STOCK STATUS UPDATE FOR AMERICAN LOBSTER (*HOMARUS AMERICANUS*) IN LOBSTER FISHING AREA 33

CONTEXT

The Resource Management Branch, Fisheries and Oceans Canada (DFO), Maritimes Region, has requested an update to stock status for American Lobster (*Homarus americanus*) in Lobster Fishing Area (LFA) 33. This Science Response Report is from the regional peer-review meeting held on September 25, 2024, on the Stock Status Update for American Lobster in LFA 33.

SCIENCE ADVICE

Status

- LFA 33 Lobster stock is in the healthy zone, well above the upper stock reference (USR).
- LFA 33 harvesting continues to occur below the removal reference. The stock is not being overfished.
- The primary productivity indicator for the stock indicates that there has been no change in stock status since the last assessment.

Trends

- The primary indicator of productivity peaked in 2016 after a two-decade increasing trend. It has remained high relative to the time series. Though below its peak value, this indicator has been stable for four years.
- The primary indicator of exploitation has shown a general increasing trend for the past five years / fishing seasons though remains below earlier time series levels.
- Landings have closely mirrored catch rates, as effort levels have remained relatively stable for the past 12 seasons (other than 2020, COVID-19 market effects). Landings from 2023 and 2024 should be similar once all data is accounted for.
- Recruitment indices had risen for two decades and peaked in 2019. Though at levels below 2019, the indices have been relatively consistent for the past five seasons.

Ecosystem and Climate Change Considerations

- The overall impact of ecosystem variables or changing ocean conditions on productivity of the LFA 33 Lobster stock is unknown. Changes in environmental variables can affect Lobster behaviour, that in turn can affect catch rates, which is the primary indicator of productivity in LFA 33.

Stock Advice

- The LFA 33 Lobster stock is in the healthy zone; that is, the current harvest strategy has maintained the stock in the healthy zone with exploitation below the removal reference.

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

October 1, 2018 (DFO 2020a).

Assessment Type

Interim Year Update.

Most Recent Assessment Date

1. Last Full Assessment: October 1, 2018 (DFO 2020a).
2. Last Interim Year Update: September 9, 2022 (DFO 2023).

Assessment Approach

1. Broad category: multiple approaches.
2. Specific category: Index-based (including fishery-dependent and fishery-independent indices).

The primary indicator of productivity is the fishery-dependent unmodelled catch rate from commercial logbooks.

The primary indicator of exploitation is derived through a continuous change in ratio (CCIR) modelling approach applied to fishery-independent data. The CCIR method provides estimates of population parameters based on the changes in observed proportions of size components within the population. The proportion of reference individuals (sublegal-sized Lobster) increases with the cumulative removals of the exploitable component (DFO 2020a).

Stock, Ecosystem, and Fishery Overview Information

The LFA 33 stock is part of the broader Lobster population on the Scotian Shelf. The LFA 33 Lobster fishery is a trap-based fishery in Southwestern Nova Scotia prosecuted from late-November to May 31st annually (DFO 2020a; DFO 2020b). As the fishing season spans calendar years, the closing year of the season is used in this document (e.g., 2023–24 is 2024).

Stock Structure Assumption

Lobster Fishing Area 33 is a management-based stock unit and does not represent a biological unit. Adjacent management areas have reference points independent of LFA 33 or other LFAs.

Reference Points

1. Limit Reference Point (LRP): Three-year running median commercial catch rate of 0.139 kg/trap haul (kg/th).
2. Upper Stock Reference (USR): Three-year running median commercial catch rate of 0.278 kg/th.

3. Removal Reference (RR): Three-year running median CCIR exploitation estimate of 0.85.
4. Target Reference Point (TRP): Not applicable.

Management Objectives

An overarching objective of fisheries management is to prevent unacceptable reductions in productivity of ecosystem components. In LFA 33, this is achieved by managing the commercial exploitation of Lobster and promoting egg production in a manner consistent with the Precautionary Approach (PA) Policy and according to the following sub-objectives:

1. To maintain a healthy Lobster stock;
2. To manage the risk of the fishery causing or precipitating a decline in stock status; and
3. To promote recovery of the stock should it fall into the cautious zone or critical zone.

Harvest Decision Rules

- When the stock is in the healthy zone, the exploitation rate will be monitored in relation to the RR. If the exploitation rate exceeds the RR, the LFA 33 fishery advisory committee will discuss and recommend management actions to reduce fishing pressure.
- In the cautious zone, the exploitation rate will be reduced progressively if stock status continues to decline.
- In the critical zone, removals will be kept to the lowest possible level, which may mean closure of fisheries. A rebuilding plan will be implemented to promote stock growth.

Data

The data source informing the productivity indicator and secondary indicators of landings and effort for LFA 33 are fishery-dependent commercial logbooks reporting information on date, location (by reporting grid), effort, and estimated catch. At the time of peer reviewing this stock update, 15% of 2024 commercial logbooks remained outstanding, so were not included in this assessment.

A fishery-independent recruitment-trap project involving volunteer fishers is also a data source. Detailed data on Lobsters captured in standardized traps is recorded throughout the commercial fishing season. This data informs the primary indicator of exploitation and the secondary indicator of recruitment through sub-legal sized Lobster catch rates. At the time of peer reviewing this stock update, 12% of recruitment-trap project data remained outstanding, so were not included in this assessment.

ASSESSMENT

History of Landings and Effort

Over the past 40 years, a slightly increasing trend in the fishing effort has been observed, as measured by total trap hauls for the fishery. This effort indicator has been relatively stable for the past 10 years. The primary indicator of productivity (i.e., commercial catches rates) peaked in 2016 after a two-decade increasing trend. It has remained high relative to the time series. Though now below the 2016 peak value, this indicator has been stable for four years.

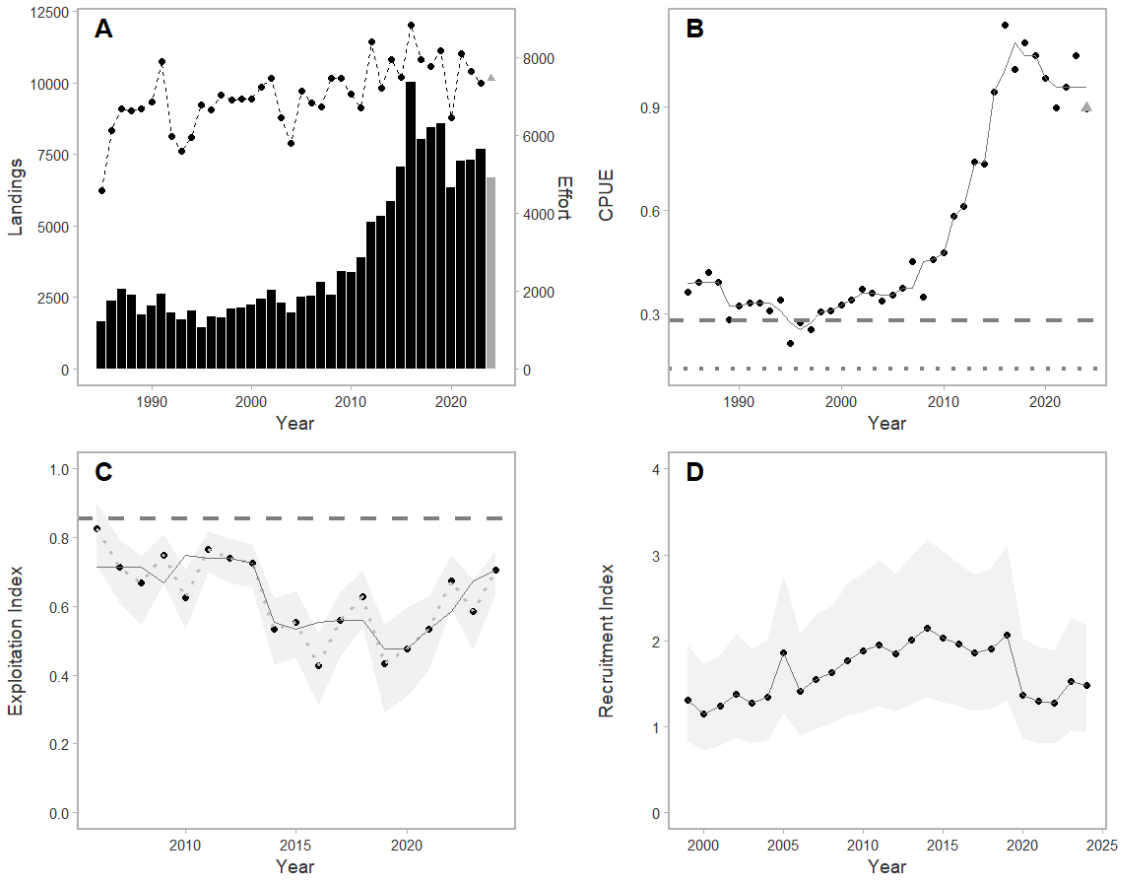

Figure 1.(A) Time series of Lobster landings (t; bars) and fishing effort ('000s trap hauls; line); note that the gray bar and gray triangle in 2024 denotes incomplete landings and effort records. (B) Commercial Lobster catch per unit effort (CPUE) in kilograms per trap haul (kg/th; black dots) in relation to the Limit Reference Point (LRP, dotted) and Upper Stock Reference (USR, dashed); note that the triangle denotes incomplete data for the 2024 fishing season. (C) Time series of continuous change in ratio-method exploitation estimates (black dots) with 95% credible intervals (grey shading) and the RR (dashed grey line). (D) Time series of recruitment-trap catch rates in Lobsters per trap (black points), with 95% credible intervals (grey shading) from modelled results sublegal-sized (70-82.5 mm) Lobsters. In panels B and C, the solid lines represent three-year running medians. Note that the x-axis time series are specific to each panel, exhibiting different ranges, and are not common among all panels.

Stock Status and Trends

Primary Indicator of Productivity – Commercial Catch Rate

The annual point estimate for the catch per unit effort (CPUE) was 0.89 kg/th with a three-year running median value of 0.95 kg/th (Figure 1, Panel B). The annual estimate is down from the previous season, but the running median remains unchanged. This places the stock in the healthy zone. The three-year running median is more than three times the value of the USR. For the past 10 seasons, the CPUE has been well above those observed prior to this time. This is consistent with increases across other Lobster LFAs.

Primary Indicator of Exploitation – CCIR Estimate

The annual point estimate and three-year running median of the CCIR exploitation estimate are both 0.71 for the 2024 fishery (Figure 1; Panel C). Both have increased since 2023.These

exploitation estimates are more representative of inshore areas where the majority of the recruitment traps are fished, though the fishery occurs in both inshore and offshore portions of LFA 33. The median CCIR estimate is below the RR of 0.85. It has slowly been trending upward for the past five seasons, but remains below median values in the early portion of the time series.

Secondary Indicator – Commercial Fishery Landings and Effort

Landings for the 2024 season were 6,667 t (Figure 1**;** Panel A)**.** However, at the time of peer reviewing this stock update 15% of 2024 commercial logbooks remained outstanding, so were not included in this assessment. Total landings are expected to be very close to 2023 levels(i.e., 7,690 t) once all logbooks have been accounted for. Effort (expressed as trap hauls) for the 2024 season exceeds 2023 estimates even with the outstanding logbooks. This is expected with decreased CPUE and consistent landings from 2023.

Secondary Indicator – Recruitment Trap Sub-Legal Catch Rates

The catch rate of recruits (R-1) Lobster (Figure 1; Panel D) in the recruitment trap project remains consistent with the 2023 value. After 20 years of an increasing trend, similarly observed in commercial catch rates, the recruitment index decreased sharply in 2020 and remained near that level in 2021 and in 2022. It has been higher in 2023 and 2024, but still well below 2010–19 levels. At the time of peer reviewing this stock update, 12% of recruitment-trap project data remained outstanding, so were not included in this assessment.

History of Management

Management measures for this effort-controlled fishery have been stable for many years. Number of licenses, traps per license, length of season, and minimum legal size have not changed. Landings and effort are shown in Figure 1 (Panel A) and described above.

Ecosystem and Climate Change Considerations

The overall impact of ecosystem variables or changing ocean conditions on productivity of the LFA 33 Lobster stock is unknown. Changes in environmental variables can affect Lobster behaviour, that in turn can affect catch rates, which is the primary indicator of productivity in LFA 33.

Stock Advice

The LFA 33 Lobster stock is in the healthy zone; that is, the current harvest strategy has maintained the stock in the healthy zone with exploitation below the RR. Current management practices have maintained the stock well above the USR and below the RR. The available data and assessment approach for LFA 33 Lobster do not provide stock projections into the future.

SOURCES OF UNCERTAINTY

The reliance on fishery-dependent data for the assessment of LFA 33 Lobster adds inherent uncertainty, as Lobster behavior such as catchability, movement, etc., and fishing behaviour can affect results. Nonetheless, the use of consistent stock-status indicators annually creates an informative index of stock health and fishery performance. At the time of drafting this stock update, 15% of commercial fishing logs had not been received by DFO Science. Though very unlikely to significantly change the primary indicator of productivity and associated stock status, landings, fishing effort levels, and CPUE cannot be considered as final.

In recent years, widespread closures of fisheries for traditional bait sources (e.g., Atlantic Mackerel [*Scomber scombrus*] and Atlantic Herring [*Clupea harengus*]) have seen some harvesters change bait types in their Lobster traps. Catch rates could be affected for harvesters that have changed baits from those traditionally used. It is unknown whether such changes in catch rate would be positive or negative.

Standardized, timely reporting for all landings is required by DFO Science to better understand the effects of removals on the Lobster population. This requirement applies to all commercial and rights-based access (i.e., Food Social and Ceremonial and Moderate Livelihood). Reporting of rights-based landings is improving and will eventually be able to further inform stock assessments in conjunction with commercial removals.

Illegal and unreported fishing activity represents further removals from Lobster stocks. The impact of additional removals cannot currently be accounted for in science advice, leading to increased uncertainty in stock status.

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SOURCES OF INFORMATION

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DFO. 2023. Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 33 for 2022. DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/007.

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