



STOCK ASSESSMENT OF LOBSTER (*HOMARUS AMERICANUS*) IN LOBSTER FISHING AREA 36 FOR 2024

CONTEXT

The Fisheries Management Branch of Fisheries and Oceans (DFO) has requested an assessment for the American Lobster (*Homarus americanus*) stocks in lobster fishing areas (LFAs) 35-38. Framework meetings were held from October 8–9 and November 7, 2024, to establish the scientific basis for the provision of management advice for these stocks.

This Science Advisory Report is from the February 26-27, 2025, regional peer review on the Stock Assessment for American Lobster in Lobster Fishing Areas 35, 36-38. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

SCIENCE ADVICE

Status

- The 2024 LFA 36 Lobster commercial biomass index is 1069.4 t, which is approximately 14 times the limit reference point (LRP; 75.2 t).

Trends

- Landings in LFA 36 have been trending downward since the time series high in 2018 of 4,073 t. Landings in the terminal year are 58% of the peak landings in 2018.
- Catch per unit effort (CPUE) has decreased since the time series high in 2014 with current estimates comparable to 2011. Hyperstability in the CPUE index is likely occurring.
- The commercial survey biomass index has been stable since 2019. In 2024, the commercial biomass index is 24% of the mean from the three highest estimates from the time series.
- Relative fishing mortality decreased after 2008 and has remained low and variable since that time. Given the reports on increased unreported harvesting, the increase in relative fishing mortality is likely underestimated.
- Trends in benthic recruitment densities match the trends observed in commercial biomass when accounting for time to reach minimum legal size. The 2024 settler density represents the second highest value in the time series.

Ecosystem and Climate Change Considerations

- The Bay of Fundy is experiencing rising temperatures, and changes in salinity, affecting lobster development and ecosystem productivity. These changes combined with ocean acidification, will impact lobster life cycle timing, distribution, and catchability.

- Short-term climate fluctuations will influence annual fisheries performance irrespective of population changes.
- Longer-term decreases in pH, increases in temperature, and variability in food availability will likely affect lobster populations in a multitude of ways; however, the magnitude of these impacts is currently unknown.

Stock Advice

- The LFA 36 Lobster stock has been managed with consistent measures since the late 1990s – early 2000s, and stock indicators have fluctuated through this time. Trends in primary and secondary indicators are above the long-term averages but are lower than recent high productivity periods. Commercial biomass is well above the LRP.

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

2024 (Cook et. al. In prep¹)

Assessment Type

Full assessment

Most Recent Assessment Date

1. Last Full Assessment: September 2019 (DFO 2021)
2. Last Interim-Year Update: September 25, 2023 (DFO 2023)

Stock Assessment Approach

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

Stock, Ecosystem and Fishery Overview Information

The LFA 36 fishery is an effort-controlled trap-based fishery along the New Brunswick coast in the Bay of Fundy and is prosecuted as a split fishing season (second Tuesday in November – January 14th, March 31st to June 29th) annually (DFO 2024). The fishing season spans calendar years, and in this document the closing year of the season is used as the season year (e.g., 2023–24 is 2024).

Stock Structure Assumption

The LFA 36 stock is part of the broader lobster population on the Scotian Shelf, Gulf of Maine and Bay of Fundy. The LFA 36 is a management-based stock unit and does not represent a

¹ Cook, A., Howse, V., Asselin, N., Armsworthy, S., Denton, C., Gurney-Smith, H., Tam, J.C., White, L., and Quinn, B.. In Prep. Framework Assessment of American Lobster (*Homarus americanus*) in Lobster Fishing Areas 35-38. DFO Can. Sci. Advis. Sec. Res. Doc.

biological unit. The stock structure in the Bay of Fundy is not fully understood but it is thought that the area consists of sub-components that are linked through adult migration and larval drift. Biomass indices are developed through spatial analyses which incorporates information from adjacent areas. The LRP for LFA 36 is estimated independently of adjacent LFAs. Trends in indicators discussed in this document are mirrored in adjacent areas and the larger Gulf of Maine complex increasing confidence in the conclusions.

Reference Points

- Limit Reference Point (LRP): 75.2 t commercial biomass estimate (Cook et al. In prep¹), a proxy for B_{recover} .
- Upper Stock Reference (USR): Not available. It is expected to be developed under a separate process.
- Removal Reference (RR): Not available
- Target Reference Point (TRP): Not available.

Data

- Commercial sales slips (landings and landings per vessel 1990–2024)
- Commercial logbook data (catch per unit effort 2005–2024)
- Food, social, ceremonial (FSC, landings 2023–2024)
- Inshore Lobster trawl survey (catch counts and length frequency 2000–2024)
- DFO Summer Ecosystem Research Vessel survey (catch counts and length frequency 2000–2024)
- Northeast Fisheries Science Centre trawl surveys (catch counts and length frequency 2000–2024)
- Maine New Hampshire inshore trawl survey (catch counts and length frequency 2000–2024)
- Beaver Harbour settlement index (Lobster density 1991–2024)

ASSESSMENT

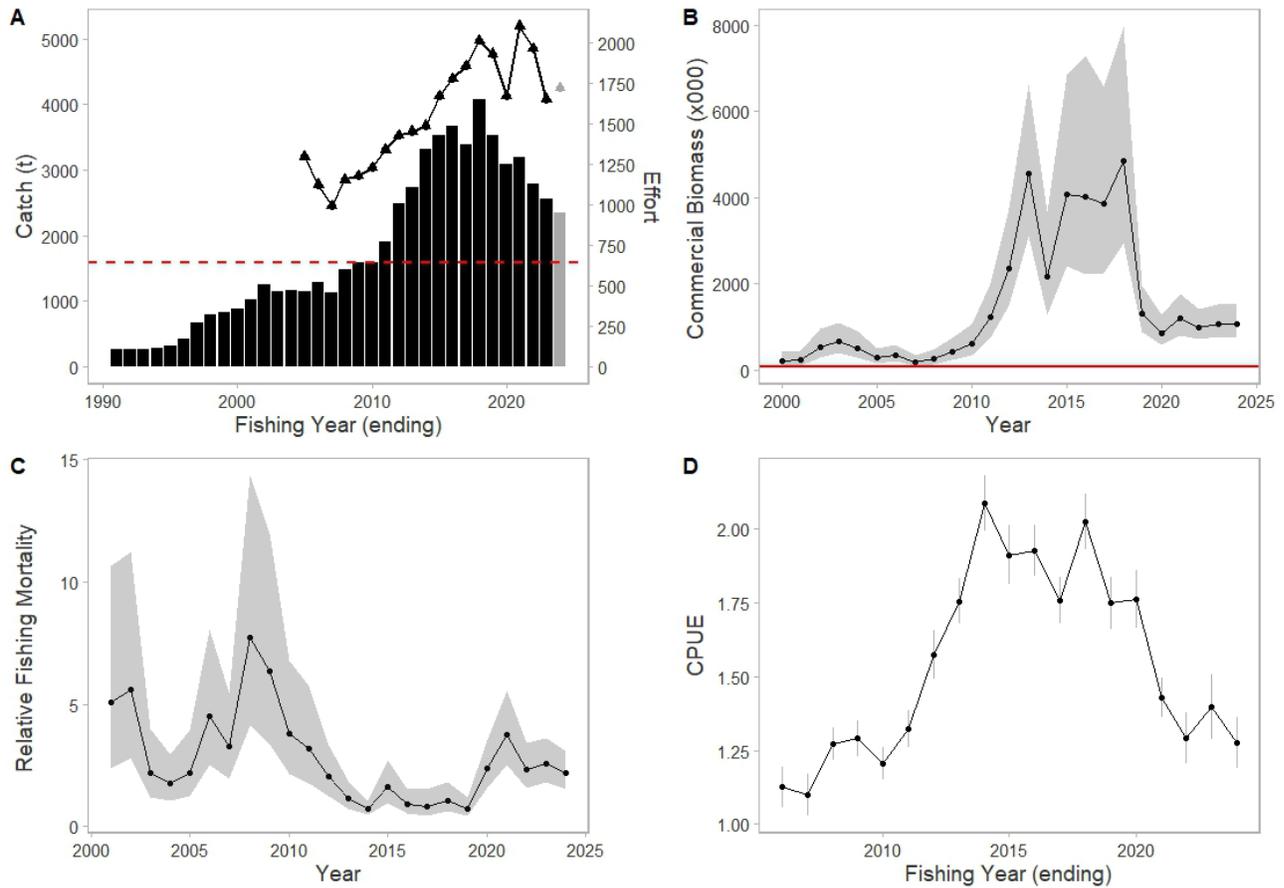


Figure 1. (A) Landings (t, bars) and effort ('000s trap hauls, solid line) and the 30-year median of landings (red horizontal dashed line); the grey bar and grey triangle represent the most recent fishing season of 2024. (B) Commercial biomass index (points and solid line) with 95% confidence interval (grey shading) from combined surveys, along the lower reference point (solid red horizontal line); year represents the biomass for the season of the data informing the coming year's pre-fishery biomass estimate. (C) Relative fishing mortality estimates (landings/commercial biomass) from combined survey model for lobster fishing area 36 (points and solid line) with 95% confidence interval (grey shading). (D) Commercial catch per unit effort (CPUE, kg/TH) by year (points and line) with 95% confidence interval (vertical lines).

Table 1. Seasonal landings in lobster fishing area 36 from 2001-2024 and catch per unit effort from 2006-2024. Dash indicates grid referenced and effort distribution information was not available until after 2005.

Fishing Season	LFA 36 Landings (t)	CPUE (kg/TH)
2001	1032	-
2002	1261	-
2003	1155	-
2004	1169	-

Fishing Season	LFA 36 Landings (t)	CPUE (kg/TH)
2005	1143	-
2006	1295	1.12
2007	1138	1.10
2008	1477	1.27
2009	1596	1.29
2010	1594	1.21
2011	1916	1.32
2012	2488	1.58
2013	2739	1.76
2014	3325	2.09
2015	3524	1.91
2016	3681	1.93
2017	3382	1.76
2018	4073	2.03
2019	3526	1.75
2020	3094	1.76
2021	3205	1.43
2022	2786	1.29
2023	2560	1.40
2024	2345	1.28

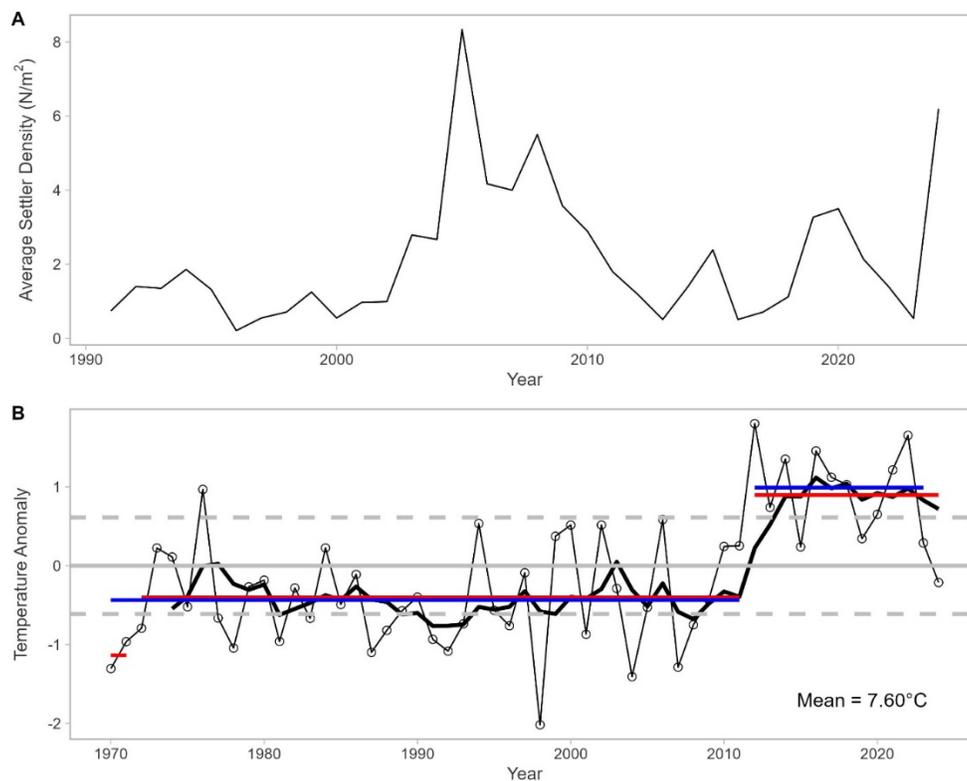


Figure 2. (A) Temporal trends in average settler density from Beaver Harbour, NB, estimated from scuba suction sampling (solid line). (B) Time series of July bottom-temperature anomalies (thin black lines with circles) and five-year-running mean filtered series (heavy black line) for NAFO Division 4X from DFO research vessel and inshore lobster trawl surveys. The solid grey horizontal line is the 1991-2020 mean and dashed lines represent ± 0.5 standard deviation. Regime shift analysis results from running the method forwards and backwards on the time series depicted by the blue and red horizontal lines, respectively.

Stock Status and Trends

Landings, Effort, and Catch Per Unit Effort

Landings more than doubled from 2010 to 2018 reaching 4,073 t. From the 2018 record high, landings steadily declined while remaining well above previous 30-year low of 257 t (1993) and the 30-year median of landings of 1,594 t. Landings have continued to decline in the last 3 years (mean of 2,564 t) and are comparable to the landings in 2012 (2,488 t; Figure 1 (A) and Table 1). The mean annual percent decline in landings since the time series high is 8.61%. Landings in the terminal year are 58% of peak landings in 2018 (3,382 t, Figure 1 (A) and Table 1). There has been a steep decline in the estimates of fishing effort (total trap hauls) in LFA 36 following 2021 with the season extension ending in 2022 (Figure 1 (A)). The evidence of hyperstability in CPUE suggests that this index may not reflect the available biomass of lobster (Cook et al. In prep.¹). CPUE has shown an overall decline since the time series high in 2014 and remains low in recent years with estimates comparable to 2011 (Figure 1 (D)).

Communal commercial landings and effort are reported and included in the commercial landings data. In Maritimes Region, DFO issues lobster harvest documents for FSC in LFAs 35-38, whereby fishing can occur both within and outside the commercial season (DFO 2022). The quantitative detail and coverage of the FSC landing reports vary by licence holder. Some FSC

harvest records have been received to date and there continues to be an improvement in reporting. Reported FSC landings in LFAs 35-38 for May 2023-May 2024 were 24.4 t. It is unknown what proportion of total FSC removals for LFAs 35-38 this reported amount represents. FSC removals are not included in the total landings nor are catch rates reported in this document.

Commercial Biomass

The commercial lobster biomass index, estimated from multiple surveys through a spatio-temporal modelling approach (Cook et al. In prep.¹), indicated a time series high in 2018, followed by a steep decline in 2019. The commercial biomass index has been stable from 2019-2024 (mean 1085.2 t) and the 2024 commercial biomass index is 22% of the peak in 2018 and 24% of the mean from the three highest estimates from the time series. The mean annual percent decline from the time series high to terminal year is 13%. The biomass index in 2024 represents the pre-fishery estimate for the 2025 fishing season. The 2024 biomass estimate is 1,069.4 t, which is 14 times the LRP of 75.2 t (Figure 1 (B)).

Relative Fishing Mortality

Relative fishing mortality is an estimated index of exploitation calculated with landings and the commercial biomass index. This index showed a decrease from 2008 and has been low with variability since that time. Given the reports on increased unauthorized harvesting, the increase in relative fishing mortality is likely underestimated (Figure 1 (C)).

Recruitment

Benthic recruitment (the process of lobsters settling to the seabed during their first year of life) is represented as average settler (individuals <13 mm carapace length) densities, from scuba suction sampling. The settler densities in Beaver Harbour, NB, remained relatively consistent from 1991 to 2002 (mean 1 N/m²), after which they markedly increased to a peak of 8.34 individuals per meter² in 2005 (Figure 2 (A)). This peak in settlement aligns with the 2013 peak in commercial biomass index (assuming 8 years from settlement to recruitment into the fishery). Densities subsequently decreased between 2006 to 2011 despite the higher densities and have remained at ca. 1.4-1.9 number/meter² from 2011 onward. The 2024 settler density represents the second highest value in the time series.

Current Status

The 2024 LFA 38 lobster commercial biomass of 1069.4 t places the stock above the LRP.

History of Management

The LFA 36 Lobster is an effort-controlled fishery with consistent management measures in the commercial fishery including limited entry licensing, traps per licence, season length, minimum legal size and possession restriction of v-notched or berried lobsters (DFO 2024). Between 2017-2022, the LFA 36 season was extended for 10 days as a pilot at the end of the regular season, ending on July 9th. The LFA 36 season reverted to its regulated dates in the 2023 season.

Access to LFA 37 is provided to both LFAs 36 and 38 licence holders by way of licence conditions. Landings from LFA 37 are attributed to the respective LFA stated on the licence. Beginning in the 2022-23 fishing season, DFO implemented a boundary line to provide separate areas of access to LFA 36 and LFA 38 commercial licence holders. The boundary was implemented in commercial communal conditions for the 2024-25 season. The boundary line is considered interim.

In Maritimes Region, DFO issues lobster harvest documents for FSC in LFAs 35-38, whereby fishing can occur both within and outside the commercial season. Management measures in the FSC fishery may be different than in the commercial fishery.

Ecosystem and Climate Change Considerations

Shifts toward warmer waters within NAFO Division 4X are evident beginning in 2012 through 2022. Cooler bottom temperature years were observed in 2023 and 2024 and are closer to the mean of the 1991-2020 period (Figure 2(B)). Future climate projection models show increases in both surface and bottom temperatures for the 4X region. Continued temperature increases will affect lobster phenology, larval connectivity, recruitment success, and incidence of disease. Water temperature anomalies, such as marine heatwaves or cold-water anomalies, can further exacerbate impacts to the ecosystem and resources. Short-term climate fluctuations will influence annual fisheries performance irrespective of population changes. Phytoplankton and zooplankton bloom timings and magnitude have shifted, and overall, there are predicted declines in zooplankton indicating lower ecosystem productivity potential. Warming in the Gulf of Maine has been linked to declines in zooplankton species, such as *Calanus finmarchicus*, a known prey item for larval lobster. Projected changes in *C. finmarchicus* abundances and timing may have food availability implications for survival of lobster larvae and recruitment success (Greenan et al. 2019, Pershing et al. 2021, and Carloni et al. 2024).

Ocean acidification has already decreased seawater pH on the Scotian Shelf. Studies suggest that early lobster larval stages are sensitive to environmental conditions, and that early juveniles are most sensitive to ocean acidification, suggesting a reduction in juvenile fitness that may have implications for fisheries and population recruitment. While ocean acidification will continue, the current phase of localized warming and saltier waters at depth may buffer calcium carbonate saturation state declines, slowing impacts for the adult fisheries resource; nearshore areas with projected salinity decreases may not have the same level of buffering. Nearshore regions are key habitat for early lobster life stages and recruits, and combined warming and acidification will have greater negative impacts. These longer-term decreases in pH, increases in temperature, and variability in food availability will likely affect lobster populations in a multitude of ways; however, the magnitude of these impacts is currently unknown (Cook et al. In prep.¹).

PROCEDURE FOR INTERIM-YEAR UPDATES

Given a changing ecosystem and a recruitment driven fishery, monitoring of indicators is important. The 2024 commercial biomass index is 22% of the peak in 2018 and 24% of the mean from the three highest estimates from the time series. The mean annual percent decrease from the time series high to terminal year is 13%. Indicators should be monitored annually to check for triggers that may flag a need for earlier than scheduled assessment/review of the data inputs.

An earlier than scheduled framework would be triggered if

1. 25% of the distribution of the last years of commercial biomass index (25% of the distribution of 2024 index is 1,010.2 t) falls below the LRP or
2. a significant loss of survey data, as this would strongly affect model performance.

SOURCES OF UNCERTAINTY

Stock abundance estimates were previously based on fishery performance, specifically commercial catch per unit effort (CPUE). In recent years, CPUE has shown patterns of hyperstability, remaining high even as biomass declines, thereby reducing its reliability as an indicator of stock health. The transition to fishery-independent metrics (survey-based biomass estimates) in the new stock assessment framework can help eliminate this fishery-behavior driven hyperstability. However, this shift introduces challenges in comparing current assessments under the new framework with the output of past assessments that relied on CPUE.

A source of uncertainty in trawl survey approaches is the uneven sampling of potential lobster habitat. This uncertainty can be mitigated by expanding the survey coverage. The likely movement of lobsters between assessment areas introduces another source of uncertainty in the estimation of abundance for LFAs.

Additionally, presumed underreporting of total removals contributes to uncertainty in exploitation estimates, as reported landings may not reflect true lobster catch levels.

LIST OF MEETING PARTICIPANTS

Name	Affiliation
Archibald, Devan	Canadian Research Lobster Network
Armsworthy, Shelley	DFO Science, Maritimes
Assalin, Natalie	DFO Science, Gulf
Bennett, Lottie	DFO Science, Maritimes
Blackwood, Emily	University of New Brunswick
Clancy, Lewis	Nova Scotia Department Fisheries and Aquaculture
Clark, Fraser	Dalhousie University
Cook, Adam	DFO Science, Maritimes
Coughlin, Elizabeth	DFO Science, Newfoundland
Courtois, Marine	Sipekne'katik First Nation
Dinning, Kristin	New Brunswick Department of Agriculture, Aquaculture, Fisheries
Docherty, Verna	DFO Resource Management, Maritimes
Element, Geraint	DFO Science, Maritimes
Greenlaw, Michelle	DFO Science, Maritimes
Gurney-Smith, Helen	DFO Science, Maritimes
Hayden, Kelsey	DFO Resource Management, Maritimes
Howe, Amy	Grand Manan Fishermen's Association

Name	Affiliation
Howse, Victoria	DFO Science, Maritimes
Hubley, Brad	DFO Science, Maritimes
Koopman, Heather	Grand Manan Whale and Seabird Research Station
Krumsick, Kyle	DFO Science, Pacific
Lawton, Peter	DFO Science, Maritimes
Quinn, Brady	DFO Science, Maritimes
Rivard, Julie	DFO Science, National Capital Region
Shank, Burton	National Oceanic and Atmospheric Administration
White, Lydia	University of New Brunswick
Zisseron, Ben	DFO Science, Maritimes

SOURCES OF INFORMATION

- Carloni, J.T., Wahle, R.A., Fields, D.M., Geoghegan, P., and Shank, B. 2024. [Diverging phenology of American lobster \(*Homarus americanus*\) larvae and their zooplankton prey in a warming ocean](#). ICES J. Mar. Sci. 81(5): 918–928.
- DFO. 2021. [Assessment of American Lobster \(*Homarus americanus*\) in Lobster Fishing Areas 35–38](#). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2021/020.
- DFO. 2022. [Food, social and ceremonial fisheries](#).
- DFO. 2023. [Stock Status Update of Lobster \(*Homarus americanus*\) in Lobster Fishing Area 35 for 2023](#). DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/040.
- DFO. 2024. [Inshore Lobster – Integrated Fisheries Management Plan](#).
- Greenan, B.J.W., Shackell, N.L., Ferguson, K., Greyson, P., Cogswell, A., Brickman, D., Wang, Z., Cook, A., Brennan, C.E., and Saba, V.S. 2019. [Climate Change Vulnerability of American Lobster Fishing Communities in Atlantic Canada](#). Front. Mar. Sci. 6.
- Pershing, A.J., Alexander, M.A., Brady, D.C., Brickman, D., Curchitser, E.N., Diamond, A.W., McClenachan, L., Mills, K.E., Nichols, O.C., Pendleton, D.E., Record, N.R., Scott, J.D., Staudinger, M.D., and Wang, Y. 2021. [Climate impacts on the Gulf of Maine ecosystem: A review of observed and expected changes in 2050 from rising temperatures](#). Elementa: Science of the Anthropocene. 9(1): 00076.

THIS REPORT IS AVAILABLE FROM THE:

Centre 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: DFO.MaritimesCSA-CASMaritimes.MPO@dfo-mpo.gc.ca

Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-5087

ISBN 978-0-660-79863-9 Cat. No. Fs70-6/2025-061E-PDF

© His Majesty the King in Right of Canada, as represented by the Minister of the
Department of Fisheries and Oceans, 2025

This report is published under the [Open Government Licence - Canada](#)



Correct Citation for this Publication:

DFO. 2025. Stock Assessment of Lobster (*Homarus americanus*) in Lobster Fishing Area 36 for 2024. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2025/061.

Aussi disponible en français :

MPO. 2025. Évaluation du stock de homard (Homarus americanus) dans la zone de pêche du homard 36 en 2024. Secr. can. des avis sci. du MPO. Avis sci. 2025/061.