

Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5ZE) for 2023

Victoria Howse

Fisheries and Oceans Canada
Science Branch, Maritimes Region
Population Ecology Division
Bedford Institute of Oceanography
PO Box 1006
1 Challenger Drive
Dartmouth, Nova Scotia
B2Y 4A2

2024

**Canadian Technical Report of
Fisheries and Aquatic Sciences 3622**



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada

Canadian Technical Report of Fisheries and Aquatic Sciences

Technical reports contain scientific and technical information that contributes to existing knowledge, but which is not normally appropriate for primary literature. Technical reports are directed primarily toward a worldwide audience and have an international distribution. No restriction is placed on subject matter and the series reflects the broad interests and policies of Fisheries and Oceans Canada, namely, fisheries and aquatic sciences.

Technical reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

Technical reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page.

Numbers 1-456 in this series were issued as Technical Reports of the Fisheries Research Board of Canada. Numbers 457-714 were issued as Department of the Environment, Fisheries and Marine Service, Research and Development Directorate Technical Reports. Numbers 715-924 were issued as Department of Fisheries and Environment, Fisheries and Marine Service Technical Reports. The current series name was changed with report number 925.

Rapport technique canadien des sciences halieutiques et aquatiques

Les rapports techniques contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais qui ne sont pas normalement appropriés pour la publication dans un journal scientifique. Les rapports techniques sont destinés essentiellement à un public international et ils sont distribués à cet échelon. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques de Pêches et Océans Canada, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports techniques peuvent être cités comme des publications à part entière. Le titre exact figure au-dessus du résumé de chaque rapport. Les rapports techniques sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques*.

Les rapports techniques sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre.

Les numéros 1 à 456 de cette série ont été publiés à titre de Rapports techniques de l'Office des recherches sur les pêcheries du Canada. Les numéros 457 à 714 sont parus à titre de Rapports techniques de la Direction générale de la recherche et du développement, Service des pêches et de la mer, ministère de l'Environnement. Les numéros 715 à 924 ont été publiés à titre de Rapports techniques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 925

Canadian Technical Report of
Fisheries and Aquatic Sciences 3622

2024

Stock Status Update for American Lobster (*Homarus americanus*) in Lobster
Fishing Area 41 (4X + 5ZE) for 2023

by

Victoria Howse

Fisheries and Oceans Canada
Science Branch, Maritimes Region
Population Ecology Division
Bedford Institute of Oceanography
PO Box 1006
1 Challenger Drive
Dartmouth, Nova Scotia
B2Y 4A2

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

Cat. No. Fs 97-6/3622E-PDF ISBN 978-0-660-72730-1 ISSN 1488-5379

Correct Citation for this publication:

Howse, V. 2024. Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5ZE) for 2023. Can. Tech. Rep. Fish. Aquat. Sci. 3622: iv + 8 p.

Table of Contents

Abstract	iv
Résumé	iv
Introduction	1
Context.....	1
Description of the fishery.....	1
Methods	3
Indicators of Stock Status	3
Primary Indicators.....	4
Bycatch.....	4
Results and Discussion	5
Primary Indicator – Commercial Biomass.....	5
Primary Indicator – Reproductive Potential	6
Sources of Uncertainty	7
References	8

Abstract

Howse, V. 2024. Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5ZE) for 2023. Can. Tech. Rep. Fish. Aquat. Sci. 3622: iv + 8 p.

The status of American Lobster (*Homarus americanus*) in Lobster Fishing Area (LFA) 41 was last assessed in the fall of 2017, with annual updates since. This technical report describes the application of the suite of indicators from the 2017 assessment to update the stock status for the 2023 fishing season. Information on landings, bycatch and the two primary indicators (commercial biomass and reproductive potential) were updated where possible. Landings data were incomplete at the time this report was prepared. Bycatch data were available for only one trip per year in 2021 and 2023 and two trips in 2022, with limited data during the 2020 season due to the COVID-19 pandemic. Currently, all four surveys (DFO and NEFSC) remain well above their respective Upper Stock Indicators (USIs) for Commercial biomass and Reproductive Potential. Therefore, the stock is in the Healthy Zone, as it has been since 2002.

Résumé

Howse, V. 2024. Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5ZE) for 2023. Can. Tech. Rep. Fish. Aquat. Sci. 3622: iv + 8 p.

L'état du homard américain (*Homarus americanus*) dans la zone de pêche au homard (ZPH) 41 a été évalué pour la dernière fois en automne 2017, et avec des mises à jour annuelles depuis. Ce rapport technique décrit l'application de la série d'indicateurs tirée de l'évaluation de 2017 afin de mettre à jour l'état du stock pour la saison de pêche de 2023. Les informations sur les débarquements, les prises accessoires et les deux indicateurs principaux (biomasse commerciale et potentiel reproductif) ont été mis à jour dans la mesure du possible. Au moment de la rédaction du rapport, les données de débarquement étaient incomplètes. Les données sur les prises accessoires n'étaient disponibles que pour un voyage par an en 2021 et 2023 et deux voyages en 2022, avec des données limitées pendant la saison 2020 en raison de la pandémie COVID-19. À l'heure actuelle, les quatre relevés (MPO et NEFSC) demeurent bien au-dessus de leurs indicateurs du niveau supérieur (INS) respectifs pour la biomasse commerciale et le potentiel de reproduction. Par conséquent, le stock se trouve dans la zone saine, comme c'est le cas depuis 2002.

Introduction

Context

The status of American Lobster (*Homarus americanus*) in Lobster Fishing Area (LFA) 41 was last assessed in the fall of 2017 (DFO 2018; Cook et al. 2017) with annual updates since (DFO 2019, DFO 2020, DFO 2021, DFO 2022, DFO 2023a). This technical report applies the suite of indicators from the 2017 assessment to update the stock status for the 2023 fishing season. The Northeast Fisheries Science Centre (NEFSC) surveys were not conducted in 2020, but surveys resumed in 2021; data for the 2023 Autumn NEFSC survey were unavailable at the time this document was prepared. The Fisheries and Oceans Canada (DFO) Research Vessel (RV) survey took place in 2022 and 2023, but the Georges Bank survey data are unavailable until calibration coefficients for the new research vessel and gear are generated. Additionally, when this document was prepared, there was outstanding commercial logbook data given the fishery occurs year-round and there is a delay in the entry and validation of data in the database. As such, some results are preliminary as detailed below. Indicators for Lobster in LFA 41 are consistent with the DFO Precautionary Approach Framework and allow for the evaluation and monitoring of the offshore Lobster fishery.

Description of the fishery

Commercial Lobster fishing in LFA 41 (Figure 1) occurs offshore, from the 50 nm line (92 km) off of Nova Scotia to the 200 nm limit and from Georges Bank to the Laurentian Channel off of Cape Breton. While LFA 41 extends to the easterly boundary of the 4V Northwest Atlantic Fisheries Organization (NAFO) line, the fishery is limited to NAFO Divisions 4X and the Canadian portion of 5Ze. The LFA 41 fishery operates under the Offshore Lobster and Jonah Crab Integrated Fisheries Management Plan (DFO 2023b). It is the only Lobster fishery in Canada that is managed with a Total Allowable Catch (TAC). The minimum legal size is 82.5 mm Carapace Length (CL), and there is a prohibition on landing berried and/or v-notched females. This fishery operates year-round and currently there is no trap limit. The annual TAC (720 t) was established in 1985 based on historical landings. Annual landings from 2002–2023 are available (Figure 2 and Table 1). The 2023 landings value includes available data until January 22, 2024. Since 2013, the TAC has been managed under a three-year management cycle that allows for quota overruns and carry-forward of uncaught quota. At the end of the third year of a cycle, no more than three times the annual quotas (i.e., no more than 2,160 t) may be landed.

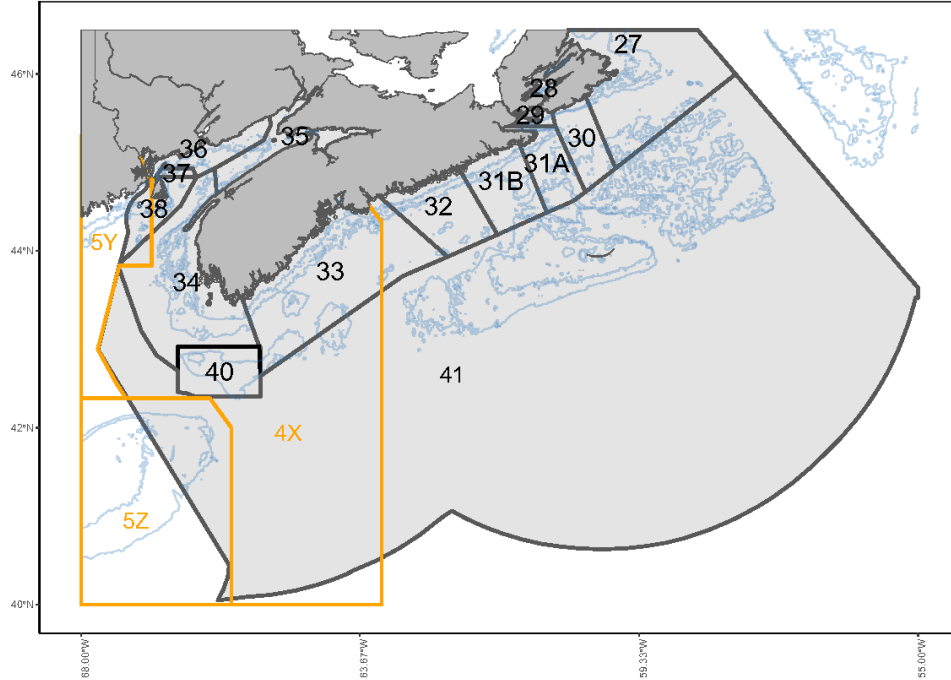


Figure 1. Map of Lobster Fishing Area (LFA) 41 with corresponding NAFO Divisions.

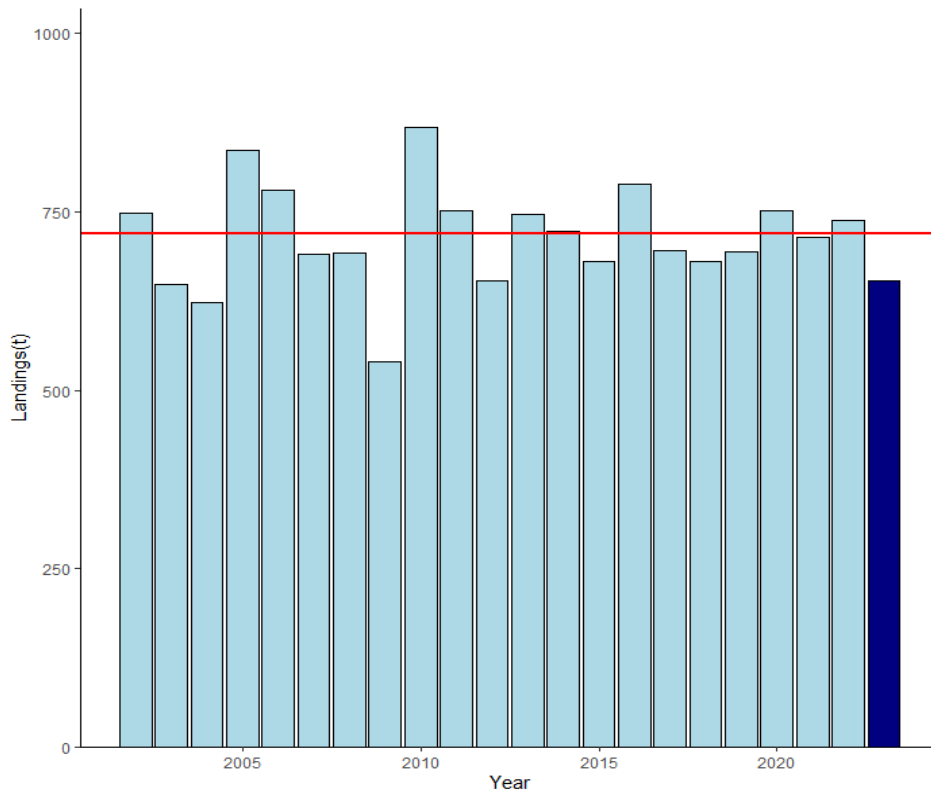


Figure 2. Landings (t) for Lobster Fishing Area 41 from 2002-2023 against a Total Allowable Catch of 720 t (horizontal red line). The 2023 landings (dark blue b) are incomplete and include only data available as of January 22, 2024.

Table 1. Landings from Lobster Fishing Area (LFA) 41 from 2002 – 2023. * 2023 landings are incomplete and include only data available as of January 22, 2024.

Year	Landings (t)
2002	748
2003	648
2004	623
2005	836
2006	780
2007	691
2008	692
2009	541
2010	869
2011	752
2012	654
2013	746
2014	723
2015	680
2016	789
2017	696
2018	680
2019	695
2020	752
2021	714
2022	739
2023*	653

Methods

Indicators of Stock Status

The status of Lobster in LFA 41 is assessed using two indicators of stock health: survey commercial biomass and reproductive potential. The reference points defining the Healthy, Cautious, and Critical zones—the Upper Stock Reference (USR) and the Limit Reference Point (LRP)—are based on the survey biomass. Both indicators use fishery-independent data available from four multispecies surveys: two conducted by DFO (Georges Bank and RV41) and two conducted by NEFSC (Nspr41 and Naut41). The overall stock status for the LFA 41 Lobster stock is determined from the combination of all survey indices relative to their respective Limit Reference Indicator (LRI) and Upper Stock Indicator (USI). A change from a Healthy stock status to a Cautious stock status would require three of four survey biomass indices to fall below the respective USIs. Similarly, to enter the Critical zone would require three of four survey biomass estimates to fall below the respective LRIs.

Table 2 highlights the data from the 2020-2023 field seasons available at the time that this document was prepared. The DFO Summer RV survey (RV41) covers the offshore portions on the Scotian Shelf, and the DFO Spring RV survey (GB) covers the offshore portions on Georges Bank. The NEFSC surveys cover the Gulf of Maine and Georges Bank in the spring (Nspr41) and autumn (Naut41).

Table 2. Summary of available data from Northeast Fisheries Science Centre (NEFSC) and DFO Research Vessel Multispecies Surveys for the LFA 41 Stock Status update as of January 2024. “Missing” data indicates that the survey was not conducted. “Unavailable” data refers to surveys that have been completed but for which data is currently not available for analysis without a conversion factor (calibration coefficients for new research vessels and gear), or for which data is not yet uploaded to the database. ** Available data was collected on the Mersey Venture rather than on typically employed Canadian Coast Guard Scientific Research Vessels but is considered the same as the Teleost, so no conversion is needed.

Source	Survey	2020	2021	2022	2023
DFO	RV41	Included	Unavailable	Included	Included
DFO	GB	Included	Included	Unavailable	Included**
NEFSC	Nspr41	Missing	Included	Included	Included
NEFSC	Naut41	Missing	Included	Included	Unavailable

Primary Indicators

Commercial Biomass from Research Vessel Surveys

Lobster biomass in LFA 41 is measured by four multispecies surveys from which commercial biomass indices are used to determine overall stock health. The Commercial Biomass is calculated for each survey, and a 3-year running median from the three most recent available years of data is used to assess stock status relative to reference indicators. The Limit Reference Indicator (LRI) for each index is defined as the median of the five lowest non-zero biomasses in the time series. The Upper Stock Indicator (USI) is defined as 40% of the median of the higher productivity period (i.e., 2000–2015). Rather than relying on the inherently variable annual estimates of survey indices, the less variable 3-year running median estimated with the available data is compared to the LRIs and USIs.

Reproductive Potential from Research Vessel Surveys

Reproductive Potential consists of an integrated index combining female abundance-at-size, fecundity-at-size, and size-at-maturity (Cook et al. 2017). It represents an estimate of total eggs produced within the stock area and can also be viewed as a surrogate for Spawning Stock Biomass (SSB). An Upper Boundary (UB) and Lower Boundary (LB) have been set where sufficient data are available to help gauge the significance of changes in egg production relative to long-term medians.

Bycatch

In 2013, the Government of Canada released the Policy on Managing Bycatch (DFO 2013a) as part of the Sustainable Fisheries Framework (DFO 2013b). This policy identified Canada’s need to systematically address bycatch in all fisheries and included the objective of accounting for total catch including retained and non-retained bycatch (DFO, 2023c). The target number of observed trips is six per season for LFA 41. The total number of commercial trips, observed trips, and the percentage of observer trip coverage are reported in Table 3. Bycatch data are available for only one trip per year in 2021 and 2023, and two trips in 2022. Data were limited during the 2020 season due to the COVID-19 pandemic. Previous update documents included annual averages of bycatch across 3-year blocks (DFO 2022); however, bycatch estimates for the 2022 update (DFO 2023a) were scaled using observed effort and total fishery effort (total traps hauled) and averaged over the 2018–2022 period. In November 2018, the method to capture fishing effort during observed trips was revised to include data on empty traps, which now allows the use of effort as the scaling factor for bycatch estimates. Prior to the availability of

individual trap information, the total weight of bycatch was estimated with a ratio estimator, a method that prorates the observer estimates of bycatch across trips for the species to the total catch using the observed lobster landings within the trip (Cook et al. 2018). Averaging data from 2018- 2023 with five years of incomplete data is insufficient for a reliable estimate; because of this, bycatch estimates are not provided for 2023.

*Table 3. Number of observed trips per year from 2011 - 2023 for Lobster Fishing Area 41. * Information for 2023 includes available data as of January 22, 2024.*

Year	Total Number of Trips	Observed Trips	% of Trips Observed
2011	51	3	5.88
2012	32	5	15.63
2013	36	6	16.67
2014	35	6	17.14
2015	34	4	11.76
2016	36	6	16.67
2017	34	4	11.76
2018	34	7	20.59
2019	43	5	11.63
2020	45	4	8.89
2021	37	1	3.13
2022	39	2	5.13
2023*	32	1	3.14

Results and Discussion

Primary Indicator – Commercial Biomass

Data for 2023 has been updated where possible for the primary indicator Commercial Biomass, to determine stock status in LFA 41. For the stock to be considered in the Healthy Zone, Commercial Biomass indices for at least three of the four surveys must be above their respective USIs. Currently, all four surveys remain above their respective LRIs and their USIs (Figure 3). Therefore, the stock is in the Healthy Zone, as it has been since 2002.

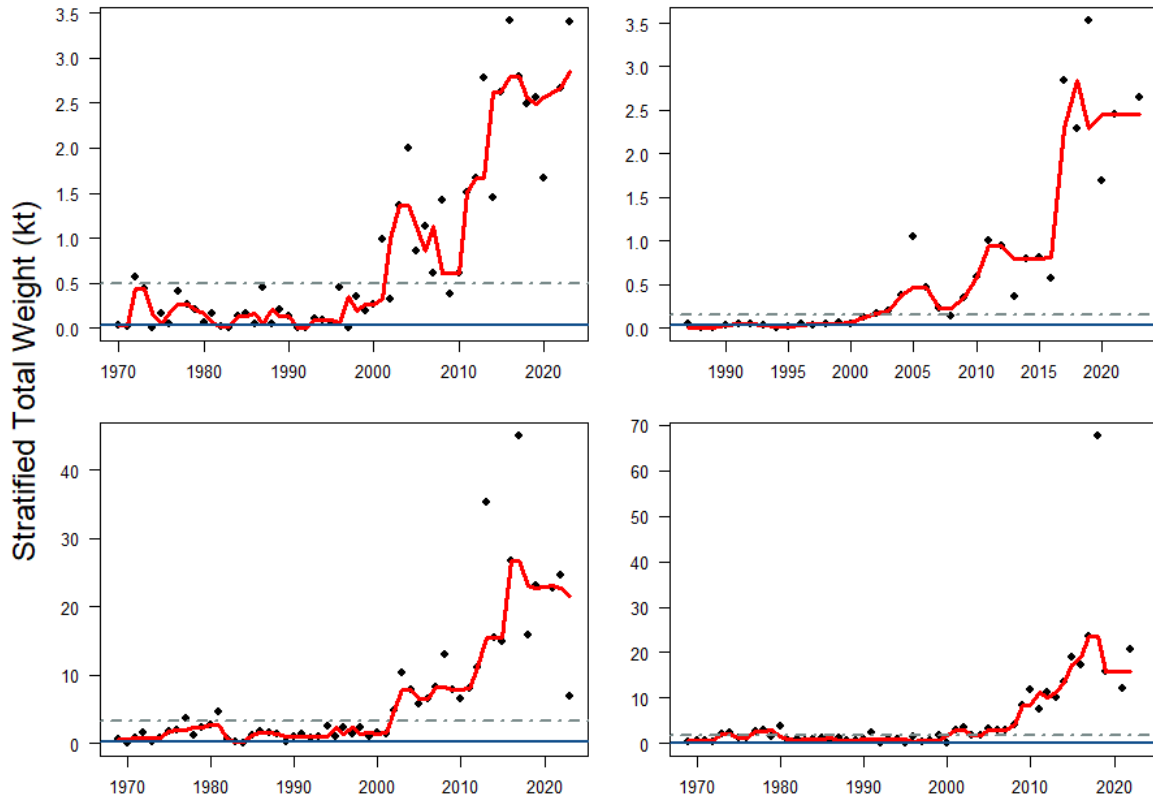


Figure 3. Commercial Biomass (Stratified Total Weight (kt)) time series (black diamonds) and three-year running medians (red lines), compared to Limit Reference Indicator (LRI, solid blue line) and Upper Stock Indicator (USI, dot-dash grey line). Top row: left—RV41, right—GB. Bottom row: left—NSpr41, right—Naut41. Note: Different scales are used on both x-axes and y-axes, and there are missing years in some panels.

Primary Indicator – Reproductive Potential

Data for 2023 has been updated where possible for the primary indicator Reproductive Potential to determine the stock status for LFA 41. DFO Summer RV survey (RV41) data point for 2023 is the highest recorded in the time series. Estimates of Reproductive Potential are variable but remain high for the time series (Figure 4). An increase in overall abundance was the main driver of the increase in Reproductive Potential, despite the decrease in median size of Lobsters that was observed in the at-sea samples and documented during the 2017 stock assessment. Currently, available data for the Reproductive Potential indicator, is above the Upper Bounds (UBs) where defined in surveys. For the Georges Bank survey, the index remains high relative to the available time series. Therefore, the stock is in the Healthy Zone, as it has been since 2002.

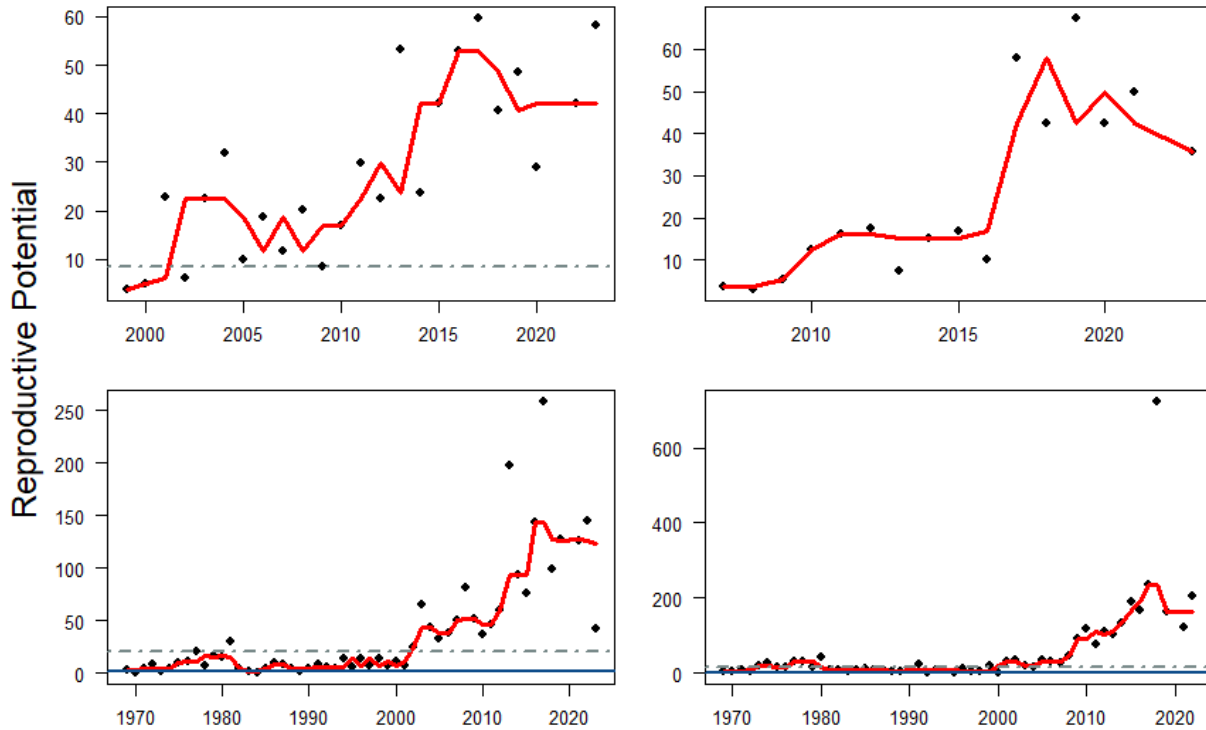


Figure 4. Reproductive Potential (black diamonds) in millions of eggs and three-year running medians (solid red lines,) estimated from the four surveys covering LFA 41. Lower bounds are represented by solid blue lines and upper bounds by dot-dash grey lines. No bounds are identified for the Georges Bank DFO survey, and only upper bounds are identified for the Summer Research Vessel survey due to the brevity of the time series. Top row: left — RV41, right — GB. Bottom row: left — NSpr41, right — Naut41. Note: Different scales are used on both x-axes and y-axes, and there are missing years in some panels.

Sources of Uncertainty

The Lobster stock in LFA 41 is likely comprised of migrants from adjacent stocks and LFA 40, an area closed to lobster fishing. The degree of connectedness is not currently known but may constitute a considerable portion of the incoming biomass. The offshore Lobster fishery assessment treats LFA 41 as a closed stock and uses survey indices and fishery catch rates from within the stock area only (DFO 2018). It is thought that this is a precautionary or conservative estimate of the offshore Lobster stock as some of the most productive Lobster areas are adjacent to LFA 41. With limited observer coverage since 2018, estimates of bycatch from the offshore Lobster fishery are uncertain and provide little understanding of the fishery’s impact on other species and non-retained Lobster such as undersized, berried, v-notched, and potentially cull, soft, and jumbo individuals. Meeting the target for at-sea sampling and observer coverage is necessary for this fishery to accomplish the objectives of DFO’s Policy on Managing Bycatch: “to ensure that Canadian fisheries are managed in a manner that supports the sustainable harvesting of aquatic species and that minimizes the risk of fisheries causing serious or irreversible harm to bycatch species; and to account for total catch, including retained and non-retained bycatch” (DFO 2013a).

Fisheries-independent data in the offshore Lobster fishery are limited to the DFO and NEFSC surveys, as the area is from 50 nm line (92 km) to the upper continental slope. Reporting on fisheries-dependent data is limited due to the “Rule of Five,” which requires that there be at least five people or personally

identifying variables aggregated in a data set as determined by the Treasury Board Directive on Privacy Practices. In the recent history of LFA 41 all licences were held by a single company, Clearwater Seafood Limited Partnerships (CSLP). Before the 2021 season, two licences were reissued to Membertou Band Council. In September 2021, the remaining six licences were reissued to FNC Quota Limited Partnership (FNC Quota) (DFO 2023b). Licence holders are in unanimous agreement to publish the landings from LFA 41; however, additional fisheries data such as fishing effort (trap hauls) and Catch per Unit Effort (CPUE) (kilograms per trap hauls) cannot be published without full consent of all involved parties.

References

- Cook, A.M., Cassista Da-Ros, M., and Denton, C. 2017. Framework Assessment of the Offshore American Lobster (*Homarus americanus*) in Lobster Fishing Area (LFA) 41. DFO Can. Sci. Advis. Sec. Res. Doc. 2017/065. viii + 186 p.
- DFO. 2013a. Policy on Managing Bycatch. (Accessed on October 23, 2023).
- DFO. 2013b. Sustainable Fisheries Framework. (Accessed on October 23, 2023).
- DFO. 2018. Assessment of Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5Z) for 2016. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/004.
- DFO. 2019. Stock Status Update of American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5Zc). DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/023.
- DFO. 2020. Stock Status Update of American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5Xc). DFO. Can. Sci. Advis. Sec. Sci. Resp. 2020/024.
- DFO. 2021. Stock Status Update for American Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5Ze) for 2020. DFO Can. Sci. Advis. Sec. Sci. Resp. 2021/017.
- DFO. 2022. Stock Status Update of Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5ZE) for 2021. DFO Can. Sci. Advis. Sec. Sci. Resp. 2022/011.
- DFO. 2023a. Stock Status Update of Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5ZE) for 2022. DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/012.
- DFO. 2023b. Offshore Lobster and Jonah crab – Maritimes Region. Integrated Fisheries Management plans. Fisheries and Oceans Canada.
- DFO. 2023c. Bycatch analysis from the inshore Lobster fisheries in Lobster Fishing Areas 27, 21A, 31B, 33, 34, and 35. DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/032.