



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Ecosystems and  
Oceans Science

Sciences des écosystèmes  
et des océans

## **Canadian Science Advisory Secretariat (CSAS)**

---

**Research Document 2026/022**

**Quebec Region**

### **Redfish Diet (*Sebastes mentella* and *S. fasciatus*) in Units 1 and 2**

Laurie Isabel and Caroline Senay

Maurice Lamontagne Institute  
Fisheries and Oceans Canada  
850 route de la Mer  
Mont-Joli, Quebec, G5H 3Z4

---

## Foreword

This series documents the scientific basis for the evaluation of aquatic resources and ecosystems in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

### Published by:

Fisheries and Oceans Canada  
Canadian Science Advisory Secretariat  
200 Kent Street  
Ottawa ON K1A 0E6

[http://www.dfo-mpo.gc.ca/csas-sccs/  
DFO.CSAS-SCAS.MPO@dfo-mpo.gc.ca](http://www.dfo-mpo.gc.ca/csas-sccs/DFO.CSAS-SCAS.MPO@dfo-mpo.gc.ca)



© His Majesty the King in Right of Canada, as represented by the Minister of the Department of Fisheries and Oceans, 2026

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

ISSN 1919-5044

ISBN 978-0-660-98588-6 Cat. No. Fs70-5/2026-022E-PDF

### Correct citation for this publication:

Isabel, L., and Senay, C. 2026. Redfish Diet (*Sebastes mentella* and *S. fasciatus*) in Units 1 and 2. DFO Can. Sci. Advis. Sec. Res. Doc. 2026/022. vii + 53 p.

### ***Aussi disponible en français :***

*Isabel, L. et Senay, C. 2026. Régime alimentaire des sébastes (Sebastes mentella et S. fasciatus) dans les unités 1 et 2. Secr. can. des avis sci. du MPO. Doc. de rech. 2026/022. vii + 55 p.*

---

---

## TABLE OF CONTENT

ABSTRACT .....	vii
INTRODUCTION .....	1
METHODS .....	1
DATA COLLECTION .....	1
DATA ANALYSIS .....	2
RESULTS .....	5
SAMPLING .....	5
SUMMER DIET IN UNIT 1 .....	7
Length classes .....	7
Periods .....	7
Consumption of northern shrimp .....	8
SUMMER DIET IN UNIT 2 .....	8
WINTER DIET .....	9
COMPARISON OF SUMMER DIET BETWEEN UNIT 1 AND 2 .....	10
COMPARISON OF SUMMER AND WINTER DIETS .....	10
CONCLUSION .....	10
ACKNOWLEDGMENTS .....	11
REFERENCES CITED .....	11
TABLES .....	13
FIGURES .....	30

---

## LIST OF TABLES

Table 1. Summary of the sampling of redfish stomachs from unit 1 by length class (cm) and total, all periods combined. A description of the length of the redfish from which the stomachs were taken, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, is provided. .... 13

Table 2. Summary of the sampling of redfish stomachs from unit 1 across different periods, all length classes combined. A description of the length of the redfish from which the stomachs were obtained, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, are provided. .... 13

Table 3. Summary of the 2024 sampling of redfish stomachs from unit 2, categorized by length class (cm) and total. A description of the length of the redfish from which the stomachs originated, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, are provided. .... 14

Table 4. Summary of the redfish stomach sampling from the winter survey collected from 2022 to 2024, by length class (cm) and total. A description of the length of the redfish from which the stomachs were taken, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, are provided..... 14

Table 5. Detailed summer diet of redfish in the DFO survey in unit 1 by length class (cm), all periods combined..... 15

Table 6. Detailed summer diet of redfish in the DFO survey in unit 1, by period.....20

Table 7. Detailed summer diet of redfish in the DFO survey in unit 2 in 2024 by length class (cm).....25

Table 8. Detailed winter diet of redfish in the DFO 2022-2024 winter survey by length class (cm).....27

---

## LIST OF FIGURES

Figure 1. Northwest Atlantic Fishery Organization (NAFO) Divisions and Subdivisions (A), and management Units 1, 2, and 3 (B). PEI = Prince Edward Island, NS = Nova Scotia, USA = United States of America. .... 30

Figure 2. Cumulative prey curves as a function of the number of stomachs collected and 95% confidence interval for units 1 and 2, broken down by length class (cm, per panel)..... 31

Figure 3. Origin of redfish stomachs (in red) used in the analyses for unit 1, by sampling period. Black marks are locations with no redfish in the catch. Blue marks are locations with redfish in the catch, but no stomachs collected. The values in the upper left corner are the number of stomachs collected for each year. .... 32

Figure 4. Origin of the redfish stomachs (in red) used in the analyses for unit 2. Black marks indicate locations without redfish in the catch. Blue marks indicate locations with redfish in the catch, but without any stomachs collected..... 33

Figure 5. Origin of redfish stomachs (in red) used in winter diet analyses. Black marks indicate locations without redfish in the catch. Blue marks indicate locations with redfish in the catch, but without any stomachs collected. .... 34

Figure 6. Relationship between the percentage of empty stomachs and the catch depth, all surveys combined. The size of the circles is proportional to the number of stomachs in each 10 m depth class. The blue line represents the linear relationship. .... 35

Figure 7. Stomach distribution according to catch depth by length class (cm, panels) and by survey. Box plot representation: the line inside the box represents the median, the box extends from percentiles 25 to 75, the whiskers show the range of data within a radius of 1.5 times the interquartile range, and points outside this range are considered outliers..... 36

Figure 8. Summer partial fullness index of redfish from unit 1, categorized by length class and prey type, all periods combined. The column height represents the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs. .... 37

Figure 9. Percentage of summer mass contribution of redfish from unit 1, categorized by length class and prey type, all periods combined. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs. .... 38

Figure 10. Summer partial fullness index of redfish in unit 1 according to length class and taxonomic group (panels), all periods combined. .... 39

Figure 11. Summer partial stomach fullness index of unit 1 redfish categorized by length class and prey type, and period. The column height represents the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs..... 40

Figure 12. Summer partial fullness index of redfish in unit 1 according to length class, period and taxonomic group (panels). .... 41

Figure 13. Estimation of annual redfish biomass by length class during the years 1995-1999, 2015-2019 and 2020-2024 in unit 1. .... 42

Figure 14. Relative consumption of northern shrimp by redfish by length class from 1995-1999, 2015-2019, and 2020-2024 in unit 1. The values provided in the upper part of the panels represent relative consumption for a given year. An "x" indicates < 20 stomachs harvested for a given length class. .... 43

---

Figure 15. Summer partial fullness index of redfish from unit 2, categorized by length class and prey type. The column heights represent the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.....	44
Figure 16. Percentage of summer mass contribution of redfish from unit 2, categorized by length class and prey type. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.....	45
Figure 17. Summer partial fullness index of unit 2 redfish according to length class and taxonomic group (panels).....	46
Figure 18. Winter partial fullness index of redfish from the winter survey, categorized by length class and prey type. The column heights represent the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.....	47
Figure 19. Percentage of winter mass contribution of redfish from the winter survey, categorized by length class and prey type. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs. ....	48
Figure 20. Partial fullness index of redfish from the winter survey according to length class and taxonomic group (panels).....	49
Figure 21. Total fullness index of redfish for unit 1 (2020-2024) and unit 2 (2024) by length class. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.....	50
Figure 22. Partial fullness index of redfish for unit 1 (2020-2024) and unit 2 (2024) according to length class and taxonomic group (panels).....	51
Figure 23. Summer and winter total fullness index of redfish by length class. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.....	52
Figure 24. Summer and winter partial fullness index of redfish according to length class and taxonomic group (panels).....	53

---

## ABSTRACT

This document presents a description of the summer and winter diet of redfish (*Sebastes mentella* and *S. fasciatus*) in Fisheries and Oceans Canada management units 1 and 2. A total of 13,399 stomachs from three surveys were analyzed: 10,555 stomachs were collected during the summer ecosystem survey in the St. Lawrence Estuary and northern Gulf of St. Lawrence (nGSL) in unit 1 between 1990 and 2024, 588 stomachs were collected during the summer survey in unit 2 in 2024, and 2,430 were collected during the winter survey in units 1 and 2 from 2022 to 2024. Redfish appear to exhibit a rather flexible and opportunistic diet, adapting to the prey available in their environment. For both units and seasons studied, an ontogenetic shift was observed in the diet of redfish, with shorter individuals exhibiting high consumption of small invertebrates, while fish and/or shrimp consumption increased with length. Consumption of fish, zooplankton, shrimp, and other invertebrates during the summer was relatively similar between the two units. During the winter, fish and shrimp consumption was lower than during the summer, while zooplankton consumption was higher in winter than in summer. For unit 1, redfish predation of northern shrimp (*Pandalus borealis*) has been decreasing since 2021. The importance of northern shrimp in the redfish diet may be less significant during the winter than during the summer. Prey accumulation curves suggest, however, that additional stomach sampling would be necessary to adequately describe the summer diet of redfish in unit 2 and the winter diet of redfish.

---

## INTRODUCTION

Understanding the feeding behavior of fish in marine ecosystems is essential for the sustainable management of aquatic resources (Link 2002; Pikitch et al. 2004; Hunsicker et al. 2011). Dietary analysis helps us understand what species eat and provides crucial information about their role within the marine ecosystem, their interactions with other species, and the impact of environmental changes on their food resources. Stomach content analysis is a standard and robust method frequently used to assess the composition of fish diets (Amundsen and Sánchez-Hernández 2019; da Silveira et al. 2020). Stomach content data allow researchers to quantify the contribution of each prey species to the diet and to assess changes in diet composition based on factors such as predator abundance, ontogeny, and size (Davis et al. 2012; Amundsen and Sánchez-Hernández 2019; Kulatska et al. 2019).

Following three strong cohorts born in 2011, 2012, and 2013, redfish (*Sebastes mentella* and *S. fasciatus*) have made a strong comeback in Fisheries and Oceans Canada (DFO) management units 1 and 2 (McAllister et al. 2021; Senay et al. 2023). Unit 1 corresponds to Northwest Atlantic Fisheries Organization (NAFO) divisions 4RST and subdivisions 3Pn4Vn from January to May. Unit 2 includes 3Ps4Vs4Wfgj and 3Pn4Vn from June to December (Figure 1). Redfish now largely dominate these areas and, since 2018, have accounted for more than 80% of the catches during the annual ecosystem survey in the Estuary and Northern Gulf of St. Lawrence (nGSL) conducted by DFO in unit 1 during the summer (Chamberland et al. 2025). Following this rapid increase in redfish stocks, questions arise regarding the potential impact of this massive increase on the food web. The massive increase in redfish could generate significant predation pressure on their prey and have major repercussions throughout the ecosystem due to competitive interactions. Analyzing the diet of redfish is therefore crucial to understanding the effects of observed ecosystem changes.

This document aims to characterize and quantify the summer and winter diet of redfish, both species combined<sup>1</sup>, from units 1 and 2. It also describes the temporal changes in redfish predation on northern shrimp (*Pandalus borealis*) in unit 1.

## METHODS

### DATA COLLECTION

The nGSL survey was conducted annually in August by DFO Quebec region and covers a portion of unit 1 (Figure 1; Chamberland et al. 2025). The nGSL survey currently covers NAFO Divisions 4R, 4S, and the northern portion of 4T. Fish and invertebrate species were sampled using a stratified random sampling design. Data were collected on the CCGS *Alfred Needler* from 1990 to 2005 with an *URI 81/114'* trawl, on the CCGS<sup>2</sup> *Teleost* from 2004 to 2022 with a *Campelen 1800* trawl, and on the CCGS *John Cabot* from 2021 onward with a modified *Campelen 1800* trawl (Chamberland et al. 2025). Since the early 1990s, stomachs have been collected during the survey. For redfish, stomachs were collected from 1993 to 1999, and then collection resumed from 2015. For more details on the sampling design and data collected, see the report by Chamberland et al. (2025).

---

<sup>1</sup> *S. mentella* and *S. fasciatus* have a high degree of morphological similarity, making their identification difficult, if not impossible, without in-depth analyses.

<sup>2</sup> Canadian Coast Guard Ship

---

In September 2024, a bottom trawl ecosystem survey was conducted by DFO Quebec Region in a portion of unit 2 aboard the CCGS *John Cabot* using a modified *Campelen 1800* trawl (Figure 1; Senay et al. In preparation<sup>3</sup>). Fish and invertebrate species were sampled using a stratified random sampling design, following the same protocol as in the nGSL survey. Redfish stomachs were collected at almost all stations where individuals were caught. For more details on the sampling design and data collected, see the report by Senay et al. (In preparation)<sup>3</sup>.

A winter bottom trawl ecosystem survey was conducted in 2022 (February 10-16), 2023 (January 17-February 3), and 2024 (February 8-March 8) by DFO Quebec and Gulf Regions aboard the MV<sup>4</sup> *Mersey Venture*, a commercial trawler, using a modified *Campelen 1800* trawl. The survey covered the waters of the Laurentian Channel from the western boundary of Anticosti Island to the Laurentian Fan, including a section of the Esquiman and Anticosti Channels, and therefore encompasses a portion of unit 1 and a portion of unit 2. Fish and invertebrate species were sampled using a non-aligned systematic design. The 150-m isobath was used to delineate the study area. Each year, redfish stomachs were collected from almost every station where individuals were captured.

## DATA ANALYSIS

Stomach sampling was performed only in successful tows (Chamberland et al. 2025). The sampling scheme for redfish stomachs is stratified by fork length. The length classes and the number of stomachs targeted for each class may differ from year to year (Ouellette-Plante et al. 2020). Specimens showing obvious signs of regurgitation, such as prey in the mouth or an everted stomach, were discarded. Selected specimens < 15 cm were frozen whole in individual plastic bags with an identification label, while stomachs from larger specimens were excised at sea, placed whole in labeled plastic bags, and kept frozen until examination.

In the laboratory, stomachs were thawed just before examination. The whole stomach was weighed, and then its content was removed and weighed again. The stomach content was then sorted by prey type, and each was identified at the most precise taxonomic level possible. The weight of each prey item was classified according to its level of digestion. A nearly undigested taxon was classified as stage 1, a partially digested taxon, but generally still identifiable at least at the genus level, was classified as stage 2, and prey items with an estimated mass loss due to digestion of 50% or more (including traces such as fish bones and otoliths) were classified as stage 3. Mass was recorded in grams (accuracy of 0.001 g). Intact prey (stage 1) were measured, and otoliths from digested specimens of commercial species were retained to estimate the length of ingested prey. The detailed protocol for the stomach content analysis can be found in Ouellette-Plante et al. (2020).

Species accumulation curves were generated using the *vegan* package in R to assess whether sampling effort was sufficient in each survey (Oksanen et al. 2024). The cumulative richness of prey categories was calculated based on the number of stomachs, and then a randomization analysis estimated confidence intervals around the observed prey richness. A curve that plateaus indicates that sampling effort is likely adequate, while a curve that continues to rise suggests that a larger sample size would be necessary to properly characterize the redfish diet.

---

<sup>3</sup> Senay, C., Poissant, D., Chavarria, C., Benoît, H.P., Bourdages, H., Blais, M., Bourret, A., and Parent, G.J. In preparation. Units 1 and 2 Redfish (*Sebastes mentella* and *Sebastes fasciatus*) Stock Status in 2024. DFO Can. Sci. Advis. Sec. Res. Doc.

<sup>4</sup> Motor Vessel

---

Five index were used to rank the importance of the different taxa found in the redfish diet : percentage of empty stomachs (*PES*), mass contribution (*MC*), partial fullness index (*FI*), contribution to total fullness index (*CFI*), and frequency of occurrence (*FO*). These measures are derived from the methods presented in Bernier and Chabot (2013) and in Ouellette-Plante et al. (2020).

For a stomach sample, *PES* was calculated as follows:

$$PES = \frac{N_V}{N} \cdot 100$$

where  $N_V$  is the number of empty stomachs and  $N$  the total number of stomachs in a sample.

*MC*, expressed as a percentage of mass, for each prey  $i$  in a sample of  $N$  stomachs, was calculated as follows:

$$M_i = \sum_{j=1}^N M_{ij}$$

$$M_{tot} = \sum_{i=1}^I M_i$$

$$MC_i = \frac{M_i}{M_{tot}} \cdot 100$$

where  $M_{ij}$  is the mass of taxon  $i$  (out of a total of  $I$  taxa) in stomach  $j$ ,  $M_i$  is the total mass of this taxon in the  $N$  stomachs of the sample, et  $M_{tot}$  is the total mass of the stomach contents of the same sample, expressed as a percentage. While informative, using *MC* alone has some drawbacks (Bernier and Chabot 2013). First, since the sum of the  $MC_i$  of all found taxa must equal 100%, this implies an interdependence between the  $MC_i$  of different taxa, where a high value found for a given taxon may reflect a decrease in the abundance of alternative taxa rather than an increase in that taxon's abundance in the predator's diet. Furthermore, taxa found in small specimens have less influence on the diet description, as they contribute less to  $M_{tot}$  than the prey of larger specimens. Finally, *MC* does not account for empty stomachs.

To complement the *MC*, the *FI* for each prey item  $i$  was calculated to describe the diet. This index adjusts the quantity of each taxon found in a stomach, taking into account the effect of fish length. This index was first calculated for each fish ( $FI_{ij}$ ), then the sample average was calculated as follows:

$$FI_{ij} = M_{ij} \cdot L_j^{-b} \cdot 10^4$$

$$TFI_j = \sum_{i=1}^I FI_{ij}$$

$$FI_i = \frac{1}{N} \cdot \sum_{j=1}^N TFI_j$$

where  $L_j$  is the length of the fish associated with the stomach, in cm, and  $b$  is the allometric exponent, corresponding to the slope of the relationship between the logarithm of mass and the logarithm of length. A constant of three for the parameter  $b$  is often used in the literature and was used for this study (Bowering and Lilly 1992, Orr and Bowering 1997, Hovde et al. 2002). A constant ( $10^4$ ) allows most of the calculated values to be kept between zero and ten.

---

The total fullness index (*TFI*) was calculated by combining the *FI* of each prey *i* in the sample as follows:

$$TFI = \sum_{i=1}^I FI_i = \frac{1}{N} \cdot \sum_{j=1}^N TFI_j$$

The *TFI* was calculated including empty stomachs for this study. The *TFI* calculated including empty stomachs can normally be used to assess the feeding intensity of a population (Bernier and Chabot 2013). For redfish, the results should be interpreted with caution since they suffer barotrauma when the trawl net is hauled to the surface (Jarvis and Lowe 2008). Redfish have a physoclastic swim bladder, meaning it does not communicate with the esophagus. This prevents the expanding gas volume in the swim bladder from escaping through the fish's mouth during hauling in the trawl net. The swim bladder therefore expands, and often the stomach contents are regurgitated, either partially or completely. In some cases, the stomach is completely inverted into the fish's mouth. Even though the sampling protocol specifies discarding individuals with their stomachs in their mouths or showing signs of regurgitation, it is likely that some stomach contents from certain individuals deemed suitable for sampling were regurgitated. This skews the percentage of empty stomachs and limits the interpretation of stomach fullness index as indicators of feeding intensity due to the overestimation of *PES* and the underestimation of *TFI*. Nevertheless, the stomach contents obtained allow us to estimate the relative importance of different taxa in the redfish diet. We assume that the probability of regurgitation for all taxa is the same and that the relative contribution of each taxon to the diet is therefore valid. The effect of capture depth on the percentage of empty stomachs was also investigated to provide further information on the impact of trawl hauling on redfish.

To simplify the interpretation of the results, the contribution of prey *i* to stomach fullness in the sample, *CFI<sub>i</sub>*, was calculated as a percentage:

$$CFI_i = \frac{FI_i}{TFI} \cdot 100$$

The frequency of occurrence *FO* of a prey item *i* was calculated as follows:

$$FO = \frac{N_i}{N} \cdot 100$$

where *N<sub>i</sub>* is the number of stomachs in the sample containing prey *i*.

Contents identified as parasites or waste (e.g., rock, sand, liquid, mucus) were excluded from the analyses. Stomachs collected outside of August and September were discarded for the summer surveys. Prey from all stages of digestion were used in the analysis. Measurements were calculated separately for each survey to provide a general description of the redfish diet in each unit and to contrast winter and summer. Length classes of 5 cm were created for the figures to clearly visualize the effect of redfish length on *MC* and *FI*. However, to increase the sample size per length class, the results are presented according to three groups: small (< 20 cm), medium (20-30 cm), and large (≥ 30 cm) specimens. These length classes correspond to the same length classes as the length stratification used during sea sampling. For the nGSL survey, calculations are performed for different periods: 1993-1999, 2015-2019, and 2020-2024.

Given the potential importance of predation of northern shrimp by redfish (Brown-Vuillemin et al. 2022; Senay et al. 2023), a declining forage and commercial species in the nGSL, the total relative consumption of northern shrimp by redfish in unit 1 was estimated. Data were separated into three five-year periods: 1995-1999, 2015-2019, and 2020-2024. Northern shrimp

---

consumption by redfish was calculated annually for each 5 cm length class ( $k$ ) from redfish biomass estimates based on nGSL survey results.

The total annual consumption for each length class ( $Q_k$ ) was first calculated as follows:

$$Q_k = B_k \cdot Q/B$$

where  $B_k$  is the redfish biomass and  $Q/B$  is the consumption-to-biomass ratio. The  $Q/B$  ratio was determined from values provided by available ecosystem models for the nGSL (Savenkoff et al. 2004).  $Q$  represents the total annual food consumption of redfish ( $t \text{ km}^{-2} \text{ yr}^{-1}$ ) and  $B$  the redfish biomass ( $t \text{ wet mass km}^{-2}$ ). For the 1990s, a  $Q/B$  ratio of  $1.036 \text{ yr}^{-1}$  was used (Savenkoff et al. 2004). For recent periods (2015-2019 and 2020-2024), a  $Q/B$  ratio of  $0.75 \text{ yr}^{-1}$  was used. This latter value comes from an unpublished paper by Savenkoff and Rioual, similar to other reports published by Savenkoff and colleagues for the ecosystem models they developed. This unpublished document covers the period 2006-2010, so the  $Q/B$  ratio used for recent periods may be inaccurate due to the considerable time lag between them. However, this is the best value currently available, and the scientific literature shows a wide range of values from  $1.3 \text{ yr}^{-1}$  to  $6.0 \text{ yr}^{-1}$  to choose from (Savenkoff et al. 2004).

To calculate northern shrimp consumption only,  $Q_k$  must be multiplied by the proportion of shrimp in the redfish diet. This value is established from the mass contribution ( $MC_k$ ) per length class derived from stomachs collected in each period (1995-1999, 2015-2019, and 2020-2024). Since shrimp consumption ( $Q_k$ ) was similar in each year of these three periods, the shrimp proportion was determined by combining the years within each period to increase the sample size for each length class as follows:

$$Q_{k'} = Q_k \cdot MC_k$$

When fewer than 20 stomachs were available, the consumption of northern shrimp by redfish was not estimated. The estimate of annual consumption for these length classes was identified as unrepresentative due to the small sample size. The annual consumption of northern shrimp for a given year, across all length classes, can be obtained as follows:

$$Q = \sum_{k=1}^K Q_{k'}$$

The relative consumption ( $Q_{rel}$ ) was then calculated as follows:

$$Q_{rel} = \frac{Q \cdot 100}{Q_{max}}$$

where  $Q_{max}$  is the maximum observed value of  $Q$  for all years and length classes combined.

## RESULTS

### SAMPLING

A total of 122 taxa were observed in the stomachs of redfish from the nGSL survey, across all periods, compared to 38 taxa in those from the unit 2 survey and 59 in those from the winter survey (Tables 1, 3 and 4). A visual inspection of the species accumulation curves suggests that more stomachs would be needed to describe the summer diet in unit 2 and the winter diet (Figure 2). Indeed, prey accumulation curves did not reach a plateau for all or some length classes, suggesting insufficient sampling in unit 2 and during winter. Conversely, prey

---

accumulation curves for the summer diet of unit 1 reached a stable asymptote for all length classes.

The summer diet of redfish in unit 1, according to the nGSL survey, is described based on the analysis of 10,555 stomachs collected from 1993 to 1999 and then from 2015 to 2024 (Table 1). Redfish stomachs were obtained from specimens ranging from 4 to 52 cm in length, with an average length of 24 cm. Approximately 45% of the stomachs were empty, across all length classes. The fish collected for this study were relatively well distributed across length classes and across the three periods studied (Tables 1 and 2). The geographical coverage of the stomach samples adequately covers most of the study area, with the exception of the Strait of Belle Isle where only a few redfish stomachs could be collected (Figure 3).

The summer diet of redfish in unit 2, according to the survey in unit 2, is described based on the analysis of 588 stomachs collected in 2024 (Table 3). Redfish stomachs were obtained from specimens ranging from 3 to 45 cm in length, with a mean length of 26 cm. Approximately 43% of stomachs were empty, regardless of length class. Most (67%) of the stomachs collected were in the 20 to 30 cm length class. Numbers were smaller in the under 20 cm, and 30 cm and over length classes. Geographic coverage shows that sampling was concentrated in deep waters, primarily the Laurentian Channel, and that redfish were captured at nearly all stations (Figure 4). Indeed, the survey focused on the deep strata of unit 2 where the presence of redfish is expected.

The winter diet of redfish, according to the winter survey, is described based on the analysis of 2,430 stomachs collected from 2022 to 2024 (Table 4). Redfish stomachs were obtained from specimens ranging from 5 to 48 cm in length, with a mean length of 23 cm. Nearly half (47%) of the stomachs were empty, regardless of length class. Most (60%) of the stomachs collected were in the 20 to 30 cm length class. The length classes of under 20 cm, and 30 cm and over represented 30% and 10% of the total, respectively. Geographic coverage shows that sampling was concentrated in the deep waters of the Laurentian, Esquiman, and Anticosti channels, with some sampling stations in shallower waters off the west coast of Newfoundland (Figure 5).

A significant relationship is observed between the percentage of empty stomachs and the depth of redfish catches; the deeper the catch, the higher the percentage of empty stomachs (Figure 6). Because trawl hauling can cause regurgitation in physoclastic fish, redfish sampled at greater depths are more likely to have an empty stomach. This could partly explain the observed relationship between depth and the percentage of empty stomachs. It is also possible that food availability varies with the capture depth. It remains difficult to distinguish the influence of each of these factors on the observed percentage of empty stomachs. Therefore, comparisons of feeding intensity between samples from different depths should be interpreted with caution. The distribution of stomach depth among the different surveys varies according to length class (Figure 7). The depth of tows where stomachs were collected was similar across the three surveys for redfish less than 20 cm in length, although fish caught in the winter survey had a slightly greater (deeper) median depth than those observed in the nGSL survey and the unit 2 survey. This trend was more pronounced for redfish between 20 and 30 cm, where the median and maximum depths reached were greater in the unit 2 and winter surveys compared to the nGSL survey. For redfish 30 cm and over, the depth of tows where stomachs were collected was significantly less in the nGSL survey compared to the unit 2 and winter surveys. Thus, for a given length, redfish from the unit 2 and the winter survey were generally caught at greater depths than those from the nGSL survey, with this difference being particularly marked in the intermediate and superior length classes. This observation is possibly an artifact of the sampling characteristics, in particular since the winter survey and the survey in unit 2 favored the deep strata, while the sampling of the shallower strata remained limited.

---

## SUMMER DIET IN UNIT 1

### Length classes

Figures 8 to 14 present the results of the summer diet of redfish in unit 1, described from the nGSL survey. An ontogenetic shift is observed, with smaller fish exhibiting high zooplankton consumption, while fish and shrimp consumption increases with length (Figures 8 and 9). Feeding intensity appears to be higher in the smallest and largest specimens, with individuals between 10 and 35 cm in length exhibiting lower fullness index. This could be related to intraspecific competition, since the majority of redfish present in the ecosystem in recent years fall within this length range.

Small redfish (< 20 cm) are primarily zooplanktivore (*CFI* of 59%, Table 5). The group of other invertebrates ranks second in importance, but does not offer much interesting information since the taxa that contribute most to *TFI* in this group are prey at advanced stages of digestion and whose precise taxonomic identification is therefore impossible (e.g., crustaceans, amphipods, Table 5). Shrimp are found in only 2% of the stomachs of small redfish and represent approximately 8% of the *TFI*. The contribution of fish to the diet of small redfish is almost null (*CFI* of 0.7%). Sand eels (*Ammodytes* sp.) and capelin (*Mallotus villosus*) are the only fish taxa identified at least at the genus level (Table 5; Figure 10).

Unlike smaller individuals, redfish measuring 20 to 30 cm in length exhibit a considerably higher intake of fish and shrimp, at the expense of zooplankton and other invertebrates (Table 5). The importance of fish in the diet is more than 20 times greater (*CFI* of 17%) than that recorded in redfish under 20 cm in length. In particular, the importance of capelin increases considerably (*CFI* of 8%). However, no fish taxon identifiable at least to the genus level was observed in more than 1% of stomachs. The importance of shrimp in the diet of redfish is significantly higher, reaching 32% of the food intake for specimens 20 to 30 cm in length. The pink glass shrimp (*Pasiphaea multidentata*) alone accounts for 13% of the *TFI* for this length class, closely followed by the northern shrimp at 10% of the *TFI*.

The importance of fish in the diet is even greater for redfish 30 cm and over. Fish intake increases from 17 to 27% of the *TFI*. Seventeen taxa identified at least at the genus level are observed in the stomachs of redfish 30 cm and over. Cannibalism increases considerably for this length class, with a *TFI* of 7%, compared to only 0.6% for redfish between 20 and 30 cm. Shrimp intake increases to 46% of the *TFI* for this length class. The importance of northern shrimp and pink glass shrimp in the diet of redfish increases with length, reaching *CFI*s of 16% and 22%, respectively.

### Periods

A total of 3,321, 3,834 and 3,400 stomachs were collected for the periods 1993-1999, 2015-2019 and 2020-2024, respectively (Table 2). A detailed comparison of the diet of redfish from the period 1993-1999 and the period 2015-2019 has been conducted and demonstrates a similar diet between the periods (Brown-Vuillemin et al. 2022; Senay et al. 2023). The present study includes an extension of the analysis period to 2024, thus covering the years 2020 to 2024. Small specimens collected during recent periods (2015-2019 and 2020-2024) show a lower feeding intensity than those collected during the 1990s, suggesting high intraspecific competition resulting from the massive increase in redfish cohorts from 2011 to 2013 (Figure 11). Fish input shows a similar contribution across the three periods. The high level of cannibalism observed during the 2015-2019 period is no longer present in 2020-2024 and has returned to almost the same level as in 1993-1999 (Figure 12). A significant increase in the contribution of zooplankton to the diet of redfish was observed between the period 1993-1999

---

and the two most recent periods (Table 6). This difference could be partly explained by improved taxonomic resolution of identified prey. For shrimp, the pink glass shrimp and the northern shrimp are the most important species in the diet of redfish, across all periods. The total shrimp input is relatively similar between the periods 1993-1999 and 2015-2019, at approximately 30% of the *TFI* (Table 6). However, the contribution of shrimp falls to 17% of the *TFI* during the period 2020-2024, mainly due to a decrease in the consumption of pink glass shrimp. Overall consumption of northern shrimp by redfish also decreased, from 10% of the *TFI* in 2015-2019 to 7% of the *TFI* in 2020-2024. Considering length classes, northern shrimp consumption decreased for individuals between 25 and 35 cm in 2020-2024 compared to 2015-2019, but increased for individuals between 35 and 45 cm.

### Consumption of northern shrimp

Estimates of the relative consumption of northern shrimp by redfish have increased with the recent increase in the biomass of redfish in length classes known to feed on shrimp (Figures 13 and 14). Northern shrimp consumption increased tenfold between 2015 and 2021, reflecting the emergence of the 2011-2013 cohorts. However, shrimp consumption has been declining since 2022, following the decrease in redfish biomass in unit 1. Since its peak in 2021, redfish consumption of northern shrimp fell by 50% in 2024. It is possible that the decrease in shrimp biomass in the ecosystem is also partly responsible for the decline in consumption observed in recent years.

### SUMMER DIET IN UNIT 2

Figures 15 to 17 present the results of the summer diet of redfish in unit 2, described from the 2024 survey in unit 2. As in unit 1, an ontogenetic shift is observed in the redfish diet, with smaller fish exhibiting high consumption of small invertebrates, while fish consumption increases with length (Figures 15 and 16). Feeding intensity appears to be higher in the smallest and largest specimens, with individuals between 15 and 30 cm in length exhibiting lower fullness index. This could indicate increased intraspecific competition for this length class, as the modal length for redfish in unit 2 was 25 cm in 2024 (Senay et al. In preparation<sup>3</sup>). Low feeding intensity is also observed in specimens between 40 and 45 cm, but the sample size for this length class is particularly small.

The diet of small redfish (< 20 cm) consists solely of invertebrates (*CFI* of 76%), the remainder being unidentified digested material (Table 7; Figure 17). The zooplankton group is the main contributor (*CFI* of 51%), primarily due to digested copepods and hyperids, more specifically the genus *Themisto*. The group of other invertebrates ranks second in importance, but provides little information since these are prey in advanced stages of digestion, making precise taxonomic identification impossible by visual inspection. Shrimp are observed in 1% of the stomachs of small redfish and represent approximately 8% of their food intake. The polar shrimp (*Lebbeus polaris*) is the only species in this group.

The stomach contents of redfish measuring 20 to 30 cm in length show a high intake of fish and shrimp, to the detriment of other invertebrates (Table 7; Figure 17). Fish alone contribute nearly half of the food intake (*CFI* of 48%). The white barracudina (*Arctozenus risso*) and lanternfishes, including the Kroyer's lanternfish (*Notoscopelus kroyeri*) and the glacier lanternfish (*Benthosema glaciale*), are the main prey, with *TFIs* of nearly 20%. The contribution of zooplankton to the *TFI* decreases by half in redfish of 20 to 30 cm (*CFI* ~ 25%). The northern krill (*Meganyctiphanes norvegica*) dominates this group for redfish 20 to 30 cm in length, with a *CFI* of 17%, while the contribution of *Themisto* is 1%. Shrimp contribute 18% of the food intake of redfish 20 to 30 cm in length and are found in 3% of their stomachs. Three species are identified and the pink glass shrimp alone contributes 7% of the *TFI*.

---

The importance of fish in the diet is similar between redfish 20 to 30 cm in length and those 30 cm and over. For zooplankton, northern krill remains an important prey item in the diet of redfish 30 cm and over, contributing 11% to the *TFI*. The importance of other invertebrates increases again to nearly 30% of the *TFI*. This increase is due to the appearance of a new prey group in the redfish diet, cephalopods. These contribute 27% of the *TFI* of redfish 30 cm and over, but are found in only three stomachs. Shrimp intake decreases to 9% of the *TFI*. However, the dietary intake of pink glass shrimp for redfish 30 cm and over remains similar to that of redfish between 20 and 30 cm.

## WINTER DIET

Figures 18 to 20 present the results of the winter diet of redfish as described from the winter survey. As with the summer diet in unit 1 and unit 2, an ontogenetic shift is observed, with smaller fish exhibiting high consumption of small invertebrates, while fish consumption increases with length (Figures 18 and 19). Feeding intensity appears to be greater in smaller specimens, with individuals between 15 and 40 cm in length showing lower fullness index.

Small redfish (< 20 cm) feed almost exclusively on invertebrates (*CFI* of 99%), and zooplankton dominate their diet, contributing 66% of the *TFI* (Table 8). Northern krill alone constitutes 19% of the food intake for this length class. Fish contribute less than 1% of the *TFI*, and no taxa have been identified to the genus or species level. Shrimp are found in less than 1% of stomachs and contribute 4% of the *TFI* for this length class. Only three shrimp taxa visually identifiable at least to the genus level are observed: the pink glass shrimp, the polar shrimp, and the genus *Pandalus* sp.

The diet of redfish measuring 20 to 30 cm shows a considerably higher intake of fish and shrimp, contributing 11% and 12% of the *TFI*, respectively (Figure 20). Zooplankton remains the primary contributor to the diet of redfish at these lengths (*CFI* of 60%). The contribution of calanoid copepods is decreasing (*CFI* of 15%), while the contribution of northern krill is increasing (*CFI* of 32%). Seven fish taxa are observed, but only one contributes more than 1% of the food intake, the Myctophiformes. For the shrimp group, four species-identifiable taxa are observed: the northern shrimp, the pink glass shrimp, the shrimp *Nematocarcinus rotundus*, and the shrimp *Eusergestes arcticus*. The pink glass shrimp contributes the most to the food intake for this length class (*CFI* of 7%), but it is present in less than 1% of stomachs. The contribution of northern shrimp to the winter diet of redfish represents 1% of the *TFI*, corresponding to a single stomach in which it was identified. This result could suggest that redfish predation pressure on northern shrimp is lower in winter than in summer, thus lowering estimates of the relative consumption of northern shrimp by redfish on an annual basis. However, certainty regarding this point remains limited. For summer consumption, the nGSL survey data encompasses the various northern shrimp stocks in the nGSL, whereas in winter, survey coverage varies from year to year and does not systematically include all stocks, which may influence the results for northern shrimp consumption.

The importance of fish in the diet is even greater for redfish 30 cm and over. Fish intake increases from 11% to 37% of the *TFI*. Atlantic cod (*Gadus morhua*) alone contributes 16% of the *TFI*, but only four individuals were observed in two stomachs. Cannibalism contributes 3% of the *TFI*, but was observed in less than 1% of stomachs. The contribution of zooplankton to the *TFI* remains high at nearly 33%, and northern krill is the most important prey in the diet of redfish 30 cm and over, contributing 21% of the *TFI*. Shrimp intake increases to 18% of the *TFI*. The *CFI* of the northern shrimp goes from 1% for redfish of 20 to 30 cm to 6% for redfish of 30 cm and over, while that of the pink glass shrimp decreases from 7 to 2%.

---

## COMPARISON OF SUMMER DIET BETWEEN UNIT 1 AND 2

To compare the summer diet of redfish between units 1 and 2, only stomachs from the nGSL survey collected between 2020 and 2024 were retained. Stomach fullness of redfish from units 1 and 2 was similar for most length classes (Figure 21). For the major taxonomic groups (fish, zooplankton, shrimp, other invertebrates and unidentifiable prey), the consumption of redfish from units 1 and 2 is similar (Figure 22). For fish, only Atlantic soft pout (*Melanostigma atlanticum*) and white barracudina were observed in the stomachs of redfish in both units. White barracudina was the most important prey in the diet of redfish in unit 2 (*CFI* of 15%), whereas it contributed only 1.4% of the *TFI* in unit 1. No capelin were observed in the stomachs of unit 2, while it was the most important identifiable fish species for redfish in unit 1. No cannibalism was observed for redfish in unit 2 in 2024. For redfish under 20 cm, zooplankton contributed less to the *TFI* in unit 2 (*CFI* of 27%) than in unit 1 (*CFI* of 64%). Zooplankton may play a less important role for redfish in unit 2, but larger stomach counts would be needed before any firm conclusions could be drawn. Northern krill is the species in this group contributing most to the diet in both units. Shrimp intake is considerably higher for redfish in unit 1. No northern shrimp were observed in the stomachs of unit 2 in 2024. Pink glass shrimp contributes similarly to the diet of redfish in both units.

## COMPARISON OF SUMMER AND WINTER DIETS

To compare the summer and winter diets of redfish, stomachs collected between 2020 and 2024 in the nGSL survey and in 2024 in the unit 2 survey were pooled to characterize the summer diet. Summer and winter stomach fullness of redfish is variable for most length classes, but no trend according to length class is observed between the two seasons (Figure 23). The percentage of empty stomachs is, however, higher in winter (51%) than in summer (40%) for redfish measuring between 15 and 30 cm, which could be a remnant of deeper sampling in the winter survey. For the major taxonomic groups (fish, zooplankton, shrimp, other invertebrates, and unidentifiable prey), fish and shrimp consumption during the summer is generally higher than during the winter, while zooplankton consumption is generally higher in winter than in summer (Figure 24). The diet of redfish under 20 cm is relatively similar between summer and winter, with a diet consisting mainly of zooplankton. Consumption of calanoid copepods and northern krill is particularly high during the winter, with a *CFI* of 34% and 19%, respectively, compared to 15% and 8%, respectively, during the summer. Northern krill consumption remains very high in winter for redfish 20 to 30 cm and 30 m and over, with *CFI* of 32% and 21%, respectively, which largely explains why zooplankton consumption is higher in winter than in summer. Conversely, the *CFI* of fish in the winter diet remains quite low for redfish 20 to 30 cm, and 30 cm and over compared to their contribution to the summer diet. For shrimp, overall consumption (all length classes combined) is lower in winter (*CFI* of 9%) than in summer (*CFI* of 37%), but is close to what is observed in summer in unit 2. Overall, the taxa consumed by redfish in winter are similar to those consumed by redfish in summer, but in different proportions.

## CONCLUSION

Analysis of the summer and winter diets of redfish from units and 2 reveals a diversity of prey consumed. Redfish appear to exhibit a rather flexible and opportunistic diet, adapting to the prey available in their environment. For both units and seasons studied, an ontogenetic shift is observed in their diet, with smaller fish exhibiting high consumption of small invertebrates, while the consumption of fish and/or shrimp increases with length. Feeding intensity is consistently higher in the smallest and largest specimens, while individuals between 15 and 35 cm show lower fullness index, indicating potentially increased intraspecific competition for these length

---

classes. The consumption of fish, zooplankton, shrimp, and other invertebrates is relatively similar between unit 1 and unit 2. In unit 1, the main prey of redfish, across all length classes, are capelin, pink glass shrimp, northern shrimp, and northern krill. In unit 2, the main prey of redfish, across all length classes, are white barracudina, lanternfish (Myctophidae), northern krill, and pink glass shrimp. During the winter, fish and shrimp consumption is lower than in the summer, while zooplankton consumption is higher in winter than in summer. However, prey accumulation curves suggest that additional stomach sampling would be needed to adequately describe the summer diet of redfish in unit 2 and the winter diet of redfish in both units. For unit 1, predation of northern shrimp by redfish has been decreasing since 2022.

## ACKNOWLEDGMENTS

We would like to thank all those who participated in the collection and analysis of redfish stomach contents over time, particularly Marie-Maude Rondeau and Sarah Brown-Vuillemin. The authors would also like to thank Jordan Ouellette-Plante, Tom Bermingham, and Charley Cyr for reviewing this document.

## REFERENCES CITED

- Amundsen, P.A. and Sánchez-Hernández, J. 2019. Feeding studies take guts - critical review and recommendations of methods for stomach contents analysis in fish. *J. Fish. Biol.* 95(6): 1364-1373.
- Bernier, B. and Chabot, D. 2013. [Évaluation de l'état du stock de flétan du Groenland \(\*Reinhardtius hippoglossoides\*\) du golfe du Saint-Laurent \(4RST\) en 2010 et description de son régime alimentaire](#). Secr. can. des avis sci. du MPO. Doc. de rech. 2012/140: viii + 85 p.
- Bowering, W.R. and Lilly, G.R. 1992. Greenland halibut (*Reinhardtius hippoglossoides*) off Southern Labrador and Northeastern Newfoundland (Northwest Atlantic) feed primarily on capelin (*Mallotus villosus*). *Neth. J. Sea Res.* 29(1): 211–222.
- Brown-Vuillemin, S., Chabot, D., Nozères, C., Tremblay, R., Sirois, P., and Robert, D. 2022. Diet composition of redfish (*Sebastes* sp.) during periods of population collapse and massive resurgence in the Gulf of St. Lawrence. *Front. Mar. Sci.* 9: 963039.
- Chamberland, J.-M., Bourdages, H., Desgagnés, M., Galbraith, P., Isabel, L., Ouellette-Plante, J., Roux, M.-J., Scallon-Chouinard P.-M., and Senay, C. 2025. [Preliminary results from the 2024 august ecosystemic survey in the Estuary and northern Gulf of St. Lawrence](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2025/032: iv + 101 p.
- da Silveira, E.L., Semmar, N., Cartes, J.E., Tuset, V.M., Lombarte, A., Ballester, E.L.C., and Vaz-dos-Santos, A.M. 2020. Methods for trophic ecology assessment in fishes: a critical review of stomach analyses. *Rev. Fish. Sci. Aquac.* 28(1): 71-106.
- Davis, A.M., Blanchette, M.L., Pusey, B.J., Jardine, T.D., and Pearson, R.G. 2012. Gut content and stable isotope analyses provide complementary understanding of ontogenetic dietary shifts and trophic relationships among fishes in a tropical river. *Freshw. Biol.* 57(10): 2156-2172.
- Hovde, S.C., Albert, O.T., and Nilssen, E.M. 2002. Spatial, seasonal and ontogenetic variation in diet of Northeast Arctic Greenland halibut (*Reinhardtius hippoglossoides*). *ICES J. Mar. Sci.* 59(2): 421–437.

- 
- Hunsicker, M.E., Ciannelli, L., Bailey, K.M., Buckel, J.A., Wilson White, J., Link, J.S., Essington, T.E., Gaichas, S., Anderson, T.W., Brodeur, R.D., Chan, K.S., Chen, K., Englund, G., Frank, K.T., Freitas, V., Hixon, M.A., Hurst, T., Johnson, D.W., Kitchell, J.F., Reese, D., Rose, G.A., Sjodin, H., Sydeman, W.J., van der Veer, H.W., Vollset, K., and Zador, S. 2011. Functional responses and scaling in predator-prey interactions of marine fishes: contemporary issues and emerging concepts. *Ecol. Lett.* 14(12): 1288-1299.
- Jarvis, J.T. and Lowe, C.G. 2008. The effects of barotrauma on the catch-and-release survival of southern California nearshore and shelf rockfish (*Scorpaenidae Sebastes* spp.). *Can. J. Fish. Aquat. Sci.* 65: 1286–1296.
- Kulatska, N., Neuenfeldt, S., Beier, U., Elvarsson, B.P., Wennhage, H., Stefansson, G., and Bartolino, V. 2019. Understanding ontogenetic and temporal variability of Eastern Baltic cod diet using a multispecies model and stomach data. *Fish. Res.* 211: 338-349.
- Link, J.S. 2002. Ecological considerations in fisheries management: when does it matter? *Fisheries.* 27(4): 10-17.
- McAllister, M.K., Duplisea, D.E., Licandeo, R., Marentette, J.R., and Senay, C. 2021. [Units 1 and 2 Redfish Management Strategy Evaluation](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2021/066. vi + 152 p.
- Oksanen, J., Simpson, G., Blanchet, F., Kindt, R., Legendre, P., Minchin, P., O'Hara, R., Solymos, P., Stevens, M., Szoecs, E., Wagner, H., Barbour, M., Bedward, M., Bolker, B., Borcard, D., Carvalho, G., Chirico, M., De Caceres, M., Durand, S., Evangelista, H., FitzJohn, R., Friendly, M., Furneaux, B., Hannigan, G., Hill, M., Lahti, L., McGlenn, D., Ouellette, M., Ribeiro Cunha, E., Smith, T., Stier, A., Ter Braak, C., and Weedon, J. 2024. *vegan: Community Ecology Package*. R package version 2.6-8.
- Orr, D.C. and Bowering, W.R. 1997. A multivariate analysis of food and feeding trends among Greenland halibut (*Reinhardtius hippoglossoides*) sampled in Davis Strait, during 1986. *ICES J. Mar. Sci.* 54(5): 819–829.
- Ouellette-Plante, J., Chabot, D., Nozères, C., and Bourdages, H. 2020. Régimes alimentaires de poissons démersaux provenant des relevés écosystémiques du NGCC *Teleost* dans l'estuaire et le nord du golfe du Saint-Laurent, août 2015-2017. *Can. Tech. Rep. Fish. Aquat. Sci.* 3383: v + 124 p.
- Pikitch, E.K., Santora, C., Babcock, E.A., Bakun, A., Bonfil, R., Conover, D.O., Dayton, P., Doukakis, P., Fluharty, D., Heneman, B., Houde, E.D., Link, J., Livingston, P.A., Mangel, M., McAllister, M.K., Pope, J., and Sainsbury, K.J. 2004. Ecosystem-based fishery management. *Science.* 305(5682): 346-347.
- Savenkoff, C., Bourdages, H., Castonguay, M., Morissette, L., Chabot, D., and Hammill, M. O. 2004. Input data and parameter estimates for ecosystem models of the northern Gulf of St. Lawrence (mid-1990s). *Can. Tech. Rep. Fish. Aquat. Sci.* 2531: vi + 93 p.
- Senay, C., Rousseau, S., Brûlé, C., Chavarria, C., Isabel, L., Parent, G.J., Chabot, D., and Duplisea, D. 2023. [Unit 1 Redfish \(\*Sebastes mentella\* and \*S. fasciatus\*\) stock status in 2021](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2023/036: xi + 125 p.

## TABLES

*Table 1. Summary of the sampling of redfish stomachs from unit 1 by length class (cm) and total, all periods combined. A description of the length of the redfish from which the stomachs were taken, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, is provided.*

Parameter		< 20	[20-30[	≥ 30	Total
TFI		0.53	0.23	0.64	0.45
Number of stomachs		4013	3657	2885	10,555
Number of empty stomachs		1655	1692	1408	4755
% of empty stomachs		41,2	46,3	48,8	45,0
Fork length (mm)	Mean	145	245	355	237
	Median	150	242	350	233
	Min	35	200	300	35
	Max	199	299	515	515
Total stomach content (g)	Mean	0.250	0.700	6.590	2.020
	Median	0.080	0.100	2.640	0.170
	Min	0.001	0.001	0.001	0.001
	Max	6.455	19.771	133.800	133.800
Number of observed taxa	Fishes	5	12	23	24
	Shrimp	10	7	11	15
	Zooplankton	50	39	34	58
	Other invertebrates	15	6	12	23
	Unidentified preys	2	2	2	2

*Table 2. Summary of the sampling of redfish stomachs from unit 1 across different periods, all length classes combined. A description of the length of the redfish from which the stomachs were obtained, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, are provided.*

Parameter		1993-1999	2015-2019	2020-2024
TFI		0.63	0.44	0.30
Number of stomachs		3321	3834	3400
Number of empty stomachs		1894	1509	1352
% of empty stomachs		57.0	39.4	39.8
Fork length (mm)	Mean	270	229	214
	Median	298	209	233
	Min	40	42	35
	Max	515	501	452
Total stomach content (g)	Mean	4.440	1.740	0.640
	Median	1.300	0.140	0.080
	Min	0.001	0.001	0.001
	Max	133.800	88.325	48.369
Number of observed taxa	Fishes	13	15	11
	Shrimp	9	12	8
	Zooplankton	32	52	32
	Other invertebrates	7	17	7
	Unidentified preys	2	2	1

Table 3. Summary of the 2024 sampling of redfish stomachs from unit 2, categorized by length class (cm) and total. A description of the length of the redfish from which the stomachs originated, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, are provided.

Parameter		< 20	[20-30[	≥ 30	Total
TFI		0.40	0.21	0.38	0.27
Number of stomachs		71	393	124	588
Number of empty stomachs		33	164	54	251
% of empty stomachs		46.5	41.7	43.5	42.7
Fork length (mm)	Mean	257	343	133	260
	Median	260	340	135	263
	Min	32	200	300	32
	Max	199	299	445	445
Total stomach content (g)	Mean	0.110	0.620	2.870	1.030
	Median	0.050	0.120	0.390	0.130
	Min	0.004	0.003	0.007	0.003
	Max	0.847	18.828	30.625	30.625
Number of observed taxa	Fishes	0	4	5	6
	Shrimp	1	4	3	5
	Zooplankton	10	16	12	18
	Other invertebrates	3	5	5	8
	Unidentified preys	1	1	1	1

Table 4. Summary of the redfish stomach sampling from the winter survey collected from 2022 to 2024, by length class (cm) and total. A description of the length of the redfish from which the stomachs were taken, the total stomach contents after the removal of waste, parasites, and empty stomachs, as well as the number of taxa per prey group, are provided.

Parameter		< 20	[20-30[	≥ 30	Total
TFI		0.40	0.16	0.36	0.25
Number of stomachs		740	1457	233	2430
Number of empty stomachs		297	750	90	1137
% of empty stomachs		40.1	41.5	38.6	46.8
Fork length (mm)	Mean	147	248	338	226
	Median	156	249	330	240
	Min	54	200	300	54
	Max	199	299	483	483
Total stomach content (g)	Mean	0.160	0.490	2.500	0.600
	Median	0.060	0.110	0.670	0.100
	Min	0.001	0.001	0.001	0.001
	Max	2.420	12.601	82.183	82.183
Number of observed taxa	Fishes	1	7	8	11
	Shrimp	4	6	5	9
	Zooplankton	20	23	18	26
	Other invertebrates	6	8	5	11
	Unidentified preys	1	2	1	2

Table 5. Detailed summer diet of redfish in the DFO survey in unit 1 by length class (cm), all periods combined.

Prey	FO			MC			CFI			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Bony fish (Actinopterygii)	<1	<1	<1	<0.01	0.65	1.05	<0.01	0.49	1.09	0.50
Atlantic herring ( <i>Clupea harengus</i> )	-	<1	<1	-	<0.01	0.48	-	<0.01	0.43	0.17
Capelin ( <i>Mallotus villosus</i> )	<1	<1	1.60	0.97	7.66	8.67	0.36	7.50	8.30	4.64
Lanternfish (Myctophidae)	-	-	<1	-	-	0.21	-	-	0.18	0.07
Kroyer's lanternfish ( <i>Notoscopelus kroyeri</i> )	-	-	<1	-	-	0.52	-	-	0.35	0.14
Barracudinas ( <i>Paralepis</i> sp.)	-	-	<1	-	-	0.07	-	-	0.06	0.02
White barracudina ( <i>Arctozenus risso</i> )	-	<1	<1	-	2.02	2.72	-	1.82	2.20	1.16
Slender snipe eel ( <i>Nemichthys scolopaceus</i> )	-	-	<1	-	-	0.20	-	-	0.19	0.07
Threespine stickleback ( <i>Gasterosteus aculeatus</i> )	-	-	<1	-	-	0.02	-	-	0.05	0.02
Cods ( <i>Gadus</i> sp.)	-	-	<1	-	-	<0.01	-	-	0.01	<0.01
Longfin hake ( <i>Phycis chesteri</i> )	-	-	<1	-	-	0.21	-	-	0.20	0.08
Marlin-spike ( <i>Nezumia bairdii</i> )	-	<1	<1	-	0.08	0.16	-	0.05	0.17	0.07
Sand lance ( <i>Ammodytes</i> sp.)	<1	<1	<1	0.04	0.92	0.02	0.03	0.92	0.02	0.18
Daubed shanny ( <i>Lumpenus maculatus</i> )	-	-	<1	-	-	0.03	-	-	0.04	0.02
Shannies ( <i>Lumpenus</i> sp.)	-	-	<1	-	-	0.02	-	-	0.03	0.01
Slender eelblenny ( <i>Lumpenus fabricii</i> )	-	<1	-	-	0.03	-	-	0.02	-	<0.01
Daubed shanny ( <i>Leptoclinus maculatus</i> )	-	<1	<1	-	0.15	<0.01	-	0.10	<0.01	0.02
Eelpout (Zoarcidae)	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Atlantic soft pout ( <i>Melanostigma atlanticum</i> )	-	<1	<1	-	0.31	0.30	-	0.26	0.32	0.17
Redfish ( <i>Sebastes</i> spp.)	-	<1	1.40	-	0.80	8.00	-	0.62	6.97	2.77
Flatfish (Pleuronectiformes)	-	-	<1	-	-	0.05	-	-	0.04	0.02
Digested roundfish	<1	<1	1.1	<0.01	0.47	1.57	<0.01	0.36	1.72	0.72
Fish (spawn) egg	-	-	<1	-	-	0.07	-	-	0.06	0.02
Digested fish	<1	1.20	3.80	0.44	4.38	4.53	0.32	4.41	4.26	2.54
<b>Fishes, total</b>	<b>&lt;1</b>	<b>2.40</b>	<b>9.70</b>	<b>1.45</b>	<b>17.49</b>	<b>28.93</b>	<b>0.71</b>	<b>16.57</b>	<b>26.72</b>	<b>13.41</b>

Prey	FO			MC			CFI			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Glass shrimp ( <i>Pasiphaeidae</i> )	-	-	<1	-	-	0.91	-	-	0.91	0.35
Glass shrimp ( <i>Pasiphaea</i> sp.)	-	<1	<1	-	0.33	0.53	-	0.23	0.53	0.24
Pink glass shrimp ( <i>Pasiphaea multidentata</i> )	<1	2.20	15.00	5.38	13.50	23.31	2.97	13.28	21.81	11.96
Shrimp (Hippolytidae)	<1	-	-	0.04	-	-	0.04	-	-	0.02
Arctic eualid ( <i>Eualus fabricii</i> )	<1	-	-	0.05	-	-	0.08	-	-	0.04
Greenland shrimp ( <i>Eualus macilentus</i> )	<1	-	<1	0.11	-	0.02	0.08	-	0.02	0.04
Gaimard's eualid ( <i>Eualus gaimardii gaimardii</i> )	<1	-	-	0.17	-	-	0.20	-	-	0.09
Parrot shrimp ( <i>Spirontocaris spinus</i> )	<1	-	-	0.08	-	-	0.09	-	-	0.04
Boreal red shrimps ( <i>Pandalus</i> sp.)	<1	<1	1.60	0.32	1.59	1.81	0.37	1.29	1.82	1.08
Northern shrimp ( <i>Pandalus borealis</i> )	<1	1	6.40	1.83	11.76	15.13	1.84	10.49	15.57	8.59
Striped pink shrimp ( <i>Pandalus montagui</i> )	<1	<1	<1	1.60	0.96	0.56	0.94	0.98	0.83	0.90
Sevenline shrimp ( <i>Sabinea septemcarinata</i> )	-	<1	<1	-	0.08	0.03	-	0.16	0.05	0.05
Norwegian shrimp ( <i>Pontophilus norvegicus</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Arctic argid ( <i>Argis dentata</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Digested shrimp	<1	1.90	7.40	1.53	5.60	4.54	1.49	5.55	4.69	3.42
<b>Shrimps, total</b>	<b>2.30</b>	<b>5.50</b>	<b>27.60</b>	<b>11.11</b>	<b>33.82</b>	<b>46.87</b>	<b>8.10</b>	<b>31.99</b>	<b>46.25</b>	<b>26.83</b>
Calanoid copepod (Calanoida)	9.60	8.40	1.10	4.28	1.27	0.06	4.54	1.63	0.10	2.34
Calanoid copepod ( <i>Calanus</i> sp.)	10.00	10.10	1.40	7.20	1.74	0.06	6.59	2.16	0.08	3.33
Calanoid copepod ( <i>Calanus finmarchicus</i> )	<1	-	<1	0.02	-	<0.01	0.01	-	<0.01	<0.01
Calanoid copepod ( <i>Calanus hyperboreus</i> )	5.70	12.00	3.30	2.23	1.77	0.15	1.50	2.10	0.21	1.11
Calanoid copepod ( <i>Calanus glacialis</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Calanoid copepod ( <i>Tortanus discaudatus</i> )	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Calanoid copepod ( <i>Scolecithricella</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Calanoid copepod ( <i>Calanus finn. + glacialis</i> )	<1	<1	<1	0.15	0.12	<0.01	0.27	0.17	<0.01	0.15
Calanoid copepod ( <i>Bradyidius similis</i> )	<1	<1	-	0.03	<0.01	-	0.06	<0.01	-	0.03
Calanoid copepod ( <i>Temora longicornis</i> )	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Calanoid copepod ( <i>Chiridius gracilis</i> )	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01

Prey	FO			MC			CFI			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Calanoid copepod (Aetideidae)	<1	<1	-	0.05	0.03	-	0.14	0.04	-	0.07
Calanoid copepod ( <i>Euchaeta</i> sp.)	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Calanoid copepod ( <i>Paraeuchaeta norvegica</i> )	2.80	7.10	1.90	0.44	0.58	0.02	0.95	0.67	0.03	0.55
Calanoid copepod (Metridinidae)	1.10	1.20	-	0.87	0.13	-	0.55	0.19	-	0.28
Calanoid copepod ( <i>Metridia</i> sp.)	3.50	1.20	<1	0.64	0.03	<0.01	0.65	0.04	<0.01	0.30
Calanoid copepod ( <i>Metridia longa</i> )	<1	<1	-	0.02	<0.01	-	<0.01	<0.01	-	<0.01
Calanoid copepod ( <i>Metridia lucens</i> )	<1	-	-	0.01	-	-	0.02	-	-	<0.01
Hyperiid (Hyperiidea)	-	<1	-	-	0.04	-	-	0.05	-	<0.01
Hyperiid (Hyperiidae)	1.70	<1	4.10	1.32	0.92	2.48	1.34	0.75	2.50	1.68
Hyperiid ( <i>Themisto</i> sp.)	7.10	7.30	5.80	3.05	3.18	0.69	4.21	3.47	0.88	2.81
Hyperiid ( <i>Themisto abyssorum</i> )	1.90	2.20	4.70	1.28	1.03	0.38	1.59	0.90	0.57	1.08
Hyperiid ( <i>Themisto compressa</i> )	2.90	2.20	5.50	3.51	1.25	0.87	4.22	1.28	1.09	2.51
Hyperiid ( <i>Hyperoche medusarum</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Hyperiid ( <i>Themisto libellula</i> )	<1	1.60	4.00	1.80	2.35	2.25	2.04	2.96	2.27	2.29
Hyperiid ( <i>Hyperia</i> sp.)	<1	-	-	<0.01	-	-	0.02	-	-	<0.01
Hyperiid ( <i>Hyperia galba</i> )	<1	<1	<1	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hyperiid ( <i>Scina borealis</i> )	<1	<1	<1	0.08	<0.01	<0.01	0.08	<0.01	<0.01	0.04
Gammarid (Gammaridea)	<1	<1	<1	0.02	<0.01	<0.01	0.05	<0.01	<0.01	0.02
Gammarid ( <i>Byblis</i> sp.)	<1	-	-	0.02	-	-	0.02	-	-	<0.01
Gammarid ( <i>Rhachotropis aculeata</i> )	-	<1	-	-	0.02	-	-	0.01	-	<0.01
Gammarid ( <i>Melita</i> sp.)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Gammarid ( <i>Maera loveni</i> )	<1	-	-	0.01	-	-	0.01	-	-	<0.01
Gammarid (Lysianassidae)	<1	<1	-	<0.01	<0.01	-	0.01	0.01	-	<0.01
Gammarid ( <i>Tmetonyx cicada</i> )	-	<1	<1	-	<0.01	<0.01	-	<0.01	<0.01	<0.01
Gammarid ( <i>Hippomedon</i> sp.)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Gammarid ( <i>Neohela monstrosa</i> )	<1	<1	-	0.27	0.02	-	0.16	0.03	-	0.08
Gammarid ( <i>Monoculodes</i> sp.)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01

Prey	FO			MC			CFI			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Gammarid ( <i>Harpinia</i> sp.)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Mysid (Mysida)	<1	<1	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01
Mysid (Mysidae)	1.30	<1	<1	1.50	0.32	0.24	1.09	0.40	0.24	0.64
Mysid ( <i>Boreomysis</i> sp.)	3.40	2.30	4.20	4.27	2.26	0.63	5.26	2.49	0.71	3.04
Mysid ( <i>Boreomysis tridens</i> )	<1	<1	<1	0.19	<0.01	<0.01	0.16	0.02	<0.01	0.08
Mysid ( <i>Boreomysis arctica</i> )	1.10	1.30	1.20	1.23	1.15	0.30	1.73	1.27	0.34	1.12
Mysid ( <i>Erythrops</i> sp.)	<1	<1	<1	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01
Mysid ( <i>Erythrops erythropthalma</i> )	<1	-	<1	<0.01	-	<0.01	0.01	-	<0.01	<0.01
Mysid ( <i>Pseudomma</i> sp.)	<1	-	-	0.02	-	-	0.04	-	-	0.02
Mysid ( <i>Pseudomma roseum</i> )	<1	-	-	0.03	-	-	0.04	-	-	0.02
Mysid ( <i>Mysis</i> sp.)	<1	<1	<1	0.07	0.07	<0.01	0.16	0.07	<0.01	0.08
Mysid ( <i>Mysis mixta</i> )	<1	-	-	0.03	-	-	0.01	-	-	<0.01
Mysid ( <i>Stilomysis</i> sp.)	<1	-	<1	0.01	-	<0.01	<0.01	-	<0.01	<0.01
Euphausiid (Euphausiacea)	<1	<1	<1	<0.01	0.02	<0.01	<0.01	0.03	<0.01	<0.01
Euphausiid (Euphausiidae)	2.80	1.30	2.30	5.57	3.57	0.76	5.31	3.30	0.70	3.20
Northern krill ( <i>Meganyctiphanes norvegica</i> )	3.10	4.60	6.30	10.13	8.44	2.84	8.47	9.44	3.64	6.79
Euphausiid ( <i>Thysanoessa</i> sp.)	<1	<1	<1	3.38	1.30	0.13	2.86	1.21	0.16	1.54
Euphausiid ( <i>Thysanoessa inermis</i> )	<1	<1	<1	0.05	<0.01	<0.01	0.06	<0.01	<0.01	0.03
Arctic krill ( <i>Thysanoessa raschii</i> )	<1	<1	<1	0.74	0.54	0.01	0.93	0.73	0.02	0.55
Digested copepod	6.30	7.30	1.30	2.52	1.18	0.06	3.86	1.43	0.08	2.00
<b>Zooplankton, total</b>	<b>43.40</b>	<b>41.90</b>	<b>24.70</b>	<b>57.08</b>	<b>33.38</b>	<b>11.96</b>	<b>59.07</b>	<b>36.87</b>	<b>13.65</b>	<b>37.85</b>
Invertebrate (Invertebrata)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Anemone (Metridiidae)	<1	-	-	0.01	-	-	0.04	-	-	0.02
Arrow worm ( <i>Parasagitta elegans</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Mollusc (Mollusca)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Gastropod (Gastropoda)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Shelled sea butterfly ( <i>Limacina</i> sp.)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01

Prey	FO			MC			CFI			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Dipperclam ( <i>Cuspidaria</i> sp.)	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Cephalopod (Cephalopoda)	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Bobtail ( <i>Rossia</i> sp.)	<1	-	<1	0.01	-	0.25	<0.01	-	0.37	0.15
Polychaete (Polychaeta)	<1	-	<1	<0.01	-	<0.01	<0.01	-	<0.01	<0.01
Sea mouse ( <i>Aphrodita hastata</i> )	<1	-	-	0.08	-	-	0.09	-	-	0.04
Crustacean (Crustacea)	18.70	14.00	11.30	15.80	6.60	3.56	14.69	7.06	3.80	9.20
Ostracod (Ostracoda)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Crustacean (Malacostraca)	<1	-	<1	0.16	-	<0.01	0.40	-	<0.01	0.18
Cumacean (Cumacea)	1.80	<1	<1	0.27	<0.01	<0.01	0.57	<0.01	<0.01	0.25
Isopod (Isopoda)	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Isopod ( <i>Syscenus infelix</i> )	-	-	<1	-	-	0.02	-	-	0.02	<0.01
Amphipod (Amphipoda)	1.60	1.00	3.10	5.08	5.31	5.60	7.06	3.96	6.22	6.20
Crab (Brachyura)	<1	-	-	<0.01	-	-	<0.01	-	-	<0.01
Snow crab ( <i>Chionoecetes opilio</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Lyre crab ( <i>Hyas</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Invertebrate egg	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Digested invertebrates	<1	-	<1	0.16	-	0.08	0.15	-	0.09	0.10
<b>Other invertebrates, total</b>	<b>21.90</b>	<b>15.00</b>	<b>15.10</b>	<b>21.59</b>	<b>11.92</b>	<b>9.51</b>	<b>23.03</b>	<b>11.03</b>	<b>10.52</b>	<b>16.16</b>
<b>Invertebrates, total</b>	<b>56.00</b>	<b>51.80</b>	<b>46.80</b>	<b>89.78</b>	<b>79.12</b>	<b>68.34</b>	<b>90.20</b>	<b>79.89</b>	<b>70.41</b>	<b>80.85</b>
Unidentified digested material	5.10	3.70	5.10	8.76	3.39	2.73	9.09	3.54	2.87	5.75
Unidentified egg	<1	<1	<1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Unidentifiable preys, total</b>	<b>5.10</b>	<b>3.70</b>	<b>5.10</b>	<b>8.77</b>	<b>3.39</b>	<b>2.73</b>	<b>9.09</b>	<b>3.54</b>	<b>2.87</b>	<b>5.75</b>
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 6. Detailed summer diet of redfish in the DFO survey in unit 1, by period.

Preys	FO			CM			CIR		
	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024
Bony fish (Actinopterygii)	<1	-	-	1.75	-	-	1.15	-	-
Atlantic herring ( <i>Clupea harengus</i> )	-	<1	<1	-	<0.01	3.62	-	<0.01	0.78
Capelin ( <i>Mallotus villosus</i> )	<1	<1	<1	11.48	3.33	7.13	5.79	4.21	2.99
Lanternfish (Myctophidae)	-	<1	-	-	0.50	-	-	0.20	-
Kroyer's lanternfish ( <i>Notoscopelus kroyeri</i> )	-	<1	-	-	1.24	-	-	0.38	-
Barracudinas ( <i>Paralepis</i> sp.)	<1	-	-	0.11	-	-	0.06	-	-
White barracudina ( <i>Arctozenus risso</i> )	<1	<1	<1	0.56	5.02	4.12	0.22	2.17	1.40
Slender snipe eel ( <i>Nemichthys scolopaceus</i> )	-	<1	-	-	0.48	-	-	0.21	-
Threespine stickleback ( <i>Gasterosteus aculeatus</i> )	<1	-	-	0.04	-	-	0.04	-	-
Cods ( <i>Gadus</i> sp.)	-	<1	-	-	0.02	-	-	0.01	-
Longfin hake ( <i>Phycis chesteri</i> )	<1	-	-	0.33	-	-	0.17	-	-
Marlin-spike ( <i>Nezumia bairdii</i> )	<1	<1	-	0.04	0.35	-	0.03	0.17	-
Sand lance ( <i>Ammodytes</i> sp.)	-	-	<1	-	-	1.15	-	-	0.84
Daubed shanny ( <i>Lumpenus maculatus</i> )	-	-	<1	-	-	0.24	-	-	0.08
Shannies ( <i>Lumpenus</i> sp.)	-	-	<1	-	-	0.15	-	-	0.06
Slender eelblenny ( <i>Lumpenus fabricii</i> )	-	<1	-	-	<0.01	-	-	0.01	-
Daubed shanny ( <i>Leptoclinus maculatus</i> )	-	-	<1	-	-	0.20	-	-	0.10
Eelpout (Zoarcidae)	<1	-	-	<0.01	-	-	<0.01	-	-
Atlantic soft pout ( <i>Melanostigma atlanticum</i> )	<1	<1	<1	0.24	0.28	0.58	0.12	0.19	0.23
Redfish ( <i>Sebastes</i> spp.)	<1	<1	<1	0.59	18.00	1.80	0.26	7.23	0.51
Flatfish (Pleuronectiformes)	-	<1	-	-	0.13	-	-	0.04	-
Digested roundfish	<1	<1	<1	0.89	1.96	1.83	0.51	0.98	0.72
Fish (spawn) egg	<1	<1	-	<0.01	0.16	-	<0.01	0.06	-
Digested fish	1.80	1.30	1.60	4.96	2.40	7.10	2.72	1.39	4.06

Preys	FO			CM			CIR		
	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024
<b>Fishes, total</b>	<b>4.20</b>	<b>3.80</b>	<b>2.80</b>	<b>20.99</b>	<b>33.87</b>	<b>27.92</b>	<b>11.09</b>	<b>17.26</b>	<b>11.77</b>
Glass shrimp ( <i>Pasiphaeidae</i> )	<1	-	-	1.40	-	-	0.80	-	-
Glass shrimp ( <i>Pasiphaea</i> sp.)	<1	<1	-	0.88	0.01	-	0.55	<0.01	-
Pink glass shrimp ( <i>Pasiphaea multidentata</i> )	7.10	6.90	1.30	19.11	28.67	8.78	11.64	16.06	5.81
Shrimp ( <i>Hippolytidae</i> )	-	<1	-	-	<0.01	-	-	0.05	-
Arctic eualid ( <i>Eualus fabricii</i> )	-	<1	-	-	<0.01	-	-	0.11	-
Greenland shrimp ( <i>Eualus macilentus</i> )	<1	<1	-	0.03	0.02	-	0.02	0.10	-
Gaimard's eualid ( <i>Eualus gaimardii gaimardii</i> )	-	<1	<1	-	0.02	0.02	-	0.16	0.15
Parrot shrimp ( <i>Spirontocaris spinus</i> )	-	<1	-	-	0.01	-	-	0.11	-
Boreal red shrimps ( <i>Pandalus</i> sp.)	<1	<1	<1	2.19	1.10	1.31	1.30	1.13	0.56
Northern shrimp ( <i>Pandalus borealis</i> )	3.20	2.30	1.10	13.06	15.14	15.65	8.34	10.04	6.68
Striped pink shrimp ( <i>Pandalus montagui</i> )	<1	<1	<1	0.55	0.75	0.92	0.97	1.04	0.54
Sevenline shrimp ( <i>Sabinea septemcarinata</i> )	-	<1	<1	-	0.03	0.26	-	0.08	0.09
Norwegian shrimp ( <i>Pontophilus norvegicus</i> )	<1	-	-	0.01	-	-	<0.01	-	-
Arctic argid ( <i>Argis dentata</i> )	-	-	<1	-	-	0.04	-	-	0.01
Digested shrimp	5.20	2.50	1.60	6.48	1.47	4.41	5.12	1.41	3.27
<b>Shrimps, total</b>	<b>15.00</b>	<b>11.69</b>	<b>4.39</b>	<b>43.72</b>	<b>47.23</b>	<b>31.38</b>	<b>28.76</b>	<b>30.29</b>	<b>17.11</b>
Calanoid copepod ( <i>Calanoida</i> )	<1	10.70	8.60	0.06	0.72	1.17	0.28	4.23	3.42
Calanoid copepod ( <i>Calanus</i> sp.)	1.20	10.60	10.70	0.04	1.03	2.08	0.26	4.77	7.25
Calanoid copepod ( <i>Calanus finmarchicus</i> )	<1	<1	-	<0.01	<0.01	-	0.01	<0.01	-
Calanoid copepod ( <i>Calanus hyperboreus</i> )	3.00	10.00	8.40	0.24	0.68	0.70	0.42	2.14	0.82
Calanoid copepod ( <i>Calanus glacialis</i> )	-	<1	-	-	<0.01	-	-	<0.01	-
Calanoid copepod ( <i>Tortanus discaudatus</i> )	-	-	<1	-	-	<0.01	-	-	<0.01
Calanoid copepod ( <i>Scolecithricella</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Calanoid copepod ( <i>Calanus finn. + glacialis</i> )	<1	<1	-	<0.01	0.07	-	0.01	0.41	-

Preys	FO			CM			CIR		
	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024
Calanoid copepod ( <i>Bradyidius similis</i> )	<1	<1	<1	<0.01	<0.01	0.01	<0.01	<0.01	0.11
Calanoid copepod ( <i>Temora longicornis</i> )	-	-	<1	-	-	<0.01	-	-	<0.01
Calanoid copepod ( <i>Chiridius gracilis</i> )	-	<1	-	-	<0.01	-	-	<0.01	-
Calanoid copepod (Aetideidae)	-	<1	<1	-	<0.01	0.04	-	0.15	0.08
Calanoid copepod ( <i>Euchaeta</i> sp.)	<1	-	-	<0.01	-	-	<0.01	-	-
Calanoid copepod ( <i>Paraeuchaeta norvegica</i> )	<1	3.70	7.70	<0.01	0.10	0.63	0.03	0.24	2.13
Calanoid copepod (Metridinidae)	-	-	2.60	-	-	0.52	-	-	1.30
Calanoid copepod ( <i>Metridia</i> sp.)	<1	3.20	1.60	<0.01	0.07	0.07	0.08	0.66	0.15
Calanoid copepod ( <i>Metridia longa</i> )	<1	<1	-	<0.01	<0.01	-	<0.01	<0.01	-
Calanoid copepod ( <i>Metridia lucens</i> )	<1	<1	-	<0.01	<0.01	-	0.02	<0.01	-
Hyperiid (Hyperiidea)	-	<1	<1	-	<0.01	0.04	-	<0.01	0.04
Hyperiid (Hyperiidae)	5.40	<1	<1	4.11	<0.01	0.09	3.67	0.06	0.28
Hyperiid ( <i>Themisto</i> sp.)	3.00	8.60	8.60	0.44	1.35	3.50	1.17	3.37	5.22
Hyperiid ( <i>Themisto abyssorum</i> )	4.10	2.50	1.70	0.77	0.19	0.21	1.99	0.49	0.17
Hyperiid ( <i>Themisto compressa</i> )	3.60	3.80	2.60	0.98	1.08	1.26	1.93	3.76	1.63
Hyperiid ( <i>Hyperoche medusarum</i> )	<1	-	-	<0.01	-	-	<0.01	-	-
Hyperiid ( <i>Themisto libellula</i> )	3.30	1.80	1.00	3.02	1.36	1.17	2.89	2.01	1.52
Hyperiid ( <i>Hyperia</i> sp.)	-	<1	-	-	<0.01	-	-	0.03	-
Hyperiid ( <i>Hyperia galba</i> )	-	<1	<1	-	<0.01	<0.01	-	0.02	<0.01
Hyperiid ( <i>Scina borealis</i> )	<1	<1	-	<0.01	0.01	-	<0.01	0.10	-
Gammarid (Gammaridea)	<1	<1	-	<0.01	<0.01	-	<0.01	0.06	-
Gammarid ( <i>Byblis</i> sp.)	-	<1	-	-	<0.01	-	-	0.02	-
Gammarid ( <i>Rhachotropis aculeata</i> )	-	<1	-	-	<0.01	-	-	<0.01	-
Gammarid ( <i>Melita</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Gammarid ( <i>Maera loveni</i> )	-	<1	-	-	<0.01	-	-	0.01	-
Gammarid (Lysianassidae)	-	<1	<1	-	<0.01	<0.01	-	0.01	0.02

Preys	FO			CM			CIR		
	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024
Gammarid ( <i>Tmetonyx cicada</i> )	-	<1	-	-	<0.01	-	-	<0.01	-
Gammarid ( <i>Hippomedon</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Gammarid ( <i>Neohela monstrosa</i> )	<1	<1	<1	<0.01	<0.01	0.09	0.03	0.03	0.25
Gammarid ( <i>Monoculodes</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Gammarid ( <i>Harpinia</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Mysid (Mysida)	-	<1	-	-	<0.01	-	-	<0.01	-
Mysid (Mysidae)	2.00	<1	<1	0.56	<0.01	0.09	1.36	0.02	0.22
Mysid ( <i>Boreomysis</i> sp.)	3.50	4.50	1.40	1.04	0.96	0.95	4.44	2.24	1.49
Mysid ( <i>Boreomysis tridens</i> )	<1	<1	<1	0.02	<0.01	0.02	0.07	0.03	0.16
Mysid ( <i>Boreomysis arctica</i> )	<1	<1	2.10	0.34	0.26	1.55	0.42	1.52	1.90
Mysid ( <i>Erythroops</i> sp.)	-	<1	<1	-	<0.01	<0.01	-	<0.01	0.01
Mysid ( <i>Erythroops erythropthalma</i> )	-	<1	-	-	<0.01	-	-	0.02	-
Mysid ( <i>Pseudomma</i> sp.)	<1	<1	<1	<0.01	<0.01	<0.01	0.04	<0.01	0.01
Mysid ( <i>Pseudomma roseum</i> )	-	<1	-	-	<0.01	-	-	0.04	-
Mysid ( <i>Mysis</i> sp.)	-	<1	<1	-	0.02	0.05	-	0.03	0.34
Mysid ( <i>Mysis mixta</i> )	<1	-	-	<0.01	-	-	0.01	-	-
Mysid ( <i>Stilomysis</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Euphausiid (Euphausiacea)	<1	<1	-	<0.01	<0.01	-	<0.01	0.02	-
Euphausiid (Euphausiidae)	2.10	3.50	<1	1.38	1.45	0.70	2.62	4.15	2.80
Northern krill ( <i>Meganyctiphanes norvegica</i> )	3.20	4.80	5.30	1.51	4.67	12.71	2.57	7.46	14.38
Euphausiid ( <i>Thysanoessa</i> sp.)	-	1.20	<1	-	0.88	1.06	-	3.54	1.39
Euphausiid ( <i>Thysanoessa inermis</i> )	<1	<1	<1	<0.01	0.01	0.01	<0.01	0.04	0.07
Arctic krill ( <i>Thysanoessa raschii</i> )	<1	<1	<1	<0.01	0.17	0.46	<0.01	0.81	1.24
Digested copepod	2.80	4.50	8.60	0.22	0.21	1.09	1.48	0.98	4.74
<b>Zooplankton, total</b>	<b>21.40</b>	<b>45.00</b>	<b>45.60</b>	<b>14.75</b>	<b>15.39</b>	<b>30.28</b>	<b>25.83</b>	<b>43.54</b>	<b>53.12</b>

Preys	FO			CM			CIR		
	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024
Invertebrate (Invertebrata)	-	<1	-	-	<0.01	-	-	<0.01	-
Anemone (Metridiidae)	-	-	<1	-	-	<0.01	-	-	0.09
Arrow worm ( <i>Parasagitta elegans</i> )	-	<1	-	-	<0.01	-	-	<0.01	-
Mollusc (Mollusca)	-	<1	-	-	<0.01	-	-	<0.01	-
Gastropod (Gastropoda)	-	<1	-	-	<0.01	-	-	<0.01	-
Shelled sea butterfly ( <i>Limacina</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Dipperclam ( <i>Cuspidaria</i> sp.)	<1	-	-	0.01	-	-	<0.01	-	-
Cephalopod (Cephalopoda)	-	-	<1	-	-	<0.01	-	-	<0.01
Bobtail ( <i>Rossia</i> sp.)	-	<1	<1	-	0.02	1.79	-	0.02	0.66
Polychaete (Polychaeta)	-	<1	<1	-	<0.01	<0.01	-	<0.01	<0.01
Sea mouse ( <i>Aphrodita hastata</i> )	-	<1	-	-	0.01	-	-	0.11	-
Crustacean (Crustacea)	10.40	15.50	19.00	5.58	1.93	7.41	8.60	6.68	14.61
Ostracod (Ostracoda)	-	<1	-	-	<0.01	-	-	<0.01	-
Crustacean (Malacostraca)	<1	-	-	0.02	-	-	0.41	-	-
Cumacean (Cumacea)	-	<1	1.50	-	<0.01	0.11	-	0.09	1.05
Isopod (Isopoda)	<1	-	-	<0.01	-	-	<0.01	-	-
Isopod ( <i>Syscenus infelix</i> )	-	<1	-	-	0.06	-	-	0.03	-
Amphipod (Amphipoda)	4.20	<1	<1	10.18	0.02	0.12	13.88	0.07	0.62
Crab (Brachyura)	-	<1	-	-	<0.01	-	-	<0.01	-
Snow crab ( <i>Chionoecetes opilio</i> )	-	<1	-	-	<0.01	-	-	<0.01	-
Lyre crab ( <i>Hyas</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-
Invertebrate egg	<1	-	-	<0.01	-	-	<0.01	-	-
Digested invertebrates	<1	<1	-	0.11	0.03	-	0.18	0.06	-
<b>Other invertebrates, total</b>	<b>15.40</b>	<b>17.00</b>	<b>20.50</b>	<b>15.91</b>	<b>2.08</b>	<b>9.44</b>	<b>23.08</b>	<b>7.07</b>	<b>17.05</b>
<b>Invertebrates, total</b>	<b>38.40</b>	<b>58.30</b>	<b>58.30</b>	<b>74.38</b>	<b>64.70</b>	<b>71.10</b>	<b>77.67</b>	<b>80.90</b>	<b>87.28</b>

Preys	FO			CM			CIR		
	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024	1993-1999	2015-2019	2020-2024
Unidentified digested material	6.50	4.50	2.90	4.63	1.42	0.98	11.24	1.84	0.95
Unidentified egg	<1	<1	-	<0.01	<0.01	-	<0.01	<0.01	-
<b>Unidentifiable preys, total</b>	<b>6.50</b>	<b>4.60</b>	<b>2.90</b>	<b>4.63</b>	<b>1.42</b>	<b>0.98</b>	<b>11.24</b>	<b>1.84</b>	<b>0.95</b>
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 7. Detailed summer diet of redfish in the DFO survey in unit 2 in 2024 by length class (cm).

Preys	FO			CM			CIR			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Lanternfish (Myctophidae)	-	1.30	1.60	-	16.54	6.33	-	16.32	4.15	9.71
Kroyer's lanternfish ( <i>Notoscopelus kroyeri</i> )	-	-	1.60	-	-	4.61	-	-	3.92	1.19
Glacier lanternfish ( <i>Benthoosema glaciale</i> )	-	<1	-	-	3.70	-	-	3.80	-	1.97
White barracudina ( <i>Arctozenus risso</i> )	-	1.30	4.80	-	19.18	18.42	-	19.64	17.35	15.42
Atlantic soft pout ( <i>Melanostigma atlanticum</i> )	-	-	<1	-	-	0.02	-	-	0.03	0.01
Digested fish	-	4.60	4.80	-	7.56	19.12	-	8.34	21.98	10.97
<b>Fishes, total</b>	<b>-</b>	<b>7.60</b>	<b>12.10</b>	<b>-</b>	<b>46.99</b>	<b>48.49</b>	<b>-</b>	<b>48.10</b>	<b>47.45</b>	<b>39.26</b>
Shrimp ( <i>Eusergestes arcticus</i> )	-	<1	1.60	-	1.74	0.70	-	2.02	0.58	3.41
Shrimp ( <i>Acanthephyra purpurea</i> )	-	<1	-	-	2.07	-	-	2.06	-	1.22
Pink glass shrimp ( <i>Pasiphaea multidentata</i> )	-	1.00	2.40	-	8.44	11.65	-	7.23	8.13	1.07
Polar lebbeid ( <i>Lebbeus polaris</i> )	1.40	-	-	20.22	-	-	8.34	-	-	6.20
Digested shrimp	-	1.50	<1	-	6.19	0.34	-	6.29	0.50	1.50
<b>Shrimps, total</b>	<b>1.40</b>	<b>3.10</b>	<b>4.00</b>	<b>20.22</b>	<b>18.44</b>	<b>12.70</b>	<b>8.34</b>	<b>17.60</b>	<b>9.21</b>	<b>13.40</b>
Calanoid copepod ( <i>Calanus</i> sp.)	7.00	7.90	3.20	3.35	0.63	0.05	1.06	0.57	0.08	0.51
Calanoid copepod ( <i>Calanus hyperboreus</i> )	-	<1	-	-	0.04	-	-	0.04	-	0.02

Preys	FO			CM			CIR			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Calanoid copepod (Aetideidae)	5.60	3.60	1.60	0.48	0.06	<0.01	3.53	0.08	<0.01	0.68
Calanoid copepod ( <i>Paraeuchaeta norvegica</i> )	1.40	30.00	24.20	0.12	5.14	0.71	0.04	5.06	0.95	2.92
Calanoid copepod (Metridinidae)	12.70	3.80	-	5.95	0.24	-	1.88	0.29	-	0.49
Hyperiid (Hyperiididae)	1.40	1.30	1.60	0.80	0.08	<0.01	7.46	0.09	0.01	1.39
Hyperiids ( <i>Themisto</i> sp.)	8.50	3.30	1.60	7.71	0.37	0.06	8.82	0.43	0.06	1.83
Hyperiid ( <i>Themisto abyssorum</i> )	-	-	3.20	-	-	0.05	-	-	0.08	0.02
Hyperiid ( <i>Themisto compressa</i> )	1.40	<1	<1	5.28	0.19	0.02	1.15	0.21	0.02	0.32
Hyperiid ( <i>Themisto libellula</i> )	-	<1	-	-	0.07	-	-	0.08	-	0.04
Hyperiid ( <i>Hyperia</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Hyperiid ( <i>Hyperia galba</i> )	1.40	1.50	4.80	0.92	0.07	0.09	1.86	0.07	0.09	0.40
Mysid (Mysidae)	4.20	<1	-	0.72	0.03	-	1.48	0.05	-	0.29
Mysid ( <i>Boreomysis</i> sp.)	-	1.50	-	-	0.35	-	-	0.39	-	0.20
Euphausiid (Euphausiidae)	-	<1	-	-	0.06	-	-	0.06	-	0.03
Northern krill ( <i>Meganyctiphanes norvegica</i> )	-	8.40	16.90	-	17.96	9.11	-	16.93	11.05	12.11
Euphausiid ( <i>Bentheuphausia amblyops</i> )	-	-	<1	-	-	0.29	-	-	0.43	0.13
Euphausiid ( <i>Thysanoessa inermis</i> )	-	-	<1	-	-	<0.01	-	-	<0.01	<0.01
Digested copepod	16.90	10.70	3.20	33.98	1.49	0.09	23.35	1.62	0.13	5.07
<b>Zooplankton, total</b>	<b>39.40</b>	<b>44.80</b>	<b>40.30</b>	<b>59.30</b>	<b>26.77</b>	<b>10.49</b>	<b>50.65</b>	<b>25.98</b>	<b>12.92</b>	<b>26.46</b>
Cephalopod (Cephalopoda)	-	<1	-	-	0.08	-	-	0.08	-	0.04
Squid (Oegopsina)	-	-	<1	-	-	14.17	-	-	14.04	4.24
Umbrella squid ( <i>Histioteuthis bonnellii</i> )	-	-	<1	-	-	11.04	-	-	12.82	3.88
Trumpet worm (Pectinariidae)	-	<1	<1	-	0.01	0.02	-	0.02	0.03	0.02
Crustacean (Crustacea)	19.70	17.00	16.90	14.55	6.79	2.64	16.40	7.32	3.06	7.67
Cumacean (Cumacea)	4.20	<1	-	2.89	<0.01	-	0.66	<0.01	-	0.12
Amphipod (Amphipoda)	2.80	<1	<1	0.29	<0.01	<0.01	0.44	<0.01	<0.01	0.08
<b>Other invertebrates, total</b>	<b>25.40</b>	<b>18.30</b>	<b>19.40</b>	<b>17.73</b>	<b>6.90</b>	<b>27.87</b>	<b>17.50</b>	<b>7.42</b>	<b>29.95</b>	<b>16.04</b>

Preys	FO			CM			CIR			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
<b>Invertebrates, total</b>	<b>49.30</b>	<b>54.50</b>	<b>50.80</b>	<b>97.25</b>	<b>52.11</b>	<b>51.06</b>	<b>76.48</b>	<b>51.01</b>	<b>52.08</b>	<b>55.91</b>
Unidentified digested material	8.50	3.80	3.20	2.75	0.90	0.45	23.52	0.89	0.47	4.83
<b>Unidentifiable preys, total</b>	<b>8.50</b>	<b>3.80</b>	<b>3.20</b>	<b>2.75</b>	<b>0.90</b>	<b>0.45</b>	<b>23.52</b>	<b>0.89</b>	<b>0.47</b>	<b>4.83</b>
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 8. Detailed winter diet of redfish in the DFO 2022-2024 winter survey by length class (cm).

Proies	FO			CM			CIR			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Capelin ( <i>Mallotus villosus</i> )	-	<1	<1	-	0.90	1.64	-	0.85	2.24	0.62
Goitre blacksmelt ( <i>Bathylagus euryops</i> )	-	<1	-	-	0.21	-	-	0.13	-	0.05
Deepwater fish (Myctophiformes)	-	<1	<1	-	1.60	1.48	-	1.43	1.27	0.71
Lanternfish (Myctophidae)	-	<1	-	-	0.37	-	-	0.23	-	0.09
Glacier lanternfish ( <i>Benthoosema glaciale</i> )	-	<1	-	-	0.18	-	-	0.11	-	0.04
White barracudina ( <i>Arctozenus risso</i> )	-	<1	<1	-	0.51	1.99	-	0.43	2.30	0.48
Atlantic cod ( <i>Gadus morhua</i> )	-	-	<1	-	-	25.07	-	-	15.85	2.15
Redfish ( <i>Sebastes</i> sp.)	-	-	<1	-	-	1.89	-	-	2.54	0.34
Witch flounder ( <i>Glyptocephalus cynoglossus</i> )	-	-	<1	-	-	0.31	-	-	0.39	0.05
Digested roundfish	-	-	<1	-	-	4.33	-	-	3.39	0.46
Digested fish	<1	1.50	6.90	0.22	8.85	8.84	0.08	7.52	9.31	4.15
<b>Fishes, total</b>	<b>&lt;1</b>	<b>1.90</b>	<b>10.70</b>	<b>0.22</b>	<b>12.62</b>	<b>45.55</b>	<b>0.08</b>	<b>10.71</b>	<b>37.30</b>	<b>9.14</b>
Shrimp ( <i>Eusergestes arcticus</i> )	-	<1	-	-	0.55	-	-	0.35	-	0.13
Benthesicymidae	-	<1	-	-	0.48	-	-	0.36	-	0.14
Shrimp ( <i>Acanthephyra purpurea</i> )	-	-	<1	-	-	0.05	-	-	0.07	<0.01
Shrimp ( <i>Nematocarcinus rotundus</i> )	-	<1	-	-	0.03	-	-	0.02	-	<0.01

Proies	FO			CM			CIR			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Pink glass shrimp ( <i>Pasiphaea multidentata</i> )	<1	<1	1.70	2.32	7.15	1.66	1.35	6.89	1.86	3.52
Polar lebbeid ( <i>Lebbeus polaris</i> )	<1	-	-	1.81	-	-	1.37	-	-	0.67
Boreal red shrimps ( <i>Pandalus</i> sp.)	<1	-	<1	1.38	-	1.53	0.71	-	2.07	0.62
Northern shrimp ( <i>Pandalus borealis</i> )	-	<1	1.70	-	0.70	6.24	-	0.64	6.05	1.06
Digested shrimp	<1	1.20	6.00	1.82	4.40	7.92	0.57	3.70	8.28	2.80
<b>Shrimps, total</b>	<b>&lt;1</b>	<b>2.30</b>	<b>10.30</b>	<b>7.33</b>	<b>13.30</b>	<b>17.40</b>	<b>4.00</b>	<b>11.96</b>	<b>18.32</b>	<b>8.96</b>
Calanoid copepod (Calanoida)	3.20	3.40	<1	0.82	0.67	0.22	1.10	0.77	0.32	0.87
Calanoid copepod ( <i>Calanus</i> sp.)	21.60	12.30	8.60	20.57	3.98	0.32	25.69	4.69	0.45	14.33
Calanoid copepod ( <i>Calanus finmarchicus</i> )	<1	-	-	0.16	-	-	0.09	-	-	0.04
Calanoid copepod ( <i>Calanus hyperboreus</i> )	3.60	5.20	5.60	1.62	1.77	0.17	0.66	2.49	0.19	1.29
Calanoid copepod ( <i>Bradyidius similis</i> )	1.40	<1	-	0.04	<0.01	-	0.05	<0.01	-	0.02
Calanoid copepod (Aetideidae)	<1	<1	-	0.03	<0.01	-	0.01	<0.01	-	<0.01
Calanoid copepod ( <i>Paraeuchaeta norvegica</i> )	12.20	21.10	22.30	2.76	6.82	0.99	2.37	6.16	1.29	3.66
Calanoid copepod (Metridinidae)	6.40	1.40	-	1.92	0.25	-	2.04	0.31	-	1.11
Calanoid copepod ( <i>Metridia</i> sp.)	<1	<1	-	0.47	<0.01	-	1.69	0.01	-	0.82
Hyperiid (Hyperiidea)	1.80	1.30	1.30	1.61	0.27	0.05	1.95	0.25	0.06	1.05
Hyperiid (Hyperiidae)	<1	<1	1.70	0.07	0.12	0.34	0.24	0.13	0.53	0.24
Hyperiid ( <i>Themisto</i> sp.)	5.10	7.00	16.30	3.97	5.16	3.76	4.36	5.43	4.25	4.75
Hyperiid ( <i>Themisto abyssorum</i> )	<1	2.50	7.30	0.33	1.06	0.72	0.33	0.96	0.89	0.64
Hyperiid ( <i>Themisto compressa</i> )	<1	2.70	12.90	2.13	2.75	2.01	0.91	3.21	2.31	1.97
Hyperiid ( <i>Hyperoche medusarum</i> )	-	-	<1	-	-	0.01	-	-	0.01	<0.01
Hyperiid ( <i>Themisto libellula</i> )	-	<1	-	-	1.27	-	-	1.01	-	0.38
Mysid ( <i>Eucopia</i> sp.)	-	<1	1.30	-	0.17	0.06	-	0.11	0.08	0.05
Mysid (Mysidae)	<1	<1	<1	0.10	0.06	<0.01	0.11	0.04	<0.01	0.07
Mysid ( <i>Boreomysis</i> sp.)	<1	<1	1.30	0.11	0.19	0.80	0.13	0.20	0.94	0.27
Mysid ( <i>Boreomysis arctica</i> )	<1	<1	-	0.38	0.33	-	0.39	0.31	-	0.31

Proies	FO			CM			CIR			Total
	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	< 20	[20-30[	≥ 30	
Mysid ( <i>Erythrops</i> sp.)	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
Mysid ( <i>Stilomysis</i> sp.)	-	<1	<1	-	0.09	0.24	-	0.09	0.32	0.08
Northern krill ( <i>Meganyctiphanes norvegica</i> )	4.60	7.20	14.20	25.44	30.74	17.45	19.16	31.70	20.78	24.12
Euphausiid ( <i>Bentheuphausia amblyops</i> )	-	-	<1	-	-	0.09	-	-	0.09	0.01
Euphausiid ( <i>Thysanoessa inermis</i> )	<1	<1	1.70	0.85	0.06	0.20	0.38	0.06	0.24	0.24
Digested copepod	15.30	9.60	4.30	5.01	1.67	0.07	4.85	1.82	0.09	3.06
<b>Zooplankton, total</b>	<b>47.80</b>	<b>40.20</b>	<b>41.20</b>	<b>68.40</b>	<b>57.43</b>	<b>27.50</b>	<b>66.48</b>	<b>59.77</b>	<b>32.87</b>	<b>59.39</b>
Cnidarian (Cnidaria)	-	-	<1	-	-	0.10	-	-	0.11	0.01
Gastropod (Gastropoda)	<1	<1	-	0.02	0.06	-	0.04	0.08	-	0.05
Cephalopod (Cephalopoda)	<1	<1	<1	<0.01	0.17	0.04	<0.01	0.15	0.05	0.07
Bobtail ( <i>Rossia</i> sp.)	-	<1	-	-	0.05	-	-	0.05	-	0.02
Squid (Teuthida)	-	-	<1	-	-	1.46	-	-	1.74	0.24
Polychaete (Polychaeta)	-	<1	-	-	0.01	-	-	0.01	-	<0.01
Trumpet worm (Pectinariidae)	-	<1	-	-	0.09	-	-	0.11	-	0.04
Crustacean (Crustacea)	21.60	18.90	32.20	21.33	15.17	7.30	25.75	16.10	8.94	19.82
Cumacean (Cumacea)	<1	<1	-	0.08	<0.01	-	0.21	<0.01	-	0.10
Amphipod (Amphipoda)	1.50	1.10	<1	1.38	0.34	<0.01	2.38	0.38	<0.01	1.30
Mud heart urchin ( <i>Brisaster fragilis</i> )	<1	-	-	0.10	-	-	0.04	-	-	0.02
<b>Other invertebrates, total</b>	<b>23.00</b>	<b>20.10</b>	<b>33.00</b>	<b>22.92</b>	<b>15.90</b>	<b>8.90</b>	<b>28.42</b>	<b>16.89</b>	<b>10.85</b>	<b>21.68</b>
<b>Invertebrates, total</b>	<b>59.30</b>	<b>47.60</b>	<b>57.50</b>	<b>98.65</b>	<b>86.63</b>	<b>53.80</b>	<b>98.91</b>	<b>88.63</b>	<b>62.04</b>	<b>90.02</b>
Unidentified digested material	2.40	2.60	3.90	1.13	0.75	0.65	1.01	0.67	0.67	0.83
Unidentified egg	-	<1	-	-	<0.01	-	-	<0.01	-	<0.01
<b>Unidentifiable preys, total</b>	<b>2.40</b>	<b>2.70</b>	<b>3.90</b>	<b>1.13</b>	<b>0.75</b>	<b>0.65</b>	<b>1.01</b>	<b>0.67</b>	<b>0.67</b>	<b>0.83</b>
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

## FIGURES

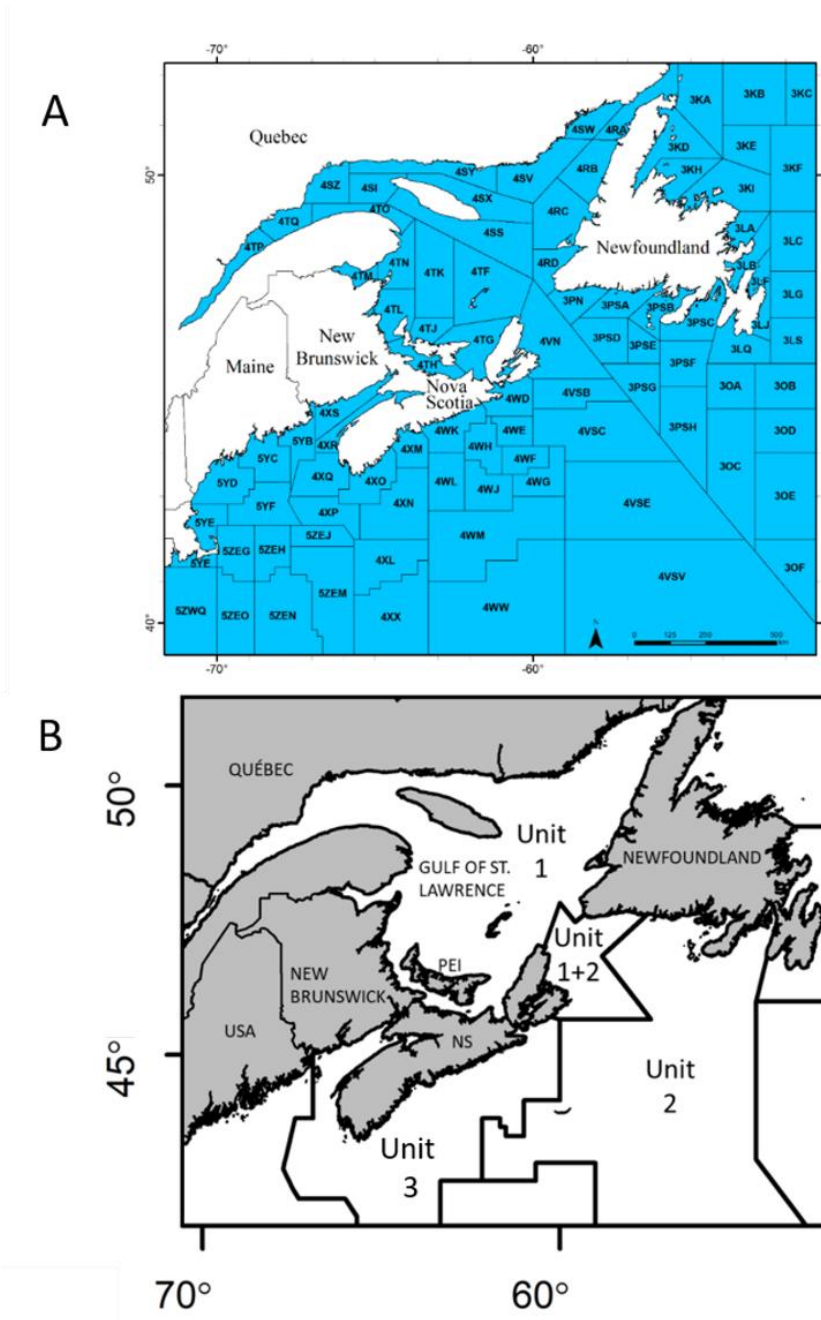


Figure 1. Northwest Atlantic Fishery Organization (NAFO) Divisions and Subdivisions (A), and management Units 1, 2, and 3 (B). PEI = Prince Edward Island, NS = Nova Scotia, USA = United States of America.

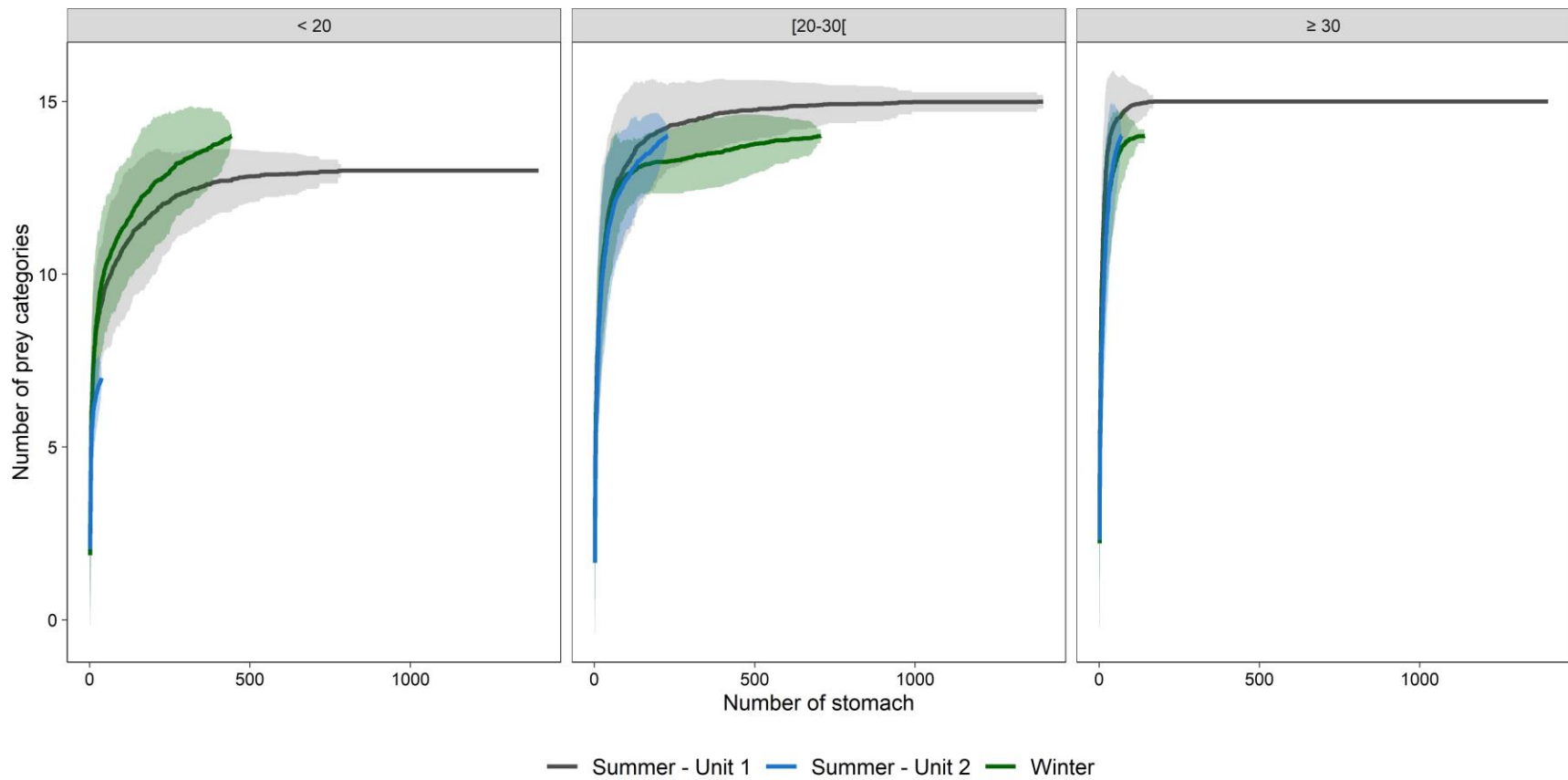


Figure 2. Cumulative prey curves as a function of the number of stomachs collected and 95% confidence interval for units 1 and 2, broken down by length class (cm, per panel).

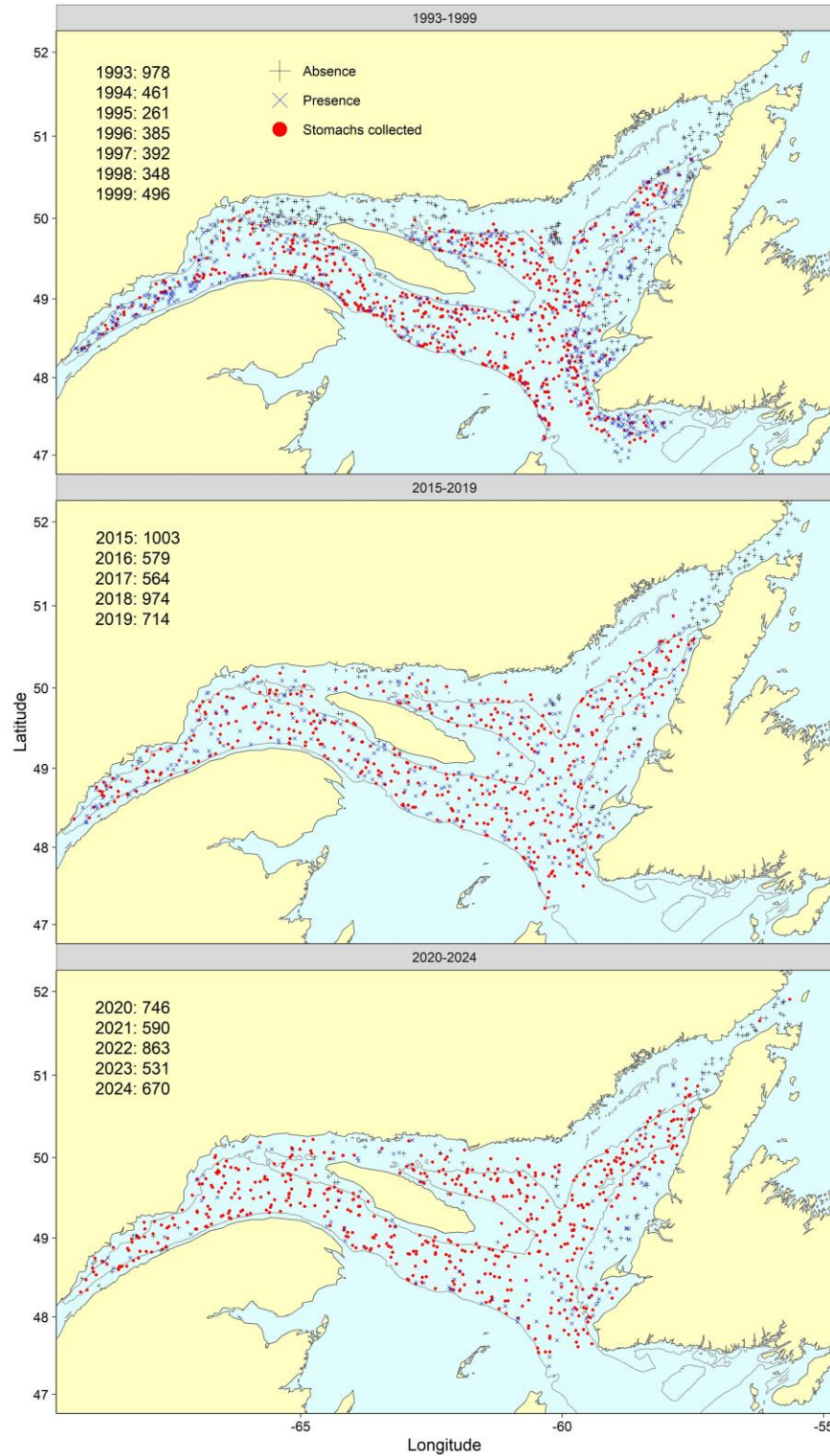


Figure 3. Origin of redfish stomachs (in red) used in the analyses for unit 1, by sampling period. Black marks are locations with no redfish in the catch. Blue marks are locations with redfish in the catch, but no stomachs collected. The values in the upper left corner are the number of stomachs collected for each year.

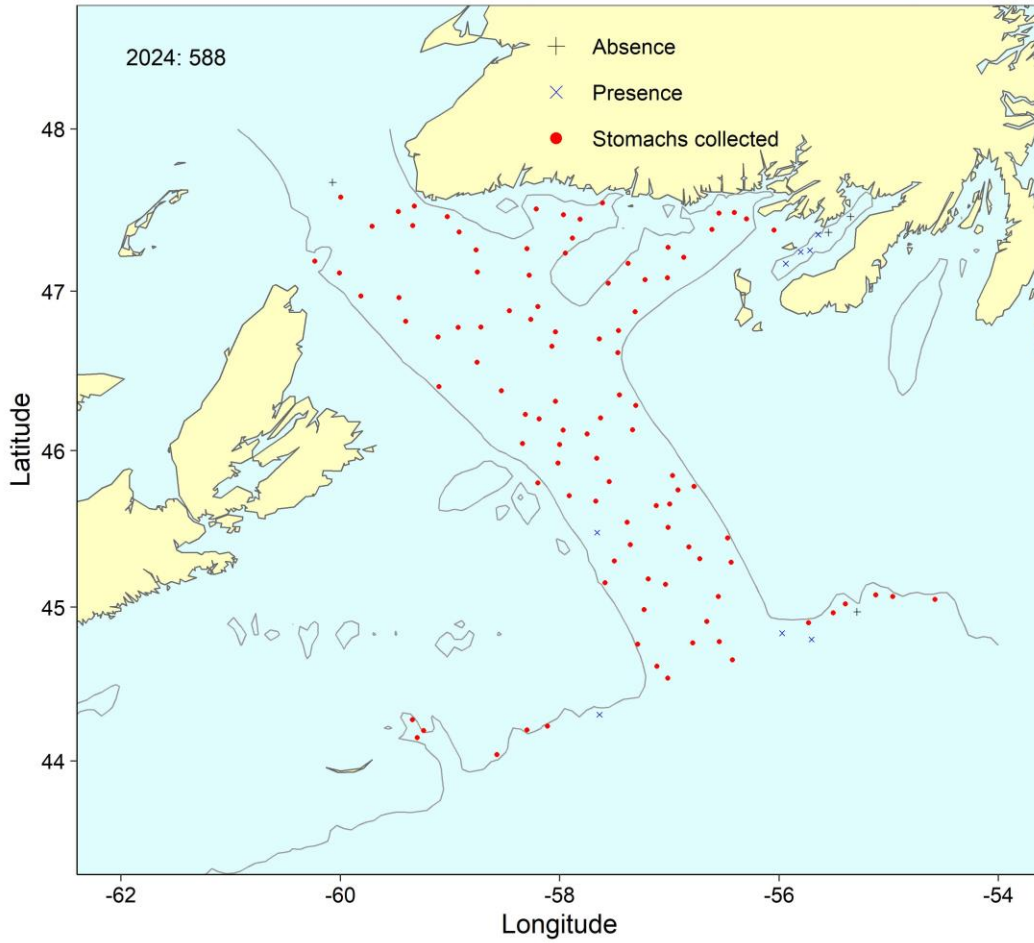


Figure 4. Origin of the redfish stomachs (in red) used in the analyses for unit 2. Black marks indicate locations without redfish in the catch. Blue marks indicate locations with redfish in the catch, but without any stomachs collected.

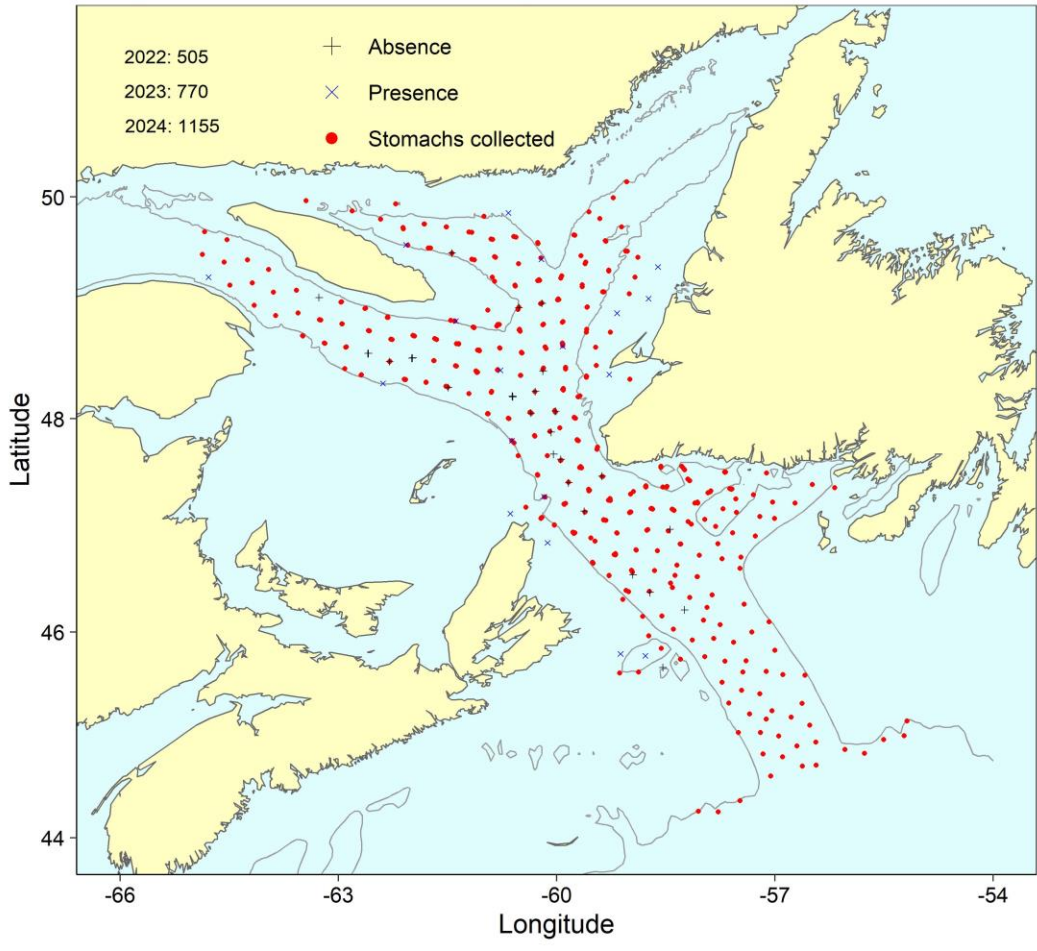


Figure 5. Origin of redfish stomachs (in red) used in winter diet analyses. Black marks indicate locations without redfish in the catch. Blue marks indicate locations with redfish in the catch, but without any stomachs collected.

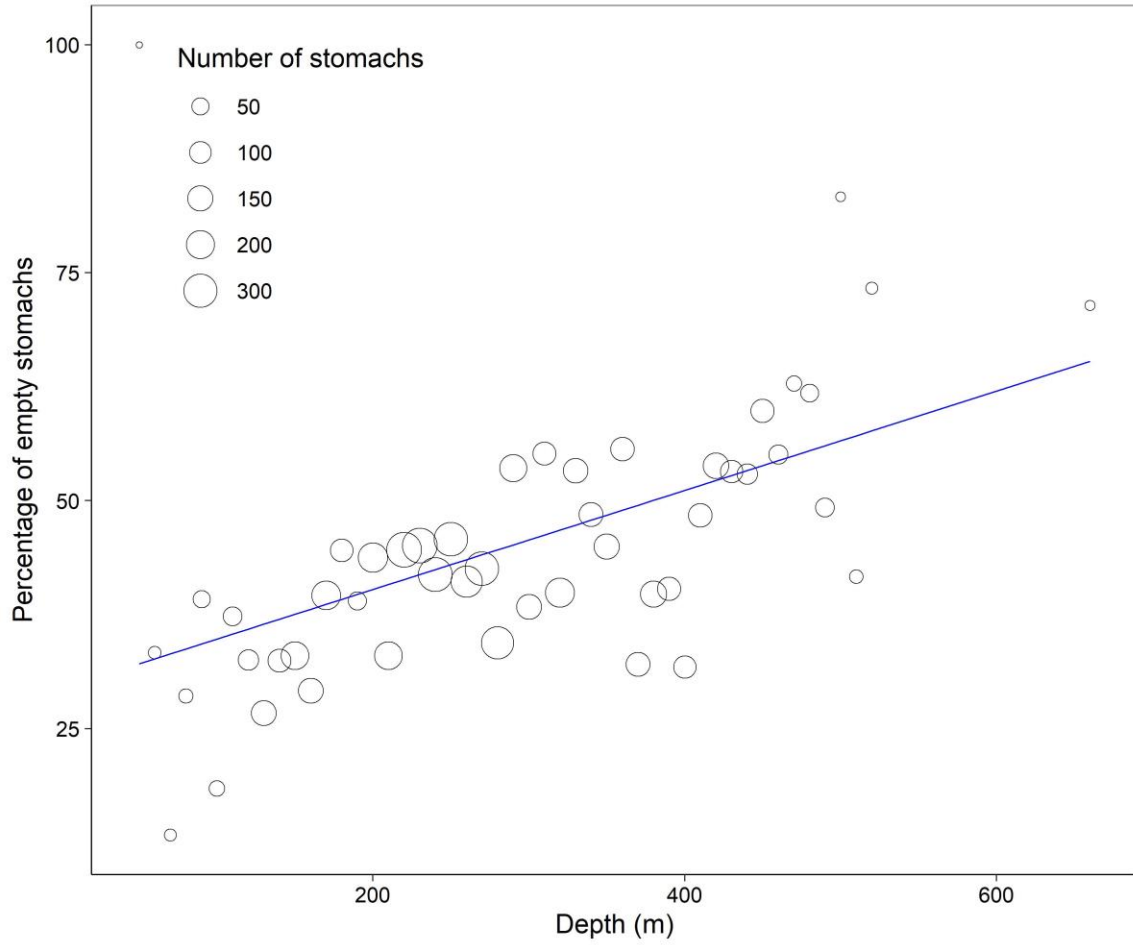


Figure 6. Relationship between the percentage of empty stomachs and the catch depth, all surveys combined. The size of the circles is proportional to the number of stomachs in each 10 m depth class. The blue line represents the linear relationship.

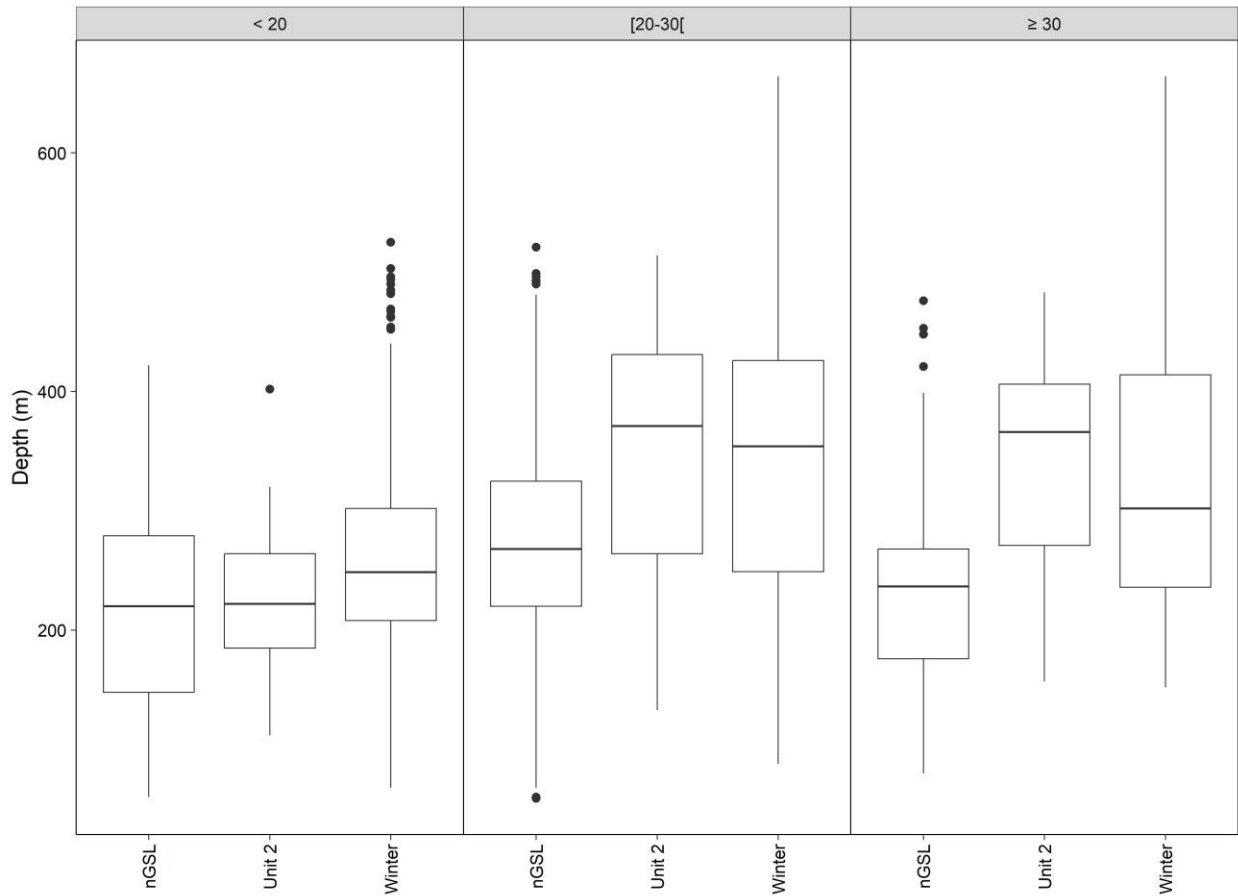


Figure 7. Stomach distribution according to catch depth by length class (cm, panels) and by survey. Box plot representation: the line inside the box represents the median, the box extends from percentiles 25 to 75, the whiskers show the range of data within a radius of 1.5 times the interquartile range, and points outside this range are considered outliers.

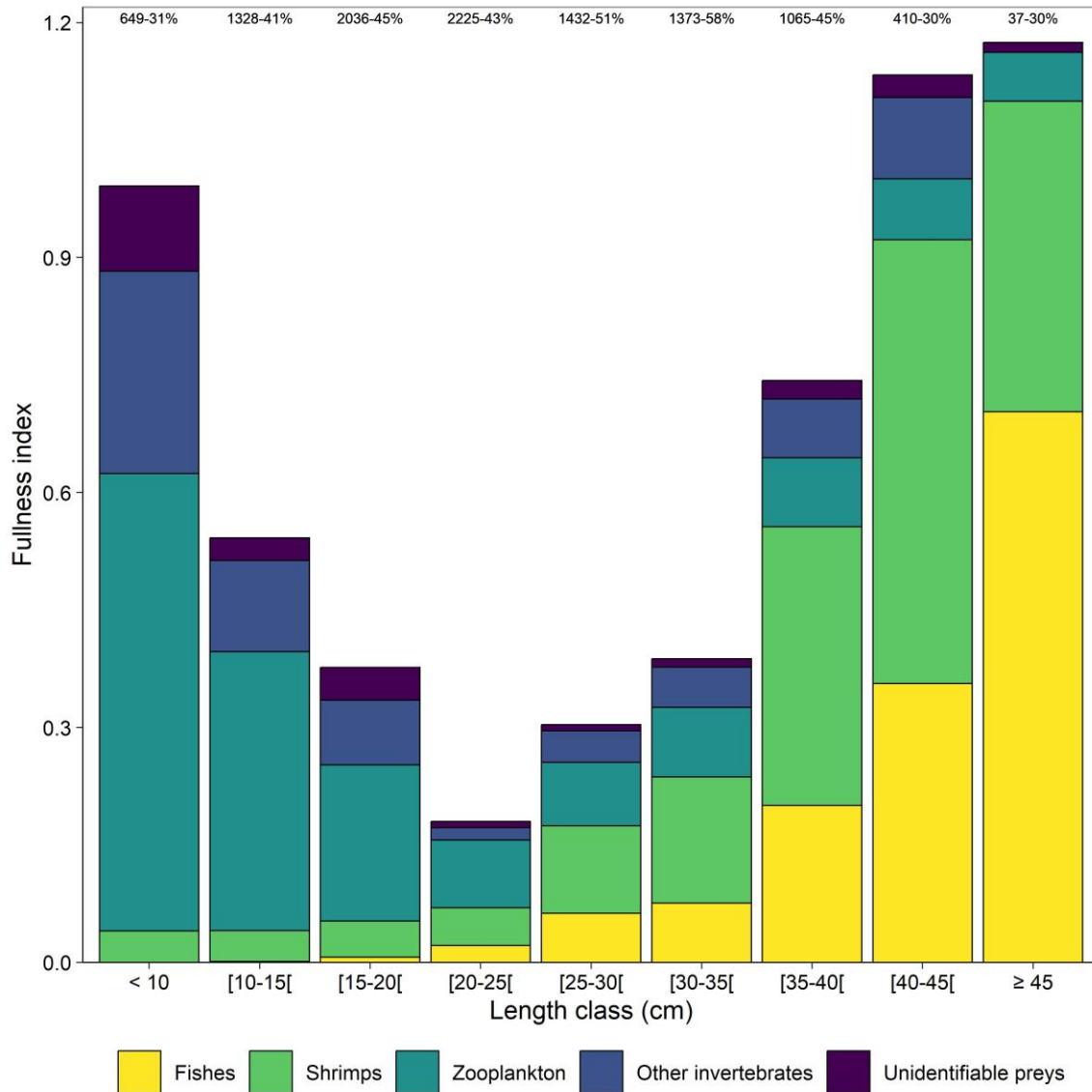


Figure 8. Summer partial fullness index of redfish from unit 1, categorized by length class and prey type, all periods combined. The column height represents the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

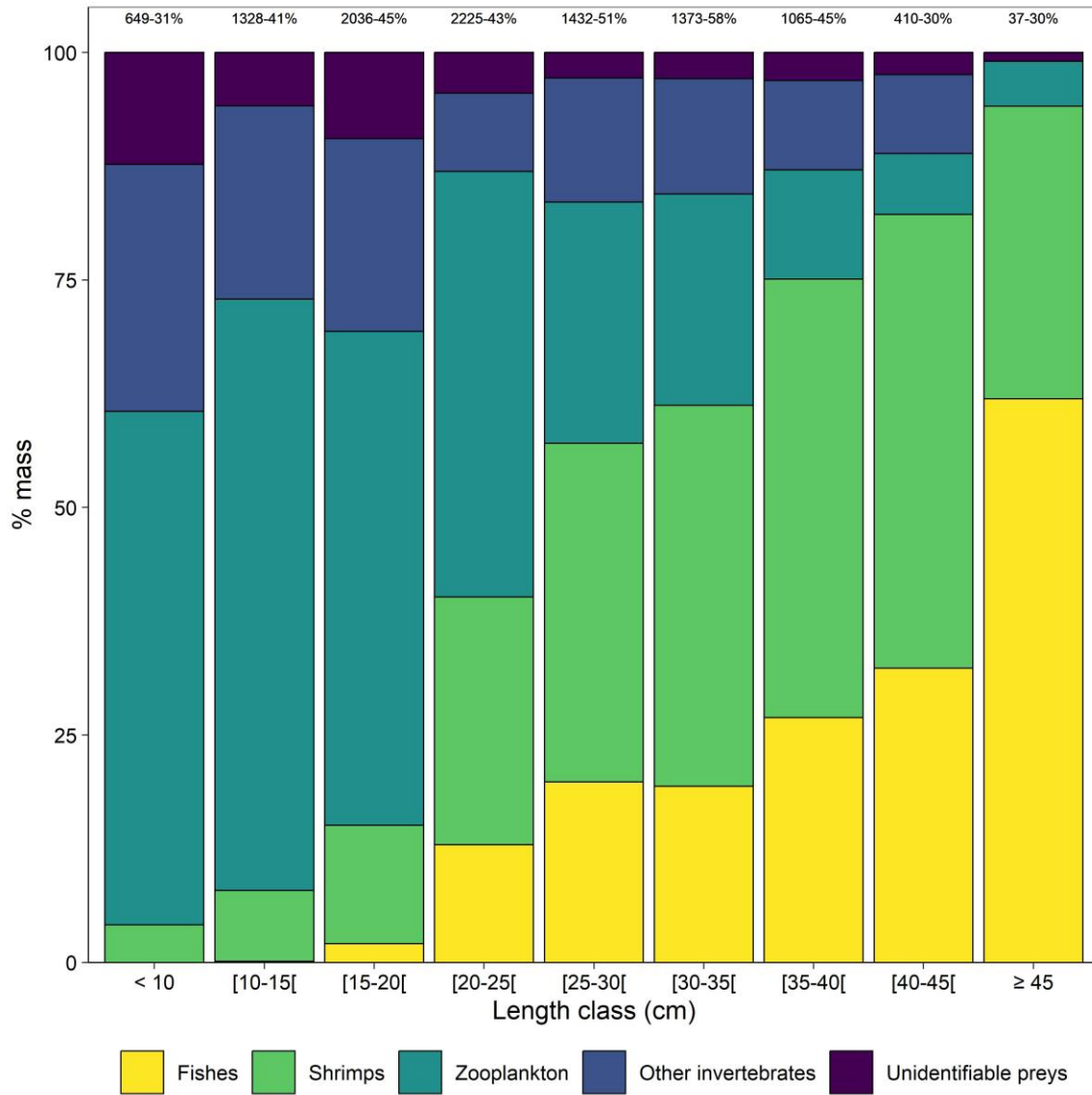


Figure 9. Percentage of summer mass contribution of redfish from unit 1, categorized by length class and prey type, all periods combined. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

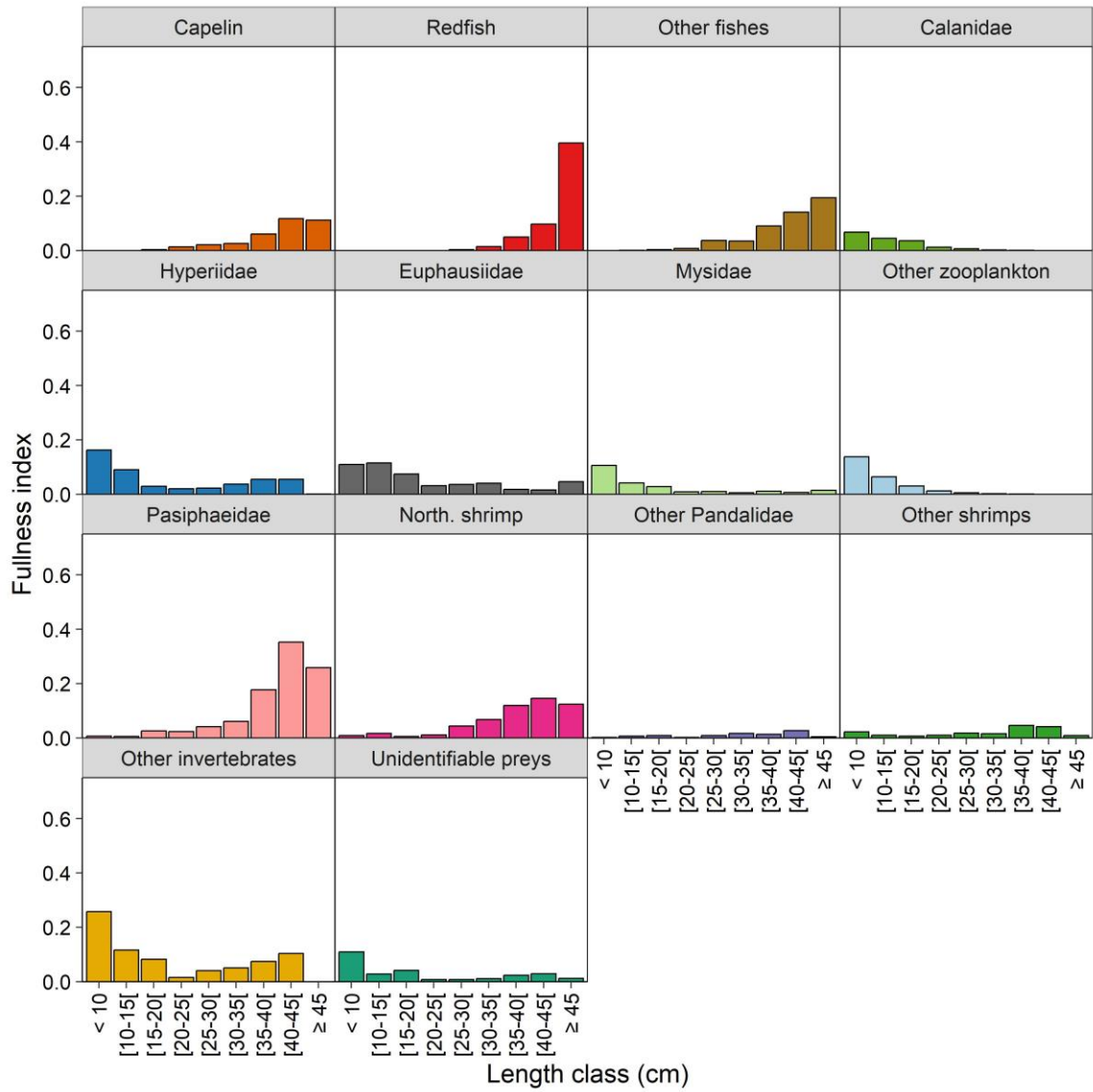


Figure 10. Summer partial fullness index of redfish in unit 1 according to length class and taxonomic group (panels), all periods combined.

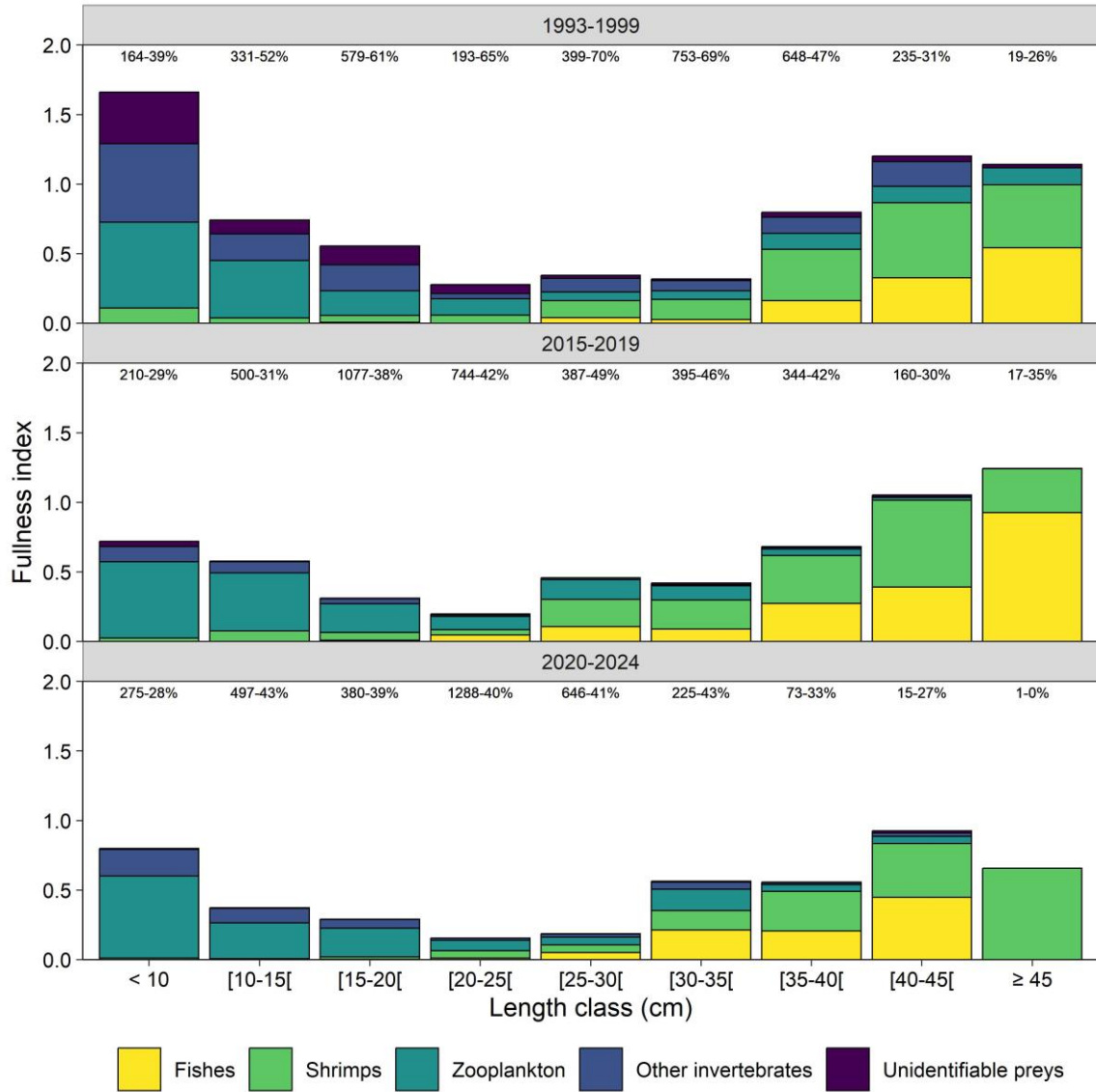


Figure 11. Summer partial stomach fullness index of unit 1 redfish categorized by length class and prey type, and period. The column height represents the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

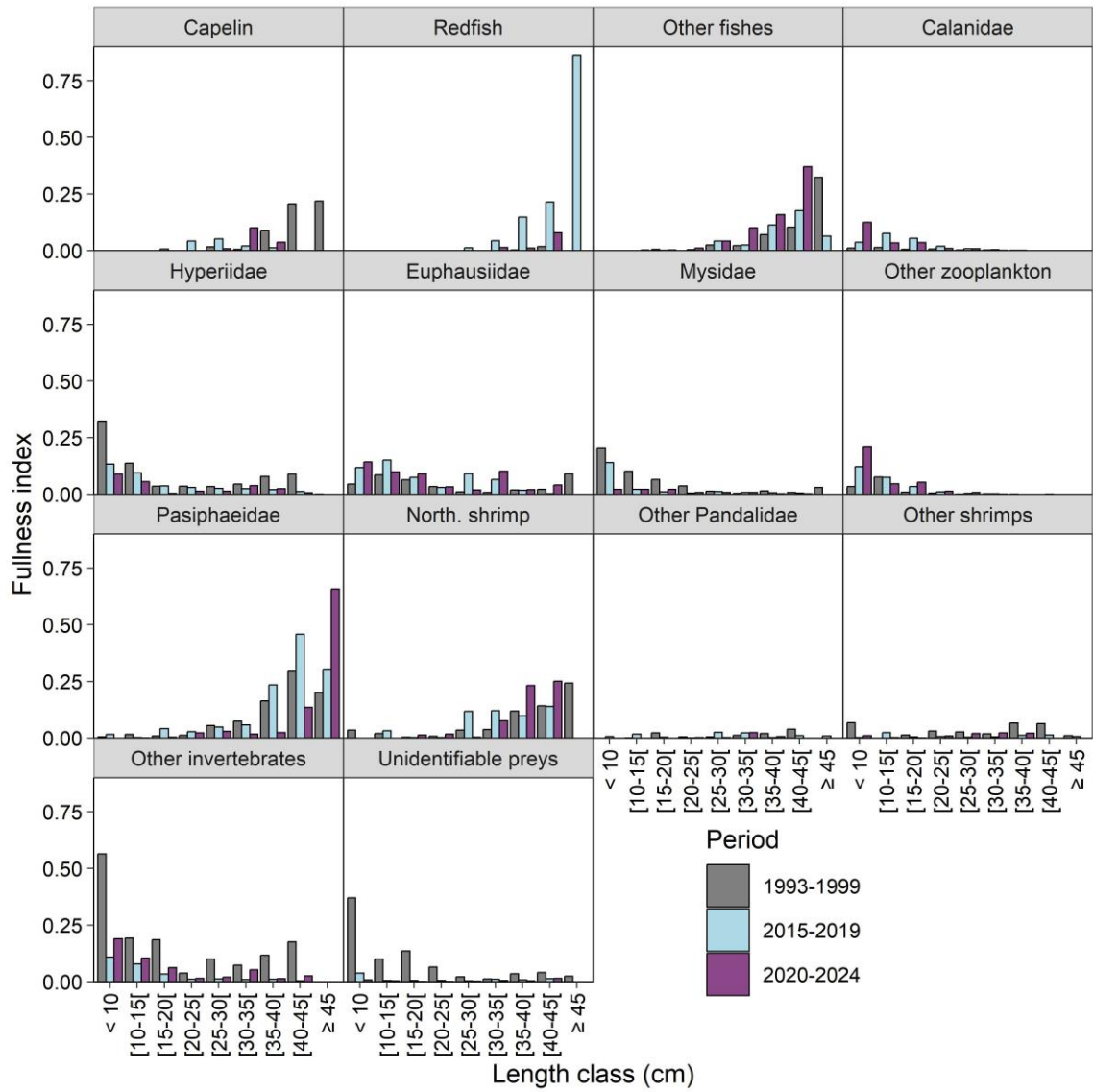


Figure 12. Summer partial fullness index of redfish in unit 1 according to length class, period and taxonomic group (panels).

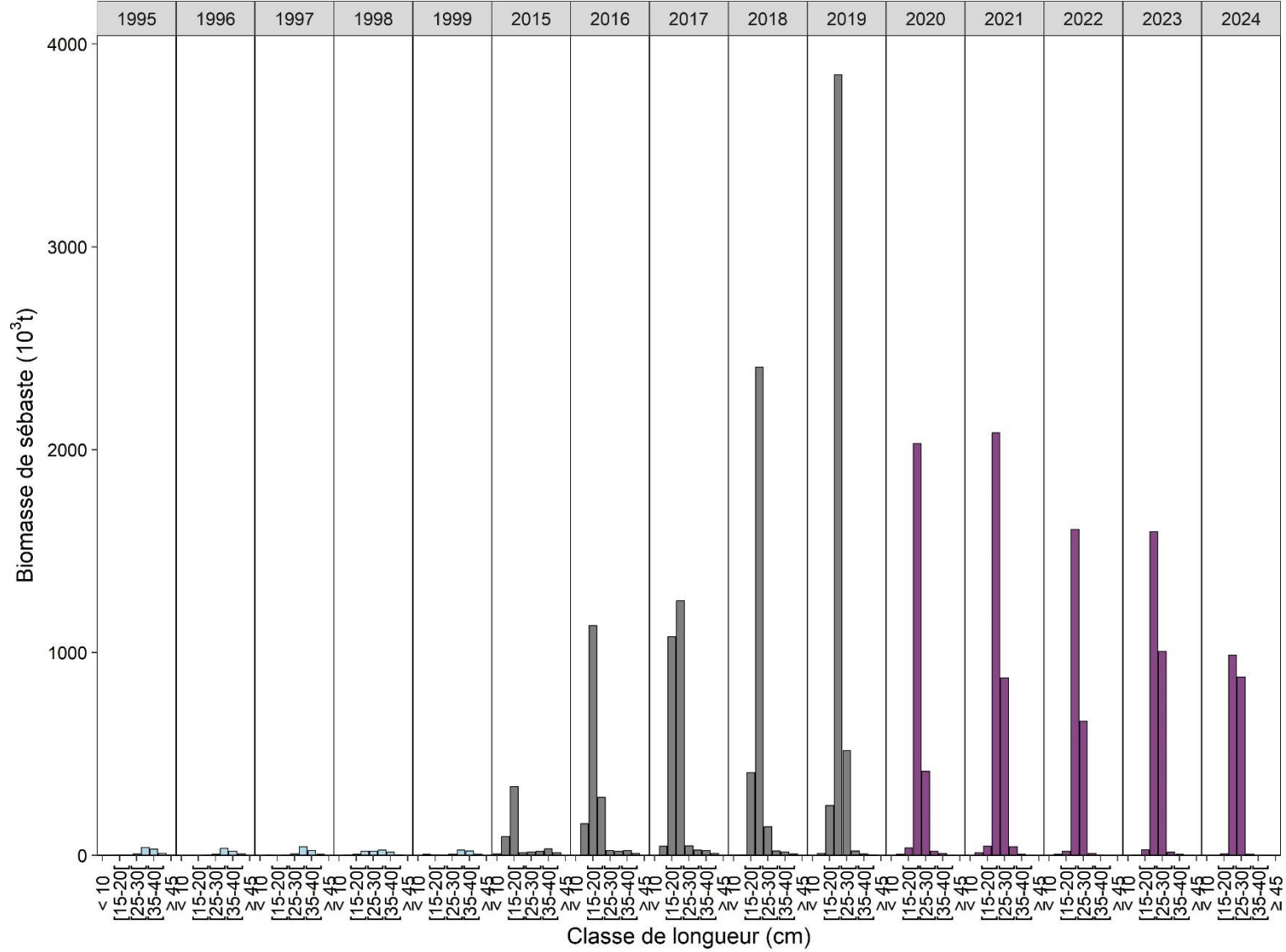


Figure 13. Estimation of annual redfish biomass by length class during the years 1995-1999, 2015-2019 and 2020-2024 in unit 1.

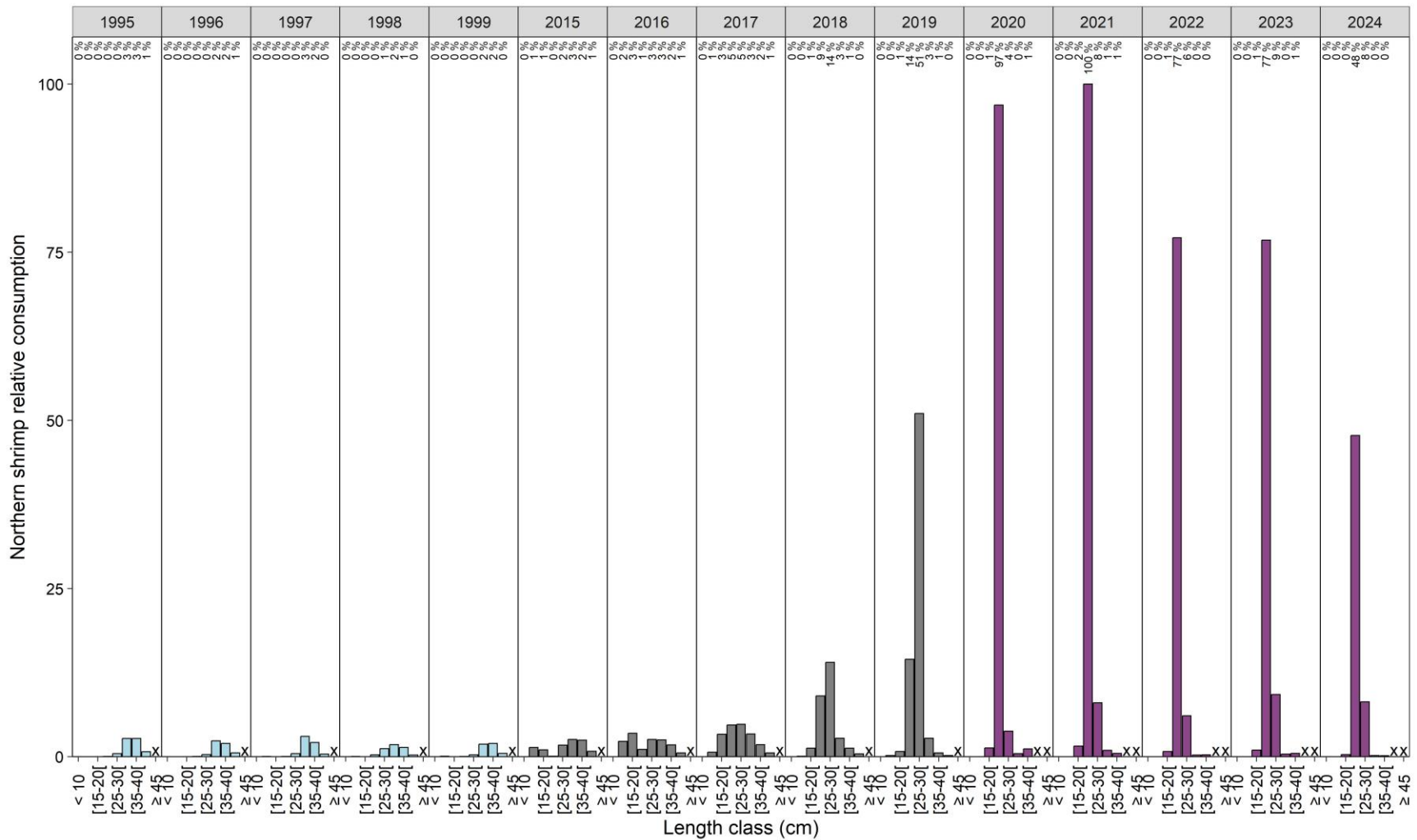


Figure 14. Relative consumption of northern shrimp by redfish by length class from 1995-1999, 2015-2019, and 2020-2024 in unit 1. The values provided in the upper part of the panels represent relative consumption for a given year. An "x" indicates < 20 stomachs harvested for a given length class.

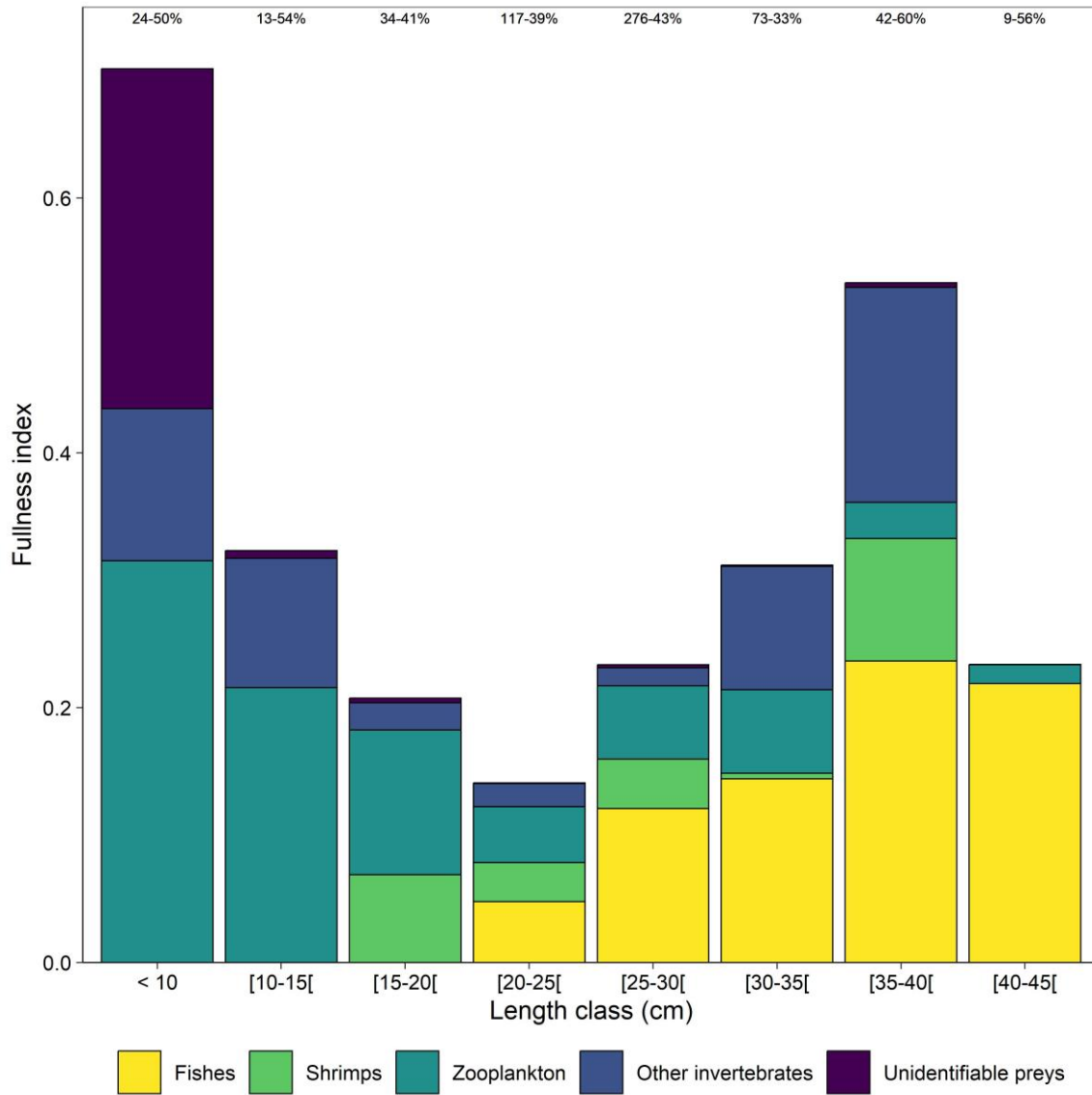


Figure 15. Summer partial fullness index of redfish from unit 2, categorized by length class and prey type. The column heights represent the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

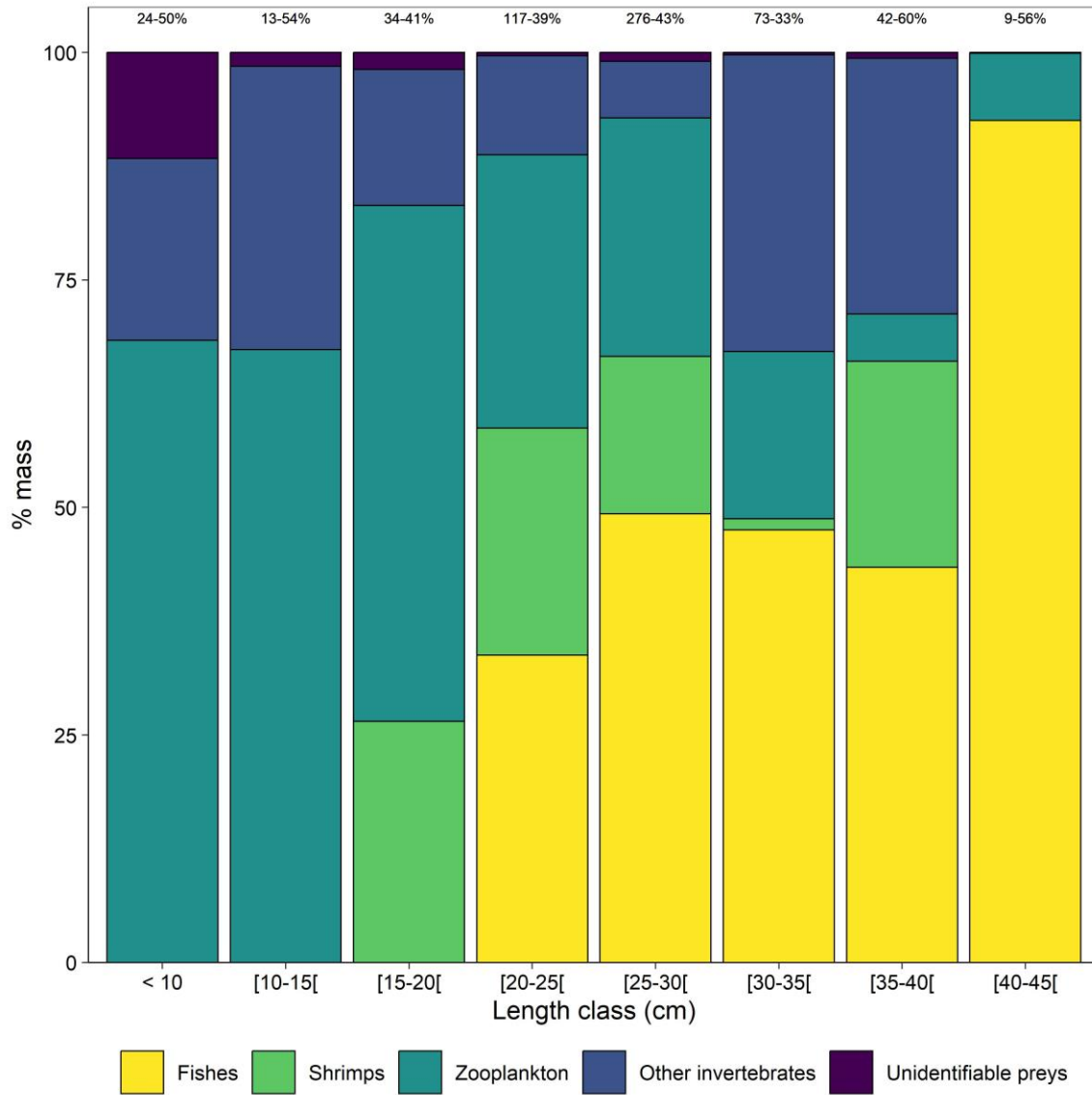


Figure 16. Percentage of summer mass contribution of redfish from unit 2, categorized by length class and prey type. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

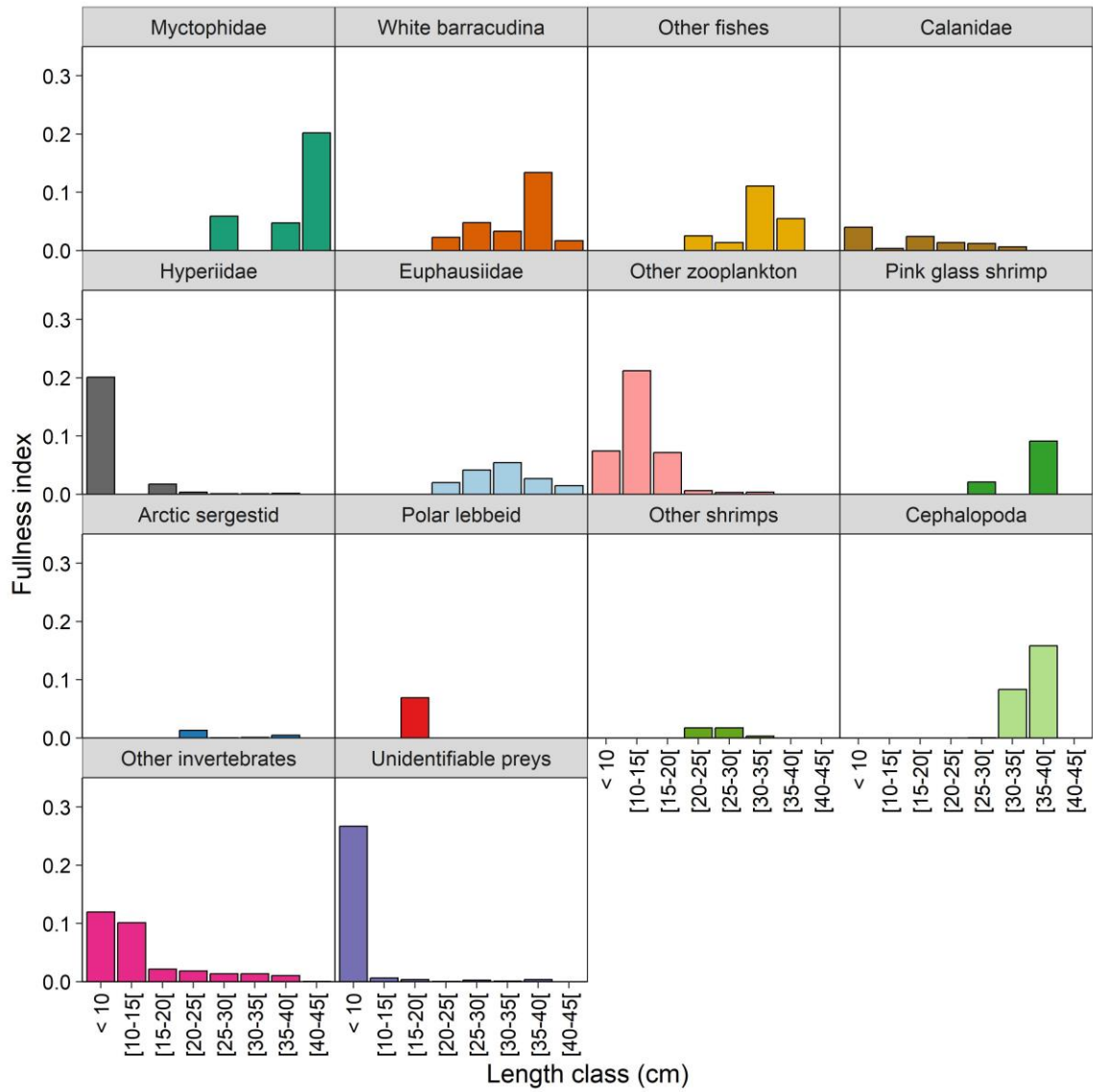


Figure 17. Summer partial fullness index of unit 2 redfish according to length class and taxonomic group (panels).

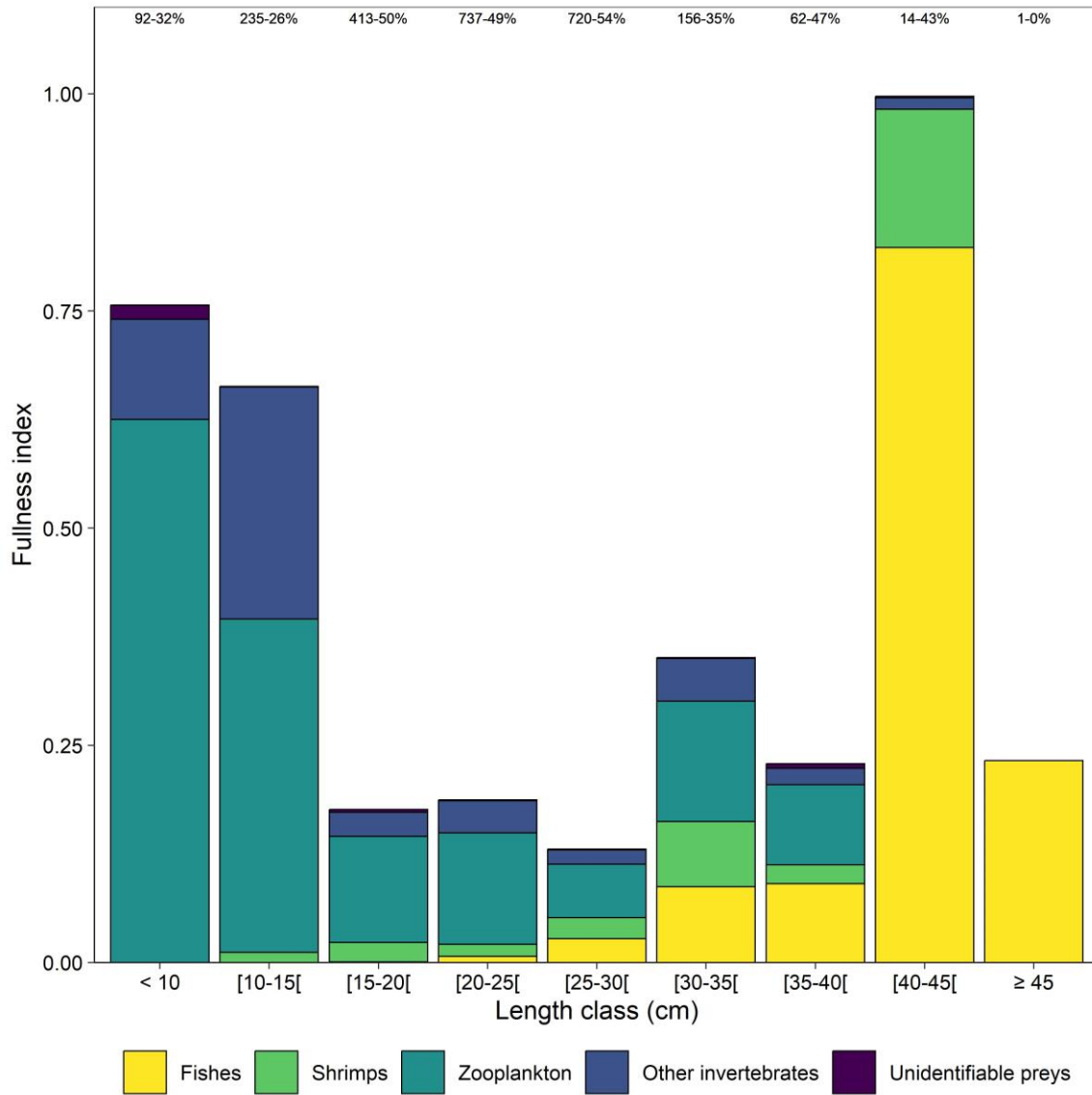


Figure 18. Winter partial fullness index of redfish from the winter survey, categorized by length class and prey type. The column heights represent the total fullness index. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

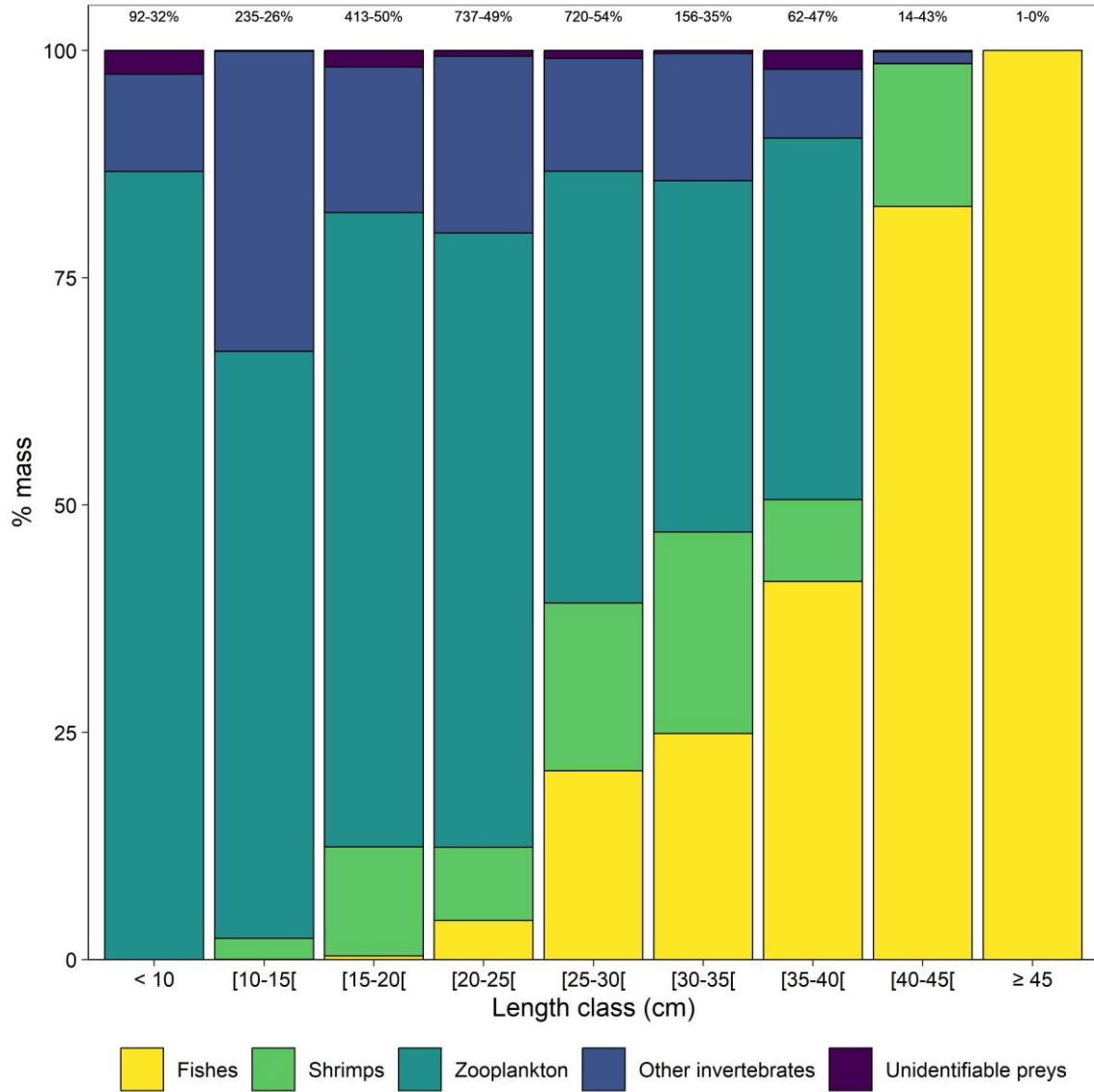


Figure 19. Percentage of winter mass contribution of redfish from the winter survey, categorized by length class and prey type. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

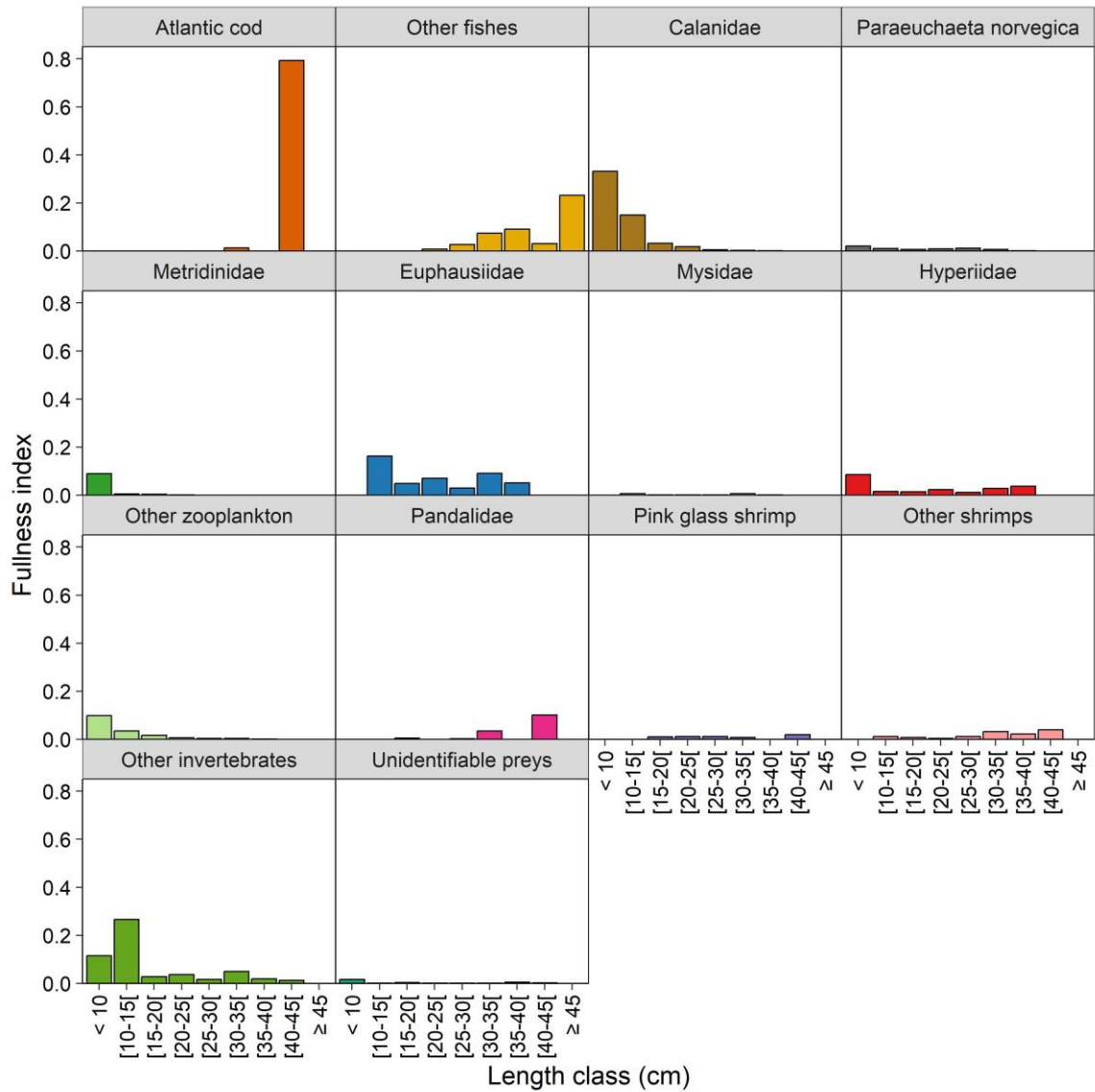


Figure 20. Partial fullness index of redfish from the winter survey according to length class and taxonomic group (panels).

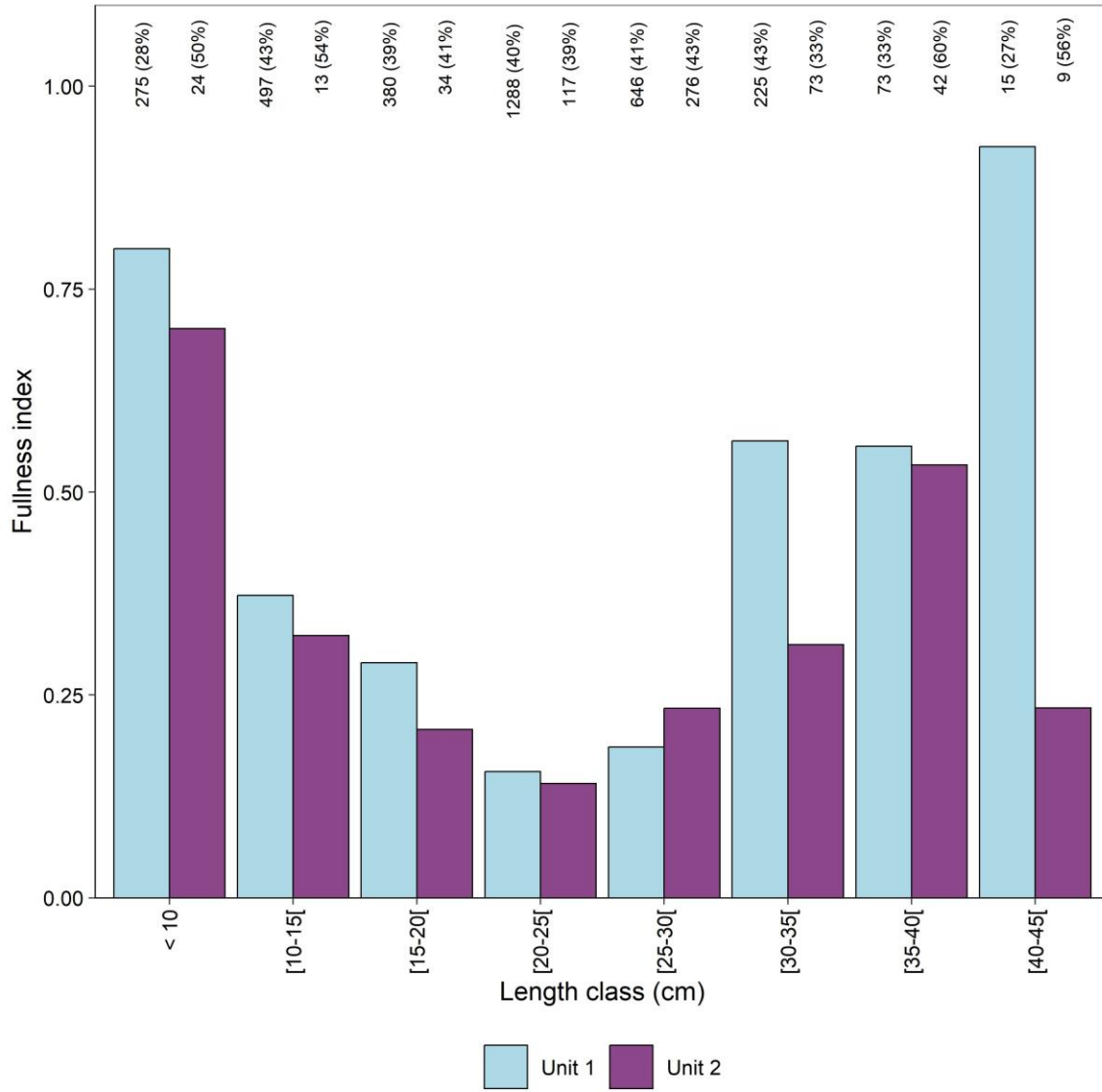


Figure 21. Total fullness index of redfish for unit 1 (2020-2024) and unit 2 (2024) by length class. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

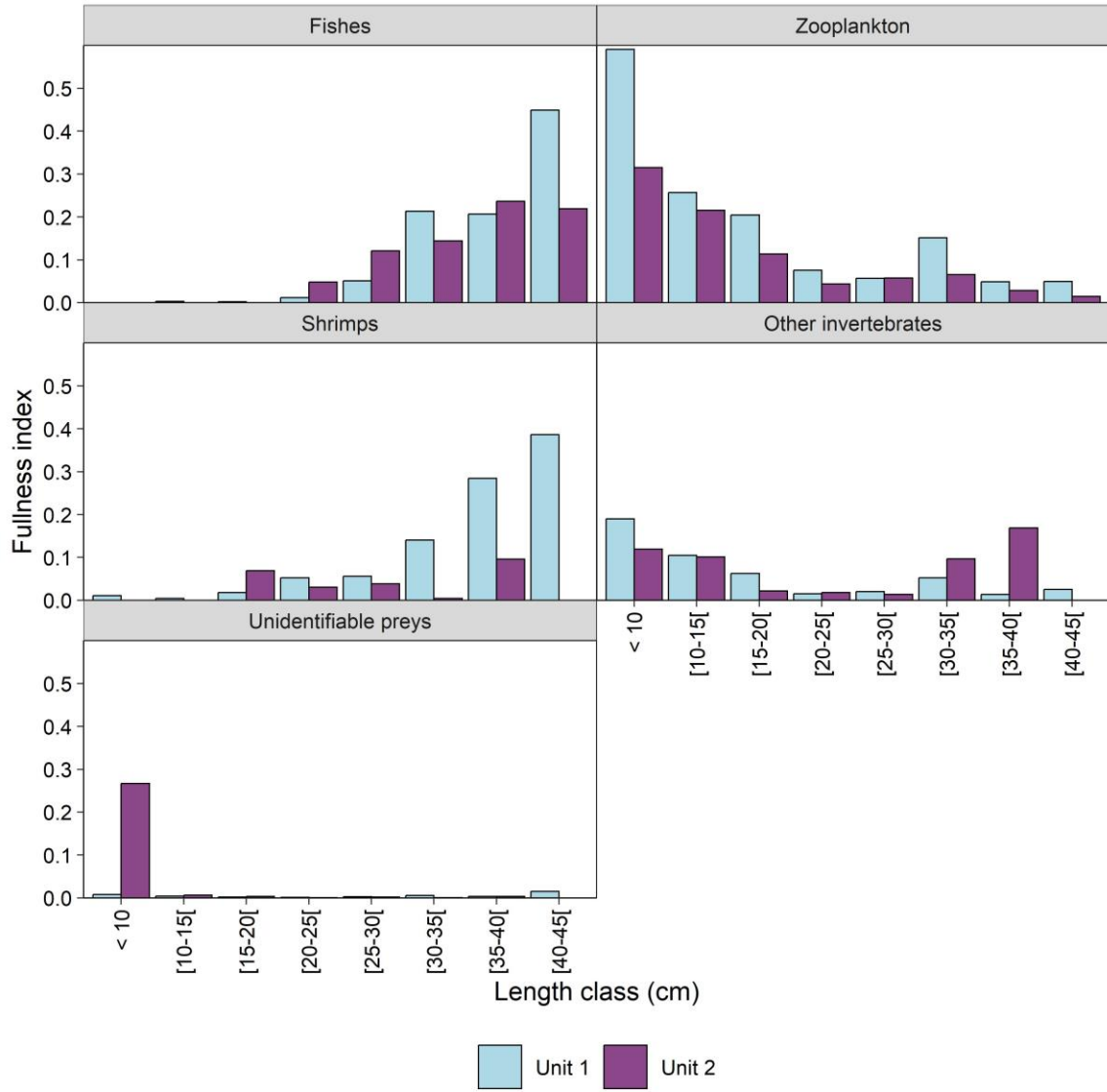


Figure 22. Partial fullness index of redfish for unit 1 (2020-2024) and unit 2 (2024) according to length class and taxonomic group (panels).

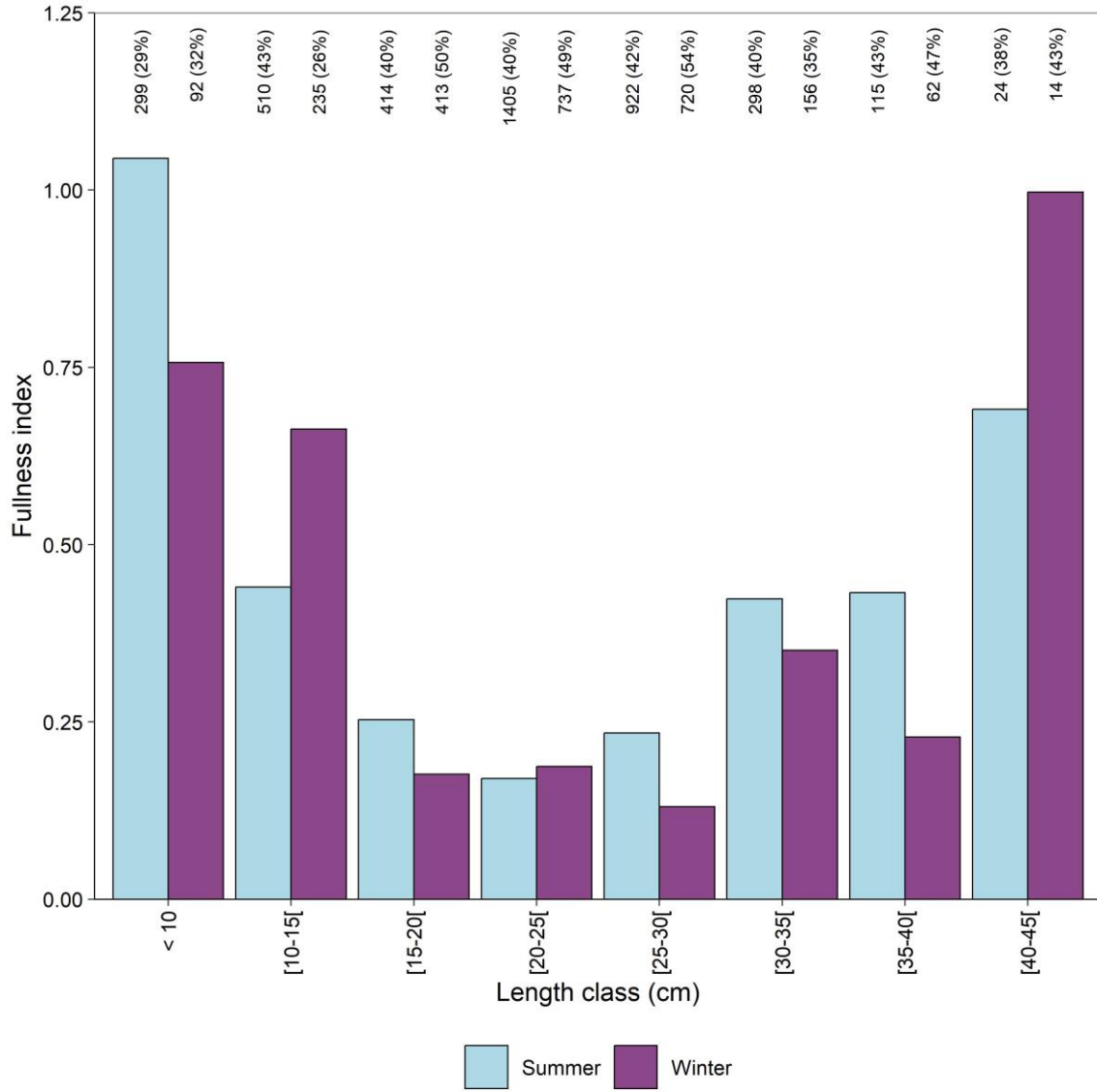


Figure 23. Summer and winter total fullness index of redfish by length class. The numbers above the columns correspond to the number of stomachs used for analysis and the percentage of empty stomachs.

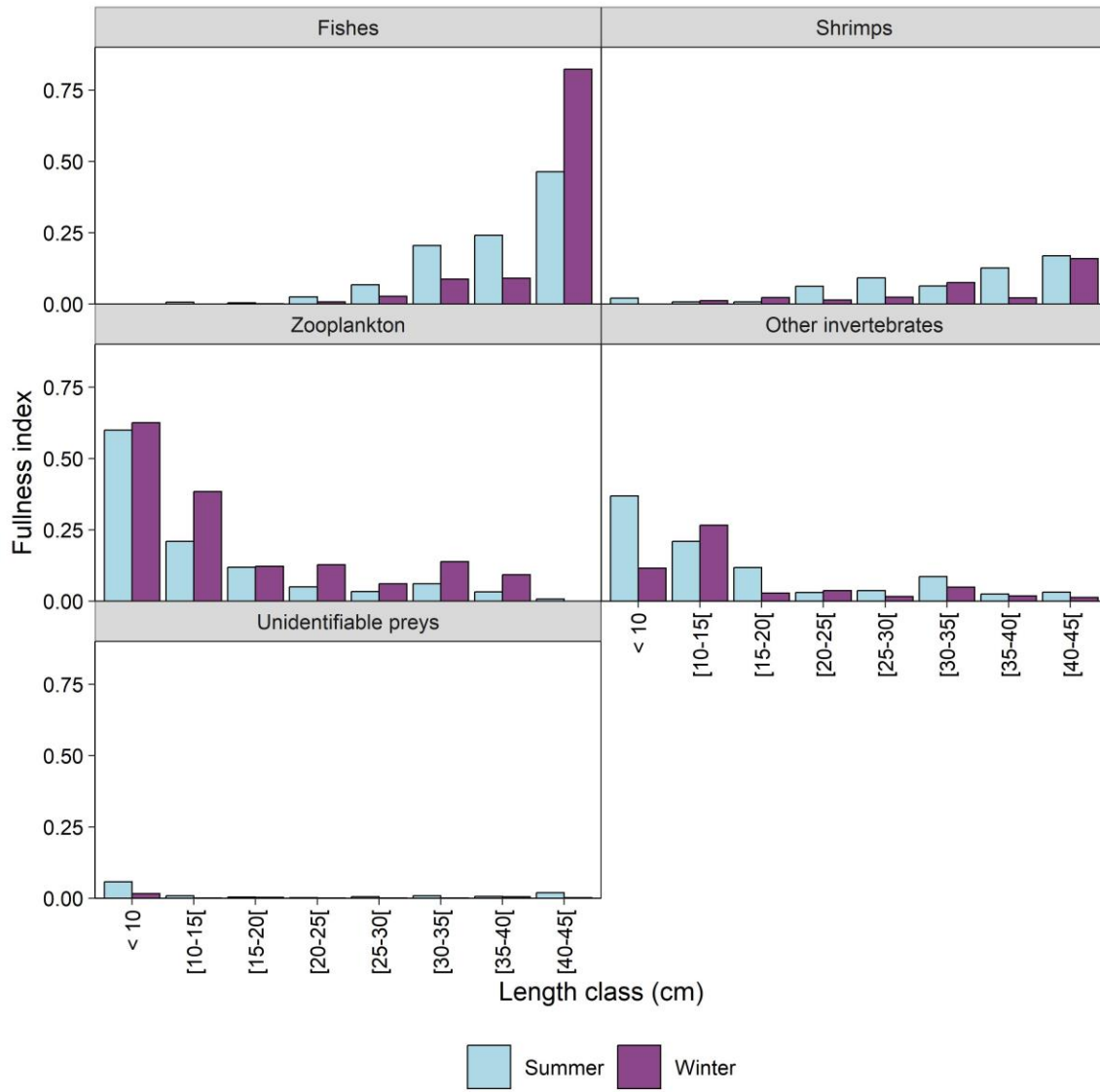


Figure 24. Summer and winter partial fullness index of redfish according to length class and taxonomic group (panels).