Northwest Atlantic



Fisheries Organization

Serial No. N7271

NAFO SCR Doc. 22/007

SCIENTIFIC COUNCIL MEETING – JUNE 2022

Temporal And Spatial Coverage Of Canadian (Newfoundland And Labrador Region) Spring And Autumn Multi-Species RV Bottom Trawl Surveys, With An Emphasis On Surveys Conducted In 2021

by

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<u>Abstract</u>

We update basic vessel performance and document the timing and spatial coverage of the annual spring and autumn multispecies bottom trawl surveys conducted by the Department of Fisheries and Oceans, Newfoundland and Labrador Region including new data for surveys in 2021. The current survey designs cover an expansive spatial area, spanning six NAFO Divisions (2HJ3KLNO) and 515,000 km² in the autumn and four NAFO Divisions (3LNOP) and 324,000 km² in the spring. The 2021 spring RV survey covered only Subdivision 3Ps, marking two years in a row where there was no coverage of Divs. 3LNO. The 2021 autumn survey also failed to cover any portion of Divs. 3LNO and did not cover the deeper strata of Divs. 2HJ3K. Overall, the autumn survey completed 30% of the intended fishing sets. This continues the trend in recent vears of systemic coverage issues for deep-water strata, particularly those in Div. 2H and Div. 3L. Coverage of Division 3L has been problematic in the spring survey as well. Coverage issues are a result of aged vessels with frequent mechanical issues, impacts from the Covid-19 pandemic, and weather. The Department has introduced two new research vessels to eventually replace the current research vessels but mechanical issues, Covid-19, and weather have hampered comparative fishing trials, without which the data collected by these new vessels would not be comparable to the existing data time series. Survey coverage issues are adding an unquantified level of uncertainty to groundfish and invertebrate assessments, and minimal progress to date with respect to comparative fishing, if not properly addressed, will hinder the integrity of the existing time series, leading to potentially serious problems for ecosystem and stock assessments going forward.

Introduction

The Canadian Department of Fisheries and Oceans (DFO), Newfoundland and Labrador Region, has undertaken stratified-random surveys in portions of NAFO subareas 2+3 since the early 1970's. A full description of the history of these surveys, including stratification, trawl gear, towing protocols, vessels employed, as well as details of spatial coverage have been detailed in previous documents (e.g. Brodie, 2005, Brodie and Stansbury, 2007, Healey and Brodie, 2009, Healey et al., 2012, and references therein). The current document, which is produced annually for the June meeting of NAFO Scientific Council (see Rideout et al., 2021 for the most recent version) focusses on survey timing and coverage in recent years, and particularly the 2021 surveys.

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Methods

The Canadian (NL Region) research vessel (RV) multispecies bottom trawl surveys cover Divisions 2HJ3KLNO (515,000 km²) in the autumn and Divisions 3LNOP (324,000 km²) in the spring. The survey area is stratified by depth range, as depicted in Figs. 1-7. Survey sets (i.e. standardized fishing hauls at a randomly selected sampling unit) for these stratified-random surveys are distributed using a proportional-allocation scheme, whereby the number of sets allocated for a given stratum is proportional to the stratum area, subject to the condition that each stratum must be allocated a minimum of two sets. Tow sites are randomly selected from sampling units within each stratum, with each sampling unit typically encompassing an area of approximately 3.5 square nautical miles (Doubleday, 1981). Within each stratum, one alternate station is also selected, and is occupied if a sample from one of the other units cannot be obtained (e.g. untrawlable bottom). A constraint is applied to the random sampling to permit selection of only one sampling unit within each consecutive group of 10 units (i.e. maximum of one unit selected from units 1-10, 11-20, 21-30, etc.).

When computing the stratified estimators of abundance or biomass for any given species, individual strata must have a minimum of two successful survey sets to be considered completed to enable calculation of stratum variance. Strata down to 1500 m are included in the survey design for the autumn survey, whereas the spring survey does not cover strata deeper than 732 m.

The Canadian Coast Guard vessels employed during current autumn surveys are the CCGS *Alfred Needler* and the CCGS *Teleost*. The CCGS *Alfred Needler* (overall length 50m) conducts fishing sets at depths down to 732m, whereas the CCGS *Teleost* (overall length 63m) completes survey sets to depths of 1500m. During spring surveys, typically only the CCGS *Alfred Needler* is used; the CCGS *Teleost* has been deployed at times when the CCGS *Alfred Needler* was unavailable due to significant mechanical problems. The CCGS *Wilfred Templeman*, which had been one of the primary vessels for survey work in the Newfoundland Region, was decommissioned in 2008. The current sampling gear used for the RV surveys is the Campelen 1800 shrimp trawl. This trawl was first deployed in the 1995 autumn survey, and has been used in all spring surveys since 1996. McCallum and Walsh (1996) provide a detailed description of the Campelen 1800 trawl.

Survey Design: Autumn Surveys

The current autumn survey design (Table 1) includes Divisions 2HJ3KLNO. Division 2G has not been surveyed since 1999 and is no longer included in survey planning. Likewise, Division 3M (the deep-water strata in the Flemish Pass and the western slopes of the Flemish Cap) was permanently excluded from survey planning starting in 2010. In the early-2000s, coverage of Division 2H was planned for every second year, but in 2011 the decision was made to cover Division 2H annually. The increased coverage of Div. 2H (84 planned sets annually) was deemed necessary for the assessment of key commercial species, primarily northern shrimp. However, since there was no increase in the amount of allotted vessel time for the survey, the increase in spatial coverage had to come at the expense of other areas that were previously part of the survey design. Starting in 2011, coverage of deep strata (>732 m) in Divs. 3NO was no longer included in the autumn survey design (a reduction of 48 planned sets). The decision to remove these strata was based on the fact that portions of these strata were unsuitable for trawling and often, a considerable amount of time was used to search for deployment sites near the intended sites. In addition, the inshore strata of Divs. 3K and 3L (19 and 34 planned sets respectively) were permanently removed from the survey design. These inshore strata were initially added to the survey design in the mid-1990s but have not been consistently covered since 2007. The limited survey coverage that has been attained in these inshore areas typically occurred at times when the survey vessels have had to leave the offshore area due to severe weather but were able to conduct fishing in the near shore areas. There have been no further substantive changes to the planned autumn survey coverage of Divs. 2HJ3KLNO in the years since 2011.

The autumn survey is generally conducted from mid-September to mid-December, although in some years (1995, 2002-2005, 2014) the survey has extended into January of the subsequent year (Table 2, Fig. 8). The general plan has been for the CCGS *Alfred Needler* to start in the south, surveying Div. 30, then Div. 3N and finally Div. 3L. The CCGS *Teleost* starts in the north, surveying Div. 2H, then to Div. 2J, Div. 3K and finally Div.



3L deep strata (>732m). It is common for the CCGS *Alfred Needler* to share some of the survey work in Div. 3K once the Div. 3LNO portion has been covered (Table 4).

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Survey Design: Spring Surveys

The spring survey encompasses Divs. 3LNOPs, and is typically conducted from early-April through to late June (Table 3, Fig. 8). The only major change in the spring survey design in recent years was the removal of inshore strata in Division 3L. These inshore strata were always considered of lower priority and were only infrequently surveyed. This change resulted in the planned number of sets decreasing from 512 to 478 (Table 1). The spring survey typically utilizes a single vessel, the CCGS *Alfred Needler*, but mechanical issues with this vessel in some years have required the use of the CCGS *Teleost* to complete the survey (Table 5).

New Research Vessels: Update on Comparative Fishing

The Department has introduced two new offshore fisheries research vessels in the Atlantic regions to eventually replace the current research vessels: the CCGS *Captain Jacques Cartier* (hereafter referred to as *Cartier*) to replace the CCSG *Alfred Needler*, and the CCGS *John Cabot* (hereafter referred to as *Cabot*) to replace the CCGS *Teleost*. The *Cartier* and *Cabot* arrived in the spring and autumn of 2020, respectively. Mechanical, technical, and COVID-19-related issues have delayed their transition into service. In order to maintain a comparable time series, comparative fishing is required to determine relative differences in catchability between the vessels and survey gears. The Newfoundland and Labrador region is maintaining the existing survey trawl (Campelen 1800 survey trawl), with a few modifications aimed at minimizing trawl damage during fishing (e.g. slight changes in some trawl panel lengths, addition of a tear-stop rope between two belly panels), and switching to standardized commercial rock hopper footgear discs. The comparative fishing program has been designed as a "shadow survey" (Thiess et al. 2018), whereby both vessels fish side by side across the standard survey design to maximize the likelihood that conversion factors are applicable over the range of conditions and species where they will be applied for both single-species and ecosystem assessments.

The first comparative fishing effort in the Newfoundland and Labrador Region occurred in the autumn of 2021, with limited CF between the *Teleost* and the *Cartier* during the fall survey. A total of 37 successful paired tows were completed over the course of three trips between October and December, spread across NAFO Div. 2HJ3K. This represents roughly 5% of the planned CF effort for the fall survey. In addition, differences were identified in how fishing protocols were being implemented across crews on the *Cartier*, calling into question the standardization of fishing in these initial trips on the new vessel. The usefulness of these sets for determining conversion factors is therefore limited, and these trips are primarily considered to be sea-trials. No results are presented here.

The autumn comparative fishing program is scheduled to be re-started in the fall of 2022 with the *Cabot* paired with the *Teleost* in Div. 2HJ3K and the *Cartier* paired with the *Needler* in Div. 3KLNO. Comparative fishing between the Needler and the Cabot is planned for spring 2022 in NAFO Div. 3LNOPs.

Survey summaries

This document summarizes the intended and realized coverage of the Canadian spring and autumn multispecies bottom trawl surveys. This includes an examination of the total number and spatial coverage of fishing sets conducted in each division as well as by individual research vessels. Years and areas with poor/inadequate survey coverage are highlighted.

The RV survey data described here form the primary basis for science advice regarding NAFO and Canadian ecosystem and stock assessments. Although we do not get into the specifics of ecosystem or stock trends, plots summarizing trends in biomass for various functional groups within the various Ecosystem Production Units (EPUs) and relevant data (survey indices, length frequencies and distribution plots) for NAFO stocks are presented as an Appendix. It is important to note that:



- 1. These data on their own do not necessarily provide a complete picture of stock status. Only the recent Campelen trawl time series are presented here and perceptions of stock status may differ when other data sources, including older RV survey time series, are considered. For details of stock status, readers are directed to the pertinent stock assessment documents available at https://www.nafo.int/.
- 2. The plots of survey biomass and abundance presented herein should be taken only as indices and not as absolute estimates of stock size. The data within these plots should only be viewed with respect to trends over time or the stock size from one period relative to another (within the same time series). Length-frequency plots are scaled on a stock-by-stock basis to allow the length composition to be easily viewed. This scaling often differs among stocks and therefore these plots should only be used to examine the size groupings of fish within a stock and should not be used to compare mean numbers per tow at length among different stocks.

<u>Results</u>

The autumn survey design has remained the same since 2011 (Table 1), but substantive mechanical issues with the research vessels have become commonplace in recent years and have resulted in reduced coverage (reduced number of fishing sets per stratum or failure to complete some strata) or a complete lack of coverage of certain areas in some years.

An examination of the successful sets completed during the autumn survey in recent years (Tables 6-11; Fig. 9) demonstrates the difficulties that have been encountered in completing this survey. Both the planned number of sets (Table 1) and the number of sets actually completed (Fig. 9) have declined. Overall, the 2021 autumn survey completed only 30% of the intended fishing sets and 40% of the intended strata. Many of those strata that were completed had reduced set density. This survey failed to cover any of the strata in Divs. 3LNO and also did not cover deep strata in Divs. 2HJ3K. The 2021 coverage issues add to systemic coverage issues in specific areas. There has been no coverage of deep strata (2014, 2015, 2017, 2019, 2020, 2021) or reduced coverage (2016, 2018) of deep strata in Div. 2H in the last eight years, although only a single stratum was missed in 2018 (Fig. 10, Table 6). In Div. 3L, deep strata have not been covered in eight of the last nine years (Fig. 10, Table 9). There have also been coverage issues for deep strata in Div. 2J3K in the autumn survey in three of the last four years (Fig. 10).

Like the autumn survey, the spring RV survey has not been immune to mechanical issues in recent years. In 2014, major mechanical issues with the primary spring survey vessel (CCGS *Alfred Needler*) required an *a priori* reduction of 64 sets from Divisions 3LNOPs for a reduction of 13% from the entire survey but primarily from Div. 3NOPs) as well as the deployment of our second research vessel (CCGS *Teleost*). In 2015, significant mechanical issues with the primary spring vessel, as well as bad weather once the vessel returned to service, resulted in a major reduction in coverage of Div. 3L. In 2017, mechanical delays again impacted the survey and resulted in most of the intended strata in Div. 3L not being covered. In 2018, there were 3 strata missed in the northern part of Div. 3L and 3 strata missed in Subdiv. 3Ps. Only one stratum (in Div. 30) was missed in the 2019 survey. In 2020, the emerging Covid-19 pandemic resulted in the spring survey being cancelled. In 2021, the CCGS *Alfred Needler* was not operational due to major mechanical issues. The CCGS *Teleost* was used to cover Subdivision 3Ps but there was no coverage of Divs. 3LNO.

In general, prior to 2014 (with the exception of 2006) the spring survey has provided good coverage of the area in the survey design. However, coverage has been sporadic and generally reduced since that time (Fig. 11). In 2014, 2016 and 2019 the reduction in the total number of sets was generally accomplished by reducing the number of sets in individual strata but still completing a sufficient number to consider the strata "complete". In 2015 and 2017 there was very poor coverage of Div. 3L and numerous strata were not covered



at all (Fig. 18). In 2018, again there was incomplete coverage of Div. 3L, with three incomplete strata in the northern part of the division. In addition, the four strata in Subdivision 3Pn have not been covered since 2013.

Discussion

Substantive mechanical issues with the research vessels in recent years have made completion of the autumn multispecies bottom trawl survey very difficult. In some instances, when one of the two vessels used during the autumn survey has been inoperative it has been possible to extend the usage time of the second vessel. This is not always possible due to the fact that vessels and vessel time are shared across multiple monitoring programs and multiple regions within Fisheries and Oceans Canada.

In recent years the main coverage issues for the autumn survey have been for the deeper strata within Div. 2H and Div. 3L. Systematic coverage issues with respect to the deep strata of Divs. 2J3K are also emerging. With respect to Div. 2H, the inclusion of this area in the annual survey design was expected to be beneficial in monitoring resource trends for Northern shrimp (*Pandalus borealus*) within Shrimp Fishing Area 5, and perhaps to a lesser extent Greenland halibut (*Reinhardtius hippoglossoides*). However, given the recent inability to cover the deeper strata within Div 2H, the added value for the assessment of deep-water demersal fish such as Greenland halibut is questionable.

The issues with covering the deep strata in Div. 3L in the autumn survey are perhaps magnified by the fact that the spring survey coverage of Div. 3L has also been very poor in recent years. These coverage issues are likely to create a great deal of uncertainty in the assessment of fishery resources on the Grand Bank. These coverage issues are occurring at an unfortunate time as ecosystem changes in total biomass and community structure appear to be occurring in all Ecosystem Production Units (EPUs) (Figs. 12-14), and including many of the Grand Bank fish stocks showing declines in the mid-late 2010s (Figs. 13, 15-19). Complete coverage of Div. 3L could help contribute to a better understanding of the changes that are occurring in this area and the implications for resource management. However, given the current rate of survey downtime and the realization that there are only two vessels operating the survey program since 2008, it is likely that in-situ unplanned reductions in survey coverage will continue to be frequent in the near future. The planned coverage at present has very limited scope for further reductions when survey delays inevitably arise. Any loss of coverage in the areas presently having long-standing time series is likely to have an adverse effect on the stock assessments of multiple species, as well as on ecosystem monitoring. The magnitude of the uncertainty introduced by such coverage shortfalls is unknown and is typically not reflected in assessment results nor management advice.

Survey coverage issues are at least partially related to the advanced age of the research vessels. New research vessels (CCGS *Captain Jacques Cartier* and CCGS *John Cabot*) have been introduced to replace the current vessels (CCGS *Alfred Needler* and CCGS *Teleost*) but, to date, comparative fishing has been difficult to achieve. The development of effective conversions factors based on comparative fishing will be critical for the integrity of the existing survey time series. Failure to achieve the necessary comparative fishing would lead to potentially serious problems for stock and ecosystem assessments going forward.

Acknowledgements

The Canadian multi-species survey dataset would not exist without extensive efforts on the part of the Fisheries and Oceans Canada scientific sampling teams as well as the crews of the CCGS *Teleost*, CCGS *A. Needler*, CCGS *J. Cabot*, and CCGS *Capt. J. Cartier*.

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Survey	Division	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Autumn	2H	77	84	84	84	84	84	84	84	84	84	84	84
Autumn	2J	117	117	117	117	117	117	117	117	117	117	117	117
Autumn	3K	175	156	156	156	156	156	156	156	156	156	156	156
Autumn	3L	206	172	172	172	172	172	172	172	172	172	172	172
Autumn	3M												
Autumn	3N	94	70	70	70	70	70	70	70	70	70	70	70
Autumn	30	99	75	75	75	75	75	75	75	75	75	75	75
	Total	768	674	674	674	674	674	674	674	674	674	674	674
Spring	3L	176	142	142	142	142	142	142	142	142	142	142	142
Spring	3N	79	79	79	79	79	79	79	79	79	79	79	79
Spring	30	79	79	79	79	79	79	79	79	79	79	79	79
Spring	3Ps	178	178	178	178	178	178	178	178	178	178	178	178
	Total	512	478	478	478	478	478	478	478	478	478	478	478

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Table 1.Number of survey sets planned per Division, for Canadian Autumn and Spring RV multispecies bottom trawl surveys over 2010-2021.

Table 2.Start and end dates (corresponding to the first and last fishing set) for the Canadian Autumn RV multispecies bottom trawl surveys in
Divs. 2HJ3KLNO. Note that Divs. 2G and 3M have not been included in the survey design since 1999 and 2007, respectively, and have
not been included here.

Veen	Div 2H	Div 2H	Div 2J	Div 2J	Div 3K	Div 3K	Div 3L	Div 3L	Div 3N	Div 3N	Div 3O	Div 3O	All Divs	All Divs	Total
rear	Start	End	Days*												
1995	NA	NA	1995-12-04	1996-01-22	1995-11-28	1996-01-25	1995-10-03	1996-01-25	1995-09-27	1995-10-26	1995-09-26	1995-10-20	1995-09-26	1996-01-25	136
1996	1996-09-18	1996-09-30	1996-10-22	1996-11-07	1996-11-07	1996-11-26	1996-10-09	1996-12-05	1996-11-25	1996-12-13	1996-11-24	1996-12-17	1996-09-18	1996-12-17	165
1997	1997-10-09	1997-10-19	1997-10-19	1997-11-04	1997-11-04	1997-12-19	1997-10-23	1997-12-20	1997-10-08	1997-11-05	1997-09-26	1997-10-19	1997-09-26	1997-12-20	156
1998	1998-10-07	1998-10-30	1998-10-20	1998-11-04	1998-11-04	1998-11-30	1998-11-02	1998-12-15	1998-10-16	1998-12-16	1998-10-10	1998-12-13	1998-10-07	1998-12-16	136
1999	1999-10-22	1999-11-09	1999-11-06	1999-11-25	1999-11-20	1999-12-11	1999-11-07	1999-12-12	1999-11-03	1999-11-22	1999-10-13	1999-11-13	1999-10-13	1999-12-12	110
2000	NA	NA	2000-11-01	2000-11-14	2000-11-14	2000-12-18	2000-10-24	2000-12-18	2000-10-17	2000-12-05	2000-10-11	2000-11-24	2000-10-11	2000-12-18	132
2001	2001-12-08	2001-12-15	2001-11-21	2001-12-08	2001-11-27	2001-12-18	2001-10-04	2001-12-06	2001-09-28	2001-10-29	2001-09-22	2001-10-14	2001-09-22	2001-12-18	179
2002	NA	NA	2002-12-07	2003-01-12	2002-12-01	2003-01-14	2002-10-23	2002-12-02	2002-10-13	2002-10-26	2002-10-05	2002-10-16	2002-10-05	2003-01-14	196
2003	NA	NA	2003-12-01	2003-12-17	2003-12-17	2004-01-31	2003-11-07	2004-01-20	2003-10-21	2003-11-07	2003-09-23	2003-10-21	2003-09-23	2004-01-31	227
2004	2004-10-08	2004-10-26	2004-10-27	2004-11-19	2004-11-13	2005-02-01	2004-11-24	2004-12-19	2004-11-11	2004-11-23	2004-10-31	2004-11-10	2004-10-08	2005-02-01	188
2005	NA	NA	2005-11-17	2005-12-16	2005-11-24	2006-01-28	2005-10-29	2006-01-29	2005-10-10	2005-11-19	2005-10-04	2005-10-17	2005-10-04	2006-01-29	239
2006	2006-10-05	2006-10-20	2006-10-20	2006-11-14	2006-11-06	2006-12-21	2006-10-21	2006-12-18	2006-10-12	2006-10-21	2006-09-30	2006-10-09	2006-09-30	2006-12-21	142
2007	NA	NA	2007-11-01	2007-11-30	2007-11-22	2007-12-16	2007-10-16	2007-12-20	2007-10-09	2007-11-14	2007-10-06	2007-10-31	2007-10-06	2007-12-20	138
2008	2008-10-04	2008-10-18	2008-11-07	2008-12-07	2008-11-11	2008-12-21	2008-11-01	2008-11-13	2008-10-24	2008-11-01	2008-10-03	2008-10-20	2008-10-03	2008-12-21	166
2009	NA	NA	2009-11-05	2009-11-23	2009-11-18	2009-12-13	2009-11-01	2009-12-20	2009-10-24	2009-11-12	2009-10-02	2009-10-25	2009-10-02	2009-12-20	139
2010	2010-10-07	2010-10-23	2010-10-21	2010-11-15	2010-11-15	2010-12-17	2010-10-29	2010-12-20	2010-10-12	2010-12-12	2010-09-30	2010-10-12	2010-09-30	2010-12-20	144
2011	2011-10-12	2011-10-27	2011-10-28	2011-11-26	2011-11-11	2011-12-19	2011-11-02	2011-12-18	2011-10-13	2011-11-20	2011-09-29	2011-10-17	2011-09-29	2011-12-19	134
2012	2012-10-07	2012-10-26	2012-10-14	2012-11-24	2012-11-12	2012-12-20	2012-10-27	2012-12-03	2012-10-11	2012-11-05	2012-09-30	2012-10-10	2012-09-30	2012-12-20	140
2013	2013-10-07	2013-10-25	2013-10-25	2013-11-18	2013-11-10	2013-12-18	2013-10-18	2013-11-25	2013-09-29	2013-10-18	2013-09-19	2013-09-29	2013-09-19	2013-12-18	147
2014	2014-10-06	2014-10-13	2014-10-18	2014-11-14	2014-11-08	2014-12-06	2014-12-06	2015-01-17	2015-01-17	2015-01-17	NA	NA	2014-10-06	2015-01-17	103
2015	2015-10-18	2015-10-24	2015-10-08	2015-11-14	2015-11-13	2015-12-13	2015-10-30	2015-12-14	2015-10-07	2015-10-30	2015-09-25	2015-10-16	2015-09-25	2015-12-14	134
2016	2016-10-07	2016-10-23	2016-10-28	2016-11-29	2016-11-15	2016-12-15	2016-10-28	2016-12-09	2016-09-29	2016-11-07	2016-09-16	2016-10-06	2016-09-16	2016-12-15	159
2017	2017-10-14	2017-10-29	2017-10-23	2017-12-02	2017-11-08	2017-12-09	2017-10-20	2017-12-15	2017-09-22	2017-10-22	2017-09-14	2017-09-24	2017-09-14	2017-12-15	148
2018	2018-10-14	2018-10-30	2018-10-26	2018-12-09	2018-11-02	2018-12-18	2018-10-05	2018-11-02	2018-09-24	2018-10-05	2018-09-14	2018-09-24	2018-09-14	2018-12-18	140
2019	2019-10-11	2019-10-26	2019-10-20	2019-12-07	2019-11-26	2019-12-22	2019-10-16	2019-11-26	2019-10-01	2019-10-16	2019-09-17	2019-10-01	2019-09-17	2019-12-22	156
2020	2020-10-23	2020-10-30	2020-10-15	2020-12-11	2020-10-19	2020-12-15	2020-09-26	2020-10-18	2020-09-11	2020-09-26	2020-08-29	2020-09-10	2020-08-29	2020-12-15	164
2021	2021-10-09	2021-10-28	2021-10-15	2021-11-13	2021-11-13	2021-12-15	NA	NA	NA	NA	NA	NA	2021-10-09	2021-12-15	67

*note that in previous reports 'Total Days' was calculated as the difference between 'All Divs Start' and 'All Divs End' and did not account for the simultaneous operation of multiple vessels. The current version accounts for the multiple vessels by calculating the total days for each vessel (End date – Start date) and then summing those values for all the vessels that operated within a given year.

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Table 3.Start and end dates (corresponding to the first and last fishing set) for the Canadian Spring RV multispecies bottom trawl surveys in
Divs. 3LNOP.

Vear	Div 3L	Div 3L	Div 3N	Div 3N	Div 3O	Div 3O	Subdiv 3Pn	Subdiv 3Pn	Subdiv 3Ps	Subdiv 3Ps	All Divs	All Divs	Total
rear	Start	End	Days										
1996	1996-05-30	1996-06-27	1996-05-22	1996-05-30	1996-05-07	1996-05-22	NA	NA	1996-04-10	1996-05-01	1996-04-10	1996-06-27	78
1997	1997-06-04	1997-06-26	1997-05-18	1997-06-04	1997-04-30	1997-05-17	NA	NA	1997-04-02	1997-04-23	1997-04-02	1997-06-26	85
1998	1998-06-06	1998-06-30	1998-05-24	1998-06-04	1998-05-12	1998-05-30	NA	NA	1998-04-10	1998-05-05	1998-04-10	1998-06-30	81
1999	1999-06-06	1999-06-29	1999-05-19	1999-06-07	1999-05-11	1999-05-28	NA	NA	1999-04-13	1999-05-06	1999-04-13	1999-06-29	77
2000	2000-06-03	2000-06-29	2000-05-23	2000-06-09	2000-05-11	2000-06-05	NA	NA	2000-04-08	2000-05-11	2000-04-08	2000-06-29	82
2001	2001-05-26	2001-06-24	2001-05-14	2001-06-06	2001-04-29	2001-05-13	NA	NA	2001-04-07	2001-04-29	2001-04-07	2001-06-24	78
2002	2002-05-29	2002-06-22	2002-05-13	2002-05-29	2002-04-27	2002-05-14	NA	NA	2002-04-05	2002-04-27	2002-04-05	2002-06-22	78
2003	2003-06-04	2003-06-26	2003-05-18	2003-06-04	2003-05-08	2003-05-15	NA	NA	2003-04-05	2003-05-02	2003-04-05	2003-06-26	82
2004	2004-06-04	2004-06-26	2004-05-24	2004-06-08	2004-05-12	2004-05-24	2004-05-01	2004-05-11	2004-04-11	2004-05-11	2004-04-11	2004-06-26	68
2005	2005-06-11	2005-06-29	2005-05-22	2005-06-19	2005-05-09	2005-05-22	2005-05-06	2005-05-08	2005-04-17	2005-05-09	2005-04-17	2005-06-29	74
2006	2006-06-10	2006-06-29	2006-06-27	2006-06-29	2006-06-25	2006-06-30	2006-04-20	2006-04-21	2006-04-13	2006-04-18	2006-04-13	2006-06-30	82
2007	2007-06-05	2007-07-12	2007-06-16	2007-06-29	2007-05-03	2007-06-19	2007-04-13	2007-04-15	2007-04-04	2007-05-02	2007-04-04	2007-07-12	103
2008	2008-06-04	2008-06-30	2008-06-01	2008-06-22	2008-05-23	2008-06-01	NA	NA	2008-04-10	2008-05-23	2008-04-10	2008-06-30	86
2009	2009-05-21	2009-06-23	2009-05-26	2009-06-11	2009-05-13	2009-05-26	2009-04-16	2009-04-18	2009-04-08	2009-05-13	2009-04-08	2009-06-23	86
2010	2010-06-07	2010-06-25	2010-05-24	2010-06-06	2010-05-08	2010-05-24	2010-04-18	2010-04-26	2010-04-08	2010-05-08	2010-04-08	2010-06-25	78
2011	2011-05-29	2011-06-22	2011-05-21	2011-05-30	2011-05-08	2011-05-20	2011-04-14	2011-04-16	2011-04-07	2011-05-08	2011-04-07	2011-06-22	76
2012	2012-05-31	2012-06-19	2012-05-21	2012-06-03	2012-04-27	2012-05-21	2012-04-09	2012-04-12	2012-03-31	2012-04-26	2012-03-31	2012-06-19	80
2013	2013-05-24	2013-06-20	2013-05-11	2013-05-24	2013-04-23	2013-05-10	2013-04-08	2013-04-10	2013-03-26	2013-04-23	2013-03-26	2013-06-20	86
2014	2014-06-07	2014-06-22	2014-06-05	2014-06-17	2014-05-29	2014-06-05	NA	NA	2014-04-05	2014-05-10	2014-04-05	2014-06-22	127
2015	2015-06-03	2015-06-17	2015-05-21	2015-06-03	2015-05-10	2015-05-21	NA	NA	2015-04-11	2015-05-10	2015-04-11	2015-06-17	67
2016	2016-05-09	2016-06-15	2016-05-05	2016-05-31	2016-04-29	2016-05-09	NA	NA	2016-04-02	2016-05-01	2016-04-02	2016-06-15	74
2017	2017-05-21	2017-06-17	2017-05-26	2017-06-14	2017-05-12	2017-05-28	NA	NA	2017-04-06	2017-05-08	2017-04-06	2017-06-17	72
2018	2018-06-03	2018-06-21	2018-06-02	2018-06-12	2018-05-24	2018-06-07	NA	NA	2018-04-28	2018-05-27	2018-04-28	2018-06-21	79
2019	2019-05-28	2019-06-16	2019-05-16	2019-06-08	2019-05-04	2019-05-16	NA	NA	2019-03-30	2019-05-04	2019-03-30	2019-06-16	78
2020	NA	NA											
2021	NA	2021-04-24	2021-05-17	2021-04-24	2021-05-17	23							

*note that in previous reports 'Total Days' was calculated as the difference between 'All Divs Start' and 'All Divs End' and did not account for the simultaneous operation of multiple vessels. The current version accounts for the multiple vessels by calculating the total days for each vessel (End date – Start date) and then summing those values for all the vessels that operated within a given year.

A. A.

Voar	Div	AN	AN	Tel	Tel	Total
Tear		sets	depth (m)	sets	depth (m)	sets
2016	2H	0	NA	77	93-1354	77
2016	2J	0	NA	115	108-1451	115
2016	3K	28	206-482	115	150-1385	143
2016	3L	138	60-673	0	NA	138
2016	3N	70	36-668	0	NA	70
2016	30	74	60-678	0	NA	74
2017	2H	0	NA	68	98-640	68
2017	2J	0	NA	114	122-1399	114
2017	3K	88	162-672	65	133-1384	153
2017	3L	141	62-712	2	902-1379	143
2017	3N	70	42-652	0	NA	70
2017	30	73	59-698	0	NA	73
2018	2H	0	NA	83	98-1399	83
2018	2J	0	NA	106	129-1357	106
2018	3K	46	139-474	65	207-658	111
2018	3L	141	64-668	0	NA	141
2018	3N	70	40-634	0	NA	70
2018	30	75	64-665	0	NA	75
2019	2H	0	NA	58	107-1166	58
2019	2J	0	NA	76	107-648	76
2019	3K	40	153-634	38	138-746	78
2019	3L	129	64-620	0	NA	129
2019	3N	70	42-684	0	NA	70
2019	30	75	62-650	0	NA	75
2020	2H	0	NA	39	107-634	39
2020	2J	0	NA	91	135-1415	91
2020	3K	69	139-949	56	181-1386	125
2020	3L	105	63-670	0	NA	105
2020	3N	52	46-609	0	NA	52
2020	30	60	66-634	0	NA	60
2021	2H	0	NA	53	120-993	53
2021	2J	0	NA	70	114-875	70
2021	3K	0	NA	81	130-962	81
2021	3L	0	NA	0	NA	0
2021	3N	0	NA	0	NA	0
2021	30	0	NA	0	NA	0

Voar	Div	AN	AN	Tel	Tel	Total
Tear		sets	depth (m)	sets	depth (m)	sets
2016	3L	0	NA	140	61-694	140
2016	3N	0	NA	78	44-624	78
2016	30	0	NA	75	64-592	75
2016	3Ps	0	NA	157	37-671	157
2017	3L	32	60-158	0	NA	32
2017	3N	68	44-658	0	NA	68
2017	30	71	63-702	0	NA	71
2017	3Ps	179	40-623	0	NA	179
2018	3L	65	61-340	46	96-665	111
2018	3N	43	41-80	36	42-725	79
2018	30	31	70-151	48	64-621	79
2018	3Ps	170	39-663	0	NA	170
2019	3L	133	62-694	0	NA	133
2019	3N	71	39-685	0	NA	71
2019	30	77	64-620	0	NA	77
2019	3Ps	171	39-611	0	NA	171
2020	3L	0	NA	0	NA	0
2020	3N	0	NA	0	NA	0
2020	30	0	NA	0	NA	0
2020	3Ps	0	NA	0	NA	0
2021	3L	0	NA	0	NA	0
2021	3N	0	NA	0	NA	0
2021	30	0	NA	0	NA	0
2021	3Ps	0	NA	143	40-691	143

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
930	<=200	0	3	0	3	4	5	5	3	5	4	5	5	5	2	2
954	<=200	0	3	0	3	4	5	5	5	5	4	5	5	5	2	2
956	<=200	0	3	0	3	5	6	6	6	6	6	6	6	6	3	2
957	<=200	0	5	0	5	6	7	6	7	4	7	7	7	7	2	2
931	201-300	0	2	0	2	2	2	2	2	2	2	2	2	0	1	2
943	201-300	0	2	0	2	2	2	2	2	2	2	2	2	0	2	2
950	201-300	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
953	201-300	0	2	0	2	2	2	2	2	2	3	2	2	2	2	2
955	201-300	0	1	0	2	2	2	2	2	2	2	2	2	1	2	2
958	201-300	0	2	0	2	2	2	2	2	2	2	2	2	2	2	2
932	301-400	0	2	0	2	2	2	2	2	2	2	2	2	0	1	2
944	301-400	0	3	0	3	4	5	6	5	5	4	5	5	5	3	2
949	301-400	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
952	301-400	0	1	0	2	2	2	2	2	2	2	2	2	2	2	2
959	301-400	0	2	0	2	2	2	2	2	2	2	2	2	2	1	2
933	401-500	0	2	0	2	3	2	2	2	2	2	2	2	0	1	2
942	401-500	0	2	0	2	2	2	1	2	2	1	2	2	1	1	2
945	401-500	0	2	0	2	2	2	2	2	2	2	2	2	2	1	2
948	401-500	0	2	0	0	1	2	2	2	2	0	2	2	2	2	2
951	401-500	0	2	0	2	2	2	2	2	2	2	2	2	2	1	2
960	401-500	0	2	0	2	2	2	2	2	2	2	2	2	2	1	2
934	501-750	0	2	0	2	2	2	2	2	0	1	2	2	0	1	2
941	501-750	0	1	0	2	2	2	2	2	0	2	2	2	0	1	2
946	501-750	0	0	0	2	3	4	4	4	0	4	4	4	4	2	2
947	501-750	0	2	0	2	2	2	2	2	0	2	2	2	2	2	2
961	501-750	0	2	0	2	2	2	2	2	0	2	2	2	2	1	2
935	751-1000	0	2	0	2	2	2	2	0	0	2	0	2	0	0	1
940	751-1000	0	2	0	2	2	2	2	0	0	2	0	2	0	0	2
962	751-1000	0	2	0	2	2	2	2	0	0	2	0	2	2	0	2
936	1001-1250	0	2	0	2	1	2	2	0	0	2	0	1	0	0	0
939	1001-1250	0	2	0	2	2	2	2	0	0	1	0	2	0	0	0
963	1001-1250	0	2	0	2	2	2	2	0	0	2	0	2	2	0	0
937	1251-1500	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0
938	1251-1500	0	2	0	2	2	2	2	0	0	2	0	2	0	0	0
964	1251-1500	0	2	0	2	2	2	2	0	0	2	0	2	0	0	0
all strata		0	69	0	70	79	84	83	66	53	77	68	83	58	39	53

Table 6.Number of successful fishing sets per stratum in Div. 2H over the last 15 years of the
Canadian Autumn RV multispecies bottom trawl surveys.

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
201	<=200	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
205	<=200	6	5	5	6	4	6	6	6	6	6	6	6	4	4	2
206	<=200	7	6	6	7	5	7	7	7	8	7	7	7	4	4	3
207	<=200	9	8	8	7	5	8	9	5	6	9	8	5	5	5	3
237	<=200	3	2	2	3	0	3	3	2	2	2	2	3	2	2	2
238	<=200	2	3	3	2	3	2	2	2	2	2	2	2	2	0	2
202	201-300	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
209	201-300	3	2	2	3	2	3	3	3	3	3	3	2	2	2	2
210	201-300	4	3	3	4	3	4	4	4	4	4	4	3	2	2	2
213	201-300	6	5	5	6	5	6	6	5	7	6	6	5	4	4	2
214	201-300	4	5	5	5	4	5	5	5	5	5	5	5	3	3	2
215	201-300	5	4	4	4	4	5	5	5	4	5	5	5	3	3	2
228	201-300	8	7	7	8	6	8	8	8	8	8	8	6	5	5	3
234	201-300	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
203	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
208	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
211	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
216	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
222	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
229	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
204	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
217	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
223	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
227	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
235	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
240	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
212	501-750	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2
218	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
224	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
230	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
239	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
219	751-1000	2	0	2	2	2	2	2	2	2	2	2	2	0	2	2
231	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2
236	751-1000	2	1	2	2	2	2	2	2	2	2	2	2	0	2	2
220	1001-1250	2	0	2	2	2	2	2	2	2	2	2	3	0	2	0
225	1001-1250	2	2	2	2	2	2	2	2	2	2	2	2	0	2	0
232	1001-1250	2	2	2	2	2	2	2	2	2	2	2	1	0	2	0
221	1251-1500	2	0	2	2	2	2	2	2	2	2	2	2	0	2	0
226	1251-1500	2	0	2	2	2	2	2	2	2	2	2	2	0	2	0
233	1251-1500	2	2	2	2	2	2	2	2	2	2	2	1	0	2	0
all strata		115	99	108	113	99	115	116	110	114	115	114	106	76	91	70

Table 7.Number of successful fishing sets per stratum in Div. 2J over the last 15 years of the
Canadian Autumn RV multispecies bottom trawl surveys.

Table 8.Number of successful fishing sets per stratum in Div. 3K over the last 15 years of the
Canadian Autumn RV multispecies bottom trawl surveys. NA denotes strata that have been
removed from the survey design (note however that some small amount of opportunistic
fishing of these strata may still have occurred when poor weather forced survey vessels to
the inshore).

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
608	<=200	0	1	0	4	NA										
612	<=200	0	0	0	2	NA										
616	<=200	0	0	0	0	NA										
618	<=200	6	5	5	5	3	2	6	5	6	5	6	5	5	4	4
619	<=200	4	7	7	8	2	3	8	7	6	8	8	6	5	4	4
609	201-300	0	1	2	2	NA										
611	201-300	0	0	0	2	NA										
615	201-300	0	0	0	2	NA										
620	201-300	7	3	10	11	8	10	10	11	11	11	11	7	5	6	7
621	201-300	7	9	8	11	6	8	11	11	10	11	10	9	8	9	7
624	201-300	5	3	4	5	4	5	5	5	5	5	5	4	2	4	3
634	201-300	7	2	6	7	5	7	4	7	7	6	7	5	2	6	3
635	201-300	2	5	5	5	5	5	4	5	3	4	5	5	2	4	2
636	201-300	3	4	6	6	6	6	4	6	7	5	6	4	2	4	2
637	201-300	3	4	4	5	5	5	4	5	5	5	5	4	4	4	2
610	301-400	0	0	0	2	NA										
614	301-400	0	0	0	2	NA										
617	301-400	2	2	2	3	2	3	3	3	3	3	2	3	2	2	2
623	301-400	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2
625	301-400	4	2	4	4	3	3	3	4	4	4	5	2	2	3	3
626	301-400	2	4	4	5	4	5	5	5	4	5	5	4	4	4	3
628	301-400	3	4	4	5	4	6	5	5	5	5	5	5	4	4	3
629	301-400	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2
630	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
633	301-400	9	5	8	9	7	8	5	9	9	6	7	6	2	7	6
638	301-400	9	7	8	9	9	8	6	9	9	9	9	7	7	7	4
639	301-400	6	3	6	6	6	6	6	6	6	5	6	3	3	6	2
613	401-500	0	0	0	2	NA										
622	401-500	3	2	3	3	2	3	3	3	3	3	3	3	2	2	2
627	401-500	4	5	5	5	4	5	5	5	5	5	5	5	2	4	3
631	401-500	6	2	5	6	4	6	3	6	6	5	6	5	2	5	4
640	401-500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
645	401-500	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2
650	401-500	2	2	2	2	2	2	2	2	2	1	2	2	2	2	0
641	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
646	501-750	2	2	2	2	2	2	2	2	2	2	2	2	1	2	0
651	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
642	751-1000	2	2	2	2	2	2	2	2	2	2	2	0	0	2	0
647	751-1000	2	1	2	2	2	2	2	2	2	2	2	0	0	2	0
652	751-1000	2	2	2	2	2	2	2	2	2	2	2	Ō	0	2	2
643	1001-1250	3	0	3	3	2	3	3	3	3	2	3	Ō	0	2	0
648	1001-1250	2	1	2	2	2	2	2	2	2	2	2	0	0	2	0
653	1001-1250	2	2	2	2	2	2	2	2	2	2	2	Ō	0	2	Ō
644	1251-1500	2	0	2	2	2	2	2	2	2	2	2	0	0	2	0
649	1251-1500	2	1	2	2	2	2	2	2	2	2	2	Ō	0	2	0
654	1251-1500	2	1	2	2	2	2	2	2	2	0	2	Ō	0	2	0
all strata		129	108	143	173	125	141	137	154	151	143	153	111	78	125	81

Table 9.Number of successful fishing sets per stratum in Div. 3L over the last 15 years of the
Canadian Autumn RV multispecies bottom trawl surveys. NA denotes strata that have been
removed from the survey design (note however that some small amount of opportunistic
fishing of these strata may still have occurred when poor weather forced survey vessels to
the inshore).

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
350	56-91	6	6	6	7	7	7	7	7	7	7	7	7	7	5	0
363	56-91	6	5	5	6	5	6	6	6	6	6	6	6	6	4	0
371	56-91	4	3	3	4	3	4	4	4	4	4	4	4	4	3	0
372	56-91	8	8	7	8	6	8	8	7	8	8	8	8	8	5	0
384	56-91	4	3	3	4	3	4	4	4	4	4	4	4	4	3	0
328	92-183	5	3	4	5	5	5	5	5	5	4	5	5	5	3	0
341	92-183	4	5	5	5	5	5	5	5	5	5	5	5	5	3	0
342	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
343	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
348	92-183		6	6		5					(6	4	6	5	0
349	92-183	(6	6	(4	((((6	(((5	0
364	92-183	9	8	8	9		9	9	9	9	8	9	9	8	5	0
305	92-183	3	3	3	3	2	3	3	3	4	3	3	3	2	2	0
370	92-103	4	4	4	4	3	4	4	4	4	4	4	4	3	3	0
305	92-103	0	1	1	0	0	0	0	0	0	0	0	0	6	2	0
797	92-103	5	4	4	5 1	4	C NA	C NIA	C NA	C NIA	C NA	C NA	C NA	C NA		NA
788	92-103	0	0	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
700	92-103	0	0	0	2		NA NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
793	92-183	0	0	1	2	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ
794	92-183	0	0	0	2	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ	NΔ
797	92-183	0	ő	ő	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
799	92-183	ő	õ	õ	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
344	184-274	4	3	4	5	2	5	5	4	4	5	5	5	4	3	0
347	184-274	2	3	3	3	2	3	3	3	3	3	3	3	3	2	õ
366	184-274	5	4	4	5	4	5	5	5	5	5	5	5	4	4	õ
369	184-274	3	3	3	3	2	3	3	3	3	3	3	3	2	2	0
386	184-274	3	3	3	3	2	3	3	3	3	3	3	3	2	2	0
389	184-274	3	2	2	3	2	3	3	3	3	3	3	3	2	2	0
391	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
791	184-274	0	0	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
795	184-274	0	0	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
345	275-366	5	4	4	4	3	5	5	5	5	4	5	5	4	3	0
346	275-366	3	3	3	3	3	3	3	3	3	3	3	3	2	2	0
368	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
387	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
388	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
392	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
789	275-366	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
796	275-366	0	0	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
798	275-366	0	0	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
800	275-366	0	0	2	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
729	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
731	367-549	2	2	2	2	0	2	2	2	2	2	2	2	2	2	0
733	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
735	367-549	2	2	2	2											NA
730	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
732	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
734	550-731	2	2	2	2	2	2	2	2	2	2	2	1	2	2	0
736	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
737	732-914	2	0	2	2	0	0	0	2	0	0	0	0	0	0	Ő
741	732-914	2	õ	2	2	õ	õ	õ	2	õ	õ	1	õ	õ	õ	Ő
745	732-914	2	Ō	2	2	õ	Õ	Õ	2	Õ	Õ	0	Õ	Õ	Õ	Ō
748	732-914	2	0	2	2	Õ	Ō	Ō	2	Õ	Ō	Õ	Ō	Õ	Ō	0
738	915-1097	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
742	915-1097	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
746	915-1097	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
749	915-1097	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
739	1098-1280	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
743	1098-1280	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
747	1098-1280	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
750	1098-1280	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
740	1281-1463	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
744	1281-1463	2	0	2	2	0	0	0	2	0	0	1	0	0	0	0
751	1281-1463	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
all strata		168	126	160	196	116	142	142	170	142	138	143	141	129	105	0

Table 10.	Number of successful fishing sets per stratum in Div. 3N over the last 15 years of the
	Canadian Autumn RV multispecies bottom trawl surveys. NA denotes strata removed from
	survey design.

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
375	<=55	4	4	4	4	4	4	4	0	4	4	4	4	4	2	0
376	<=55	4	3	3	4	4	4	4	0	4	4	4	4	4	2	0
360	56-91	8	7	7	8	8	8	8	0	8	8	8	8	8	4	0
361	56-91	5	4	4	5	5	5	5	0	4	5	5	5	5	3	0
362	56-91	7	6	6	7	7	7	7	0	7	7	7	7	7	4	0
373	56-91	6	6	6	7	7	7	7	0	7	7	7	7	7	4	0
374	56-91	3	2	2	3	3	3	3	0	3	3	3	3	3	2	0
383	56-91	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
359	92-183	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
377	92-183	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
382	92-183	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
358	184-274	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
378	184-274	2	2	2	1	2	2	2	0	2	2	2	2	2	2	0
381	184-274	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
357	275-366	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
379	275-366	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
380	275-366	2	2	2	2	2	2	2	1	2	2	2	2	2	2	0
723	367-549	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
725	367-549	2	2	2	1	2	2	2	0	2	2	2	2	2	2	0
727	367-549	2	2	2	2	2	2	2	1	2	2	2	2	2	2	0
724	550-731	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
726	550-731	2	2	2	2	2	2	2	0	2	2	2	2	2	1	0
728	550-731	2	2	2	2	2	2	2	1	2	2	2	2	2	2	0
752	732-914	2	0	0	1	NA										
756	732-914	2	0	1	0	NA										
760	732-914	2	0	2	0	NA										
753	915-1097	2	0	1	1	NA										
757	915-1097	2	0	0	0	NA										
761	915-1097	2	0	2	0	NA										
754	1098-1280	2	0	0	2	NA										
758	1098-1280	3	0	0	0	NA										
762	1098-1280	2	0	2	0	NA										
759	1281-1463	2	0	1	0	NA										
763	1281-1463	2	0	2	0	NA										
755	1281-1463	2	0	0	0	NA										
all strata		94	64	75	72	70	70	70	3	69	70	70	70	70	52	0

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Table 11.	Number of successful fishing sets per stratum in Div. 30 over the last 15 years of the
	Canadian Autumn RV multispecies bottom trawl surveys. NA denotes strata removed from
	survey design.

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
330	56-91	6	5	7	6	6	6	6	0	6	6	6	6	6	4	0
331	56-91	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
338	56-91	5	5	6	5	5	5	5	0	5	5	5	5	5	3	0
340	56-91	5	3	5	6	5	5	5	0	5	5	5	5	5	3	0
351	56-91	7	6	7	6	7	7	7	0	7	7	7	7	7	5	0
352	56-91	7	6	7	7	7	7	7	0	7	7	7	7	7	5	0
353	56-91	4	3	4	4	4	4	4	0	4	4	4	4	4	3	0
329	92-183	5	3	5	5	5	5	5	0	5	5	5	5	5	3	0
332	92-183	3	3	3	3	3	3	3	0	3	3	3	3	3	2	0
337	92-183	3	2	3	3	3	3	3	0	3	3	3	3	3	2	0
339	92-183	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
354	92-183	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
333	184-274	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
336	184-274	2	2	1	2	2	2	2	0	2	1	2	2	2	2	0
355	184-274	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
334	275-366	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
335	275-366	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
356	275-366	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
717	367-549	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
719	367-549	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
721	367-549	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
718	550-731	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
720	550-731	2	2	2	2	2	2	2	0	2	2	2	2	2	2	0
722	550-731	2	2	2	2	2	2	2	0	2	2	0	2	2	2	0
764	732-914	2	0	2	0	NA										
768	732-914	2	0	2	0	NA										
772	732-914	2	0	2	0	NA										
765	915-1097	2	0	2	0	NA										
769	915-1097	2	0	2	0	NA										
773	915-1097	2	0	2	0	NA										
766	1098-1280	2	0	2	0	NA										
770	1098-1280	2	0	2	0	NA										
774	1098-1280	2	0	2	0	NA										
767	1281-1463	2	0	2	0	NA										
771	1281-1463	2	0	2	0	NA										
775	1281-1463	2	0	2	0	NA										
all strata		99	66	100	75	75	75	75	0	75	74	73	75	75	60	0

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Table 12.Number of successful fishing sets per stratum in Div. 3L over the last 15 years of the
Canadian Spring RV multispecies bottom trawl surveys. NA denotes strata that have been
removed from the survey design (note however that some small amount of opportunistic
fishing of these strata may still have occurred when poor weather forced survey vessels to
the inshore).

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
350	56-91	7	6	7	7	7	7	7	6	0	7	7	7	7	0	0
363	56-91	6	5	6	6	6	6	6	6	0	6	6	5	6	0	0
371	56-91	4	4	3	4	4	4	3	4	0	4	4	3	4	0	0
372	56-91	8	7	9	8	8	8	7	8	0	8	8	6	8	0	0
384	56-91	4	3	4	4	4	4	3	4	3	4	4	3	4	0	0
328	92-183	5	1	5	5	5	6	6	4	0	5	0	5	4	0	0
341	92-183	5	3	5	5	5	5	5	4	0	5	3	5	5	0	0
342	92-183	2	3	2	2	2	2	2	2	2	2	0	2	2	0	0
343	92-183	3	2	2	1	2	2	2	2	2	2	0	2	2	0	0
348	92-183	6	6	7	5	7	5	6	7	4	7	0	4	7	0	0
349	92-183	7	6	7	6	7	7	5	7	0	7	0	6	7	0	0
364	92-183	9	8	9	9	7	9	9	9	3	9	0	6	9	0	0
365	92-183	2	3	3	3	3	2	3	3	2	3	0	2	3	0	0
370	92-183	4	4	4	4	4	4	5	4	4	4	0	3	4	0	0
385	92-183	8	6	8	7	8	8	7	8	6	9	0	7	7	0	0
390	92-183	5	3	5	5	5	5	4	5	4	4	0	4	4	0	0
786	92-183	0	0	0	0	NA										
787	92-183	0	0	0	0	NA										
344	184-274	4	4	5	2	5	5	3	3	2	4	0	5	3	0	0
347	184-274	2	3	3	3	3	2	3	3	2	3	0	1	2	0	0
366	184-274	4	4	5	4	5	0	5	5	2	5	0	0	3	0	0
369	184-274	3	3	3	3	3	3	3	3	2	3	0	2	3	0	0
386	184-274	3	3	3	3	3	3	3	3	0	3	0	2	3	0	0
389	184-274	3	3	3	3	3	3	3	3	0	3	0	2	3	0	0
391	184-274	2	2	2	2	2	2	2	2	2	2	0	2	2	0	0
345	275-366	4	4	5	3	5	3	5	4	2	4	0	3	4	0	0
346	275-366	3	3	3	3	3	3	3	2	2	3	0	0	3	0	0
368	275-366	2	2	2	2	2	2	2	2	2	2	0	2	2	0	0
387	275-366	2	2	2	2	2	2	2	2	0	2	0	2	2	0	0
388	275-366	2	2	2	2	2	2	2	2	0	2	0	2	2	0	0
392	275-366	2	2	2	2	2	2	2	2	2	2	0	2	2	0	0
729	367-549	2	2	2	1	2	2	2	2	2	2	0	2	2	0	0
731	367-549	2	2	2	2	2	2	2	2	0	2	0	2	2	0	0
733	367-549	2	2	2	2	2	2	2	2	0	2	0	2	2	0	0
735	367-549	2	2	2	2	2	2	2	2	2	2	0	2	2	0	0
730	550-731	2	2	2	2	2	2	2	2	2	2	0	2	2	0	0
732	550-731	2	2	2	2	1	2	2	2	0	2	0	2	2	0	0
734	550-731	2	1	2	2	3	2	2	2	0	2	0	2	2	0	0
736	550-731	2	2	2	2	2	2	2	2	2	2	0	2	2	0	0
all strata		137	122	142	130	140	132	134	135	56	140	32	111	133	0	0

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
375	<=55	5	4	5	5	5	5	5	3	5	5	4	5	5	0	0
376	<=55	5	4	5	5	5	5	5	3	4	5	3	5	4	0	0
360	56-91	10	8	10	10	10	10	10	6	9	10	8	10	8	0	0
361	56-91	6	5	6	6	6	6	6	4	5	6	5	6	5	0	0
362	56-91	9	9	9	8	9	9	9	5	7	9	8	9	7	0	0
373	56-91	9	8	8	9	9	9	9	5	7	8	8	9	7	0	0
374	56-91	3	2	3	3	3	3	3	2	3	3	2	3	3	0	0
383	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
359	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
377	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
382	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
358	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
378	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
381	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
357	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
379	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
380	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
723	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
725	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
727	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
724	550-731	2	1	2	2	2	1	2	2	2	2	0	2	2	0	0
726	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
728	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
all strata		79	71	78	78	79	78	79	60	72	78	68	79	71	0	0

Table 13.Number of successful fishing sets per stratum in Div. 3N over the last 15 years of the
Canadian Spring RV multispecies bottom trawl surveys.

Table 14.Number of successful fishing sets per stratum in Div. 30 over the last 15 years of the
Canadian Spring RV multispecies bottom trawl surveys.

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
330	56-91	7	7	7	7	7	7	7	4	6	7	7	7	7	0	0
331	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
338	56-91	6	6	6	6	6	6	6	3	5	6	5	6	6	0	0
340	56-91	5	6	5	5	5	5	5	3	5	5	4	5	5	0	0
351	56-91	8	8	8	8	8	8	8	5	7	7	6	8	8	0	0
352	56-91	8	8	8	8	8	8	8	5	7	9	6	8	7	0	0
353	56-91	4	4	4	4	4	4	4	2	3	4	3	4	4	0	0
329	92-183	5	5	5	5	5	5	5	3	5	5	5	5	5	0	0
332	92-183	3	3	3	3	3	3	3	2	3	3	3	3	3	0	0
337	92-183	3	3	3	3	3	3	3	2	3	2	2	3	3	0	0
339	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
354	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
333	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
336	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
355	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
334	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
335	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
356	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
717	367-549	2	2	2	2	2	2	2	2	2	1	2	2	2	0	0
719	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
721	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0
718	550-731	2	2	2	2	2	2	2	2	2	0	2	2	1	0	0
720	550-731	2	2	2	2	1	2	2	2	2	2	2	2	2	0	0
722	550-731	2	2	2	3	2	2	2	2	2	2	2	2	2	0	0
all strata		79	80	79	80	78	79	79	59	74	75	71	79	77	0	0

stratum	depth range (m)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
314	<=55	8	6	8	7	8	8	8	7	8	6	8	8	6	0	5
320	<=55	11	9	10	11	11	10	11	8	11	9	11	11	10	0	10
293	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	1
308	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
312	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
315	56-91	7	5	7	7	7	7	7	6	7	6	7	7	7	0	7
321	56-91	10	10	9	10	10	10	10	8	10	8	10	10	10	0	9
325	56-91	8	8	8	8	8	8	8	7	8	7	8	8	8	0	7
326	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
783	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
294	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
297	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
307	92-183	3	3	3	3	3	3	3	2	3	3	3	3	3	0	2
311	92-183	3	3	3	3	3	3	3	2	3	3	3	3	3	0	2
317	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
319	92-183	8	8	8	8	8	8	8	7	8	7	8	8	8	0	5
322	92-183	13	12	13	13	12	13	14	12	13	11	13	13	11	0	9
323	92-183	6	6	6	6	5	6	6	5	5	5	6	6	6	0	5
324	92-183	4	4	4	4	4	4	4	4	4	3	4	4	3	0	3
781	92-183	4	5	4	4	4	4	4	4	4	4	4	4	4	0	3
782	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
295	184-274	2	2	2	2	0	2	2	2	2	2	2	2	2	0	2
298	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
300	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
306	184-274	3	3	3	3	3	3	3	2	3	3	3	3	3	0	2
309	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
310	184-274	2	2	2	2	2	2	2	2	2	2	3	2	2	0	2
313	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
316	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
318	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
779	184-274	4	4	4	4	4	4	4	4	4	3	4	4	4	0	3
780	184-274	3	3	3	3	3	3	3	3	3	3	3	2	3	0	2
296	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
299	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
705	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2
706	275-366	4	3	4	4	4	4	4	3	4	3	4	4	4	0	2
707	275-366	2	2	2	2	2	2	2	2	2	2	2	1	2	0	2
715	275-366	2	2	2	2	2	2	2	2	2	2	2	1	2	0	2
716	275-366	4	4	4	4	4	4	4	4	4	3	4	2	3	0	3
708	367-549	2	2	2	2	2	2	2	1	2	1	2	1	2	0	2
711	367-549	5	5	5	5	5	5	5	4	5	4	5	5	5	0	2
712	367-549	6	5	6	6	6	6	6	5	6	5	6	6	6	0	3
713	367-549	7	6	7	7	7	7	7	6	7	6	7	5	7	0	5
/14	367-549	9	9	8	9	9	9	9	7	7	8	9	9	9	0	7
709	550-731	2	2	2	2	2	2	2	1	2	2	2	2	2	0	2
all strata		178	169	1/5	1//	1/4	1//	1/9	156	1/5	157	1/9	170	1/1	0	143

Table 15.Number of successful fishing sets per stratum in Div. 3Ps over the last 15 years of the
Canadian Spring RV multispecies bottom trawl surveys.



Figure 1. Stratification scheme for NAFO Division 2H.



Figure 2. Stratiffication scheme for NAFO Division 2J.



Figure 3. Stratification scheme for NAFO Division 3K.



Figure 4. Stratification schems for NAFO Division 3L.



Figure 5. Stratification scheme for NAFO Division 3N.



Figure 6. Stratification scheme for NAFO Division 30.



Figure 7. Stratification scheme for NAFO Subdivision 3Ps.



Figure 8. Timing of Canadian NL Spring (left) and Autumn (right) multispecies bottom trawl surveys. Horizontal bars simply represent the period between the first and last fishing set for each vessel. The different colours represent the three primary research vessels in operation over the displayed time series.



Figure 9.Total number of successful fishing sets in the Canadian Autumn (above) and Spring (below)
multispecies bottom trawl surveys.



Figure 10. Summary of survey coverage in recent years for the Canadian Autumn multispecies bottom trawl surveys. Fishing set positions (circles) are overlayed on the survey stratification scheme for the most recent survey. Strata with fewer than 2 successful sets are considered incomplete. Strata that are not coloured are not included in the current survey design.



Figure 11. Summary of survey coverage in recent years for the Canadian spring multispecies bottom trawl surveys. Fishing set positions (circles) are overlayed on the survey stratification scheme for the most recent survey. Strata with fewer than 2 successful sets are considered incomplet. Strata that are not coloured are not included in the current survey design.

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Appendix



Figure 12.Synoptic summary of changes in RV Biomass and community structure by fish functional
groups in the southern portion (Div. 2H) of the Labrador Shelf (Divs. 2GH) EPU (top) and the
Newfoundland Shelf (NAFO Divs. 2J3K) EPU (bottom) from DFO autumn RV multispecies
survey.



Figure 13.Synoptic summary of changes in RV Biomass and community structure by fish functional
groups in the Grand Bank (NAFO Divs 3LNO) EPU from DFO autumn (top) and spring
(bottom) multispecies surveys.



Figure 14. Synoptic summary of changes in RV Biomass and community structure by fish functional groups in the Southern Newfoundland (Subdiv. 3Ps) EPU from DFO spring RV multispecies survey.





Figure 15. Atlantic Cod (*Gadus morhua*) in Divs. 3NO. Survey abundance indices are expressed in millions of fish and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on index strata (<365 m). Years with missing data represent years with no or incomplete survey coverage.





Figure 16. American Plaice (*Hippoglossoides platessoides*) in Divs. 3LNO. Survey abundance indices are expressed in millions of fish and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with no or incomplete survey coverage.





Figure 17.Witch Flounder (*Glyptocephalus cynoglossus*) in Divs. 3NO. Survey abundance indices are
expressed in millions of fish and biomass indices are expressed in thousands of tons (error
bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with
no or incomplete survey coverage.

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Figure 18.Yellowtail Flounder (*Limanda ferruginea*) in Divs. 3LNO. Survey abundance indices are
expressed in millions of fish and biomass indices are expressed in thousands of tons (error
bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with
no or incomplete survey coverage.

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Figure 19. Greenland Halibut (*Reinhardtius hippoglossoides*) in Divs. 3LNO. Survey abundance indices are expressed in millions of fish and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on index strata (<730 m). Years with missing data represent years with no or incomplete survey coverage. Note that the autumn survey is currently treated as two separate indices for this stock, one index for Divs. 3LNO and one for Divs. 2J3K (see next figure).





Figure 20. Greenland Halibut (*Reinhardtius hippoglossoides*) in Divs. 2J3K. Survey abundance indices are expressed in millions of fish and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with no or incomplete survey coverage. Note that the autumn survey is currently treated as two separate indices for this stock, one index for Divs. 3LNO (see previous figure) and one for Divs. 2J3K.



Figure 21.Beaked Redfish (Sebastes fasciatus & Sebastes mentella) in Divs. 3LN. Survey abundance
indices are expressed in millions of fish and biomass indices are expressed in thousands of
tons (error bars are ± 1SD). Plots are based on all strata. Years with missing data represent
years with no or incomplete survey coverage.

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Figure 22.Beaked Redfish (Sebastes fasciatus & Sebastes mentella) in Div. 30. Survey abundance indices
are expressed in millions of fish and biomass indices are expressed in thousands of tons
(error bars are ± 1SD). Plots are based on all strata. Years with missing data represent years
with no or incomplete survey coverage.

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Figure 23.Thorny Skate (Amblyraja radiata) in Divs. 3LNOPs. Survey abundance indices are expressed
in millions of fish and biomass indices are expressed in thousands of tons (error bars are ±
1SD). Plots are based on all strata. Years with missing data represent years with no or
incomplete survey coverage.



Figure 24. Capelin (*Mallotus villosus*) in Divs. 3NO. Survey abundance indices are expressed in millions of fish and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with no or incomplete survey coverage. Note that these bottom-trawl indices may not reflect population trends for this pelagic species.





Figure 25.White Hake (Urophycis tenuis) in Divs. 3NOPs. Survey abundance indices are expressed in
millions of fish and biomass indices are expressed in thousands of tons (error bars are ±
1SD). Plots are based on all strata. Years with missing data represent years with no or
incomplete survey coverage.



Figure 26. Roughhead Grenadier (*Macrourus berglax*) in Divs. 2J3K. Survey abundance indices are expressed in millions of fish and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with no or incomplete survey coverage.



Figure 27. Northern shortfin squid (*Illex illecebrosus*) in SA 3. Survey abundance indices are expressed in millions of squid and biomass indices are expressed in thousands of tons (error bars are ± 1SD). Plots are based on all strata. Years with missing data represent years with no or incomplete survey coverage.