



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Ecosystems and
Oceans Science

Sciences des écosystèmes
et des océans

Canadian Science Advisory Secretariat
Science Response 2024/040

Maritimes Region

STOCK STATUS UPDATE FOR AMERICAN LOBSTER (*HOMAUROS AMERICANUS*) IN LOBSTER FISHING AREA 34

CONTEXT

The Resource Management Branch, Fisheries and Oceans Canada (DFO), Maritimes Region, has requested an update to stock status for American Lobster in Lobster Fishing Area (LFA) 34. 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 Lobster Fishing Area 34.

SCIENCE ADVICE

Status

- LFA 34 lobster stock is in the healthy zone, as four of four survey biomass indicators are above their respective Upper Stock Indicators.
- LFA 34 harvesting continues to occur below the Removal Indicators across all four indices. The stock is not being overfished.
- The primary productivity indicator for the stock shows that there has been no change in stock status since the last assessment.

Trends

- Fisheries independent survey indices of commercial biomass are stable or increasing in recent years.
- Landings and commercial catch per unit effort (CPUE; kg/trap haul) have been decreasing since 2015–16 and are currently on par with the 2010–12 seasons.
- As landings have been decreasing and survey indices are increasing, relative fishing mortality has been declining in recent years.

Ecosystem and Climate Change Considerations

- The overall impact of ecosystem variables and changing ocean conditions on the LFA 34 Lobster stock's productivity and fishery performance (CPUE, Landings) are currently under investigation. Changes in environmental variables (e.g., temperature) can affect lobster bioenergetics and behaviour, which in turn can affect catch rates and resulting landings; both fisheries-dependent indices. Fisheries-independent indices are less affected by lobster behaviour and thus less prone to the impacts of climate variability.

Stock Advice

- 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 2, 2019 (DFO 2021).

Assessment Type: Interim Year Update.

Most Recent Assessment Date

1. Last Full Assessment: October 2, 2019 (DFO 2021).
2. Last Interim Year Update: October 7, 2022 (DFO 2023).

Stock Assessment Approach

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

Stock status is a combined result across four fisheries independent survey biomass indices, relative to the respective Limit Reference Indicators (LRIs) and Upper Stock Indicators (USIs) (Table 1). For each index, the USI is defined by using the median commercial biomass during the survey-specific high-productivity period, as a proxy for carrying capacity (K), and setting it equal to 40% of K. LRI is defined as the median of the five lowest non-zero biomasses from which the stock has rebuilt (Cook et al. 2023).

A Removal Indicator (RI) is derived for each survey index using its respective three-year running median commercial biomass estimates and seasonal commercial landings.

Stock, Ecosystem, and Fishery Overview Information

The LFA 34 stock is part of the broader lobster population on the Scotian Shelf, Gulf of Maine, and Bay of Fundy. The LFA 34 fishery is a trap-based fishery in Southwestern Nova Scotia prosecuted from late-November to May 31st annually (DFO 2020; DFO 2021). 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

The LFA 34 is a management-based stock unit and does not represent a biological unit. Adjacent management areas have reference points independent of LFA 34 or other LFAs.

Reference Points

Reference points to delineate stock status are based on an amalgamation of survey-specific indicators. The use of multiple surveys to form single reference points is described in Table 1.

Table 1. Description of the Upper Stock Reference (USR) and Limit Reference Point (LRP) for LFA 34. USI = Upper Stock Indicator; LRI = Limit Reference Indicator; (—) not applicable.

| Zone | Reference Point | Description |
|----------|-----------------|---|
| Healthy | USR | Two or more survey biomasses are above their respective USIs |
| Cautious | — | Three or more survey biomasses are below their respective USI and above their respective LRI; OR |
| | | Two survey biomasses are above their respective USIs and two survey biomasses are below their respective LRIs; OR |
| | | One survey biomass above its respective USI, one survey biomass below its respective LRI, and two survey biomasses between their respective USIs and LRIs |
| Critical | LRP | Two or more survey biomasses are below their respective LRIs |

Other Stock Reference Points

Overfishing will be considered to have occurred when three or more of the Removal Indicators (RI) have been exceeded for their respective survey indices.

Management Objectives

An overarching objective of fisheries management is to prevent unacceptable reductions in productivity of ecosystem components. In LFA 34, this is achieved by managing the commercial exploitation of lobster and promoting egg production in a manner consistent with the PA (Precautionary Approach) 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 removal reference. If the exploitation rate exceeds the removal reference, the 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 would be implemented to promote stock growth.

Data

Fishery-independent data sources are from the Inshore Lobster Trawl Survey (ILTS), DFO Maritimes Region Summer Trawl Survey (hereafter DFO survey), and spring and fall surveys conducted by the Northeast Fisheries Science Center (NEFSC). Survey stations included in biomass estimation are in or adjacent to LFA 34.

The fishery-dependent data consist of commercial logbooks reporting information on date, location by reporting grid, effort, and estimated catch. At the time of this peer review, 13% of 2024 commercial logbooks remained outstanding, so are not included in this assessment.

Data change

Length based vessel calibration factors for the DFO Research Vessel (RV) series were incorporated into the time series of commercial biomass to properly account for a recent change in vessel and gear type. This allows results from throughout the time series to be comparable.

ASSESSMENT

From the mid-1990's, landings, catch rate, and biomass estimates have shown an increasing trend for approximately twenty years. Catch rates and landings have both decreased since peaking in 2016. Biomass indices also decreased from that same peak time period but have shown an increasing trend over the past five years. This increasing trend has not been observed in landing and catch rate data in recent years. This discrepancy between fishery-dependent and fisheries-independent indices is potentially explained by the influence of changing environmental conditions or fishing behaviour that can affect fisheries-dependent indices.

Stock Status and Trends

Primary indicator of Productivity – Commercial Biomass Indices

All-time high levels of commercial biomass indices were observed between 2013 and 2016 across all four fisheries independent surveys (Figure 1, Panel C,D; Figure 2). Following these highs, indices decreased for 3-5 years and have since stabilized or increased.

Current Outlook

All four commercial biomass indices are above their respective USI and the stock is therefore considered to be in the healthy zone.

Primary Indicator of Exploitation – Relative fishing mortality

The highest estimates of relative fishing mortality were observed in the early parts of the time series for all four indices (Figure 2). Since that time, relative fishing mortality has declined and is at moderate to low levels compared to historic estimates.

Current Outlook

Relative fishing mortality is currently below the RI for each of the four indices, indicating that overfishing is not occurring.

Secondary Indicators – Landings and CPUE

Landings increased between 1990 and 2016, when an all-time high of 29,131 t were landed. Since 2016, landings have declined to 15,325 t in 2024 (Figure 1; Panel A). However, at the time of peer reviewing this stock update 13% of 2024 commercial logbooks remained outstanding, so were not included in this assessment. The CPUE has also declined since 2016 (Figure 1; Panel B). Last, there has been a declining trend in the number of trap hauls in the commercial fishery over the past 20-years (Figure 1; Panel A).

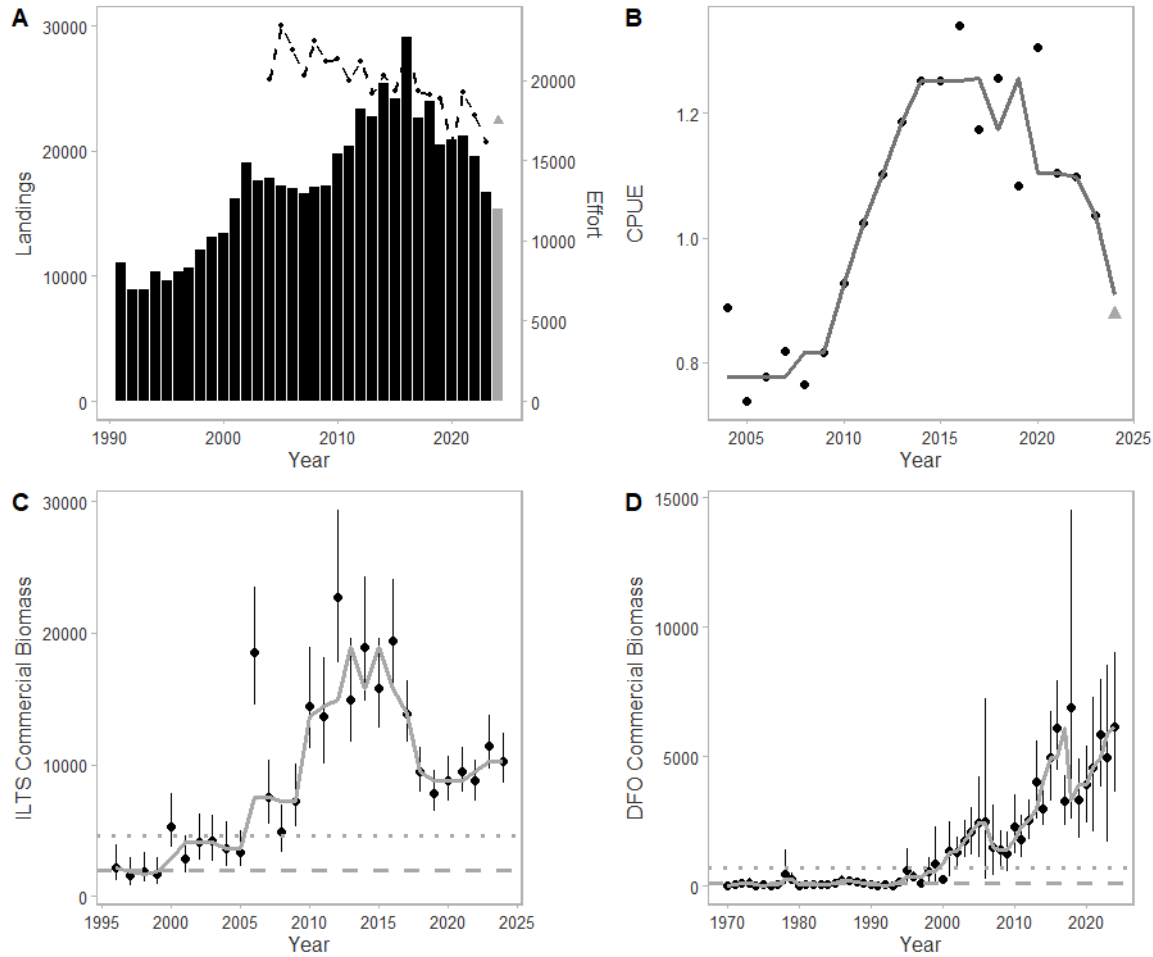


Figure 1. (A) Landings (t, bars) and number of trap hauls, or TH ('000s, dashed line); note that grey bar and grey triangle represent incomplete 2024 fishery data. (B) Commercial catch per unit effort (kg/TH) by year (points) and the three-year running median (line); note that the grey triangle represents incomplete 2024 fishery data. (C) Commercial biomass index (points with confidence intervals) and running median (line) from the ILTS, along with USI (dotted line) and LRI (dashed line). (D) Commercial biomass index (points with confidence intervals) and running median (line) from the DFO survey, along with USI (dotted line) and LRI (dashed line). Note that the x-axis time series are specific to each panel, exhibiting different ranges, and are not common among all panels.

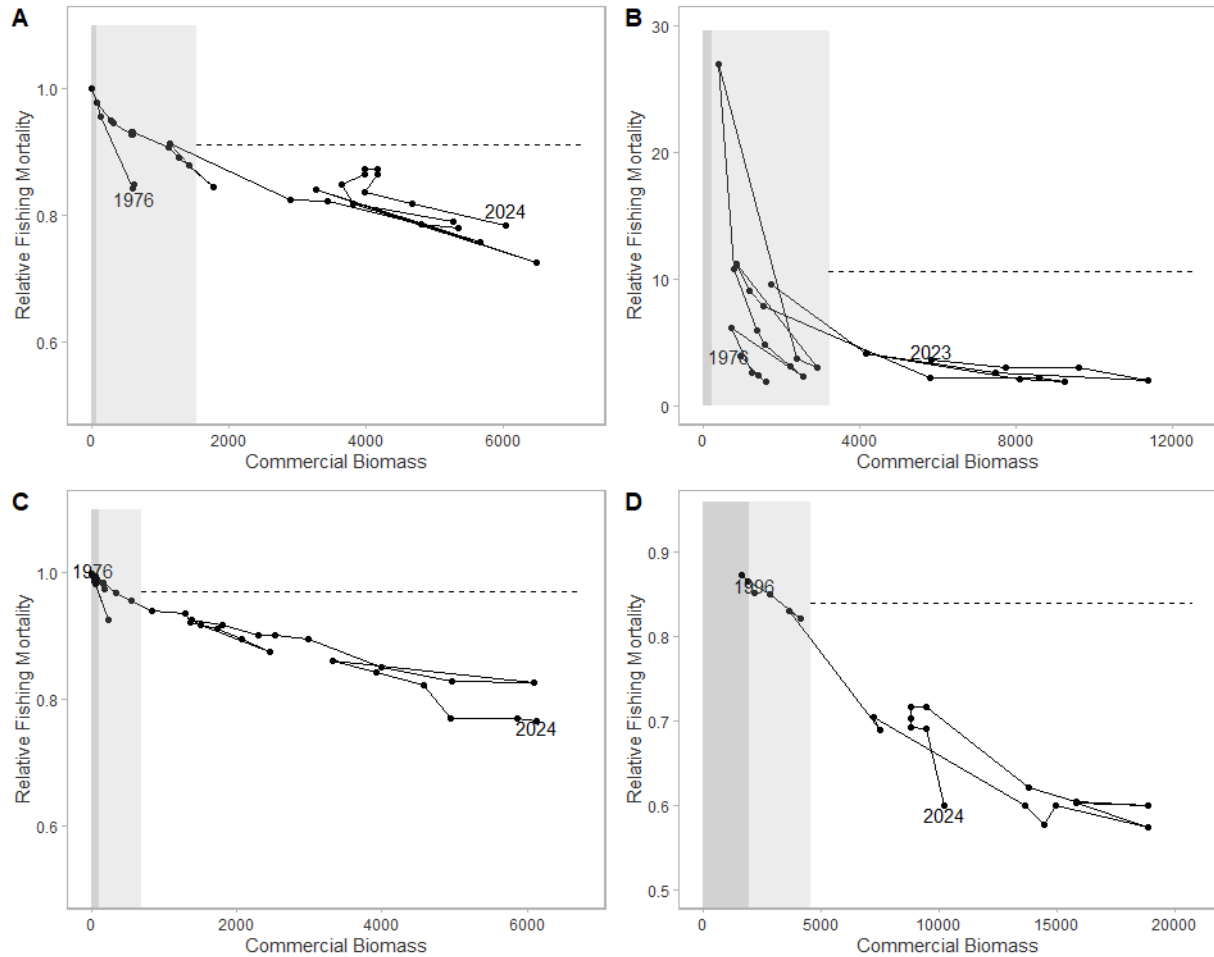


Figure 2. Time series of running median seasonal indices (points) of commercial biomass (t) and relative fishing mortality from: (A) NEFSC spring survey; (B) NEFSC fall survey; (C) DFO survey; and (D) ILTS survey. In each plot the dark gray shaded area is below the LRI, the light gray is above the LRI and below the USI, and the unshaded is above the USI. The dashed line represents the RI for each survey. Start and end of the time series are labelled with respective years. Note that the NEFSC fall survey (Panel B) is pre-fishery, so Relative Fishing Mortality is not directly comparable to other surveys.

History of Management

Management measures for this effort-controlled fishery have been stable for many years. Number of licences, traps per licence, 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 and changing ocean conditions on the LFA 34 Lobster stock's productivity and fishery performance (CPUE, Landings) are currently under investigation. Changes in environmental variables (e.g., temperature) can affect lobster bioenergetics and behaviour, which in turn can affect catch rates and resulting landings; both fisheries-dependent indices. Fisheries-independent indices are less affected by lobster behaviour and thus less prone to the impacts of climate variability.

Stock Advice

The current harvest strategy has maintained the stock in the healthy zone, with exploitation below the removal reference. Current management practices have maintained all survey biomass indices above their respective USIs and below their respective RIs. The available data and assessment approach for LFA 34 Lobster do not provide stock projections into the future.

SOURCES OF UNCERTAINTY

Using multiple survey indices strengthens the assessment approach, as a single survey can be affected by logistics such as vessel issues and/or weather. Conversely, a reliance on four survey indices, only one of which is under the direction of the DFO Lobster assessment team, means that the pressures and operational priorities of external surveys may not always align with the needs of the LFA 34 lobster stock assessment.

The partial reliance on fishery-dependent data adds inherent uncertainty as Lobster behavior, such as catchability, movement, etc., can affect results. At the time of peer reviewing this stock update, 13% of commercial fishing logbooks had not yet been received by DFO Science. Though very unlikely to change indicators and associated stock status significantly, landings, fishing effort levels, and CPUE for the 2023–24 season cannot be considered as final.

In recent years, wide-spread closures of fisheries for traditional bait sources (e.g., Atlantic Mackerel and Atlantic Herring) 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. Specific areas in LFA 34 have been documented by DFO Conservation & Protection to have substantial fishing outside the commercial season. The impact of additional removals cannot currently be accounted for in science advice, leading to increased uncertainty in removal indicators.

LIST OF MEETING PARTICIPANTS

| Name | Affiliation |
|----------------------|--------------------------------------|
| Adam Cook (Lead) | DFO Science, Maritimes |
| Ben Zisserson (Lead) | DFO Science, Maritimes |
| Jeremy Broome | DFO Science, Maritimes |
| Claire Mussells | DFO Science, Maritimes |
| Kristian Curran | DFO Science, National Capital Region |
| Shannan Murphy | DFO Science, National Capital Region |
| Susan Thompson | DFO Science, National Capital Region |
| Verna Docherty | DFO Resource Management, Maritimes |
| Kelsey Hayden | DFO Resource Management, Maritimes |

SOURCES OF INFORMATION

- Cook, A.M., Hubley, P.B., Howse, V., and Denton, C. 2023. [2019 Framework Assessment of American Lobster \(*Homarus americanus*\) in LFA 34–38](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2023/075. vii + 158 p.
- DFO. 2020. [Inshore Lobster Integrated Fishery Management Plan \(Summary\): Lobster Fishing Areas 27–38 Scotia-Fundy Sector-Maritimes Region](#). 10pp.
- DFO. 2021. [Assessment of Lobster \(*Homarus americanus*\) in Lobster Fishing Area 34](#). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2021/015.
- DFO. 2023. [Stock Status Update for American Lobster \(*Homarus americanus*\) in Lobster Fishing Area 34 for 2022](#). DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/021.

THIS REPORT IS AVAILABLE FROM THE:

Center for Science Advice (CSA)
Maritimes Region
Fisheries and Oceans Canada
Bedford Institute of Oceanography
1 Challenger Drive, PO Box 1006
Dartmouth, Nova Scotia B2Y 4A2

E-Mail: MaritimesRAP.XMAR@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3769

ISBN 978-0-660-74572-5 Cat. No. Fs70-7/2024-040E-PDF

© His Majesty the King in Right of Canada, as represented by the Minister of the
Department of Fisheries and Oceans, 2024



Correct Citation for this Publication:

DFO. 2024. Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 34. DFO Can. Sci. Advis. Sec. Sci. Resp. 2024/040.

Aussi disponible en français :

MPO. 2024. Mise à jour sur l'état du stock de homard d'amérique (*Homarus americanus*) dans la zone de pêche du homard 34. DFO Can. Sci. Advis. Sec. Sci. Resp. 2024/040.