains unknown.

Lobster landings increased dramatically over the entire east coast of North America during the 1980s and have remained high in the Gulf of Maine region. The underlying cause of the increase is not known but the large scale nature of the increase suggests an environmental cause that improved larval and juvenile survival.

The Fishery

Year	71-80* Avg.	81-91* Avg.	1992-3 **	1993-4 **	1994-5 **	1995-6 **	1996-7 ***
TAC			720	720	720	720	720
Total	504	569	542	700	719	722	

* Annual Jan-Dec.
 ** Season landings Oct. 16-Oct. 15
 *** Incomplete data

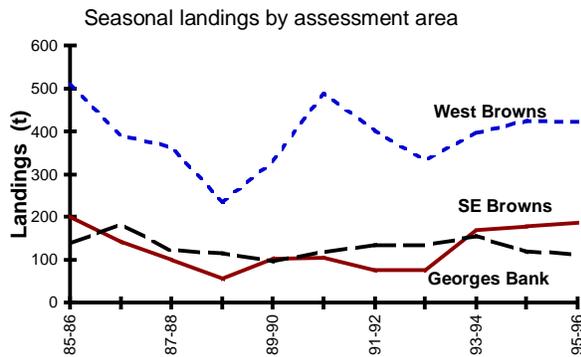


The Canadian offshore fishery began in 1972 in the area outside the offshore boundary line, approximately 92 km from shore. LFA 41 extends from the ICJ line on Georges Bank to the Laurentian Channel off Cape Breton, but all fishing occurs in the Browns (4X) and Georges Bank (5Ze) area. Licences were frozen at 8 in 1976, a trap limit of 1000/vessel and a 408 t TAC placed on vessels fishing 4X; no quota was applied to 5Ze. To protect brood stock believed to occur on Browns Bank, a rectangular closed area (LFA 40) was

established in 1979 which encompassed all portions of the bank less than 50 fathoms.

Following the ICJ-Gulf of Maine boundary decision in 1985, American effort was removed from northeast Georges Bank and most of Georges and Crowell Basins. A 720 t TAC (90 t/licence) was set in 1985 for all of LFA 41. An Oct. 16-Oct. 15 season was established, an Enterprise Allocation plan put in place and trap limits were eliminated. The 720 t TAC was based on the previous 4X quota, the historical 5Ze landings and a conservative estimate of previous American landings from the region.

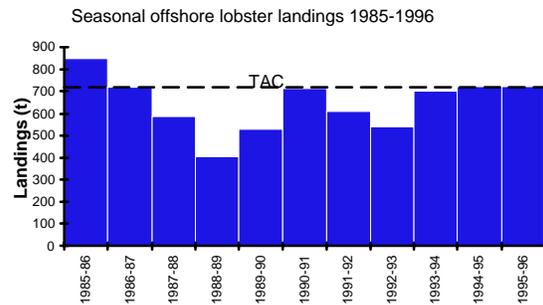
The offshore fishery consists of three major grounds: Georges Bank (outer shelf and upper slope), Southeast Browns (outer shelf and upper slope east of the Northeast Channel) and West Browns (Georges Basin-Crowell basin).



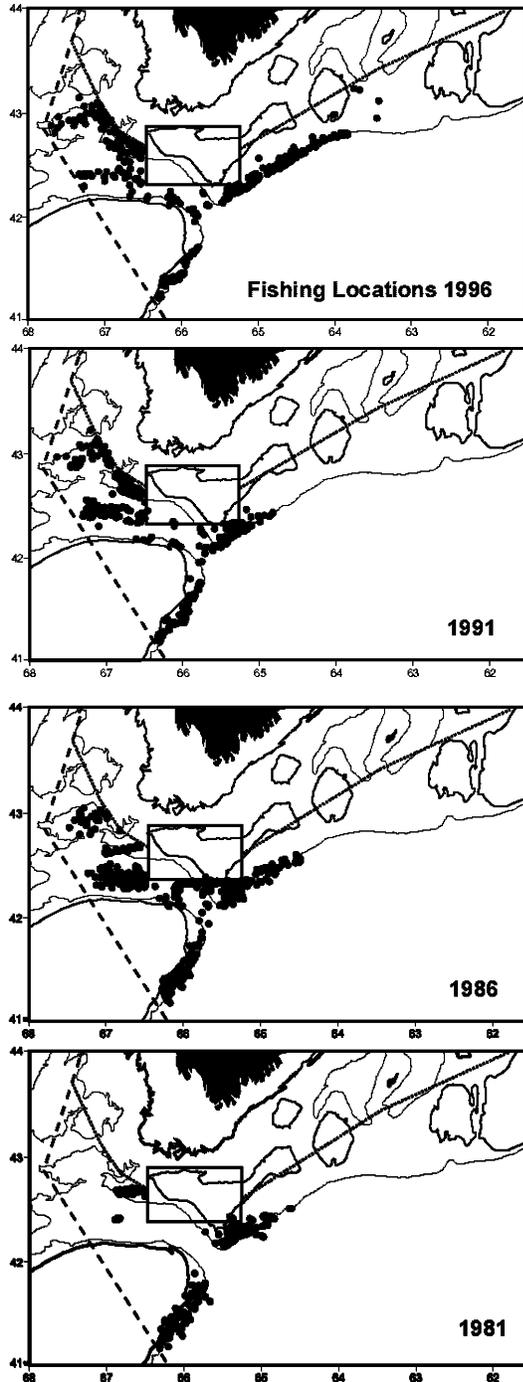
Canadian landings increased in 1985-86 following the removal of American effort from Canadian grounds, and introduction of the new TAC. At the same time, the introduction of larger vessels increased the fleet's flexibility, allowing vessels to fish more than one area at a time and move gear between them as catch rates changed. The result was increased fishing effort in the area southwest of Browns Bank and Georges and Crowell Basin.

Landings have remained relatively stable since the new TAC and season were established in 1985-86. The offshore fishery harvests a wide

size range which includes more than 10 age-classes. Landings are not dependent on the annual recruitment into the legal size groups as are those in the inshore fisheries. Short-term variations in landings are believed to be due more to changing distribution, catchability and effort than to changes in abundance.



West Browns has been the dominante area since the early 1980s. Georges Bank has declined in importance since the 1970s as vessels target the closer and more valuable smaller lobsters in West Browns. SE Browns has been fished by 1-2 vessels during the 1980s-90s and has shown a small increase in landings in the last 3 years with vessels venturing further east then before. The distribution of landings between Browns and Georges Bank is similar to that used in the original allocation of the 720 TAC.

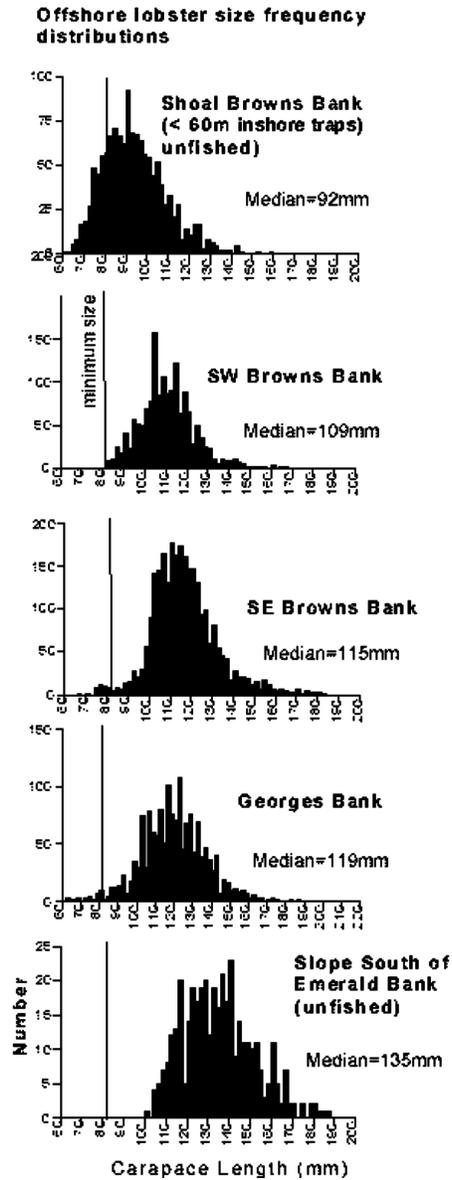


Catch rates have remained relatively stable though their value as a long-term indicator has been reduced in recent years due to changes in fishing strategy, trap design, vessel size and fishing power. The recent introduction of a Jonah crab by-catch has complicated CPUE determination. The vessels fish both species with some trips targeting lobsters and other crab. Links between the offshore lobster and the new offshore crab databases are being developed which will allow separation of the effort directed for crab and lobsters.

The size of lobster in the catch has remained stable on the different grounds since the fishery began in 1971. The largest median size occurs on Georges Bank (122 mm CL), followed by SE Browns (120 mm CL) and the smallest in SW Browns (110 mm CL). While this stability may reflect trap and behavioural selectivity (lobsters of certain sizes are more likely to be caught than others), the lack of any change over the 22 years of fishing suggests a low removal rate. In contrast, the removal rate in the inshore fisheries is high (70-80%).

Resource Status

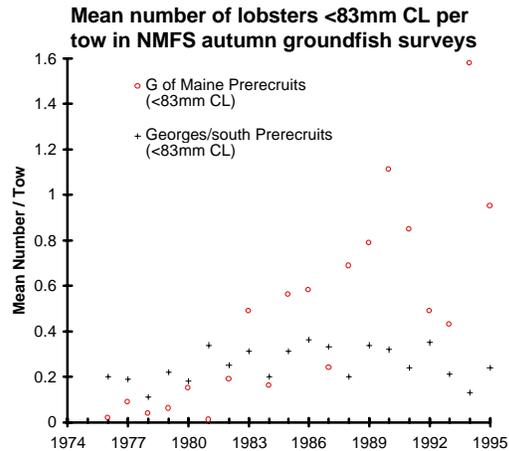
Stock status evaluations are based on trends in landings, catch rate (CPUE) calculated from compulsory daily logbooks, and size structure of the commercial catch from at-sea sampling.



The median size of lobsters in the offshore catch is greater than the size at which 50% of the females mature (95 mm CL) and thus a high proportion of the females have the opportunity to breed 2-3 times. This contrasts with the coastal inshore fisheries where the median size in the catch is below the size of maturity and a small percentage has the opportunity to breed once.

Recruitment is believed to have been high in inshore regions during the 1980-90s, resulting in the record landings during that period. U.S.A.

National Marine Fisheries Service (NMFS) groundfish trawl surveys data on prerecruit lobsters (<83 mm CL/tow) suggest a similar increase in the Gulf of Maine, and a relatively constant level on Georges Bank.

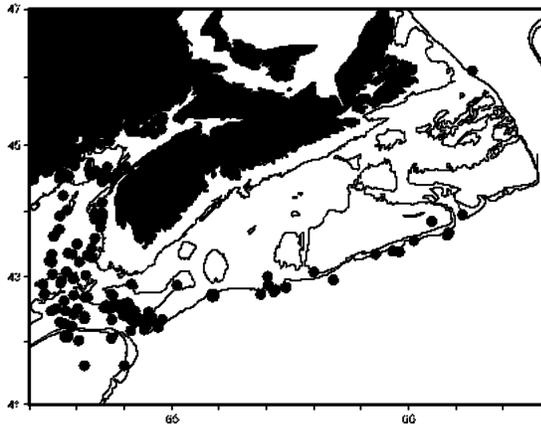


In the past, many assumed that recruitment was restricted to shallow coastal regions but recent submersible observations and the distribution of prerecruits in the NMFS and other trawl surveys indicates successful larval settlement occurs in the deep water basins of the Gulf of Maine and shallow areas of Browns and Georges Bank. The importance of deep water settlement to the overall level of recruitment in the Gulf of Maine is unknown.

Extension of the fishery to 4W (Emerald-Sable Island Bank) was reviewed in 1987 when new licences were considered for the offshore fishery. Lobsters are consistently present in low numbers in the DFO groundfish surveys along the outer edge of the Scotian Shelf. There has been renewed interest in exploring the possibility of establishing a fishery in 4W. Existing licence holders have not explored this region because all indications are that catch rates would be much lower than the existing grounds in 4X and 5Ze. The size of the population in 4W and its relation to the existing offshore grounds are unknown. The limited size data available suggest a large median size similar to eastern Georges Bank.

There appears to be little likelihood of a connection between the outer slope and coastal population along the eastern shore of Nova Scotia. Surface water movements along the outer slope would keep larvae from drifting to the coast and cold bottom water near the coast prevents adult movements.

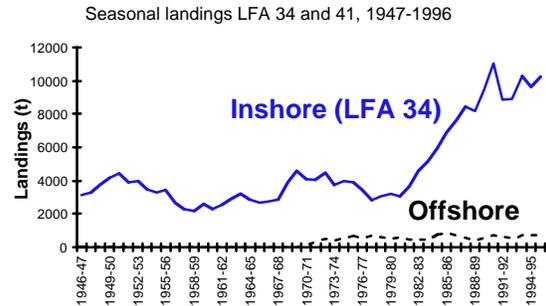
Lobster bycatch in the DFO spring groundfish trawl surveys 1980-1989



Sources of Uncertainty

Lobster stock structure in the Gulf of Maine area remains unknown. Current thinking is that the Gulf of Maine lobster population can be viewed as a metapopulation, which means there are a number of subpopulations linked in various ways by movements of larvae and adults. In such situations, especially when the degree of linkage is not known, it is prudent to manage each subpopulation separately to ensure sufficient egg production and not to assume recruitment or immigration from other subpopulations.

The offshore has been managed to preserve a high reproductive capacity. The TAC and the closure of Browns Bank, were designed to preserve the reproductive potential of what has been perceived as a potential brood stock for the larger more valuable inshore fishing grounds.



There are no indications to date that the offshore fishery has had any impact on the inshore fishery, and the information available can neither prove nor disprove an important links between them. It has been suggested that if a link does exist it would most likely be through exchange of larvae from Browns Bank and not from Georges Bank or the upper slope of the Scotian Shelf.

Landings by inshore vessels fishing inside the offshore line west of Browns Bank are not known. These vessels fish the same concentration of lobsters as the offshore, and need to be considered when evaluating the offshore resource. Landings from these inshore vessels were estimated to be 50-70 t in 1995. The lack of information on catch location in the inshore fishery is a major problem in assessing both the inshore and offshore fisheries.

Detecting changes in size structure is an important component of the offshore assessment. The use of size data is based on the assumption that changes in trap caught size frequencies reflect changes in the population size structure. There are indications this may not be true for smaller and larger sizes and small changes in the population size structure may not be detectable.

Outlook

The short-term outlook is for no change in stock structure and availability. The 720 t TAC should be retained for the 1997-98 season. The TAC keeps the exploitation rate low and maintains a healthy broodstock. To date, there are no indications of any negative impact of the offshore

fishery on the inshore fishery.

Lobsters are present in the offshore basins and banks because of the year-round warm water and a change in temperature could result in changes in distribution and productivity. A cooling trend as occurred during the 1960s, would have had important implications to the distribution and productivity of the lobster population.

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