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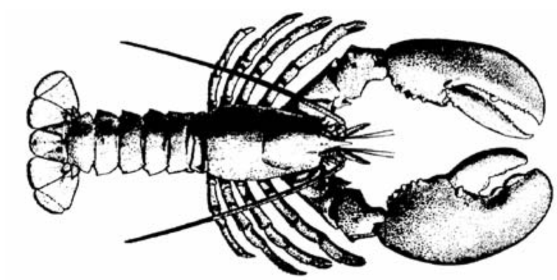
FRAMEWORK AND ASSESSMENT FOR LOBSTER (*HOMARUS AMERICANUS*) IN THE SOUTHERN GULF OF ST. LAWRENCE LOBSTER FISHING AREAS 23, 24, 25, 26A AND 26B



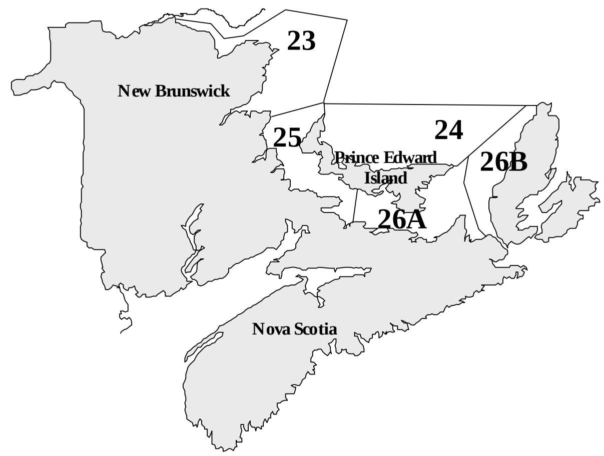


Figure 1: Lobster fishing areas in the Gulf Region.

Context :

In 1994, the Fisheries Resource Conservation Council (FRCC) was requested by the federal fisheries Minister to review the current approaches to conservation, and recommend strategies for sustainable exploitation of all Canadian lobster stocks. In their report (FRCC, 1995), they concluded that the present fisheries were operating at excessively high exploitation rates; harvesting primarily immature animals; and not allowing for adequate egg production (estimated to be as low as one to two percent of what might be expected in an unfished population). While they accepted that lobster stocks have historically been resilient, they concluded that the risk of recruitment failure was unacceptably high and suggested that egg production be increased. A precautionary biological reference point was recommended in the form of a target level of egg production per recruits (E/R) equivalent to 5% of that of an unfished population.

In 1998, DFO announced the first multiyear conservation plan (1998-2001) for the lobster fisheries in the southern Gulf of St. Lawrence (sGSL, Fig. 1). After extensive consultations with the fishing industry, it was decided to double E/R values instead of the target of 5% proposed by the FRCC. To reach that target, all LFAs (except LFA 26B) increased their minimum legal size (MLS) and implemented a 50% v-notching on egg bearing females (except LFA 24). In addition, fishermen in LFA 23 reduced their trap allocation by 75 per fisherman (25 per year for 3 years). Although the initial objective of doubling E/R was not achieved in all LFAs (mainly due to the non-compliance of 50% v-notch of the egg bearing females), progress was made in terms of increasing egg production (Lanteigne et al., 2004). To reach the initial goal, a second multiyear conservation plan (2003-2005) was announced that mainly dealt with further MLS increases and mandatory release of window-size (115-129 mm) females. In 2004, the window-size female regulation was replaced by a maximum legal size of 114 mm CL in LFA 25.

The purpose of this Science Advisory Report is to assess the 2005 stock status of lobster fisheries in the sGSL, LFAs 23, 24, 25, 26A and 26B, and recommend an assessment framework, including indicators for monitoring the health of the lobster stock, to guide future assessments.

SUMMARY

- Any changes in fishing efficiency (or “effective effort”, from larger vessels, better navigation or improved fishing strategy) have not been accounted for. Hence, any fishery dependent catch rate indicators will be biased.

- **Abundance indicators** based on landings for legal size lobster from all LFAs except 25, are close to or above the long-term median. Landings in the central Northumberland Strait (southern half of 25 and western half of 26A) are below the long-term median. Similar trends in abundance were observed based on the fishery-independent trawl survey.

- **Fishing pressure indicators** indicate that most of the catches consist of new recruits (i.e.: lobsters growing to commercial sizes and entering the fishery for the first time). There is further evidence that the fishing pressure is too high based on estimates that 50% of traps are empty (over the season) in four of the five LFAs (LFA 24 had 24%).

- **Production indicators** based on pre-recruit logbook program and the trawl survey are negative in Northumberland Strait and positive elsewhere. An increase in berried females catch rates was observed except in LFA 25 and part of LFA 26A located in the Northumberland Strait. Fishery-independent data (SCUBA) show that the density of 1-2 year olds (<40 mm CL) has increased in LFA 23, since 2000. It was low in LFA 25 and 26A in 2005 and 2006, the only years sampled.

- **Ecosystem indicators**. Climatic conditions for the sGSL are warming, and temperature has been rising in all areas. In terms of larval drift and survival, current observations and models suggest that the Northumberland Strait is essentially an isolated system (relying on itself for recruitment) unlike the rest of the sGSL. In LFA 25, rock crab form the largest part of the lobster diet and the principal predator on lobster is shorthorn sculpin.

- Recommendations for **Assessment framework indicators** are:
  - Fishery dependent indicators of abundance (for example, landings, catch rate, fishing location) need to be compared with changes in effort.
  - Fishery-independent indicators of abundance are needed to overcome the uncertainty associated with fishery-dependent indicators. These include dive surveys and the trawl survey in the Strait and adjacent waters.
  - Indicators of fishing effort (for example, trap-hauls, fishing location, vessel size, navigation, trap design, and fishing strategy) are required.
  - Surveys to develop newly settled lobster indices should be expanded across the sGSL in order to improve the predictive value of these indicators.

BACKGROUND

Species Biology

The American lobster habitat extends along the Atlantic coast from North Carolina to Labrador. In Canadian waters, lobsters may be fished in deep waters (e.g., Georges Bank, Bay of Fundy) but are generally fished close to shore in depths ranging from 1 to 30 m in the sGSL.

The life history of the lobster can be divided into a planktonic and benthic phase. The planktonic phase follows the hatching of the eggs in July and August. The larvae go through the free-swimming period that lasts from 3 to 10 weeks depending on environmental conditions, mostly water temperature. The planktonic phase ends at stage IV when the larvae settle on the bottom.

Female lobsters will reach the size at 50% maturity at 72 mm of carapace length (CL) in most of the sGSL, and 75 mm CL in western Cape Breton and part of St. Georges Bay. Male lobsters become sexually mature at smaller sizes than females. Mating occurs between July and September. Generally, female lobsters extrude eggs one year after mating and carry the eggs, attached under the abdomen, for nearly another year.

Fishery

The lobster fishery of the southern Gulf of St. Lawrence (sGSL) began in the mid-1800's. For over a century, the fishery developed as a nearshore, small-boat fishery, providing revenues for a large number of harvesters. Starting in the mid-1970s, lobster landings in the sGSL increased sharply (>2.5-fold) to a record of 22,099 t in 1990 (Fig. 2). Landings in 2005 (15,314 t) were still 53% above the long-term median (9,997 t) observed between 1947 and 2004. Although part of this latest increase in landings could be attributed to an increase in fishing power, favorable environmental factors are thought to be responsible for strong lobster recruitment success over its entire range.

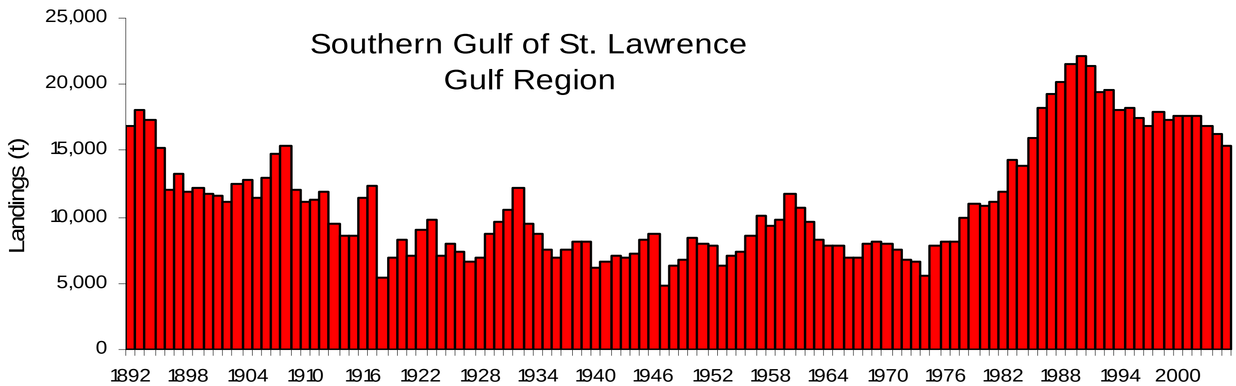


Figure 2. Historical lobster catches in the sGSL (DFO, Gulf Region) from 1892 to 2005.

In the sGSL, management of the lobster fishery is based entirely on effort control (input fishery) (Table 1). The four most important measures in controlling effort are the fixed number of lobster fishing licences (stable at approximately 3,260 fishing licenses since 1967), individual trap allocations, restrictions on gear characteristics, and limited fishing seasons. For market purposes there are two categories of lobster being retained in the sGSL: canners from the MLS to 80 mm CL and markets larger than 80 mm CL.

ASSESSMENT

Source of Information

The stock status of the five LFAs located in the Gulf Region has been assessed using indicators primarily based on a fishery-independent trawl survey in LFA 25 and part of LFA 26A and SCUBA surveys in LFAs 23, 25, 26A, and fishery-based data from DFO official catch statistics, at-sea sampling, voluntary index-fishermen logbooks, voluntary recruitment-index logbooks, and biological sampling.

Table 1. Key management measures in the lobster fishery in sGSL in 2006.

Management measures	**Description**				
Lobster Fishing Areas (LFA)	LFA 23	LFA 24	LFA 25	LFA 26A	LFA 26B
Fishing season	May 1 to June 30	May 1 to June 30	Aug. 10 to Oct. 10	May 1 to June 30[1]	May 1 to June 30
Number of licence (Type A and B)[2]	718-42	635-4	848-6	756-11	243-4
Number of traps/license holder	300	300	250	300	300
Restriction on gear type	Traps (no restriction on internal design)				
Trap overall dimension (cm)	Length = 125, Width = 90, Height = 50				
Rectangular escape mechanism height in parlor section of trap (mm) (width common to all LFA = 127 mm)	40	40	40	40 [3]	38.1
Biodegradable mechanism in the parlor section of the trap	Dimension of unobstucted opening not less than 89 mm in height and 152 mm in width				
Maximum size of entrances (mm)	152		152		
Minimum legal carapace size (mm)	70	70	70	70 [4]	75
Female size restriction (mm)	115-129	115-129	Greater than 114mm	115-129	115-129
Landing of egg-berring females is prohibited	Common to all LFAs				
Time restriction	Possession of lobster and fishing gear is prohibited between 9PM and sunrise in LFA 25 only				

[1]Regions between Pointe Prim and Victoria have their season from May 6 to July 7

[2]Type A represent fishermen with a full set of gear and Type B with 30%

[3]Western and Eastern Nova scotian side of 26A is at 41 mm

[4]Western Nova Scotia of 26A is at 76 mm and Eastern Nova Scotia at 71.5 mm

Since LFAs were established for management purposes, they sometime do not adequately reflect biological units or the lobster populations and/or the fishery itself. Therefore, for the purpose of this assessment LFAs were sometime divided in nine sub-regions: LFA 24 and 26B were not sub-divided; LFA 23 sub-divided into LFA 23BC (Baie des Chaleurs) and LFA 23G (GSL side); LFA 25 into LFA 25N (northern part) and LFA 25S (southern part, central Northumberland Strait); LFA 26A sub-divided into LFA 26AD (west of Pictou Island, central Northumberland Strait) LFA 26APEI (eastern side of PEI) and LFA 26ANS (mainland Nova Scotia east of Pictou Island).

Abundance

Abundance indicators based on landings for legal size lobster from all LFAs except 25, are close to or above the long-term median. While landings have generally increased since 1947, the timing of the peaks differed as did the pattern of decline of landings following the peaks (Fig. 3). This reflects the heterogeneity of the spatial distribution and the temporal variability of the lobster resource in the sGSL. The exception is LFA 24 where landings show a steady increase since 1977. The landings in LFA 24 during 2005 were 5,697 t, higher (160%) than the long-term (1947-2004) median (2,195 t) (Table 2).

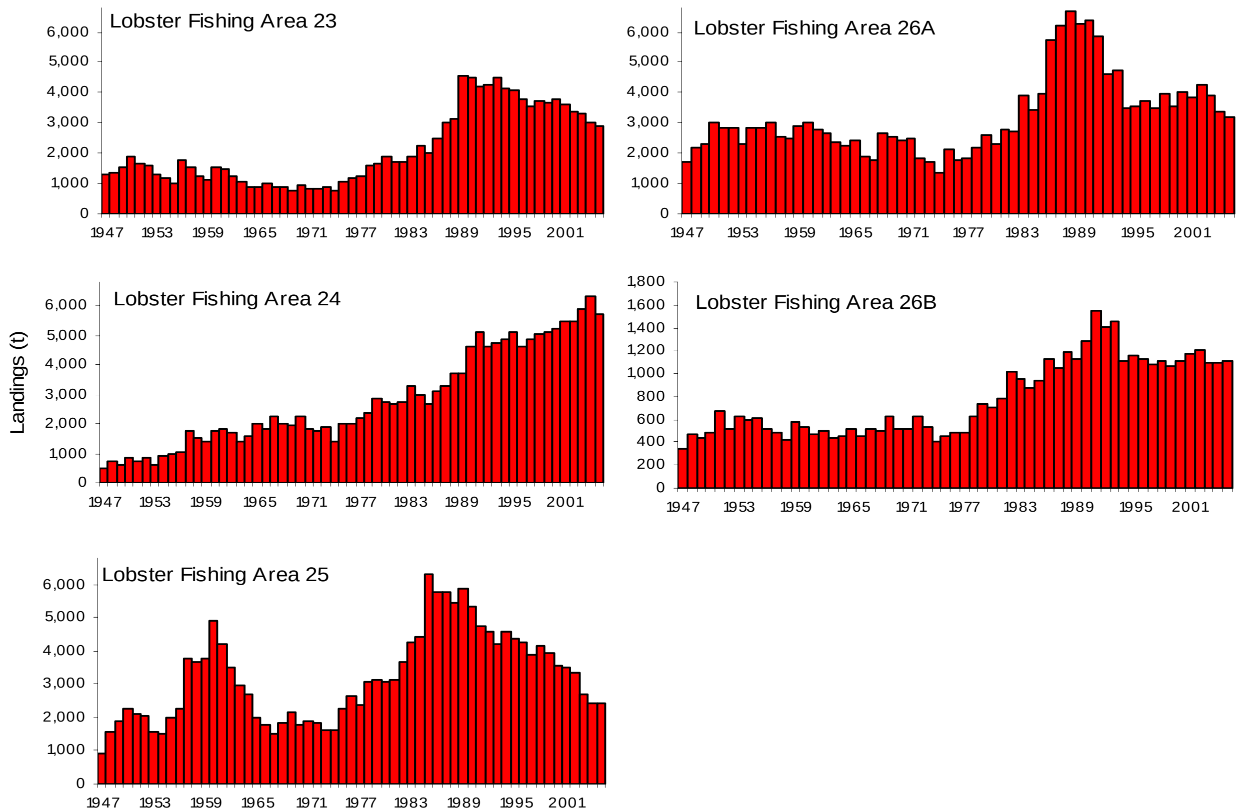


Figure 3. Lobster catches in the sGSL (DFO, Gulf Region) by Lobster Fishing Area from 1947 to 2005.

Table 2. Abundance indicators based on the 2005 commercial landings and the 2006 fishery-independent trawl survey (carried out mainly in LFA 25 and LFA 26AD). Indicators were categorized as positive ("+") for values above 10% of the median, negative ("--") or values below 10% of the median or neutral ("0") within 10% of the median for a given time period.

Source	23 BC	23 G	24	25 N	25 S	26A D	26A PEI	26A NS	26B
Landings									
55-yr median vs. 2005	+	+	+	--	--	0	0	0	+
38-yr median vs. 2005	0	0	+	--	--	--	--	+	--
10-yr median vs. 2005	--	0	0	--	--	--	--	0	0
2004 vs. 2005	0	0	0	0	0	0	0	0	0
Trawl Survey 2005									
Canner				--	--	--			
Market				--	--	--			

Very little change was observed for landings between 2004 and 2005 for all LFAs (Table 2). For the long-term trends, it seems that declining trends have been less pronounced in the spring fisheries and those outside of central Northumberland Strait, with landings for 2005 still above the long-term median (Table 2). In LFA 23, the 2005 landings (2,907 t) were 79% above the long-term median (1,626 t) but landings have been declining since 1993 (Fig. 3). Within LFA 23, the decline in landings was more pronounced in Baie des Chaleurs (Table 2). Landings in LFA 26B have varied little for the last 12 years (Table 2; Fig. 3). In LFA 26A, the 2005 landings of 3,172 t were 13% above the long-term median (Fig. 3). However, landing trends within LFA 26A varied with location. Landings in the Northumberland Strait portion of the LFA dropped more than 76% from the highest peak landings, while they dropped more that 58% in LFA 26A eastern PEI (Table 2). Conversely, landings have been somewhat stable for the last 18 years for fisheries operating in mainland NS east of Pictou (Table 2).

The landing trends in LFA 25 were characterized by wide fluctuations with no stable period (Fig. 3). In 2005, 2,419 t were landed, which represent a 21% reduction from the long-term median (Table 2). The 20-year decline is the largest one observed in the sGSL (Fig. 3). Although a declining trend was observed for the entire LFA, the one observed in LFA 25 north is similar to LFA 23. LFA 25 south is the area within the sGSL with the most alarming trend.

Similar trends in abundance were observed in the fishery-independent trawl survey. The numbers of canners in LFA 25N declined about 67% between 2001 and 2005 (Table 2) but rebounded to near-2002 levels in 2006. The number of canners remained low for LFA 25S and LFA 26AD (Table 2). The number of market size lobsters declined by about 40% during the same period (Table 2) and was the highest ever estimated for the entire LFA 25 and LFA 26AD in 2006. The spatial extent of high density areas (area with >400 animals per km^2) contracted within west-central Northumberland Strait between 2001 and 2005 and rebounded in 2006.

Fishing Pressure

The percentage of the first molt group into the fishery landings (FMG) could be a good indicator of the fishing pressure because, under the assumption of a low exploitation rate, there should be a good representation of multi-molt groups in the catch (i.e., low FMG) and more stability in landings. Based on at-sea sampling data from the 2000’s, the FMG were higher than 70% for LFA 23G and 24, between 60% and 70% for LFA 23BC, 25N, 26APEI, and 26B, and were lower than 60% for LFA 25S, 26AD and 26ANS (Table 3). However, the FMG alone will only give a partial indication of the situation if it is not coupled with landing trends. Hence, a decline of the FMG could be viewed as positive but coupled with a declining trend in landings could be indicative of a high fishing pressure (not allowing FMG to survive the fishery and growth to bigger sizes). By comparing the FMG to the 38-yr landings trend (in terms of a risk analysis given the most severe situation), a high fishing pressure is observed in several sub-regions, except in LFA 23BC and 26B where the indicator is neutral, and in LFA 26ANS where the indicator is positive (Table 3). The high incidence of the FMG coupled with declining landings trends indicates that the fishing pressure or the exploitation rates are still high except in LFA 26ANS. Based on estimates from previous stock status reports (Lanteigne et al., 1998, 2004) the exploitation rates in the sGSL could vary from 63% to 87%.

There is further evidence that the fishing pressure is too high based on estimates that 50% of traps are empty (over the season) in four of the five LFAs (LFA 24 had 24%). An increase of more than 10% between 1980’s and 2000’s was observed in LFA 23, 25 and 26AD, while it remained constant (neutral) in LFA 26APEI, 26ANS, and 26B (Table 3). It also remained constant in LFA 24 but at a low value of 24%, indicating a positive situation. The increase in the percentage of empty traps is surprising for LFA 23 since the number of allowable traps went down from 375 to 300 traps. Had the number of traps stayed at 375, the proportion of empty traps would have probably resulted in a much higher increase. The biggest increase was observed in central Northumberland Strait (LFA 25S and LFA 26AD) averaging 13-17% in the 1980’s to 57-61% in the 2000’s. Finally, since LFA 25 at-sea sampling data only include August, a even higher percentage of empty traps in the fishery would be obtained if data from the months of September and October were included.

Table 3. Fishing pressure indicators based on the percentage of the first molt group into the fishery (FMG) from the at-sea sampling, 38-yr landings trend and the percentage of empty trap in the fishery. Indicators were categorized as positive ("+") for values above 10% of the median, negative ("--") or values below 10% of the median or neutral ("0") within 10% of the median for a given time period.

Source	23 BC	23 G	24	25 N	25 S	26A D	26A PEI	26A NS	26B
At-sea sampling									
FMG	0	--	--	0	+	+	0	+	0
Landings trends									
38-yr median vs. 2005	0	0	+	--	--	--	--	+	--
FMG vs. Landings trend	0	--	--	--	--	--	--	+	--
Empty Trap									
1980's vs. 2000's*	+	+	0	+	+	+	0	0	0

* A positive indicator for empty trap is considered negative

Production

The production indicators using the pre-recruit logbook program and the trawl survey are negative in the Northumberland Strait and positive elsewhere in the sGSL. The trawl survey indicates that the level of pre-recruits into the fishery is low in LFA 25S and 26AD corroborating the information from fishery-based surveys (Table 4). Moreover, the number of pre-recruits has decreased by about 70% between 2001 and 2005. The advantage of using three modified traps (escape vent blocked) during the recruitment-index program allows assessing pre-recruits into the fishery. High levels of pre-recruits were observed in LFA 24 and 25N, while levels were very low and on a constant decline, indicating a scarcity of pre-recruits, in LFA 25S and 26AD (Table 4). In LFA 23, 26APEI, 26ANS and 26B, the levels were high but stable (Table 4).

A gradual increase of berried females catch rate was observed in several LFAs in the sGSL, while a decline was observed in the summer-fall fishery and the Northumberland Strait (Table 4). Increases ranging from a 2-fold increase in LFA 23G, LFA 26APEI and 26ANS, to a 4- to 5-fold in LFA 24 and 26B. However, the berried females catch rate declined in LFA 25 and LFA 26AD (Table 4). In LFA 23BC, berried females catch rate had increased from 1983 to 2002, but seems to follow a declining trend since 2003.

The abundance of 1 and 2 year old lobsters was assessed by SCUBA diving surveys in LFA 23, 25S, and LFA 26AD. Abundances observed in LFA 23 increased from 1.3 to 6.2 lobster/100m^2 between 2000 and 2006 (Table 4). Abundances observed in both LFA 25S and 26AD were much lower than in LFA 23BC. They were below 1 lobster/100m^2 for 2005 and 2006 with no increase (Table 4).

Table 4. Production indicators for 1- and 2-yr old lobsters (SCUBA diving surveys); pre-recruits (one molt before entering the fishery) based on the recruitment-index program and the 2005 trawl survey; the abundance of berried females in the catch (at-sea sampling program); and the female reproductive condition based on females collected in LFA 25. Indicators were categorized as positive ("+") for values above 10% of the median, negative ("--") or values below 10% of the median or neutral ("0") within 10% of the median for a given time period.

Source	23 BC	23 G	24	25 N	25 S	26A D	26A PEI	26A NS	26B
SCUBA Diving									
1- and 2-yr old abundance	+	+			--	--			
Pre-recruit Program									
Pre-recruits	0	0	+	+	--	--	0	0	0
Trawl survey 2005									
Pre-recruits				0	--	--			
At-sea sampling Program									
Berried females	0	+	+	--	--	--	+	+	+
Biological									
Female condition				--	--				

A monitoring program was initiated in 2002 to assess the reproductive condition of females captured during the LFA 25 season. Females in their egg-extrusion year (EEY) were observed in the commercial catch in both LFA 25N and 25S (Table 4). The weekly level of EEY was different between those two areas, being higher in LFA 25S (33-54%) compared to LFA 25N (19-44%). However, the absence in the catch of EEY was observed simultaneously reaching 0% the first week of September. These females were already exposed to the fishery the previous year. This "double-dipping" by the fishery of the mature female population is not observed in a spring fishery. Hence, compared to a spring fishery, a summer fishery makes it more difficult to achieve the management goal of increasing egg per recruit based only on increases in MLS and is contradictory to the FRCC's (FRCC, 1995) recommendations for lobster conservation.

Ecosystem

Environmental conditions, such as water temperature, can influence the distribution of lobster as well as their catches (Drinkwater et al., 2006). Chassé et al. (2006) reported that the bottom temperatures over most of the sGSL are typically less than 3 °C, which is not considered a suitable thermal habitat for lobster. This constraints the distribution of lobster to the coastal water of the sGSL (i.e., < 30 m) where bottom temperature can reach over 20°C (e.g. central Northumberland Strait) during the summer.

Overall, environmental conditions have been warming up in the sGSL over the last decade. In particular, sea surface temperatures have been rising in all lobster fishing areas. There has been less ice coverage than normal over the last 6 -7 years, except 2003. The volume of the cold intermediate layer has decreased and its core temperature became warmer since the late 1990s. This may favour an expansion of the lobster distribution.

In terms of larval drift and survival, current observations and models suggest that the Northumberland Strait is essentially an isolated system (relying on itself for recruitment) unlike the rest of the sGSL.

Lobster diet and predator-prey relationships were established based on samples collected during the May, July, August and October trawl surveys carried out in LFA 25. Lobster was largely carnivorous and decapods were the principal prey (57-84% of prey biomass), with rock crab being the single most important one (45-78%). About 70% of the rock crab consumed by lobster represented fresh prey (muscle or gills attached) and the remainder consisted of old carapaces. Lobster represented 8% to 13% of the prey biomass; however, a substantial portion (39-79%) of the lobster remains consisted of old carapaces. The only demersal fish to consume large amounts of intact lobster was the shorthorn sculpin.

Sources of Uncertainty

Landings and information gathered during the recruitment-index program and at-sea sampling program are a function of abundance, the level of fishing effort (trap hauls, soak-days, timing of effort and fishing strategy) and catchability. Catchability in turn is affected by environmental conditions, gear efficiency (including trap design and bait), and other factors. Changes in any of these can affect landings and catch rates. Thus, indicators derived from these sources would not necessarily reflect changes in abundance, fishing pressure, or production.

Data on landings from the Statistical Branch (DFO) correspond to compilation of sale transactions (purchase slips) conducted between official lobster buyers and fishermen. This information takes 18 to 24 months before being available. There are also uncertainties as for the non-recorded lobster captures corresponding to quantities used as other sales, personal consumption and to poaching. In addition, there is no direct data on the spatial distribution of landings and effort. This information is needed to monitor the extent and changes in the distribution of fishing effort and to map the overlap of fishing gear. Information on catch, effort and fishing location from all the users is imperative to properly assess lobster stocks. To remedy this situation, a pilot project conducted by DFO Science Gulf Region in collaboration with fishermen in LFA 26B started in 2006 to electronically collect accurate landings with effort and location information in a timely fashion.

Any changes in fishing efficiency (or “effective effort”) have not been accounted for. If fishing efficiency has increased in the last five years due to larger vessels, better navigation or improved fishing strategies, then the catch rate index may inflate our perception of abundance in recent years.

CONCLUSIONS AND ADVICE

Framework

Recommended indicators for the sGSL fisheries depend upon fishery-independent trawl survey in LFA 25 and part of LFA 26A and SCUBA surveys in LFAs 23, 25, 26A, and fishery-based data from DFO official catch statistics, at-sea sampling, voluntary index-fishermen logbooks, voluntary recruitment-index logbooks, and biological sampling.

Data Sources: Existing indicators based on at-sea sampling, voluntary recruitment-index logbooks and the trawl survey should be continued and improved. These data sources are essential and provide the basis for current indicators of abundance, fishing pressure and production. The low coverage of the voluntary index-fishermen logbook makes it difficult to properly analyze data and should be terminated. A new system to gather information directly from fishermen (landings and effort that is not available at the present time) that is timely, accurate, and available via an electronic structured database should be designed as an alternative to the information gathered from sale slips to provide a total catch indicator. Indicators based on diving surveys should be maintained and even expanded into new areas. New fishery-independent surveys should be considered.

Abundance Indicators: Landings are the first level of abundance indicator and although they may not always track abundance changes, landings will continue to be monitored for a variety of reasons. To better interpret catch rate changes, indicators of fishing efficiency are needed that would capture improvements in boats, navigation, traps, etc.

Fishery-independent indicators of abundance could be expanded from existing diver based surveys and the trawl survey in LFA 25 and part of LFA 26A.

Fishing Pressure Indicators: Percentage of the catch in molt group one appears to be limited to evaluating average exploitation over a number of years.

Additional indicators of fishing effort (vessel size, navigation, trap design fishing strategy, etc.) are required because the lobster fishery is largely effort-controlled and the "quality" of effort is not being tracked effectively. The effect of soak time on our perception of effort should be evaluated. The distribution of fishing effort is extremely important and spatial distribution indicators of fishing effort should be developed.

Production Indicators: Indicators of pre-recruits using the voluntary recruitment-index logbook program could be expanded.

Fishery-independent indicators are also needed for berried females and pre-recruits, including newly settled lobsters. Indicators for berried females are needed to estimate reproductive output directly and to track this important component of the population. Recording berried females during commercial fishing through the at-sea samples is efficient in the sGSL and form the basis for one indicator. Indicators are needed for juveniles that are more than three years away from reaching fishable sizes (< approx 50 mm CL). Such indicators would give advance warning of downturns in recruitment and could be obtained by out-of-season sampling.

Ecosystem Indicators: Long-term temperature monitoring throughout the season is essential to understand potential changes in catchability and molt timing. However it will be sometime before indicators such as ocean productivity, predators and prey will be operational.

General Comments: The recommended assessment schedule is every 5 years.

Annual monitoring of the above indicators would be used to determine if an earlier than scheduled assessment is required.

Recognizing that progress has been made, with respect to examining current indicators, data limitations, and interpretation of trends, there was insufficient opportunity to fully address all stated objectives of this meeting. For instance, data to provide an estimation of fishery impacts on the ecosystem with respect to by-catch of non-lobster species and potential impact of lobster fishing on the habitat was not reviewed because the approach to collect and process this information is required.

Stock Status

Lobsters in the sGSL as a whole continue to be in high abundance with landings above long-term means. The only area that shows strong negative trends is the Northumberland Strait (i.e., LFA 25 and 26AD). Fishing pressure, measured by the percentage of the first molt group into the fishery coupled with the 38-yr landings trend, indicated that it is high for the entire sGSL except for LFA 26ANS. The lobster fishery in the sGSL continues to have high exploitation rates and to be heavily dependent on new recruits making this "recruitment fishery" immediately susceptible to changes in the level of recruitment. The increase in the percentage of empty trap during the fishery in several areas also corroborates the interpretation that the fishing pressure on the lobster stock is high. Exploitation rates were not evaluated but based on previous evaluation it is still considered high.

The two multiyear management plans aimed at increasing egg production seems to have had a positive effect on lobster production in the sGSL as a whole. Once again, the only area that systematically shows negative indicators for the level of 1- and 2-yr old lobsters, pre-recruits into the fishery and berried females is central Northumberland Strait. Furthermore, the female condition monitoring program in LFA 25 clearly show that the time of the fishery is detrimental to the reproductive potential of the stock (i.e., increase in the egg production).

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FOR MORE INFORMATION

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