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Performance and description of Canadian multi-species bottom trawl surveys in
NAFO subarea 2 + Divisions 3KLMNO, with emphasis on 2012-2014.

D. Power, B.P. Healey, and D.W. Ings
NW Atlantic Fisheries Centre
St. John's, NL, Canada
don.power@dfo-mpo.gc.ca

Abstract

We update basic survey performance statistics and document the spatial coverage of the annual spring and autumn multi-species surveys conducted by the Department of Fisheries and Oceans, Newfoundland Region over 2012-2014. Noteworthy issues include modifications to survey density, extended time required to complete surveys, and coverage shortfalls during fall surveys (particularly during 2014). The impact of these items in relation to the stock assessments of various species is briefly discussed.

Introduction

The Canadian Department of Fisheries and Oceans, Newfoundland 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, survey stratification, trawl gear, towing protocols, vessels employed, as well as details of spatial coverage up to the surveys of 2008 are detailed in a suite of documents [see Healey *et al.* 2012, Healey and Brodie (2009), Brodie and Stansbury (2007) , Brodie (2005), and references therein].

These surveys are stratified by depth range, and maps of Divs. 2GHJ3KLMNO illustrating the stratification boundaries are provided in Figs. 1-8. 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 (ed.) 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). 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.

The Canadian Coast Guard vessels employed during current fall surveys are the CCGS *Alfred Needler* and the CCGS *Teleost*. The CCGS *Alfred Needler* (overall length 50m) conducts fishing sets at depths of 732m or less, 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.

Focus herein is upon the performance of the spring and fall surveys in 2012-2014, with additional attention given to some revisions of fall survey efforts since the mid-2000's.

Methods

Survey results were analyzed to determine the total number of successful fishing “sets” (sampling events for which all fishing tow protocols are met) and with minimal or no damage to the survey gear. Counts of successful sets for both spring and fall surveys were organized by stratum, division and vessel. Survey start and end dates and the depth ranges covered were also tabulated over the entire period in which the Campelen 1800 shrimp trawl has been used. This sampling gear was first deployed in the 1995 fall survey, and has been used in all spring surveys since 1996. McCallum and Walsh (1996) provide a detailed description of the Campelen 1800 trawl.

In addition to the number of sets successfully completed, tabulations of the number of sets planned *a priori* per division/stratum and survey series (spring/fall) were compiled to demonstrate slight changes to the intensity of the fall survey in recent years, and to also provide a comparison of overall survey success.

Fall Surveys

Division 2G has not been surveyed since 1999 and is no longer included in survey planning. Since the early-2000s, coverage of Division 2H was planned for every second year, though the amount of available vessel time was unchanged across years. In 2010 it was decided to cover Division 2H annually at the expense of dropping coverage in Divisions 3NO for strata beyond 400 fathoms (732m). This was done for several reasons, including the importance of Division 2H for the assessment of several key shellfish and groundfish species. In addition, the deep water coverage of strata in the Flemish Pass and western slopes of Division 3M was also permanently excluded from survey planning in 2010. The current fall survey design includes Divisions 2HJ3KLMNO, and this survey is generally conducted from early-October to mid-December.

The survey allocation for the fall of 2011 included coverage of Div. 2H (84 planned sets) – and current plans are to continue surveying Div. 2H annually. To facilitate this, both the inshore strata of Divs. 3K and 3L (19 and 34 planned sets respectively) and the deep-water (>732m) strata of Divs. 3NO (48 planned sets) were excluded from the survey design when planning the fall 2011 survey, yielding a reduction of 101 planned sets compared to the 2010 allocation. The inshore strata were 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 in recent years has occurred at times when the survey vessels have had to leave the offshore area due to severe weather. Portions of the deep-water strata in Divs. 3NO area are unsuitable for trawling and typically, a considerable amount of time in previous years was used to search for deployment sites near the intended site. There was a slight reduction in the number of vessel days available in 2011 but no further reductions to the planned coverage were considered necessary to take this into account.

A further significant change to the planned coverage occurred midway through the 2011 survey to compensate for lost survey time, mainly because of mechanical problems with one of the research vessels. This revision was required as it would not have been possible to fully cover the remaining planned areas within the time available. Therefore, a decision was made to reduce the survey allocations across Divs. 2J, 3K and 3L, to permit coverage of strata that are important to a number of resource assessments. These reductions resulted in the exclusion of 14, 29 and 23 planned stations, respectively. In addition, it was also decided to exclude the deep water strata of Div. 3L (30 sets originally allocated) from the 2011 survey. Overall, the initial planned coverage of 674 sets was reduced to 578 planned sets after these mid-survey adjustments.

In 2012 and 2013, the planned coverage was for 674 sets as per the 2011 initial allocation. In 2012, there was substantive mechanical issues with one of the research vessels that required 14 additional days to complete the survey by Dec 21. In 2013, there were no major issues with vessels.

In 2014, major mechanical issues with one vessel caused it to be out of service for the entire fall survey. In advance of the survey, it was decided that (1) Divisions 3NO would be dropped from the coverage (145 planned sets), and (2) that Division 2H would not be surveyed beyond 750m (16 scheduled sets). This reduced the planned coverage from 674 sets to 513 sets (24% reduction) and in order to accomplish this reduced survey using one vessel, an additional 28 days were added to the survey in January 2015.

Spring Surveys

Spring survey allocations have been consistent since 2009. A total of 334 sets are allocated annually, which includes 34 sets within the inshore strata of Div. 3L (Table 1). However, the inshore area is considered of lower priority and is infrequently occupied. The spring survey encompasses Divs. 3LNOPs, and is typically conducted from early-April through to late June. Though the spring survey covers Divs. 3LNOPs, we report on performance within Divs. 3LNO only.

In 2014, major mechanical issues with the spring survey vessel required an *a priori* reduction of 46 sets (primarily from Divisions 3NO) as well as the deployment of our second research vessel.

Results and Discussion

A synopsis of the successful sets during fall surveys over 1995-2014 (Table 2; see also Fig. 9a) indicates that challenges in completing fall surveys have continued over 2012-2014. It is noteworthy that the planned sets have declined over the time series and the number of sets realized were the lowest in the time series in 2014 (at 503). In the recent period, there have also been significant shortfalls in 2008, 2009 and 2011. Divisionally, the greatest impact in these years was with Divs. 2J3KL, particularly so in 2011 when only 340 sets were completed in Divisions 2J3KL and this was the second lowest in the time-series. In 2014, there was better coverage in 2J3KL, including the coverage of deep strata in Division 3L for the first time since 2010. The overall low set count in 2014 is primarily due to the elimination of Divisions 3NO at the start of the survey. In addition, the survey required an extension into January to complete the coverage in 3L.

Detailed examination of coverage in the 2011-2014 fall surveys (Table 4) identifies where some of the gaps exist. The deficiencies of the 2011 survey include no coverage in the deep-water of Divs. 3NO or the inshore strata in Divs. 3KL, five incomplete strata in Div. 2H (936, 937, 948, 949, and 950), with reduced set counts across most of Divs. 2J3KL due to the mid-survey adjustments noted previously. In fact, for 2012 onward, strata 937, 949 and 950 have been excluded from the planned sets due to difficulty with untrawlable bottom. The surveys in 2012 and 2013 were much improved in the core offshore areas with inshore strata in Divisions 3KL and deep water strata in Division 3L accounting for much of the shortfall. Coverage was complete for all strata in these years with the exception of stratum 942 was incomplete in Division 2H in 2013. Comparison of intended versus realized sets during 2009 to 2014 (Fig. 9b) indicate completion rates between 76% (2014) and 95% (2013) respectively.

Surveys of 2009-2014 were conducted within the normal timeframe with two notable exceptions. The first was that during the fall of 2010, the survey within Div. 3O was a couple of weeks later than normal and, secondly, the survey of 2014 required extension into January 2015.

In the spring surveys of 2009-2014, the number of sets completed (Table 3; see also Fig. 10a) is quite good – the percentage of intended sets completed over 1996-2014 has been 96% or higher with the exception of 2014 where the completion rate was 85%. The spring surveys have generally been completed with the exception of the 2006, 2009 and 2014 surveys (Fig. 10b). Mechanical difficulties with the CCGS *Alfred Needler* in both 2009 and 2014 required the utilization of the CCGS *Teleost*, which completed 81 of 299 successful sets in 2009, and, 182 of 254 successful sets in 2014 over Divs. 3LNO.

Set counts by stratum for spring surveys in 2009-2014 (Table 5) show that the only coverage issues were two incomplete strata within Div. 3L during 2010 (strata 343 and 729), two incomplete strata during 2011 (3L-732 and 3O-720) and two incomplete strata in 2012 (3L-366 and 3N-724). The timing of the recent spring surveys was within the typical range with the exception of 2014 where Divisions 3NO were covered later than normal.

In addition to gaps in spatial coverage and reduced intensity in some years, another potential source of uncertainty in the survey may result from vessel effects that may be introduced when research vessels conduct survey sets in an area typically covered by another vessel (see Brodie and Stansbury, 2007). This was an issue in the 2014 survey where CCGS *Teleost* conducted the entire Division 3L survey shallower than 732m. There was some variation over 2009-2014 in the proportion of sets conducted by the CCGS *Teleost* and

the CCGS *Alfred Needler* within Div. 3K during fall surveys. In addition, the CCGS *Teleost* conducted a large proportion of the 2014 spring 3LNO survey, and, portions of the 2009 spring survey, which is atypical but has occurred infrequently in previous surveys.

The decision to attempt coverage of Div. 2H annually at the cost of excluding the deep-water strata in Divs. 3NO has some impact on the information available for various assessments. For both Greenland Halibut and the Northern shrimp stock (*Pandalus Borealis*) within Shrimp Fishing Area 5, annual coverage of Div. 2H will be beneficial in monitoring resource trends, and should permit enhanced capabilities when providing of management advice, particularly for the relatively short-lived shrimp. Alternatively, the loss of the deep-water survey coverage in Divs. 3NO will have some impacts on the available data for traditionally important commercial species (e.g. Greenland Halibut, Witch Flounder and Grenadiers), but the survey information from these areas has not formed an essential part of the assessment of any of these species. It is imperative that any assessments relying upon either stratified mean numbers or mean weights per tow computed using results over all of Divs. 3NO investigate the impact that the removal of this portion of the survey area will have on these time-series.

Division 2H is covered at the beginning of the fall survey in early October, and is currently allocated 84 sets. Although coverage of the deep-water in Divs. 3NO has been cancelled (48 planned sets), a concern is that the survey design at present has very limited scope for further reductions when survey delays inevitably arise. In the recent past, Division 3M, the inshore strata of Divs. 3KL, and the deep-water portion of Divs. 3NO were routinely cancelled in order to preserve the continuity of other areas with long-standing coverage considered more crucial to stock assessment. In all fall surveys from 2011 onward none of these areas have been covered (of the three, only the Div. 3KL inshore strata were planned). Given the current rate of survey time lost and the fact that a third research vessel is no longer available to assist in survey coverage when problems arise, it is possible that in-situ unplanned reductions may be more frequent in the near future. Any loss of coverage in the areas presently having long-standing time series is likely to have adverse bearing on the stock assessments of multiple species.

Conclusion

Extensive mechanical delays during the 2009, 2011 and 2014 fall surveys resulted in reduced survey coverage, interchange of research vessels outside of their normal area coverage pattern, and have extended the time required to complete surveys of the individual divisions. The number of survey sets completed in the fall of 2009, 2011 and 2014 were relatively low, and some of the survey area was not covered. Recent spring surveys have generally been fully completed with limited coverage issues. Deficiencies in these surveys combined with those over 1995-2008 (see Brodie and Stansbury, 2007, Healey and Brodie, 2009) impact the assessments of many groundfish and invertebrate stocks to varying degrees, uncertainties which are typically not factored into the assessment results nor management advice.

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Table 1. Number of survey sets allocated per Division, for fall and spring surveys over 2006-2014.

Division	Fall Surveys								
	Year								
	2006	2007	2008	2009	2010	2011 ^a	2012	2013	2014 ^b
2H	83		77		77	84	84	84	84
2J	117	117	108	121	117	117	117	117	117
3K	175	175	162	181	175	156	156	156	156
3L	206	206	191	213	206	172	172	172	172
3M	26	26	23	26					
3N	94	94	88	97	94	70	70	70	70
3O	99	99	92	103	99	75	75	75	75
Total	800	717	741	741	768	674	674	674	674

^a Does not reflect reductions made Nov 16/2011 across Divs. 2J3KL (96 planned sets excluded).

^b Does not reflect reductions made on Sep 29/2014 in Div. 2H, Div. 3L and Div 3NO (161 planned sets excluded)
Refer to text for additional detail.

Division	Year								
	2006	2007	2008	2009	2010	2011	2012	2013	2014 ^d
3L ^c	176	176	176	176	176	176	176	176	176
3N	79	79	79	79	79	79	79	79	79
3O	79	79	79	79	79	79	79	79	79
Total	334	334	334	334	334	334	334	334	334

^c includes 34 sets allocated in "inshore" strata of Div. 3L, which are included in the annual allocations but are considered of lower priority during spring surveys and are rarely covered.

^d Does not reflect reductions made on April 30, 2014 in Div. 3LNO (46 planned sets excluded)

Table 2. Summary of successful sets, Canadian fall surveys 1995-2014. Depths surveyed by each vessel given in meters, number of sets appear in parentheses.

Year	Division	Ship			Year	Division	Ship			Year	Division	Ship			
		Teleost	W.Templeman	A.Needler			Teleost	W.Templeman	A.Needler			Teleost	W.Templeman	A.Needler	
1995	2G	Not surveyed in 1995			2003	2G	Not surveyed in 2003			2011	2G	Not surveyed in 2011			
	2H	145-948 (84)				2H	123-1404 (116)				2H	91-1480 (79)			
	2J	166-1444 (31)	162-494 (100)			3K	151-1474 (118)	115-489 (50)			2J	132-1411 (99)			
	3L	733-1210 (5)	63-640 (161)			3L	753-1446 (30)	32-702 (175)			3K	139-1429 (125)			
	3M	Not surveyed in 1995				3M	795-1455 (26)				3L	201-529 (12)	61-663 (104)		
	3N	40-650 (90)				3N	43-727 (70)				3M	Not surveyed in 2011			
	3O	63-730 (81)				3O	761-1382 (8)	63-650 (75)			3N	43-673 (70)			
1995 fall survey extended into January 1996 (66 sets)		552			2003 fall survey extended into January 2004 (210 sets)		668				3O	64-692 (75)			
1996	2G	127 - 1436 (47)				2004	2G	Not surveyed in 2004			2012	2G	Not surveyed in 2012		
	2H	122 - 1415 (77)					2H	109-1415 (87)				2H	99-1435(84)		
	2J	126 - 1410 (117)					2J	127-1365 (115)				2J	114-1425(115)		
	3K	111 - 1368 (115)	126 - 472 (60)				3K	112-1412 (135)	212-549 (16)			3K	145-1435(133)	141-353(8)	
	3L	805 - 1433 (31)	51 - 671 (180)				3L	151-522 (4)	44-653 (143)			3L	65-725(142)	142	
	3M	784 - 1400 (18)	127 - 707 (68)				3M	Not surveyed in 2004				3M	Not surveyed in 2012		
	3N	390 - 1147 (13)					3N	40-659 (69)				3N	39-641(70)		
	3O	68 - 690 (24)	65 - 139 (19)	63 - 304 (15)			3O	63-634 (76)				3O	62-631(75)		
		838				2004 fall survey extended into February 2005 (36 sets)		645							
1997	2G	201-1209 (69)				2005	2G	Not surveyed in 2005			2013	2G	Not surveyed in 2013		
	2H	220-1382 (71)					2H	118-1427 (108)	172-416 (9)			2H	91-1378(83)		
	2J	123-1488 (117)					2J	150-1334 (26)	136-669 (141)			2J	99-1445(116)		
	3K	143-1431 (155)	117-421 (20)				3K	803-1351 (7)	50-706 (120)	121-667 (57)		3K	140-1407(87)	155-488(60)	
	3L	161-1436 (71)	35-714 (134)				3L	754-1410 (24)	69-649 (75)			3L	100-304(6)	57-657(142)	
	3M	799-1379 (26)					3M	Not surveyed in 2005				3M	Not surveyed in 2013		
	3N	41-769 (74)					3N	776-1445 (17)	42-633 (69)			3N	42-681(70)		
	3O	62-611 (73)					3O	754-1410 (24)	69-649 (75)			3O	66-630(75)		
		810				2005 fall survey extended into January 2006 (86 sets)		653							
1998	2G	143-1488 (34)				2006	2G	Not surveyed in 2006			2014	2G	Not surveyed in 2014		
	2H	98-1473 (83)					2H	107-1437 (81)				2H	101-677(66)		
	2J	126-1398 (118)					2J	107-1443 (117)				2J	118-1402(110)		
	3K	122-1415 (154)	121-346 (17)				3K	153-1384 (93)	109-480 (61)			3K	132-1469(154)		
	3L	691-1437 (32)	34-675 (172)				3L	111-1401 (34)	61-641 (151)			3L	62-1388(170)		
	3M	768-1436 (26)					3M	756-1352 (23)				3M	Not surveyed in 2014		
	3N	834-1447 (12)	37-1079 (78)				3N	46-650 (70)				3N	313-692(3)		
	3O	82-1076 (87)					3O	63-674 (74)				3O	Not surveyed in 2014		
		813				2006 fall survey extended into January 2007 (82 sets)		704							
1999	2G	142-1415(69)				2007	2G	Not surveyed in 2007			2014	2G	Not surveyed in 2014		
	2H	104-1454(81)					2H	127-1494 (115)				2H	101-677(66)		
	2J	109-1375(115)					2J	145-1358 (92)	149-683 (37)			2J	118-1402(110)		
	3K	146-1477(154)					3L	81-1424 (48)	61-694 (120)			3K	132-1469(154)		
	3L	1366(1)	63-1407 (169)				3M	768-1404 (26)				3L	62-1388(170)		
	3M	853-1403(12)					3N	775-1419 (25)	48-652 (69)			3M	Not surveyed in 2014		
	3N	39-664(68)					3O	753-1410 (24)	64-632 (75)			3N	38-643 (64)		
	3O	58-692(75)						704				3O	60-661 (66)		
		744				2007 fall survey extended into January 2008 (63 sets)		631							
2000	2G	Not surveyed in 2000				2008	2G	Not surveyed in 2008			2014	2G	Not surveyed in 2014		
	2H	127-1400 (117)					2H	114-1392 (69)				2H	101-677(66)		
	2J	113-1379 (159)					2J	253-1422 (20)	125-630 (79)			2J	118-1402(110)		
	3K	152-1430 (74)	42-447 (102)				3K	839-1439 (10)	147-608 (52)	148-455 (46)		3K	132-1469(154)		
	3L	764-1401 (26)					3L	62-664 (83)	71-332 (43)			3L	62-1388(170)		
	3M	747-1419 (24)	46-642 (70)				3M	Not surveyed in 2008				3M	Not surveyed in 2014		
	3N	752-1424 (24)	62-654 (76)				3N	38-643 (64)				3N	313-692(3)		
	3O	67-703 (75)					3O	60-661 (66)				3O	Not surveyed in 2014		
		672				2008 fall survey extended into January 2009 (53 sets)		532							
2001	2G	Not surveyed in 2001				2009	2G	Not surveyed in 2009			2014	2G	Not surveyed in 2014		
	2H	999-1466 (8)					2H	111-1325 (108)				2H	101-677(66)		
	2J	120-1389 (49)					2J	147-1358 (30)				2J	118-1402(110)		
	3K	146-1479 (106)	128-439 (55)				3K	784-1385 (30)				3K	132-1469(154)		
	3L	146-1457 (34)	38-702 (169)				3L	839-1409 (11)	42-708 (64)			3L	62-1388(170)		
	3M	763-1407 (26)					3M	798-1409 (11)	48-696 (76)			3M	Not surveyed in 2014		
	3N	739-1410 (24)	45-660 (70)				3O	768-1397 (24)				3N	313-692(3)		
	3O	803-1391 (22)	67-703 (75)					764				3O	60-661 (66)		
		97				2009 fall survey extended into January 2010 (50 sets)		586							
2002	2G	Not surveyed in 2002				2010	2G	Not surveyed in 2010			2014	2G	Not surveyed in 2014		
	2H	102-1372 (98)	136-572 (19)				2H	95-1451 (70)				2H	101-677(66)		
	2J	156-1395 (64)	121-481 (111)				2J	109-1397 (113)				2J	118-1402(110)		
	3K	763-1431 (30)	35-670 (176)				3K	140-1442 (111)				3K	132-1469(154)		
	3L	818-1403 (26)					3L	100-1446 (55)	58-657 (141)			3L	62-1388(170)		
	3M	811-1429 (24)	44-675 (70)				3M	Not surveyed in 2010				3M	Not surveyed in 2014		
	3N	775-1504 (24)	65-696 (75)				3N	855-1219 (4)	40-614 (68)			3N	313-692(3)		
	3O	99					3O	61-667 (75)				3O	60-661 (66)		
		717				2010 fall survey extended into January 2011 (49 sets)		599							

Table 3. Summary of successful sets, Canadian spring surveys 1996-2014. Depths surveyed by each vessel given in meters, number of sets appear in parentheses.

Year	Division	Ship		Year	Division	Ship*	
		<i>W. Templeman</i>	Total			<i>W. Templeman</i>	Total
1996	3L	66-664	188	2006	3L	60-701	141
	3N	42-665	82		3N	46-77 ¹	22
	3O	65-685	86		3O	64-103 ¹	32
			356				195
1997	3L	60-681	158	2007	3L	61-702 ²	137
	3N	35-689	71		3N	44-636	79
	3O	62-669	81		3O	64-719	79
			310				295
1998	3L	53-721	163	2008	3L	60-684 ³	122
	3N	38-682	88		3N	40-623	71
	3O	64-657	93		3O	64-704	80
			344				273
						<i>A. Needler⁴</i>	
1999	3L	41-692	177		3L	61-694 ⁵	142
	3N	40-659	82		3N	44-668	78
	3O	62-679	86		3O	64-674	79
			345				299
2000	3L	61-681	134	2010	3L	59-715	130
	3N	45-664	81		3N	39-714	78
	3O	61-694	83		3O	60-673	80
			298				288
2001	3L	34-695	154	2011	3L	57-723	144
	3N	40-650	79		3N	40-673	79
	3O	74-699	79		3O	63-716	78
			312				301
2002	3L	42-710	146	2012	3L	60-723	132
	3N	40-641	79		3N	38-665	78
	3O	63-628	79		3O	63-656	79
			304				289
2003	3L	62-698	156	2013	3L	62-632	134
	3N	39-681	79		3N	40-689	79
	3O	63-726	79		3O	64-650	79
			314				292
2004	3L	47-710	151	2014	3L	64-702 ⁶	135
	3N	44-675	79		3N	47-662 ⁷	60
	3O	61-636	79		3O	61-662 ⁷	59
			309				254
2005	3L	64-672	133				
	3N	45-691	78				
	3O	66-719	79				
			290				

¹CCGS A. Needler conducted 47 sets in Divs 3NO.

²CCGS Teleost conducted 40 sets in Div. 3L.

³CCGS Teleost conducted 43 sets in Div. 3L.

⁴CCGS A. Needler became the primary ship for spring surveys in 2009.

⁵CCGS Teleost conducted 81 sets in Div. 3L.

⁶CCGS Teleost conducted 63 sets in Div. 3L.

⁷CCGS Teleost conducted all sets in Divs 3NO.

Table 4a. Number of successful fall survey sets in Division 2G over 1996-1999. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.nmi.)	Depth (m)	Survey Year			
			1996 Se 30 - Oc 8	1997 Oct 1-9	1998 Oct 1-7	1999 Oct 12-27
901	1213	201-300		4	8	1
902	120	301-400		2	3	2
903	80	401-500	0	3	2	2
904	153	501-750	0	2	2	2
905	164	751-1000	0	1	2	2
906	229	1001-1250	0	2	2	2
907	360	1251-1500	0	0	1	2
908	585	201-300		2	4	2
909	2773	<=200		8	0	2
910	2339	<=200		6	0	2
911	692	201-300		3	5	3
912	73	301-400	0	2	2	2
913	62	401-500	0	2	2	2
914	113	501-750	0	2	2	2
915	96	751-1000	0	0	1	0
916	146	1001-1250	0	1	2	0
917	165	1251-1500	0	0	1	0
918	515	1251-1500	1	0	0	0
919	316	1001-1250		1	2	0
920	172	751-1000		1	1	0
921	142	501-750		1	2	1
922	186	401-500	0	2	1	2
923	186	301-400		2	2	0
924	756	201-300		2	5	0
925	1804	<=200		4	0	1
926	433	201-300		2	3	0
927	832	301-400		2	6	0
928	783	401-500		3	3	0
929	1261	501-750		3	8	0
Annual Total			16749	47	69	34
						69

Table 4b. Number of successful fall survey sets in Division 2H over 1996-2014. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n. miles)	Depth (m)	Survey Year												
			1996 Sep 18-30	1997 Oct 9-19	1998 Oct 7-30	1999 Oct 22-No 9	2001 Dec 8-15	2004 Oct 8-26	2006 Oct 5-20	2008 Oct 4-18	2010 Oct 7-23	2011 Oct 12-27	2012 Oct 7-26	2013 Oct 7-25	2014 Oct 6-13
930	1028	<=200	4	0	5	4	3	5	4	3	3	4	5	5	3
931	276	201-300	2	2	2	2	0	2	2	2	2	2	2	2	2
932	55	301-400	2	2	2	2	0	2	2	2	2	2	2	2	2
933	50	501-750	2	2	2	2	0	2	2	2	2	3	2	2	2
934	78	501-750	2	2	2	2	0	2	2	2	2	2	2	2	2
935	96	751-1000	1	2	2	2	0	2	2	2	2	2	2	2	0
936	78	1001-1250	1	2	2	1	2	2	2	2	2	1	2	2	0
937	94	1251-1500	1	2	2	1	2	2	2	2	0	1	0	0	0
938	191	1251-1500	2	2	2	2	2	2	2	2	2	2	2	2	0
939	130	1001-1250	2	2	1	2	1	2	1	2	2	2	2	2	0
940	97	751-1000	2	2	2	2	1	2	2	2	2	2	2	2	0
941	89	501-750	2	2	2	2	2	2	2	1	2	2	2	2	2
942	55	501-750	2	2	2	2	2	2	2	2	2	2	2	1	2
943	354	201-300	2	2	2	2	0	2	2	2	2	2	2	2	2
944	860	301-400	3	6	4	4	1	4	4	3	3	4	5	6	5
945	461	501-750	2	3	2	2	2	2	2	2	2	2	2	2	2
946	721	501-750	3	5	4	4	3	4	3	0	2	3	4	4	4
947	227	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2
948	246	501-750	2	2	2	1	2	1	2	2	0	1	2	2	2
949	206	301-400	2	2	0	1	2	2	1	0	1	1	0	0	0
950	261	201-300	2	2	0	2	2	2	2	1	0	0	0	0	0
951	234	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2
952	177	301-400	2	2	2	2	2	2	2	1	2	2	2	2	2
953	291	201-300	2	2	2	2	2	2	2	2	2	2	2	2	2
954	971	<=200	4	0	5	4	3	5	4	3	3	4	5	5	5
955	389	201-300	2	3	2	2	2	2	2	1	2	2	2	2	2
956	1051	<=200	3	0	5	4	4	5	4	3	3	5	6	6	6
957	1371	<=200	5	0	7	7	5	7	6	5	5	6	7	6	7
958	294	201-300	2	2	2	2	2	2	2	2	2	2	2	2	2
959	178	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2
960	107	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2
961	211	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2
962	242	751-1000	2	2	2	2	0	2	2	2	2	2	2	2	0
963	265	1001-1250	2	2	2	2	0	2	2	2	2	2	2	2	0
964	342	1251-1500	2	2	2	2	0	2	2	2	2	2	2	2	0
Total	11776		77	71	83	81	57	87	81	69	70	79	84	83	66

Table 4c. Number of successful fall survey sets in Division 2J over 1995-2014. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n. miles)	Depth (m)	Survey Year																				
			1995 De 4 - Ja 22	1996 Oct 22 - No 7	1997 Oct 19 - No 4	1998 Oct 20 - No 4	1999 Nov 6-25	2000 Nov 1-14	2001 No 21 - Dec 1	2002 Dec 7 - Ja 12	2003 Dec 1-17	2004 Oct 27 - No 1	2005 No 17-De 16	2006 Oct 20-No 14	2007 Nov 1-30	2008 No 7 - De 7	2009 Nov 5-23	2010 Oct 21-No 15	2011 Oct 28-No 26	2012 Oct 14-No 24	2013 Oct 25-No 18	2014 Oct 18-No 14	
201	633	<=200	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
202	621	201-300	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
203	487	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
204	288	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
205	1594	<=200	0	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	6	4	6	6	
206	1870	<=200	5	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7	5	7	7	7	
207	2264	<=200	8	9	9	9	9	9	9	9	9	8	9	9	9	8	8	7	5	8	9	5	
208	588	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
209	680	201-300	2	3	3	3	3	3	3	3	3	2	3	3	3	3	2	2	3	2	3	3	
210	1035	201-300	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4	3	4	4	
211	251	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
212	557	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
213	1583	201-300	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	6	5	6	5	
214	1341	201-300	4	5	5	5	5	5	6	5	5	5	5	5	5	4	5	5	5	4	5	5	
215	1302	201-300	2	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	5	5	5	
216	360	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
217	241	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
218	362	501-750	3	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
219	283	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	
220	303	1001-1250	0	2	2	2	2	1	2	2	2	2	2	2	2	2	2	0	2	2	2	2	
221	330	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	
222	450	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
223	158	501-750	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
224	228	501-750	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
225	195	1001-1250	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
226	201	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	
227	598	501-750	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
228	2196	201-300	7	8	8	8	8	8	7	8	8	8	8	8	8	8	7	7	8	6	8	8	
229	536	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
230	185	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
231	186	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
232	228	1001-1250	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
233	237	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
234	530	201-300	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
235	414	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
236	193	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	
237	733	<=200	3	3	3	3	3	3	4	3	3	3	3	3	3	3	2	2	3	0	3	3	
238	778	<=200	0	3	3	3	3	2	3	3	3	2	3	3	3	2	3	3	2	3	2	2	
239	120	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
240	133	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Total			25272	84	117	117	118	115	117	120	117	116	115	117	117	115	99	108	113	99	115	116	110

Table 4d. Number of successful fall survey sets in Division 3K over 1995-2014. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n. miles)	Depth (m)	Survey Year																				
			1995 No 28 - Ja 26	1996 Nov 7-26	1997 No 4- De 19	1998 Nov 4-30	1999 No 20	2000 De 1	2001 No 14 - De 11	2002 No 27 - De 11	2003 Ja 1 - De 1	2004 Ja 14 - De 17	2005 Ja 31 - No 13	2006 Fe 1 - No 24	2007 Ja 28 - No 6	2008 De 21 - No 22	2009 Ja 16 - No 22	2010 De 11 - No 18	2011 Ja 13 - No 15	2012 De 17 - No 17	2013 Ja 11 - No 12	2014 De 19 - No 10	2015 De 20 - No 10
608	798	<=200	0	3	3	3	0	3	2	3	2	3	2	3	0	1	0	4	0	0	0	0	0
609	342	201-300	0	2	2	2	0	2	2	2	2	2	2	2	0	1	2	2	0	0	0	0	0
610	256	301-400	0	2	2	2	0	2	2	2	2	2	2	2	0	0	0	2	0	0	0	0	0
611	573	201-300	0	3	3	2	0	2	2	2	2	2	2	2	0	0	0	2	0	0	0	0	0
612	445	<=200	0	2	2	2	0	2	2	2	2	2	2	2	0	0	0	2	0	0	0	2	0
613	30	501-750	0	2	2	2	0	2	2	2	2	2	2	2	0	0	0	2	0	0	0	2	0
614	263	301-400	0	2	2	2	0	2	2	2	2	2	2	2	0	0	0	2	0	0	0	3	0
615	251	201-300	0	2	2	2	0	2	2	2	2	2	2	2	0	0	0	2	0	0	0	2	0
616	250	<=200	0	2	2	2	0	2	2	2	2	2	1	2	0	0	0	0	0	0	0	1	0
617	593	301-400	2	3	3	3	3	3	3	3	3	3	3	3	2	2	2	3	2	3	3	3	3
618	1347	<=200	5	6	6	4	6	6	3	6	4	6	6	5	6	5	5	5	3	2	6	5	
619	1753	<=200	4	7	7	6	6	8	8	8	6	8	8	8	7	7	8	2	3	8	7	7	
620	2545	201-300	3	11	11	11	11	11	11	11	11	8	11	11	7	3	10	11	8	10	10	11	
621	2537	201-300	6	11	11	11	11	6	11	8	10	11	7	9	8	11	6	8	11	11	11	11	
622	691	501-750	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
623	494	301-400	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
624	1105	201-300	4	5	5	5	5	5	5	5	5	5	5	5	5	5	3	4	5	4	5	5	5
625	888	301-400	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	4
626	1113	301-400	4	5	5	5	5	5	4	5	5	4	5	5	5	2	4	4	5	4	5	5	5
627	1255	501-750	5	5	5	5	5	5	3	5	5	4	5	4	4	4	5	5	5	4	5	5	5
628	1085	301-400	5	5	5	5	5	5	3	5	5	5	5	5	3	3	4	4	5	4	6	5	5
629	495	301-400	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2
630	332	301-400	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2
631	1321	501-750	5	6	6	6	6	6	10	6	6	6	4	5	6	6	2	5	6	4	6	3	6
633	2067	301-400	8	9	9	9	9	9	9	9	9	9	9	9	8	9	5	8	9	7	8	5	9
634	1555	201-300	7	7	7	7	7	7	7	7	5	2	7	6	7	2	6	7	5	7	4	7	
635	1274	201-300	6	5	5	5	5	5	5	5	5	2	3	1	2	5	5	5	5	4	5	5	
636	1455	201-300	7	6	6	6	6	6	6	6	6	3	5	3	3	4	6	6	6	6	4	6	
637	1132	201-300	5	5	5	5	5	5	1	5	5	5	5	5	4	3	4	4	5	5	4	5	
638	2059	301-400	9	9	9	9	9	8	5	8	9	9	9	9	5	9	7	8	9	9	8	6	
639	1463	301-400	7	6	6	6	6	7	3	5	6	6	3	5	3	6	3	6	6	6	6	6	
640	69	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
641	230	501-750	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
642	418	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
643	733	1001-1250	3	3	3	3	3	2	3	3	3	3	3	3	3	3	0	3	3	2	3	3	
644	474	1251-1500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	
645	216	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
646	325	501-750	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
647	360	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	
648	228	1001-1250	0	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	
649	212	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	
650	134	501-750	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	
651	359	501-750	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
652	516	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
653	531	1001-1250	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
654	479	1251-1500	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	
Total	37051		131	175	175	171	154	159	165	175	168	151	167	154	129	108	143	173	125	141	147	154	

Table 4e. Number of successful fall survey sets in Division 3L over 1995-2014. (Dates of first and last set in each year listed under survey year.)

Total 46338 166 211 205 204 170 176 205 206 205 147 184 185 168 126 160 196 116 142 148 170

Table 4f. Number of successful fall survey sets in Division 3M over 1995-2007. Shaded cells indicate strata not included in the survey design after 1996.
(Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.nmi.)	Depth (m)	Survey Year									
			1996 Se 25 - De 4	1997 Dec 1-15	1998 Dec 9-13	1999 Dec 11-12	2000 Oct 24-29	2001 Oct 8-13	2002 Oct 24 - No 5	2003 Jan 13-18 (2 No 26 - De 2	2006 Oct 16-29	2007
501	342	<=146										
502	838	147-183										
503	628	184-256										
504	348	184-256										
505	703	184-256										
506	496	184-256										
507	822	257-366										
508	646	257-366										
509	314	257-366										
510	951	257-366										
511	806	257-366										
512	670	367-549										
513	249	367-549										
514	602	367-549										
515	666	367-549										
516	634	550-731										
517	216	550-731										
518	210	550-731										
519	414	550-731										
528	530	732-914	2	3	3	1	3	3	3	3	3	3
529	488	915-1097	2	3	3	2	3	3	3	3	3	3
530	1134	1098-1280	2	7	7	5	7	7	7	7	7	7
531	203	1281-1463	2	2	2	2	2	2	2	2	2	2
532	238	915-1097	2	2	2	2	2	2	2	2	2	2
533	98	732-914	2	2	2	0	2	2	2	2	2	2
534	486	915-1097	2	3	3	0	3	3	3	3	2	3
535	92	1098-1280	2	2	2	0	2	2	2	2	2	2
536	112	1281-1463	2	2	2	0	2	2	2	2	0	2
Total	13936		86	26	26	12	26	26	26	26	23	26

Table 4g. Number of successful fall survey sets in Division 3N over 1995-2014. Shaded cells indicate strata not included in the survey design after 2010.
(Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n. miles)	Depth (m)	Survey Year																			
			Se 27 - Oc 2 No 25 - De 1: Oc 8 - No 5	Oc 16 - De 1 Nov 3-22	Oc 17 - De 5 Se 28 - Oc 2 Oct 13-26	Oc 21 - No 7 Nov 11-23	Oc 10-No 19 Oct 12-21	Oc 9-No 14	Oc 24 - No 1	Oc 24-No 12 Oct 12-De 12 Oc 13-No 20	Oc 11-No 5 Se 29-Oct 18 Ja 17											
357	164	275-366	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
358	225	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
359	421	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
360	2992	56-91	17	6	9	8	8	8	8	8	8	8	8	8	8	7	7	8	8	8	8	0
361	1853	56-91	11	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	5	5	5	0
362	2520	56-91	5	6	7	7	7	7	7	7	7	7	7	7	7	6	6	7	7	7	7	0
373	2520	56-91	5	7	7	7	6	7	7	7	7	7	7	7	7	6	6	6	7	7	7	0
374	931	56-91	2	2	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	0
375	1593	<=55	9	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
376	1499	<=55	9	4	5	4	4	4	4	4	4	4	4	4	4	3	3	4	4	4	4	0
377	100	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
378	139	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	0
379	106	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
380	116	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
381	182	184-274	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
382	647	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
383	674	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
723	155	367-549	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
724	124	550-731	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	0
725	105	367-549	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	2	0
726	72	550-731	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	0
727	160	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
728	156	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
752	134	732-914	0	0	0	2	0	2	2	2	0	0	0	0	0	0	0	0	0	0	1	
753	138	915-1097	0	0	0	0	2	0	2	2	2	0	0	0	1	0	2	0	0	1	1	
754	180	1098-1280	0	1	0	2	0	2	2	2	0	0	0	0	0	0	2	0	0	0	2	
755	385	1281-1463	0	0	0	0	2	0	2	2	2	0	0	0	0	0	0	0	0	0	0	
756	106	732-914	0	0	0	0	2	0	2	2	2	0	0	0	2	0	2	0	0	1	0	
757	102	915-1097	0	0	0	0	2	0	2	2	2	0	0	0	2	0	2	0	0	0	0	
758	99	1098-1280	0	0	0	0	2	0	2	2	2	0	0	0	2	0	3	0	0	0	0	
759	127	1281-1463	0	0	0	0	2	0	2	2	2	0	0	0	2	0	0	0	1	0		
760	154	732-914	0	0	0	0	2	0	2	2	2	0	0	0	2	0	2	0	2	0	0	
761	171	915-1097	0	0	0	0	2	0	2	2	2	0	0	0	2	0	2	0	2	0	0	
762	212	1098-1280	0	0	0	0	0	0	2	2	2	0	0	0	2	0	2	0	2	0	0	
763	261	1281-1463	0	0	0	0	0	0	2	2	2	0	0	0	2	0	2	0	2	0	0	
Total	19523		90	67	74	90	68	94	94	94	70	69	86	70	94	64	75	72	70	70	3	

Table 4h. Number of successful fall survey sets in Division 30 over 1995-2014. Shaded cells indicate strata not included in the survey design after 2010.
 (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.miles)	Depth (m)	Survey Year																			
			1995 Se 26 - Oc 2 No 24 - De 1 Se 26 - Oc 1 Oc 10 - De 1 Oc 13 - No 1 Oc 11 - No 2 Se 22 - Oc 1 Oct 5-16	1996 Se 23 - Oc 2 Oc 31 - No 1 Oct 4-17	1997 Se 30 - Oc 9 Oc 6-31	1998 Oct 3-20	1999 Oct 2-25 Se 30-Oct 12 Se 29-Oct 17 Se 30-Oct 10 Se 19-29	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
329	1721	92-183	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	0
330	2089	56-91	5	6	6	6	6	6	6	6	6	7	6	6	6	5	7	6	6	6	6	0
331	456	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
332	1047	92-183	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
333	147	184-274	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
334	96	275-366	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
335	58	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
336	121	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	0
337	948	92-183	2	2	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	0
338	1898	56-91	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	5	5	0
339	585	92-183	2	3	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
340	1716	56-91	4	5	5	5	7	5	5	5	5	5	5	5	5	5	3	5	6	5	5	0
351	2520	56-91	7	6	7	7	6	7	7	7	7	7	7	7	7	7	6	7	7	7	7	0
352	2580	56-91	17	5	6	7	7	7	7	7	7	7	7	7	7	7	6	7	7	7	7	0
353	1282	56-91	3	2	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	0
354	474	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
355	103	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
356	61	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
717	166	367-549	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
718	134	550-731	2	0	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	0
719	76	367-549	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	0
720	105	550-731	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
721	76	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
722	93	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
764	105	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2	0
765	124	915-1097	0	0	0	2	0	2	2	0	0	0	2	0	2	0	2	0	2	0	2	0
766	144	1098-1280	0	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
767	158	1281-1463	0	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
768	99	732-914	0	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
769	138	915-1097	0	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
770	128	1098-1280	0	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
771	175	1281-1463	0	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
772	135	732-914	0	0	0	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
773	128	915-1097	0	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
774	135	1098-1280	0	0	0	0	0	0	2	2	2	2	0	2	0	2	0	2	0	2	0	2
775	155	1281-1463	0	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	2	0	2
Total	20176		81	58	73	87	75	100	97	99	83	76	99	74	99	66	100	75	75	75	0	

Table 5a. Number of successful spring survey sets in Division 3L over 1996-2014. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq.n. miles)	Depth (m)	Survey Year																			
			1996 Ma 30-Ju 27 Ju 4-26	1997 Ju 6-30	1998 Ju 6-29	1999 Ju 3-29	2000 Ma26-Ju24	2001 Ju 4-26	2002 Ju 4-26	2003 Ju 11-29	2004 Ju 10-29	2005 Ju5-July12	2006 Ju 4-30	2007 Ma 21-Ju 23	2008 Ju 7-25	2009 Ma 29-Ju 22	2010 Ma 31-Ju 19	2011 Ma 24-Ju 20	2012 Ju 7-22	2013	2014	
328	1519	92-183	7	6	5	5	5	5	5	5	4	5	5	1	5	5	5	6	6	4		
341	1574	92-183	7	6	5	6	5	5	5	5	4	5	5	3	5	5	5	5	5	4		
342	585	92-183	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
343	525	92-183	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2		
344	1582	184-274	7	5	6	5	4	5	5	5	4	5	5	4	4	5	2	5	5	3		
345	1432	275-366	6	5	6	5	4	5	5	5	4	5	5	4	4	5	3	5	3	4		
346	865	275-366	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2		
347	983	184-274	4	4	4	3	3	3	3	3	3	3	3	2	3	3	3	3	2	3		
348	2120	92-183	10	8	8	8	8	7	7	7	7	7	7	6	6	7	5	7	5	6		
349	2114	92-183	9	8	8	7	8	7	7	7	6	6	7	7	6	7	7	7	7	7		
350	2071	56-91	9	7	6	6	8	7	7	7	7	6	7	7	6	7	7	7	7	6		
363	1780	56-91	8	6	6	6	7	6	6	6	6	5	6	6	5	6	6	6	6	6		
364	2817	92-183	13	9	11	9	10	9	9	9	9	8	9	9	8	9	9	7	9	9		
365	1041	92-183	5	4	5	4	2	3	3	3	3	3	3	2	3	3	3	3	2	3		
366	1394	184-274	5	6	5	4	2	5	5	5	5	5	5	4	4	5	4	5	0	5		
368	334	275-366	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
369	961	184-274	4	4	4	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3		
370	1320	92-183	6	5	4	5	5	4	4	4	4	4	4	4	4	4	4	4	5	4		
371	1121	56-91	5	5	4	4	4	4	4	4	4	5	4	4	4	3	4	4	4	3		
372	2460	56-91	11	9	8	9	9	8	8	8	8	6	7	8	7	9	8	8	8	7		
384	1120	56-91	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3		
385	2356	92-183	11	9	9	7	4	7	8	8	8	6	8	8	6	8	7	8	8	7		
386	983	184-274	4	4	4	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3		
387	718	275-366	3	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
388	361	275-366	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
389	821	184-274	4	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3		
390	1481	92-183	7	6	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5	4		
391	282	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
392	145	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
729	186	367-549	2	3	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2		
730	170	550-731	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2		
731	216	367-549	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
732	231	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2		
733	468	367-549	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
734	228	550-731	2	2	2	2	2	2	2	2	2	2	2	1	2	2	3	2	2	2		
735	272	367-549	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
736	175	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
784	268	<=55	0	0	2	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0		
785	465	56-91	0	0	2	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0		
786	84	92-183	0	0	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0		
787	613	92-183	0	0	2	2	0	2	0	0	0	2	0	0	0	0	0	0	0	0		
788	261	92-183	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
789	72	275-366	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
790	89	92-183	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0		
791	227	184-274	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
792	50	367-549	0	0	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0		
793	72	92-183	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
794	216	92-183	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
795	164	184-274	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
796	175	275-366	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0		
797	98	92-183	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0		
798	100	275-366	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0		
799	72	92-183	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0		
800	81	275-366	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0		
Total		41918	188	158	163	177	134	154	146	156	151	133	141	137	122	142	130	144	132	134	135	

Table 5b. Number of successful spring survey sets in Division 3N over 1996-2014. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.miles)	Depth (m)	Survey Year																			
			1996 Ma 22-30	1997 Ma 18 - Ju4	1998 Ja 24 - Ju 4	1999 Ma 19 - Ju 7	2000 Ma 23 - Ju 9	2001 Ma 14 - Ju 6	2002 Ma 13 - 29	2003 Ma 18 - Ju 4	2004 Ma 24 - Ju 8	2005 Ma 22 - Ju 1!	2006 Ju 27-29	2007 Ju 16-29	2008 Ju 1 - 22	2009 Ma 26-Ju 11	2010 Ma 24-Ju 6	2011 Ma 21-30	2012 Ma 21- Ju 3	2013 Ma 11-24	2014 Jun 5-17	
357	164	275-366	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
358	225	184-274	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
359	421	92-183	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
360	2992	56-91	11	9	12	11	10	10	10	10	9	6	10	8	10	10	10	10	10	10	10	6
361	1853	56-91	7	5	7	7	6	6	6	6	7	4	6	5	6	6	6	6	6	6	6	4
362	2520	56-91	9	7	10	9	9	9	9	9	9	8	4	9	9	8	9	9	9	9	9	5
373	2520	56-91	9	7	10	9	9	9	9	9	9	9	0	9	8	8	9	9	9	9	9	5
374	931	56-91	3	3	4	3	4	3	3	3	3	3	2	3	2	3	3	3	3	3	3	2
375	1593	<=55	6	5	6	5	6	5	5	5	5	5	3	5	4	5	5	5	5	5	5	3
376	1499	<=55	5	4	6	6	4	5	5	5	5	5	3	5	4	5	5	5	5	5	5	3
377	100	92-183	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
378	139	184-274	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
379	106	275-366	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
380	116	275-366	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
381	182	184-274	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
382	647	92-183	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
383	674	56-91	2	2	3	2	3	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
723	155	367-549	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
724	124	550-731	2	2	2	2	2	2	2	2	2	2	0	2	1	2	2	2	2	1	2	2
725	105	367-549	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
726	72	550-731	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
727	160	367-549	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
728	156	550-731	2	1	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
Total	17454		82	71	88	82	81	79	79	79	79	78	22	79	71	78	78	79	78	79	60	

Table 5c. Number of successful spring survey sets in Division 30 over 1996-2014. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n. miles)	Depth (m)	Survey Year																			
			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
			Ma 7 - 22	Ap30 - Ma17	Ma 12-30	Ma 11-28	Ma11-Ju5	Ap29 - Ma13	Ap27 - Ma14	Ma 8-15	Ma 12-24	Ma 9-22	Ju25-30	Ma3 - Ju19	Ma23-Ju1	Ma 13-26	Ma 8-24	Ma 8-20	Ap 27-Ma 21	Ap 23- Ma 1(Ma 29-Ju 5)		
329	1721	92-183	6	6	7	6	5	5	5	5	5	5	0	5	5	5	5	5	5	5	5	3
330	2089	56-91	8	7	8	7	7	7	7	7	7	7	9	7	7	7	7	7	7	7	7	4
331	456	56-91	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2
332	1047	92-183	4	3	4	4	4	3	3	3	3	3	0	3	3	3	3	3	3	3	3	2
333	147	184-274	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
334	96	275-366	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
335	58	275-366	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
336	121	184-274	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
337	948	92-183	3	3	4	3	4	3	3	3	3	3	0	3	3	3	3	3	3	3	3	2
338	1898	56-91	7	6	7	7	6	6	6	6	6	6	7	6	6	6	6	6	6	6	6	3
339	585	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
340	1716	56-91	6	6	7	6	5	5	5	5	5	5	2	5	6	5	5	5	5	5	5	3
351	2520	56-91	8	8	10	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
352	2580	56-91	9	8	10	9	9	8	8	8	8	8	8	5	8	8	8	8	8	8	8	
353	1282	56-91	5	4	5	5	5	4	4	4	4	4	3	4	4	4	4	4	4	4	4	
354	474	92-183	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
355	103	184-274	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
356	61	275-366	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
717	166	367-549	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
718	134	550-731	2	2	3	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
719	76	367-549	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
720	105	550-731	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	1	2	2	
721	76	367-549	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	
722	93	550-731	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	3	2	2	2	
Total	18552		86	81	93	86	83	79	79	79	79	79	32	79	80	79	80	78	79	79	59	

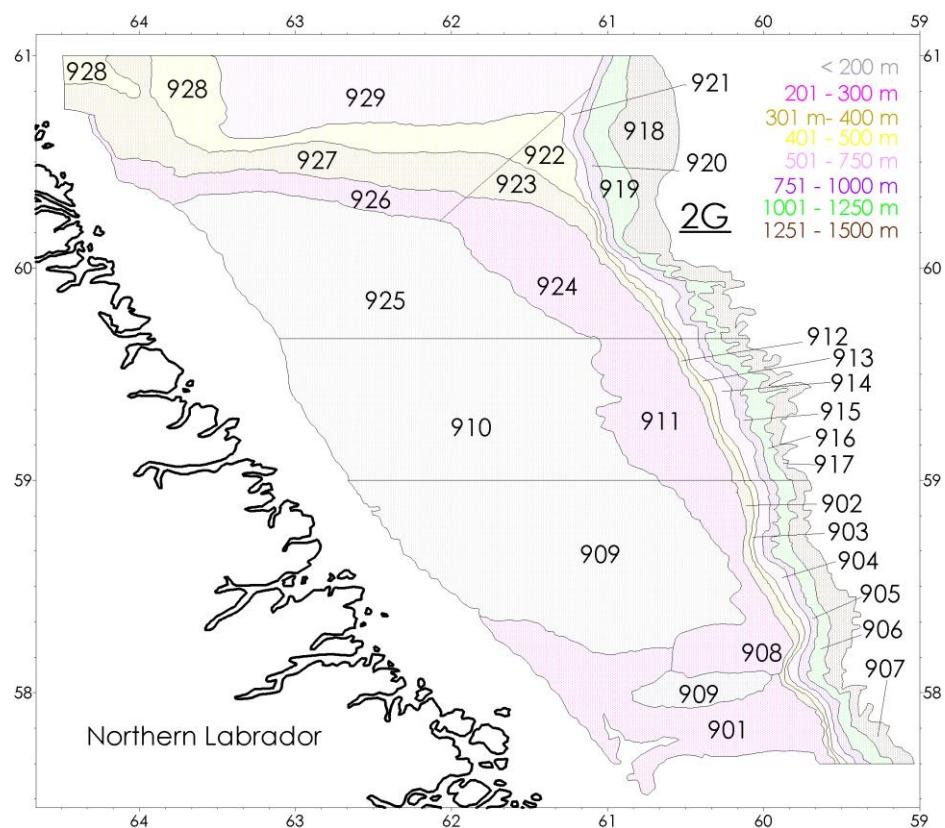


Fig 1. Stratification of Div. 2G

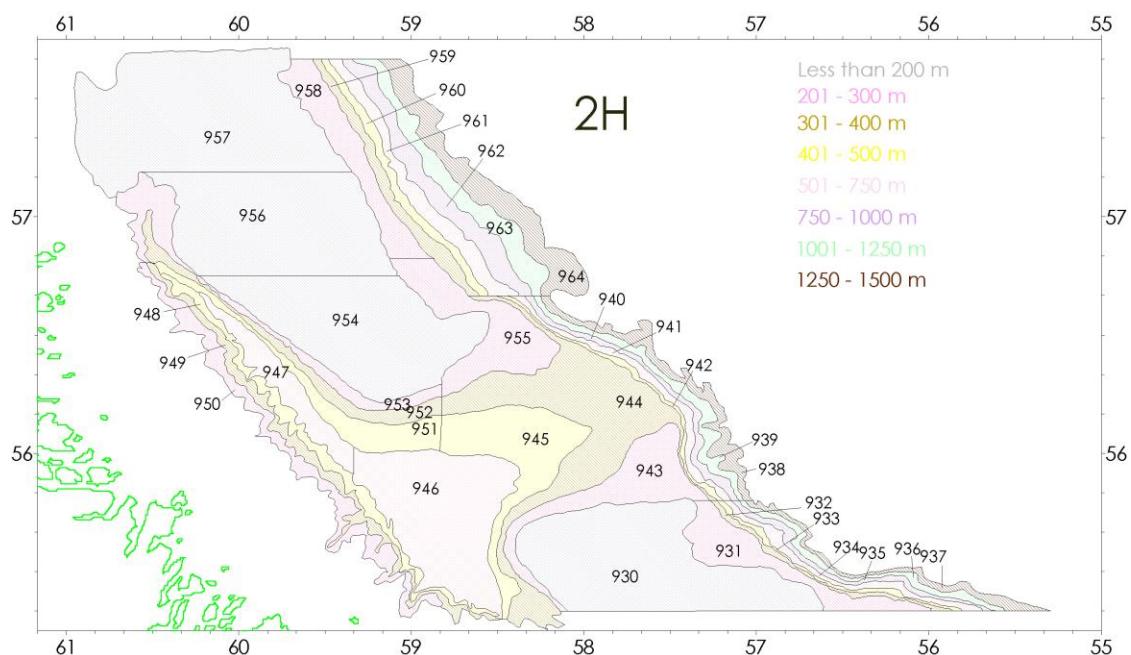


Fig 2. Stratification of Div. 2H

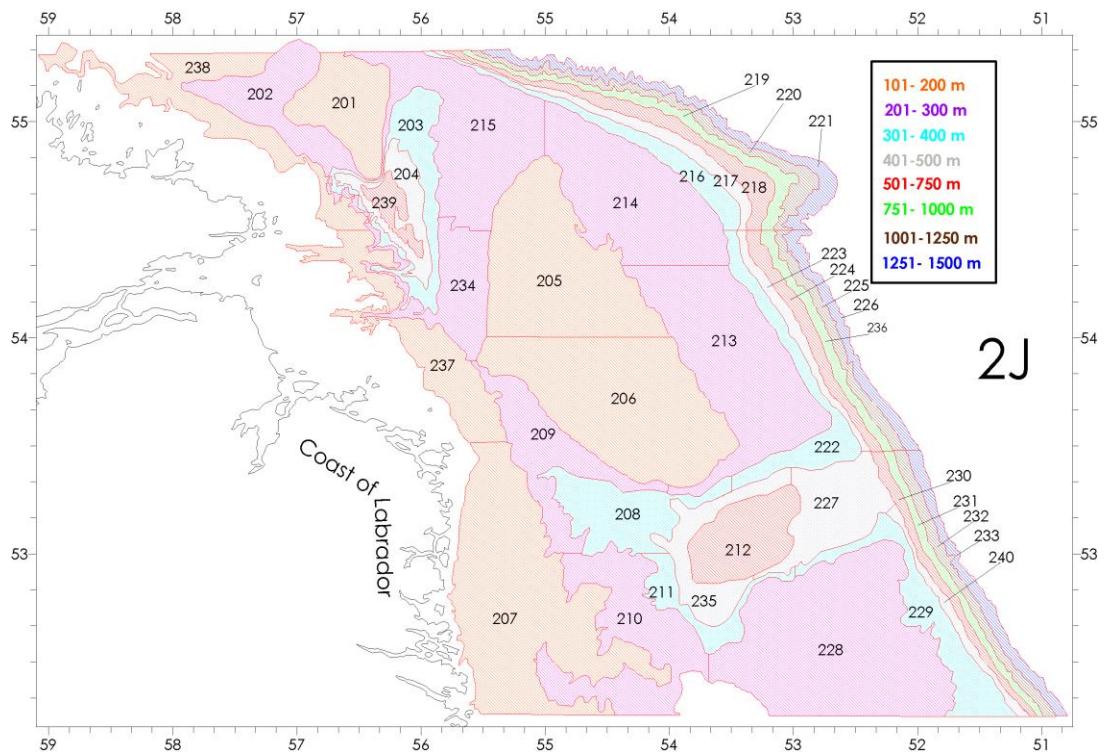


Fig 3. Stratification of Div. 2J

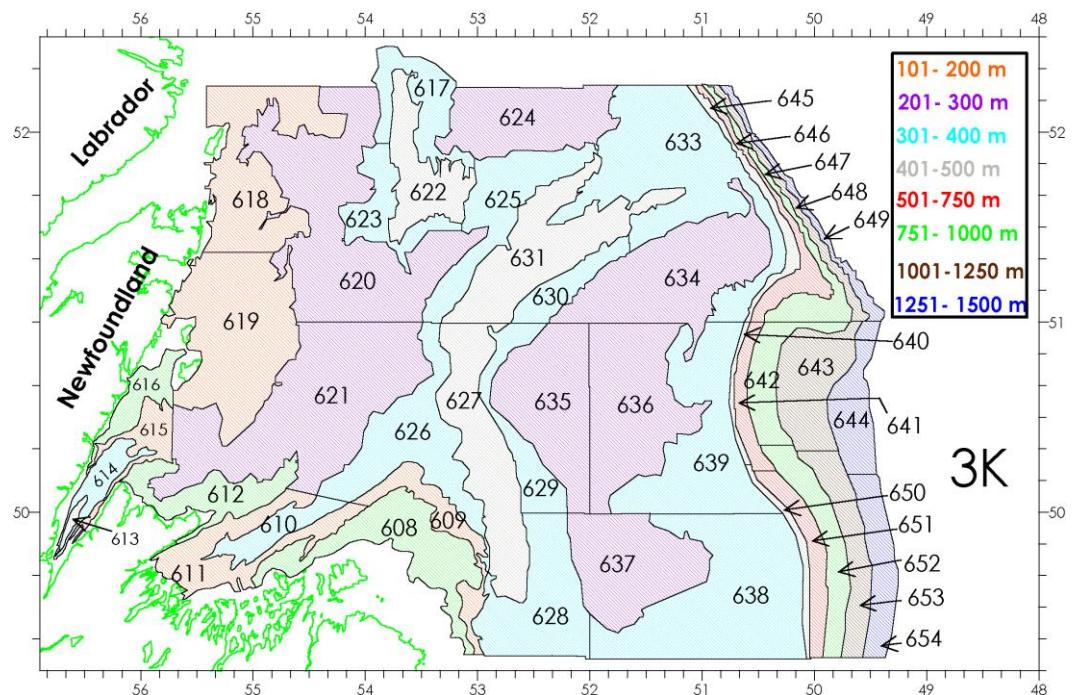


Fig 4. Stratification of Div. 3K

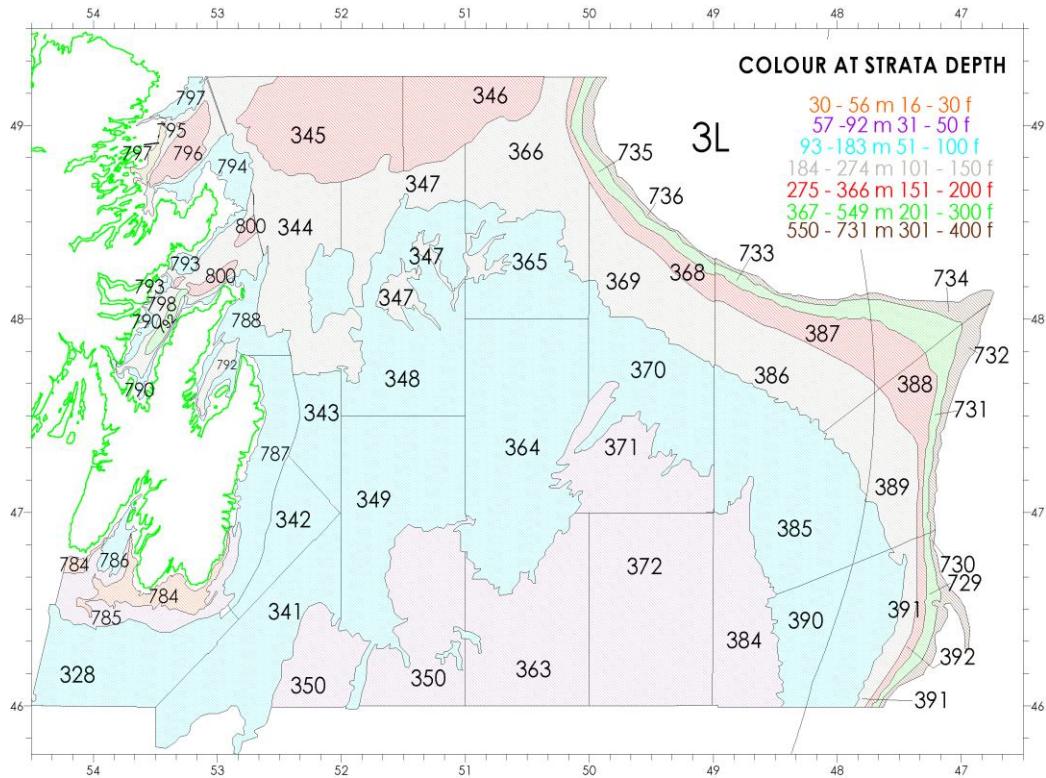


Fig 5. Stratification of Div. 3L

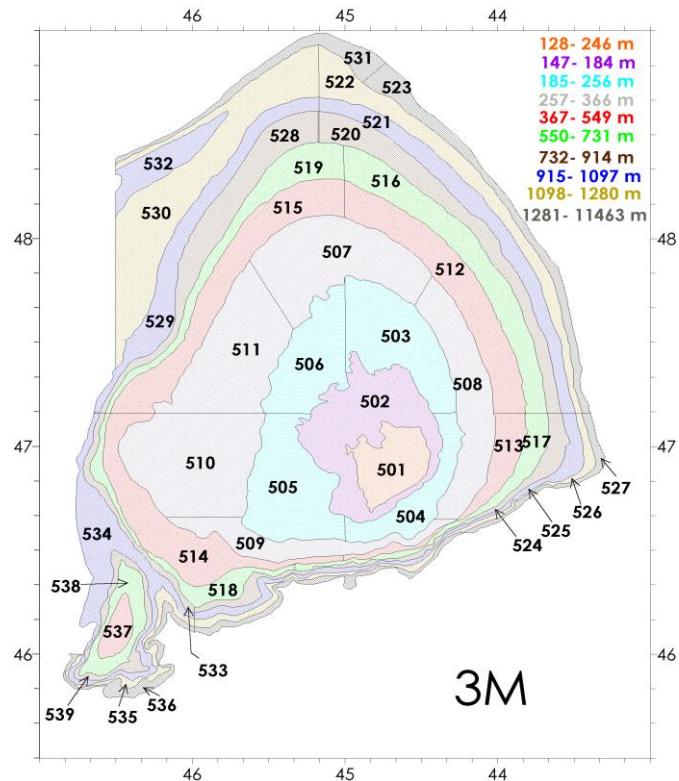
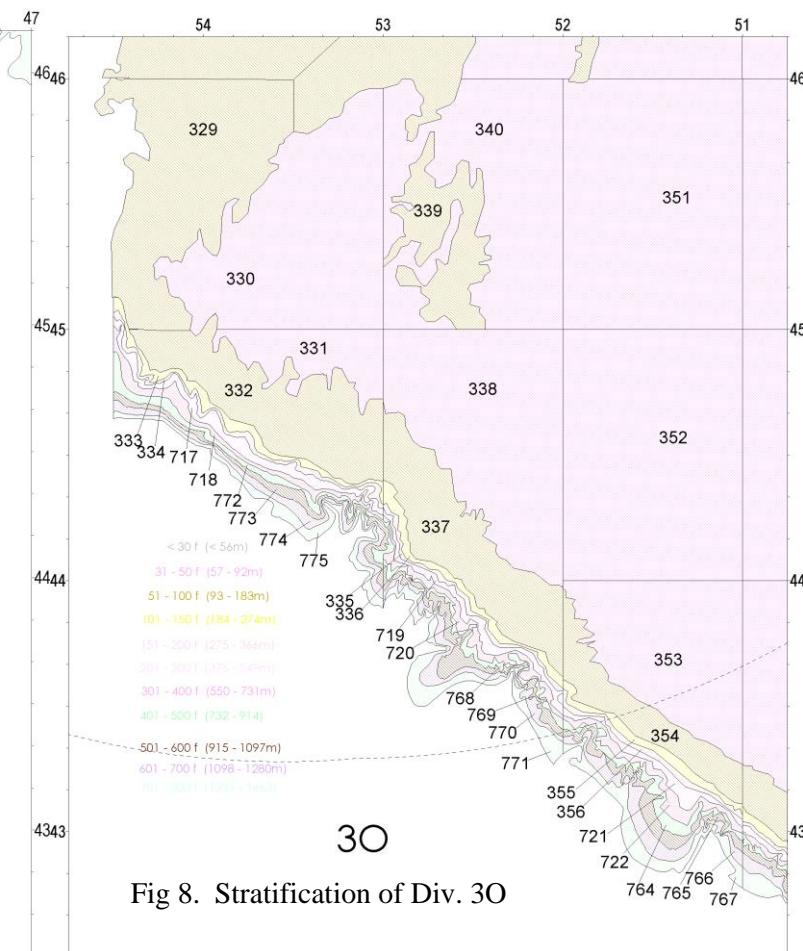
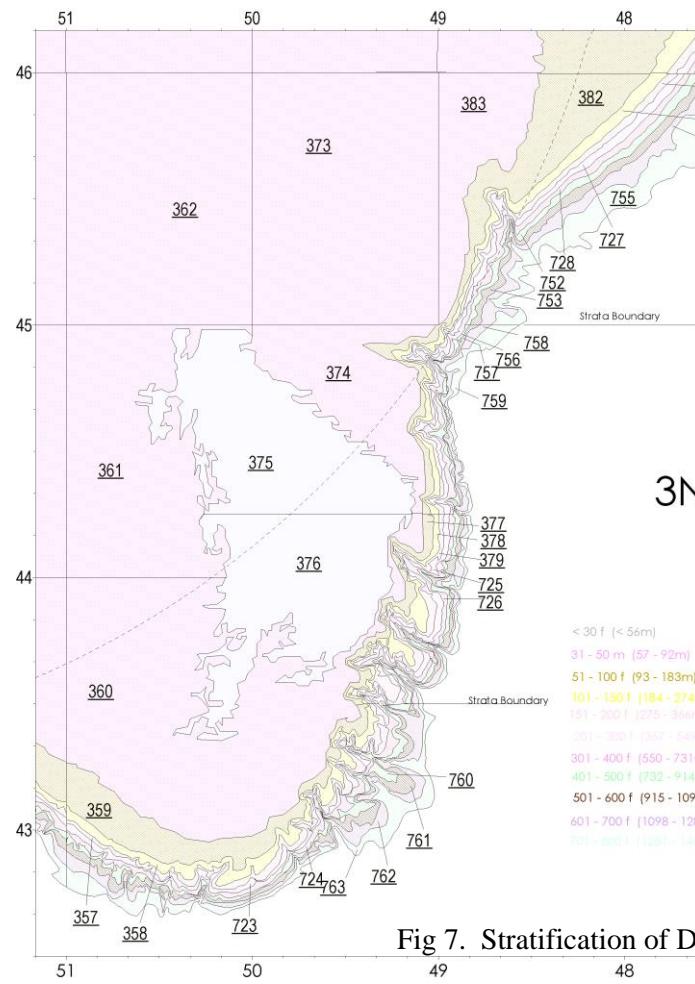


Fig 6. Stratification of Div. 3M



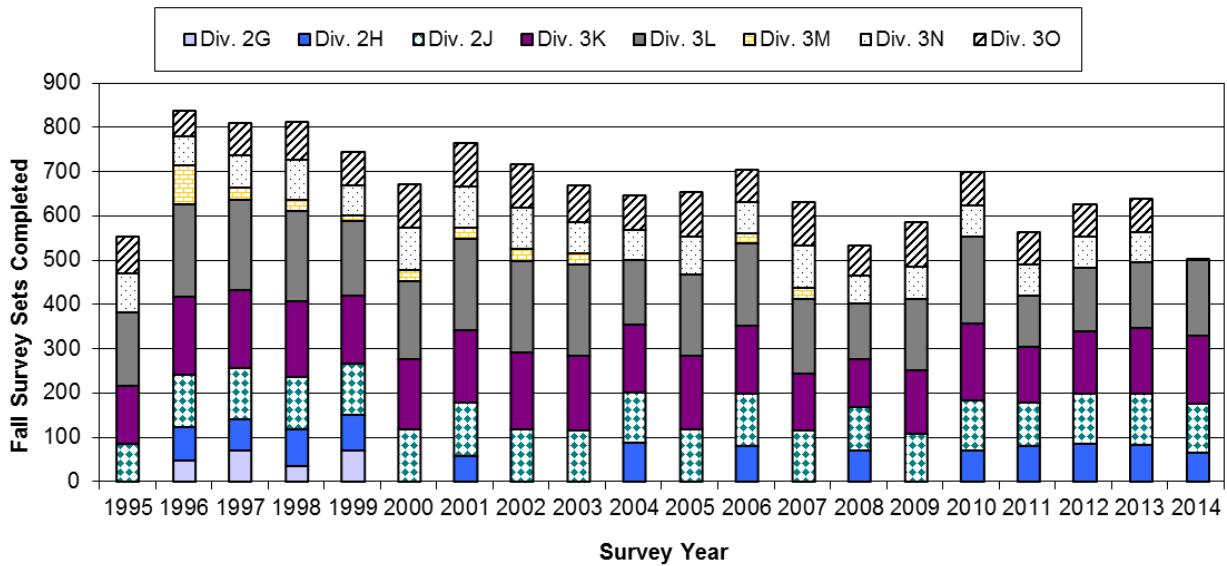


Figure 9a. Number of successful fall survey sets, by NAFO Division, 1995-2014.

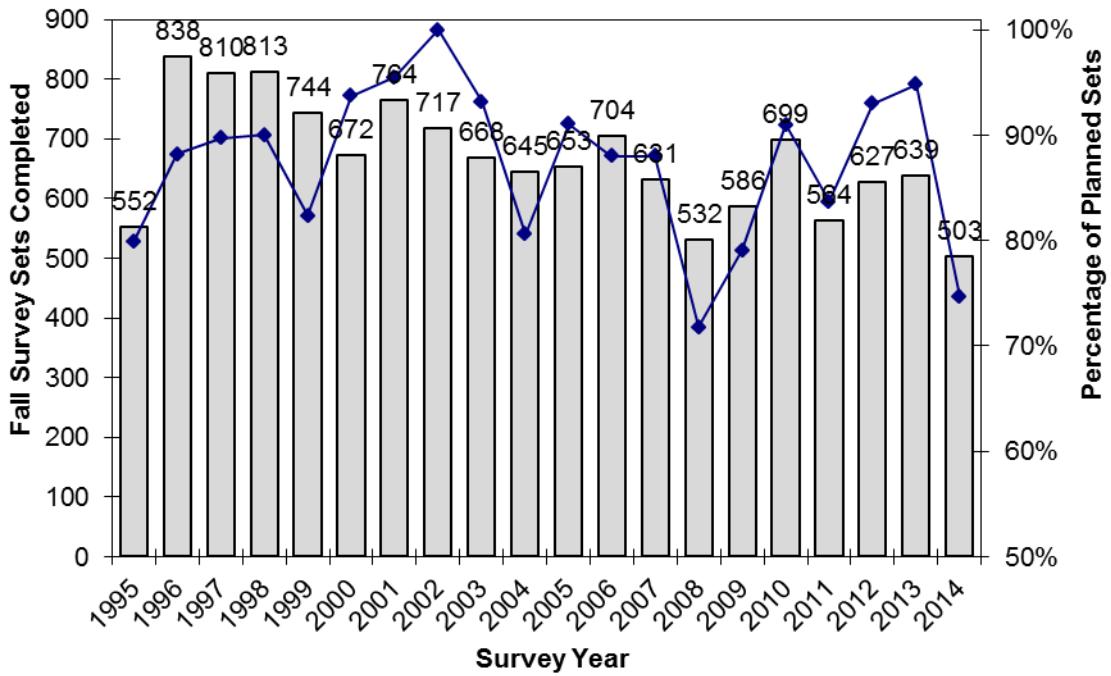


Figure 9b. Number of successful fall survey sets (bars with numbers), with percent of allocated sets realized (diamonds, joined line).

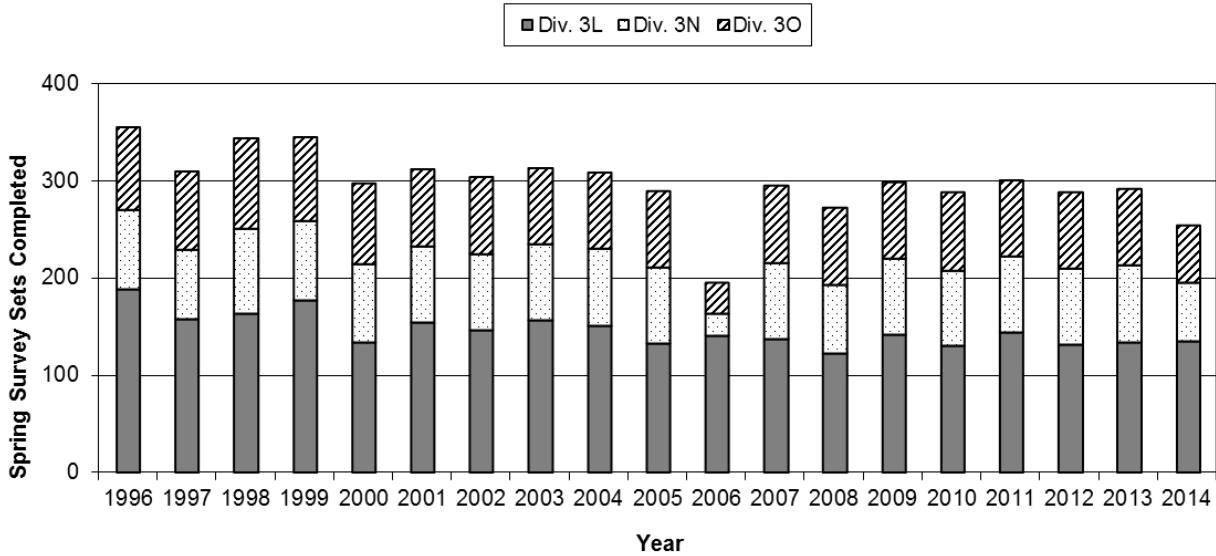


Figure 10a. Number of successful spring survey sets, by NAFO Division, 1996-2014.

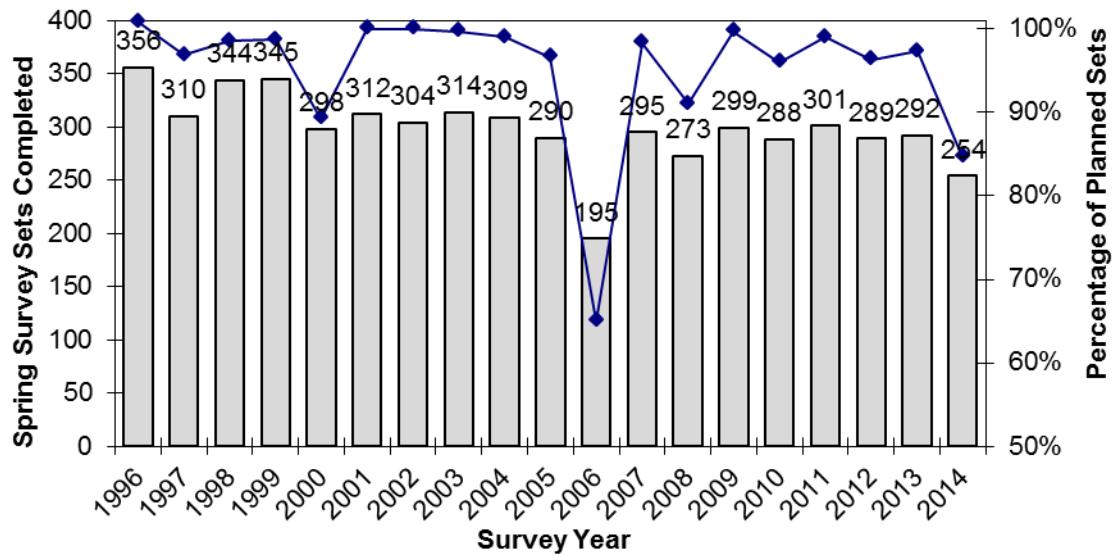


Figure 10b. Number of successful spring survey sets (bars), with percent of allocated sets realized (diamonds).

(These figures exclude the inshore strata of Div. 3L, which are included in the annual allocations but are considered of lower priority and rarely covered.)