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Performance and description of Canadian multi-species surveys in
NAFO subarea 2 + Divisions 3KLMNO, with emphasis on 2009-2011.

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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 2009-2011. Noteworthy issues include modifications to survey density, some prioritizing of survey efforts, and coverage shortfalls during fall surveys. 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 documents by Healey and Brodie (2009), Brodie and Stansbury (2007), Brodie (2005), and references therein.

These surveys are stratified by depth range, and stratification maps of Divs. 2GHJ3KLMNO are illustrated in Figs. 1-8. Survey "sets" (a sample taken at a randomly selected sampling unit) for this random-stratified survey 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, has recently been decommissioned.

Focus herein is upon the performance of the spring and fall surveys in 2009-2011, 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 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 in each of 2009-2011 were also tabulated. For comparative purposes, we include similar information 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 completed, tabulations of the number of sets allocated per division and survey were compiled to demonstrate slight changes to the intensity of the fall survey in recent years, and to also provide a comparison with the number of sets realized.

Fall Surveys

Division 2G has not been surveyed since 1999 and is excluded from the present survey design. 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. Divisions 2J3KLMNO are covered annually, and the entire survey is generally conducted from early-October to mid-December.

The overall density of the Canadian fall survey was altered slightly prior to the beginning of the 2008 survey (Healey and Brodie, 2009). The number of sets allocated for the fall 2008 survey was decreased by approximately 7.5% from 800 to 741 compared to the allocation throughout Divs. 2HJ3KLMNO in prior years. The reduction was implemented for two reasons. First, continual mechanical problems with research vessels in recent years lead to a significant reduction in the realized number of sampling sets compared to the total number of sets allocated (Table

1). Secondly, a program of expanded sampling of numerous “non-commercial” species to gain a broader perspective on ecosystem dynamics and trends in support of an Ecosystem Research Initiative (ERI) was initiated during 2008.

For the fall 2009 survey, the total number of sets allocated was maintained at 741. Div. 2H was not scheduled to be sampled during 2009 as per the biennial sampling design and it was excluded during this year, resulting in an overall per-capita increase in the number of sets planned for remaining divisions, to levels even higher than when 800 total sets were allocated.

During the fall 2010 survey, allocations for Divisions 2J3KLNO were restored to the levels of 2007 and prior years. The allocation for Div. 2H was slightly less than intended for that year and was inadvertently maintained at the 2008 level – the most recent year in which 2H had been covered and Div. 3M was excluded from the survey design entirely. In total, 768 sets were allocated for completion.

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+34 planned sets) 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.) 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 time 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. In the time remaining it would not have been possible to fully cover the remaining planned areas. 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 drop 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.

Spring Surveys

Spring survey allocations have been consistent during recent years. A total of 334 sets are allocated annually, which includes 34 sets within the inshore strata of Div. 3L. During the spring surveys, these sets are considered of lower priority and are 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.

Results and Discussion

A synopsis of the successful sets during fall surveys over 1995-2011 (Table 2; see also Fig. 9a) indicates that challenges in completing fall surveys have continued over 2009-2011. Although the set counts and completion rate were much improved in 2010, there were significant shortfalls in both 2009 and 2011. The total number of completed sets in 2009 and 2011 were among the lowest for the Campelen time-series – only the surveys of 1995 and 2008 had less sets realized. Divisionally, the greatest impact in both years was with Divs. 2J3KL, particularly so in 2011. Just 340 sets were completed in Divs. 2J3KL in 2011, the second lowest in the time-series.

Detailed examination of coverage in the 2009-2011 fall surveys (Table 3) identifies where some of the gaps exist. In 2009, the inshore strata in Divs. 3KL (Div 3L: strata 784-800; Div. 3K: strata 608-616) and eight deep-water strata in Div. 3N were not completed. Only partial coverage of the inshore strata was attained during 2010. In addition, the deep-water portions of Divs. 3NO were not covered, plus six strata were not fully completed (2H-937, 2H-948, 2H-949, 2H-950, 3N-378 and 3N-725). 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. Comparison of intended versus realized sets (Fig. 9b) indicate completion rates of 79%, 91%, and 84%, respectively during 2009 to 2011.

In contrast to fall survey extensions into January during the mid-2000s, surveys of 2009-2011 were conducted within the normal timeframe. One anomaly was that during the fall of 2010, the survey within Div. 3O was a couple of weeks later than normal.

In the spring surveys of 2009-2011, the number of sets completed (Table 4; see also Fig. 10a) are quite good – the percentage of intended sets completed over 1996-2011 has averaged 96%. Although the 2010 survey had the third lowest set count for this time-series, only twelve fewer sets than the total allocation were completed. With the exception of the 2006 survey, spring surveys have generally been fully completed (Fig. 10b). The completion rate of the spring surveys of the past three years are 100%, 96%, and 99%, respectively. Mechanical difficulties with the CCGS *Alfred Needler* in 2009 required the utilization of the CCGS *Teleost*, which completed 81 of the 299 successful sets over Divs. 3LNO.

Set counts by stratum for spring surveys in 2009-2011 (Table 5) show that the only coverage issues were two incomplete strata within Div. 3L during 2010 (strata 343 and 729), and two incomplete strata during 2011 (3L-732 and 3O-720). The timing of the recent spring surveys was within the typical range.

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 has not been a major issue in recent

surveys, however, there was some variation over 2009-2011 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 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 (eg. Greenland Halibut, Witch Flounder and Grenadiers), but the survey information from these areas is not 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 approximately 80 sets. Although coverage of the deep-water in Divs. 3NO has been cancelled (approximately 50 planned sets), a concern is that the survey design at present has very limited scope for further cutbacks 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 the fall of 2011, none of these areas were covered (of the three, only the Div. 3KL inshore strata were planned) and due to delays arising from vessel mechanical problems compounded by unusually poor weather, significant reductions to the number of planned sets in Divs. 2J3KL were required mid-survey. 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 such in-situ 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 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 and 2011 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 2006-2011.

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

*Does not reflect survey allocation reductions made Nov 16/2011 across Divs. 2J3KL (96 planned sets excluded). Refer to text for additional detail.

		Spring Surveys				
		Year				
Division	2006	2007	2008	2009	2010	2011
3L*	176	176	176	176	176	176
3N	79	79	79	79	79	79
3O	79	79	79	79	79	79
Total	334	334	334	334	334	334

*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.

Table 2. Summary of successful sets, Canadian fall surveys 1995-2011. Depths surveyed by each vessel given in meters, number of sets appear in parentheses.

Year	Division	Ship			Total	Year	Division	Ship			Total
		Teleost	W. Templeman	A. Needler				Teleost	W. Templeman	A. Needler	
1995	2G	Not surveyed in 1995				2004	2G	Not surveyed in 2004			
	2H						2H	109-1415 (87)			87
	2J	145-948 (84)			84		2J	127-1365 (115)			115
	3K	166-1444 (31) 162-494 (100)			131		3K	112-1412 (135) 212-549 (16)			151
	3L	733-1210 (5) 63-640 (161)			166		3L	151-522 (4) 44-653 (143)			147
	3M	Not surveyed in 1995					3M	Not surveyed in 2004			
	3N	40-650 (90)			90		3N	40-659 (69)			69
3O	63-730 (81)			81	3O	63-634 (76)			76		
1995 fall survey extended into January 1996 (66 sets)					552	2004 fall survey extended into February 2005 (36 sets)					645
1996	2G	127 - 1436 (47)			47	2005	2G	Not surveyed in 2005			
	2H	122 - 1415 (77)			77		2H				
	2J	126 - 1410 (117)			117		2J	118-1427 (108) 172-416 (9)			117
	3K	111 - 1368 (115) 126 - 472 (60)			175		3K	150-1334 (26) 136-669 (141)			167
	3L	805 - 1433 (31) 51 - 671 (180)			211		3L	803-1351 (7) 50-706 (120) 121-667 (57)			184
	3M	784 - 1400 (18) 127 - 707 (68)			86		3M	Not surveyed in 2005			
	3N	390 - 1147 (13) 37 - 309 (54)			67		3N	776-1445 (17) 42-633 (69)			86
3O	68 - 690 (24) 65 - 139 (19) 63 - 304 (15)			58	3O	754-1410 (24) 69-649 (75)			99		
					838	2005 fall survey extended into January 2006 (86 sets)					653
1997	2G	201-1209 (69)			69	2006	2G	Not surveyed in 2006			
	2H	220-1382 (71)			71		2H	107-1437 (81)			81
	2J	123-1488 (117)			117		2J	107-1443 (117)			117
	3K	143-1431 (155) 117-421 (20)			175		3K	153-1384 (93) 109-480 (61)			154
	3L	161-1436 (71) 35-714 (134)			205		3L	111-1401 (34) 61-641 (151)			185
	3M	799-1379 (26)			26		3M	756-1352 (23)			23
	3N	41-769 (74)			74		3N	46-650 (70)			70
3O	62-611 (73)			73	3O	63-674 (74)			74		
					810						704
1998	2G	143-1488 (34)			34	2007	2G	Not surveyed in 2007			
	2H	98-1473 (83)			83		2H				
	2J	126-1398 (118)			118		2J	127-1494 (115)			115
	3K	122-1415 (154) 121-346 (17)			171		3K	145-1358 (92) 149-683 (37)			129
	3L	691-1437 (32) 34-675 (172)			204		3L	81-1424 (48) 61-694 (120)			168
	3M	768-1436 (26)			26		3M	768-1404 (26)			26
	3N	834-1447 (12) 37-1079 (78)			90		3N	775-1419 (25) 48-652 (69)			94
3O	82-1076 (87)			87	3O	753-1410 (24) 64-632 (75)			99		
					813						631
1999	2G	142-1415(69)			69	2008	2G	Not surveyed in 2008			
	2H	104-1454(81)			81		2H	114-1392 (69)			69
	2J	109-1375(115)			115		2J	253-1422 (20) 125-630 (79)			99
	3K	146-1477(154)			154		3K	839-1439 (10) 147-608 (52) 148-455 (46)			108
	3L	1366(1) 63-1407 (169)			170		3L	62-664 (83) 71-332 (43)			126
	3M	853-1403(12)			12		3M	Not surveyed in 2008			
	3N	39-664(68)			68		3N	38-643 (64)			64
3O	58-692(75)			75	3O	60-661 (66)			66		
					744						532
2000	2G	Not surveyed in 2000				2009	2G	Not surveyed in 2009			
	2H						2H				
	2J	127-1400 (117)			117		2J	111-1325 (108)			108
	3K	113-1379 (159)			159		3K	135-1412(92) 150-469 (51)			143
	3L	152-1430 (74) 42-447 (102)			176		3L	784-1385 (30) 62-682 (130)			160
	3M	764-1401 (26)			26		3M	Not surveyed in 2009			
	3N	747-1419 (24) 46-642 (70)			94		3N	798-1409 (11) 42-708 (64)			75
3O	752-1424 (24) 62-654 (76)			100	3O	768-1397 (24) 48-696 (76)			100		
					672						586
2001	2G	Not surveyed in 2001				2010	2G	Not surveyed in 2010			
	2H	999-1466 (8)			8		2H	95-1451 (70)			70
	2J	120-1389 (49)			120		2J	109-1397 (113)			113
	3K	146-1479 (106) 128-439 (55) 170-252 (4)			165		3K	140-1442 (111) 123-478 (62)			173
	3L	146-1457 (34) 38-702 (169) 187-203 (2)			205		3L	100-1448 (55) 58-657 (141)			196
	3M	763-1407 (26)			26		3M	Not surveyed in 2010			
	3N	739-1410 (24) 45-660 (70)			94		3N	855-1219 (4) 40-614 (68)			72
3O	803-1391 (22) 67-703 (75)			97	3O	61-667 (75)			75		
					764						699
2002	2G	Not surveyed in 2002				2011	2G	Not surveyed in 2011			
	2H						2H	91-1480 (79)			79
	2J	102-1372 (98) 136-572 (19)			117		2J	132-1411 (99)			99
	3K	156-1395 (64) 121-481 (111)			175		3K	139-1429 (125)			125
	3L	763-1431 (30) 35-670 (176)			206		3L	201-529 (12) 61-663 (104)			116
	3M	818-1403 (26)			26		3M	Not surveyed in 2011			
	3N	811-1429 (24) 44-675 (70)			94		3N	43-673 (70)			70
3O	775-1504 (24) 65-696 (75)			99	3O	64-692 (75)			75		
2002 fall survey extended into January 2003 (128 sets)					717						564
2003	2G	Not surveyed in 2003				2003 fall survey extended into January 2004 (210 sets)					
	2H										
	2J	123-1404 (116)			116						
	3K	151-1474 (118) 115-489 (50)			168						
	3L	753-1446 (30) 32-702 (175)			205						
	3M	795-1455 (26)			26						
	3N	43-727 (70)			70						
3O	761-1382 (8) 63-650 (75)			83							
					668						

Table 3. Summary of successful sets, Canadian spring surveys 1996-2011. Depths surveyed by each vessel given in meters, number of sets appear in parentheses.

Year	Division	Ship	Total	Year	Division	Ship	Total
		<i>W. Templeman</i>				<i>W. Templeman</i>	
1996	3L	66-664	188	2004	3L	47-710	151
	3N	42-665	82		3N	44-675	79
	3O	65-685	86		3O	61-636	79
			356				309
1997	3L	60-681	158	2005	3L	64-672	133
	3N	35-689	71		3N	45-691	78
	3O	62-669	81		3O	66-719	79
			310				290
1998	3L	53-721	163	2006	3L	60-701	141
	3N	38-682	88		3N	46-77 ¹	22
	3O	64-657	93		3O	64-103 ¹	32
			344				195
1999	3L	41-692	177	2007	3L	61-702 ²	137
	3N	40-659	82		3N	44-636	79
	3O	62-679	86		3O	64-719	79
			345				295
2000	3L	61-681	134	2008	3L	60-684 ³	122
	3N	45-664	81		3N	40-623	71
	3O	61-694	83		3O	64-704	80
			298				273
						<i>A. Needler</i> ⁴	
2001	3L	34-695	154	2009	3L	61-694 ⁵	142
	3N	40-650	79		3N	44-668	78
	3O	74-699	79		3O	64-674	79
			312				299
2002	3L	42-710	146	2010	3L	59-715	130
	3N	40-641	79		3N	39-714	78
	3O	63-628	79		3O	60-673	80
			304				288
2003	3L	62-698	156	2011	3L	57-723	144
	3N	39-681	79		3N	40-673	79
	3O	63-726	79		3O	63-716	78
			314				301

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

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

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

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

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

Table 4a. Number of successful fall survey sets in Division 2G over 1996-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.nmi.)	Depth (m)	Survey Year			
			1996	1997	1998	1999
			Se 30 - Oc 8	Oct 1-9	Oct 1-7	Oct 12-27
901	1213	201-300	4	8	1	5
902	120	301-400	2	3	2	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	3
909	2773	<=200	8	0	2	12
910	2339	<=200	6	0	2	9
911	692	201-300	3	5	3	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	0
920	172	751-1000	1	1	0	0
921	142	501-750	1	2	1	2
922	186	401-500	0	2	1	2
923	186	301-400	2	2	0	2
924	756	201-300	2	5	0	3
925	1804	<=200	4	0	1	4
926	433	201-300	2	3	0	2
927	832	301-400	2	6	0	2
928	783	401-500	3	3	0	2
929	1261	501-750	3	8	0	0
Annual Total	16749		47	69	34	69

Table 4b. Number of successful fall survey sets in Division 2H over 1996-2011. (Dates of first and last set in each year listed under survey year.)

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

Table 4c. Number of successful fall survey sets in Division 2J over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
			De 4 - Ja 22	Oc 22 - No 7	Oc 19 - No 4	Oc 20 - No 4	Nov 6-25	Nov 1-14	No 21 - Dec 8	De 7 - Ja 12	Dec 1-17	Oc 27 - No 11	No 17-De 16	Oc 20-No 14	Nov 1-30	No 7 - De 7	Nov 5-23	Oc 21-No 15	Oc 28-No 26
201	633	<=200	0	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	
203	487	301-400	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	
205	1594	<=200	0	6	6	6	6	6	6	6	6	6	6	6	5	5	6	4	
206	1870	<=200	5	7	7	7	7	7	7	7	7	7	7	7	6	6	7	5	
207	2264	<=200	8	9	9	9	9	9	9	9	9	8	9	9	8	8	7	5	
208	588	301-400	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	2	3	2	
210	1035	201-300	3	4	4	4	4	4	4	4	4	4	4	4	3	3	4	3	
211	251	301-400	2	2	2	2	2	2	3	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	
213	1583	201-300	6	6	6	6	6	6	6	6	6	6	6	6	5	5	6	5	
214	1341	201-300	4	5	5	5	5	5	6	5	5	5	5	5	4	5	5	4	
215	1302	201-300	2	5	5	5	5	5	5	5	5	5	5	5	4	4	4	4	
216	360	301-400	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	
218	362	501-750	3	2	2	3	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	0	2	2	2	
220	303	1001-1250	0	2	2	2	1	2	2	2	2	2	2	2	0	2	2	2	
221	330	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	
222	450	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	
223	158	501-750	2	2	2	2	2	1	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	
225	195	1001-1250	0	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	0	2	2	2	
227	598	501-750	2	2	2	2	2	3	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	7	7	8	6	
229	536	301-400	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	
231	186	751-1000	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	
233	237	1251-1500	0	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	
235	414	501-750	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	1	2	2	2	
237	733	<=200	3	3	3	3	3	3	4	3	3	3	3	3	2	2	3	0	
238	778	<=200	0	3	3	3	2	3	3	3	2	3	3	3	2	3	2	3	
239	120	501-750	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	
Annual Total	25272		84	117	117	118	115	117	120	117	116	115	117	117	115	99	108	113	99

Table 4d. Number of successful fall survey sets in Division 3K over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																	
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
			No 28 - Ja 25	Nov 7-26	No 4- De 19	Nov 4-30	No 20 - De 11	No 14 - De 18	No 27 - De 18	De 1 - Ja 14	De 17 - Ja 31	No 13 - Fe 1	No 24-Ja 28	No 6-De 21	No 22-De 16	No 11 - De 21	No 18-De 13	No 15-De 17	No 11 -De 19	
608	798	<=200	0	3	3	3	0	3	2	3	2	3	2	3	0	1	0	4	0	
609	342	201-300	0	2	2	2	0	2	2	2	2	2	2	2	0	1	2	2	0	
610	256	301-400	0	2	2	2	0	2	2	2	2	2	2	0	0	0	2	0		
611	573	201-300	0	3	3	2	0	2	2	2	2	2	2	0	0	0	2	0		
612	445	<=200	0	2	2	2	0	2	2	2	2	2	2	0	0	0	2	0		
613	30	501-750	0	2	2	2	0	2	2	2	2	2	2	0	0	0	2	0		
614	263	301-400	0	2	2	2	0	2	2	2	2	2	2	0	0	0	2	0		
615	251	201-300	0	2	2	2	0	2	2	2	2	2	2	0	0	0	2	0		
616	250	<=200	0	2	2	2	0	2	2	2	2	1	2	0	0	0	0	0		
617	593	301-400	2	3	3	3	3	3	3	3	3	3	3	2	2	2	3	2		
618	1347	<=200	5	6	6	4	6	6	3	6	4	6	6	5	6	5	5	3		
619	1753	<=200	4	7	7	6	6	8	8	8	6	8	8	4	7	7	8	2		
620	2545	201-300	3	11	11	11	11	11	11	11	11	8	11	11	7	3	10	11		
621	2537	201-300	6	11	11	11	11	11	11	11	11	8	10	11	7	9	8	11		
622	691	501-750	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2		
623	494	301-400	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	3	4	5	4		
625	888	301-400	3	4	4	4	4	4	4	4	4	4	4	4	2	4	4	3		
626	1113	301-400	4	5	5	5	5	5	4	5	5	4	5	5	2	4	4	4		
627	1255	501-750	5	5	5	5	5	5	3	5	5	4	5	4	4	5	5	4		
628	1085	301-400	5	5	5	5	5	5	3	5	5	5	5	3	4	4	5	4		
629	495	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2		
630	332	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2		
631	1321	501-750	5	6	6	6	6	6	10	6	6	4	5	6	6	2	5	6		
633	2067	301-400	8	9	9	9	9	9	9	9	9	9	8	9	5	8	9	7		
634	1555	201-300	7	7	7	7	7	7	7	7	5	2	7	6	7	2	6	7		
635	1274	201-300	6	5	5	5	5	5	5	5	5	2	3	1	2	5	5	5		
636	1455	201-300	7	6	6	6	6	6	6	6	6	3	5	3	3	4	6	6		
637	1132	201-300	5	5	5	5	5	1	5	5	5	5	5	4	3	4	4	5		
638	2059	301-400	9	9	9	9	9	8	5	8	9	9	9	9	5	9	7	9		
639	1463	301-400	7	6	6	6	7	3	5	6	6	3	5	3	6	3	6	6		
640	69	501-750	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	1	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		
643	733	1001-1250	3	3	3	3	3	2	3	3	3	3	3	3	0	3	3	2		
644	474	1251-1500	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2		
645	216	501-750	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		
647	360	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2		
648	228	1001-1250	0	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2		
649	212	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2		
650	134	501-750	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2		
651	359	501-750	2	2	2	2	2	1	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		
653	531	1001-1250	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	1	2	2	2		
Annual Total	37051		131	175	175	171	154	159	165	175	168	151	167	154	129	108	143	173	125	

Table 4e. Number of successful fall survey sets in Division 3L over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
			Oct 3 - Ja 25	Oct 9 - De 5	Oct 23 - De 20	Nov 2 - De 15	Nov 7 - De 12	Oct 24 - De 18	Oct 4 - De 6	Oct 23 - De 2	Nov 7 - Ja 20	Nov 24 - De 15	Oct 29 - Ja 29	Oct 21 - De 18	Oct 16 - De 20	Nov 1 - 13	Nov 1 - De 20	Oct 29 - De 20	Nov 2 - De 18
328	1519	92-183	6	5	5	5	5	5	5	5	5	5	5	5	5	3	4	5	5
341	1574	92-183	6	6	4	5	5	5	5	5	5	4	5	5	4	5	5	5	5
342	585	92-183	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	2	2	2	2	2
344	1582	184-274	5	6	5	5	5	3	4	5	5	5	5	5	4	3	4	5	2
345	1432	275-366	7	5	5	5	5	3	5	5	5	5	5	5	5	4	4	4	3
346	865	275-366	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3
347	983	184-274	4	3	3	3	3	3	3	3	3	2	3	3	2	3	3	3	2
348	2120	92-183	7	7	7	6	7	4	7	7	7	7	7	7	7	6	6	7	5
349	2114	92-183	9	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7	7
350	2071	56-91	8	7	7	7	7	7	7	7	7	7	7	7	6	6	6	7	7
363	1780	56-91	7	6	6	6	6	4	6	6	6	6	6	6	6	5	5	6	5
364	2817	92-183	9	10	9	9	9	2	9	9	9	9	9	9	9	8	8	9	7
365	1041	92-183	4	4	3	3	3	1	3	3	3	0	3	3	3	3	3	3	2
366	1394	184-274	5	5	5	5	5	2	5	5	5	0	5	5	5	4	4	5	4
368	334	275-366	2	3	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2
369	961	184-274	3	2	3	3	3	2	3	3	3	0	3	3	3	3	3	3	2
370	1320	92-183	5	4	4	4	4	4	4	4	4	1	4	4	4	4	4	4	3
371	1121	56-91	5	4	4	4	4	3	4	4	4	4	4	4	4	3	3	4	3
372	2460	56-91	10	9	8	8	8	2	8	8	8	8	8	8	8	8	7	8	6
384	1120	56-91	5	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4	3
385	2356	92-183	9	9	8	8	8	8	8	8	8	8	8	8	8	7	7	8	6
386	983	184-274	4	3	3	3	3	3	3	3	3	0	3	3	3	3	3	3	2
387	718	275-366	3	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2
388	361	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
389	821	184-274	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	2
390	1481	92-183	6	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	4
391	282	184-274	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
729	186	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
730	170	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
731	216	367-549	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
732	231	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
733	468	367-549	2	3	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	0	2	2	2	2	2	2	2
735	272	367-549	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2
736	175	550-731	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2
737	227	732-914	2	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
738	221	915-1097	2	2	2	2	2	2	2	2	2	0	1	2	2	2	2	2	0
739	254	1098-1280	1	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
740	264	1281-1463	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
741	223	732-914	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
742	206	915-1097	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
743	211	1098-1280	0	2	2	2	2	3	2	2	2	0	2	2	2	0	2	2	0
744	280	1281-1463	0	2	2	2	2	1	2	2	2	0	2	2	2	0	2	2	0
745	348	732-914	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
746	392	915-1097	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
747	724	1098-1280	0	3	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
748	159	732-914	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	0
749	126	915-1097	0	2	2	2	2	1	2	2	2	0	0	1	2	2	2	2	0
750	556	1098-1280	0	2	2	2	2	2	2	2	2	0	0	1	2	0	2	2	0
751	229	1281-1463	0	2	2	2	2	1	2	2	2	0	0	0	2	0	2	2	0
784	268	<=55	0	2	2	2	2	0	2	2	2	2	0	0	0	0	0	0	0
785	465	56-91	0	2	2	2	2	0	2	2	2	2	2	0	0	0	0	0	0
786	84	92-183	0	2	2	2	2	0	2	2	2	2	2	0	0	0	0	0	0
787	613	92-183	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	1
788	261	92-183	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	2
789	72	275-366	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	0
790	89	92-183	0	2	2	2	2	0	2	2	2	2	2	0	0	0	0	0	2
791	227	184-274	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	2
792	50	367-549	0	2	2	2	2	0	2	2	2	2	2	0	0	0	0	0	2
793	72	92-183	0	2	2	2	2	0	2	2	2	2	2	0	0	0	0	1	2
794	216	92-183	0	2	2	2	2	0	1	2	2	2	2	2	0	0	0	0	2
795	164	184-274	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	2
796	175	275-366	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	2
797	98	92-183	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	2
798	100	275-366	0	2	2	2	2	0	2	2	2	2	2	0	0	0	0	0	2
799	72	92-183	0	2	2	2	2	0	2	2	2	2	2	2	0	0	0	0	2
800	81	275-366	0	0	2	2	2	0	2	2	2	2	2	2	1	0	0	2	2
Annual Total	46338		166	211	205	204	170	176	205	206	205	147	184	185	168	126	160	196	116

Table 4f. Number of successful fall survey sets in Division 3M over 1995-2011. 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	1997	1998	1999	2000	2001	2002	2003	2006	2007								
			Se 25 - De 4	Dec 1-15	Dec 9-13	Dec 11-12	Oct 24-29	Oct 8-13	Oct 24 - No 5	Jan 13-18 (2)	No 26 - De 2	Oc 16-29								
501	342	<=146	2																	
502	838	147-183	6																	
503	628	184-256	4																	
504	348	184-256	2																	
505	703	184-256	5																	
506	496	184-256	3																	
507	822	257-366	5																	
508	646	257-366	4																	
509	314	257-366	2																	
510	951	257-366	6																	
511	806	257-366	5																	
512	670	367-549	4																	
513	249	367-549	2																	
514	602	367-549	4																	
515	666	367-549	3																	
516	634	550-731	4																	
517	216	550-731	2																	
518	210	550-731	2																	
519	414	550-731	3																	
528	530	732-914	2	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
529	488	915-1097	2	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
530	1134	1098-1280	2	7	7	5	7	7	7	7	7	7	7	7	7	7	7	7	7	7
531	203	1281-1463	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
532	238	915-1097	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
533	98	732-914	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2
534	486	915-1097	2	3	3	0	3	3	3	3	3	3	3	3	2	3	2	3	3	3
535	92	1098-1280	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2
536	112	1281-1463	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annual Total	13936		86	26	26	12	26	26	26	26	26	26	26	23	26					

Table 4g. Number of successful fall survey sets in Division 3N over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
			Se 27 - Oc 26 No 25 - De 13	Oc 8 - No 5	Oc 16 - De 16 Nov 3-22	Oc 17 - De 5	Se 28 - Oc 29 Oct 13-26	Oc 21 - No 7 Nov 11-23	Oc 10-No 19 Oct 12-21	Oc9-No14	Oc 24 - No 1 Oc 24-No 12	Oc 12-De 12 Oc 13-No 20							
357	164	275-366	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	
358	225	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
359	421	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
360	2992	56-91	17	6	9	8	8	8	8	8	8	8	8	8	7	7	8	8	
361	1853	56-91	11	5	5	5	5	5	5	5	5	5	5	5	4	4	5	5	
362	2520	56-91	5	6	7	7	7	7	7	7	7	7	7	7	6	6	7	7	
373	2520	56-91	5	7	7	7	6	7	7	7	7	7	7	6	6	6	7	7	
374	931	56-91	2	2	3	3	3	3	3	3	3	2	3	3	2	2	3	3	
375	1593	<=55	9	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
376	1499	<=55	9	4	5	4	4	4	4	4	4	4	4	4	3	3	4	4	
377	100	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
378	139	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	
379	106	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
380	116	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
381	182	184-274	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
382	647	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
383	674	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
723	155	367-549	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
724	124	550-731	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	
725	105	367-549	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	
726	72	550-731	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	
727	160	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
728	156	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
752	134	732-914	0	0	0	2	0	2	2	2	0	0	0	2	0	0	1	0	
753	138	915-1097	0	0	0	2	0	2	2	2	0	0	1	0	2	0	1	0	
754	180	1098-1280	0	1	0	2	0	2	2	2	0	0	0	0	2	0	0	2	
755	385	1281-1463	0	0	0	2	0	2	2	2	0	0	0	0	2	0	0	0	
756	106	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2	0	1	0	
757	102	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2	0	0	0	
758	99	1098-1280	0	0	0	2	0	2	2	2	0	0	2	0	3	0	0	0	
759	127	1281-1463	0	0	0	2	0	2	2	2	0	0	2	0	2	0	1	0	
760	154	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	
761	171	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	
762	212	1098-1280	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	
763	261	1281-1463	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	
Annual Total	19523		90	67	74	90	68	94	94	94	70	69	86	70	94	64	75	72	70

Table 4h. Number of successful fall survey sets in Division 30 over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
			Se 26 - Oc 20 No 24 - De 17	Se 26 - Oc 19 Oc 10 - De 13	Se 26 - Oc 13 Oc 13 - No 13	Se 22 - Oc 14 Oct 5-16	Se 23 - Oc 21 Oc 31 - No 1	Se 22 - Oc 14 Oct 4-17	Se 30 - Oc 9 Oc 6-31	Oct 3-20	Oct 2-25	Se 30 - Oc 12	Se 29 - Oc 17						
329	1721	92-183	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	
330	2089	56-91	5	6	6	6	6	6	6	6	6	6	6	6	5	7	6	6	
331	456	56-91	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
332	1047	92-183	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
333	147	184-274	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
334	96	275-366	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
335	58	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
336	121	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	
337	948	92-183	2	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	
338	1898	56-91	5	2	5	5	5	5	5	5	5	5	4	5	5	6	5	5	
339	585	92-183	2	3	2	2	1	2	2	2	2	2	2	2	2	2	2	2	
340	1716	56-91	4	5	5	5	7	5	5	5	5	5	5	5	3	5	6	5	
351	2520	56-91	7	6	7	7	7	7	7	7	7	7	7	7	6	7	6	7	
352	2580	56-91	17	5	6	7	7	7	7	7	7	7	7	8	7	6	7	7	
353	1282	56-91	3	2	4	4	4	4	4	4	4	4	4	4	3	4	4	4	
354	474	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
355	103	184-274	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
356	61	275-366	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
717	166	367-549	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
718	134	550-731	2	0	2	2	2	2	2	2	2	2	2	1	2	2	2	2	
719	76	367-549	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	
720	105	550-731	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
721	76	367-549	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
722	93	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
764	105	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	
765	124	915-1097	0	0	0	2	0	2	2	2	0	2	0	2	0	2	0	0	
766	144	1098-1280	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	
767	158	1281-1463	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	
768	99	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	
769	138	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2	0	2	0	
770	128	1098-1280	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	
771	175	1281-1463	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	0	
772	135	732-914	0	0	0	2	0	2	2	2	0	2	0	2	0	2	0	0	
773	128	915-1097	0	0	0	2	0	2	2	2	2	2	0	2	0	2	0	0	
774	135	1098-1280	0	0	0	0	0	2	2	2	2	0	2	0	2	0	2	0	
775	155	1281-1463	0	0	0	0	0	2	2	2	2	0	2	0	2	0	2	0	
Annual Total	20176		81	58	73	87	75	100	97	99	83	76	99	74	99	66	100	75	75

Table 5a. Number of successful spring survey sets in Division 3L over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year															
			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
			Ma 30- Ju 27	Ju 4-26	Ju 6-30	Ju 6-29	Ju 3-29	Ma26-Ju24	Ma29-Ju22	Ju 4-26	Ju 4-26	Ju 11-29	Ju 10-29	Ju5-July12	Ju 4-30	Ma 21-Ju 23	Ju 7-25	Ma 29-Ju 22
328	1519	92-183	7	6	5	5	5	5	5	5	5	4	5	1	5	5	5	
341	1574	92-183	7	6	5	6	5	5	5	5	5	4	5	3	5	5	5	
342	585	92-183	3	2	2	2	2	2	2	2	2	2	2	3	2	2	2	
343	525	92-183	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	
344	1582	184-274	7	5	6	5	4	5	5	5	4	5	5	4	4	5	2	
345	1432	275-366	6	5	6	5	4	5	5	5	4	5	5	4	4	5	3	
346	865	275-366	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
347	983	184-274	4	4	4	3	3	3	3	3	3	3	3	2	3	3	3	
348	2120	92-183	10	8	8	8	8	7	7	7	7	7	7	6	6	7	5	
349	2114	92-183	9	8	8	7	8	7	7	7	6	6	7	7	6	7	6	
350	2071	56-91	9	7	6	6	8	7	7	7	7	6	7	7	6	7	7	
363	1780	56-91	8	6	6	6	7	6	6	6	6	5	6	6	5	6	6	
364	2817	92-183	13	9	11	9	10	9	9	9	9	8	9	9	8	9	9	
365	1041	92-183	5	4	5	4	2	3	3	3	3	3	3	2	3	3	3	
366	1394	184-274	5	6	5	4	2	5	5	5	5	5	5	4	4	5	4	
368	334	275-366	3	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	
370	1320	92-183	6	5	4	5	5	4	4	4	4	4	4	4	4	4	4	
371	1121	56-91	5	5	4	4	4	4	4	4	4	5	4	4	4	3	4	
372	2460	56-91	11	9	8	9	9	8	8	8	8	6	7	8	7	9	8	
384	1120	56-91	5	5	4	4	4	4	4	4	4	4	4	4	3	4	4	
385	2356	92-183	11	9	9	7	4	7	8	8	8	6	8	8	6	8	7	
386	983	184-274	4	4	4	3	2	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	
388	361	275-366	3	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	
390	1481	92-183	7	6	5	5	3	5	5	5	5	5	5	5	3	5	5	
391	282	184-274	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	
729	186	367-549	2	3	2	2	2	2	2	2	2	2	2	2	2	1	2	
730	170	550-731	2	2	3	2	2	3	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	
732	231	550-731	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	
733	468	367-549	3	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	
735	272	367-549	3	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	
784	268	<=55	0	0	2	2	0	2	2	0	2	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	
786	84	92-183	0	0	2	2	0	2	0	0	2	0	0	0	0	0	2	
787	613	92-183	0	0	2	2	0	2	0	0	2	0	0	0	0	0	2	
788	261	92-183	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	
789	72	275-366	0	0	0	2	0	0	0	0	2	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	
791	227	184-274	0	0	0	2	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	
793	72	92-183	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	
794	216	92-183	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	
795	164	184-274	0	0	0	2	0	0	0	2	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	
797	98	92-183	0	0	0	2	0	0	0	2	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	
799	72	92-183	0	0	0	0	0	0	0	0	2	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	
Annual Total	41918		188	158	163	177	134	154	146	156	151	133	141	137	122	142	130	144

Table 5b. Number of successful spring survey sets in Division 3N over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																															
			1996		1997		1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011	
			Ma 22-30	Ma 18 - Ju 4	Ja 24 - Ju 4	Ma 19 - Ju 7	Ma 23 - Ju 9	Ma 14 - Ju 6	Ma 13 - 29	Ma 18 - Ju 4	Ma 24 - Ju 8	Ma 22 - Ju 19	Ju 27-29	Ju 16-29	Ju 1 - 22	Ma 26-Ju 11	Ma 24-Ju 6	Ma 21-30																
357	164	275-366	2	2	2	2	2	2	2	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	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	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	10	10	10	10	10	10	10	10	9	6	10	8	10	10	10	10	10	10	10					
361	1853	56-91	7	5	7	7	6	6	6	6	6	6	6	6	6	6	6	6	7	4	6	5	6	6	6	6	6	6	6					
362	2520	56-91	9	7	10	9	9	9	9	9	9	9	9	9	9	9	9	9	8	4	9	9	9	9	9	9	8	9	9					
373	2520	56-91	9	7	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	0	9	8	8	8	8	9	9	9	9					
374	931	56-91	3	3	4	3	4	3	3	3	3	3	3	3	3	3	3	3	2	3	2	2	3	3	3	3	3	3	3					
375	1593	<=55	6	5	6	5	6	5	5	5	5	5	5	5	5	5	5	5	5	3	5	4	5	5	5	5	5	5	5					
376	1499	<=55	5	4	6	6	4	5	5	5	5	5	5	5	5	5	5	5	5	3	5	4	5	5	5	5	5	5	5					
377	100	92-183	2	2	2	2	2	2	2	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	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	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	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	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	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	2	2	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	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	2	2	2	2	2	2	2	0	2	1	2	2	2	2	2	2	2					
725	105	367-549	2	2	2	2	2	2	2	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	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	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	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2					
Annual Total	17454		82	71	88	82	81	79	79	79	79	79	79	79	79	79	79	79	78	22	79	71	78	78	78	78	78	78	79					

Table 5c. Number of successful spring survey sets in Division 30 over 1995-2011. (Dates of first and last set in each year listed under survey year.)

Stratum	Area (sq. n.mi.)	Depth (m)	Survey Year																															
			1996		1997		1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011	
			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																
329	1721	92-183	6		6	7	6	5	5	5	5	5	5	5	0	5	5	5	5	5	0	5	5	5	5	5	5	5	5	5				
330	2089	56-91	8		7	8	7	7	7	7	7	7	7	7	9	7	7	7	7	7	9	7	7	7	7	7	7	7	7	7				
331	456	56-91	2		2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2				
332	1047	92-183	4		3	4	4	4	4	3	3	3	3	3	3	0	3	3	3	3	0	3	3	3	3	3	3	3	3	3				
333	147	184-274	2		2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	0	2	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	0	2	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	0	2	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	0	2	2	2	2	2	2	2	2	2				
337	948	92-183	3		3	4	3	4	4	3	3	3	3	3	0	3	3	3	3	3	0	3	3	3	3	3	3	3	3	3				
338	1898	56-91	7		6	7	7	6	6	6	6	6	6	6	7	6	6	6	6	7	6	6	6	6	6	6	6	6	6	6				
339	585	92-183	2		2	2	2	2	2	2	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	5	2	5	6	5	5	2	5	6	5	5	5	5	5	5	5	5				
351	2520	56-91	8		8	10	9	8	8	8	8	8	8	8	4	8	8	8	8	4	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	5	8	8	8	8	8	8	8	8	8	8				
353	1282	56-91	5		4	5	5	5	4	4	4	4	4	4	3	4	4	4	4	3	4	4	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	0	2	2	2	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	0	2	2	2	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	0	2	2	2	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	0	2	2	2	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	0	2	2	2	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	0	2	2	2	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	0	2	2	2	2	2	2	2	2	2	1				
721	76	367-549	2		2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	0	2	2	2	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	2	0	2	2	2	2	2	2	3	2	2	2				
Annual Total	18552		86		81	93	86	83	79	79	79	79	79	79	32	79	80	79	79	80	79	80	78											

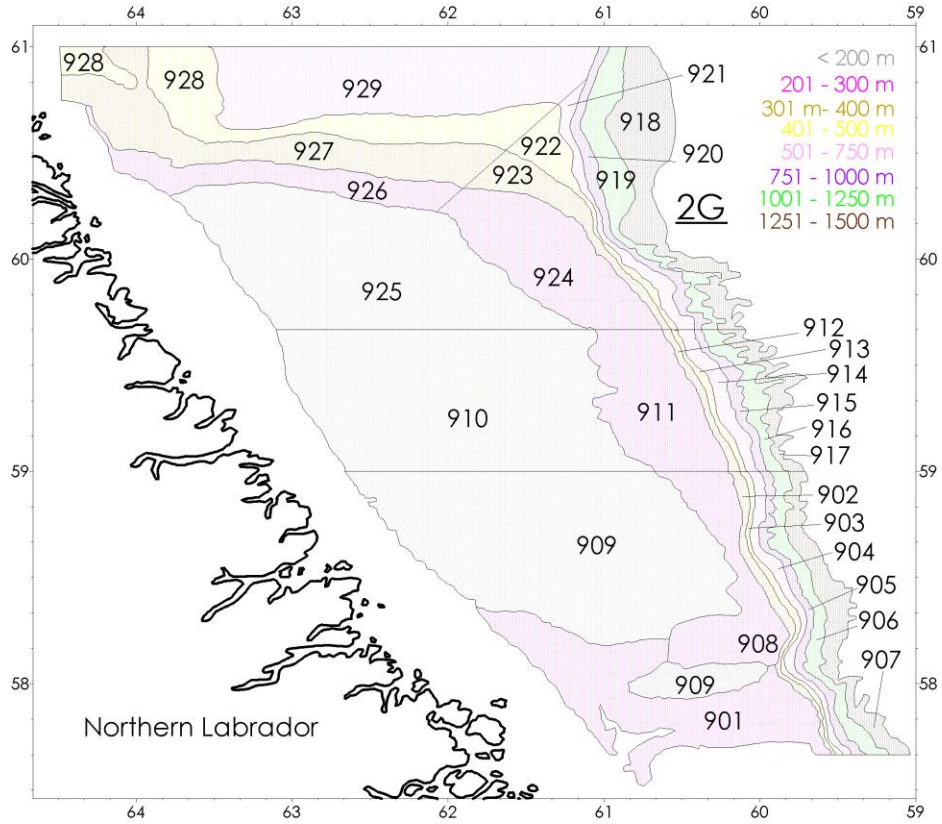


Fig 1. Stratification of Div. 2G

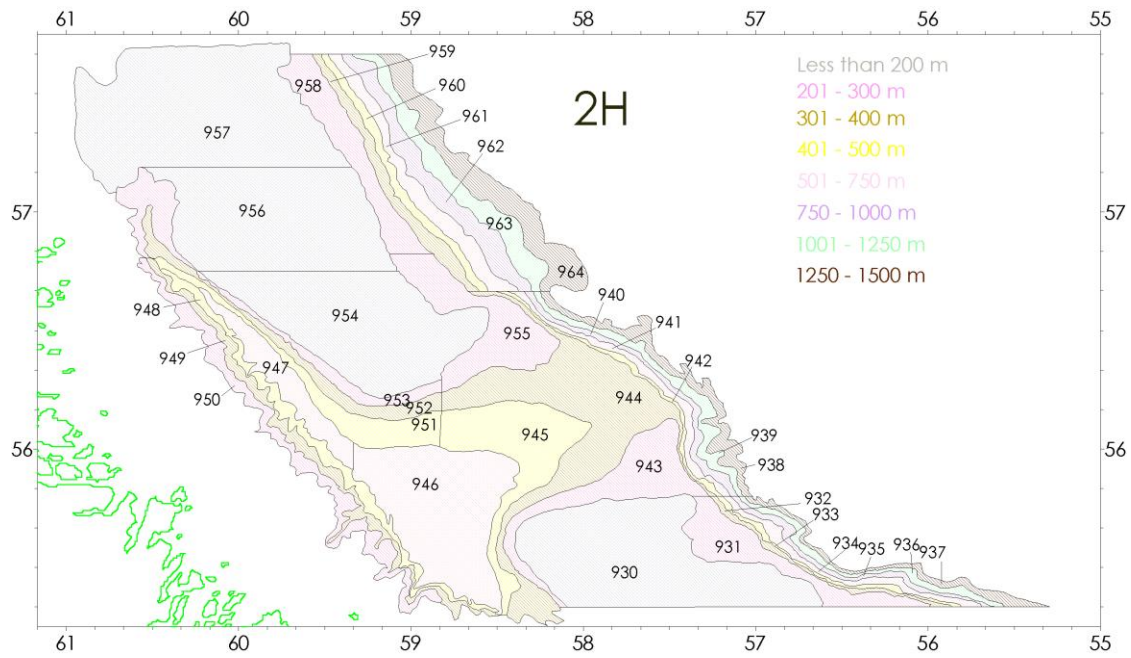


Fig 2. Stratification of Div. 2H

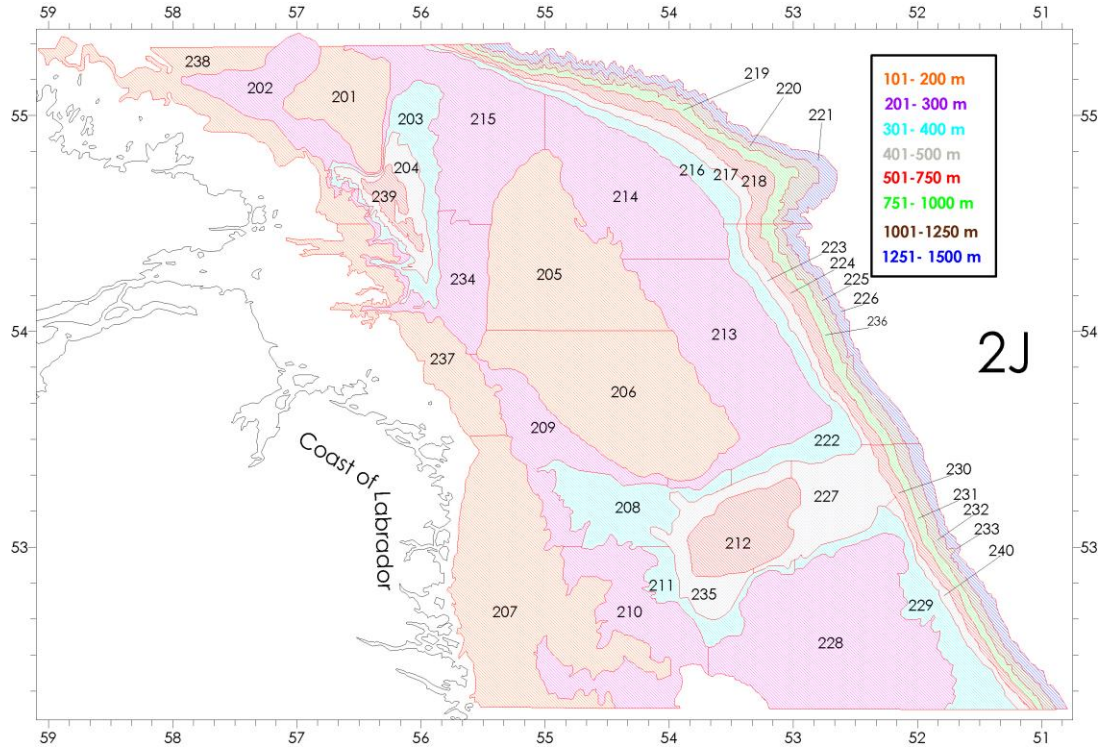


Fig 3. Stratification of Div. 2J

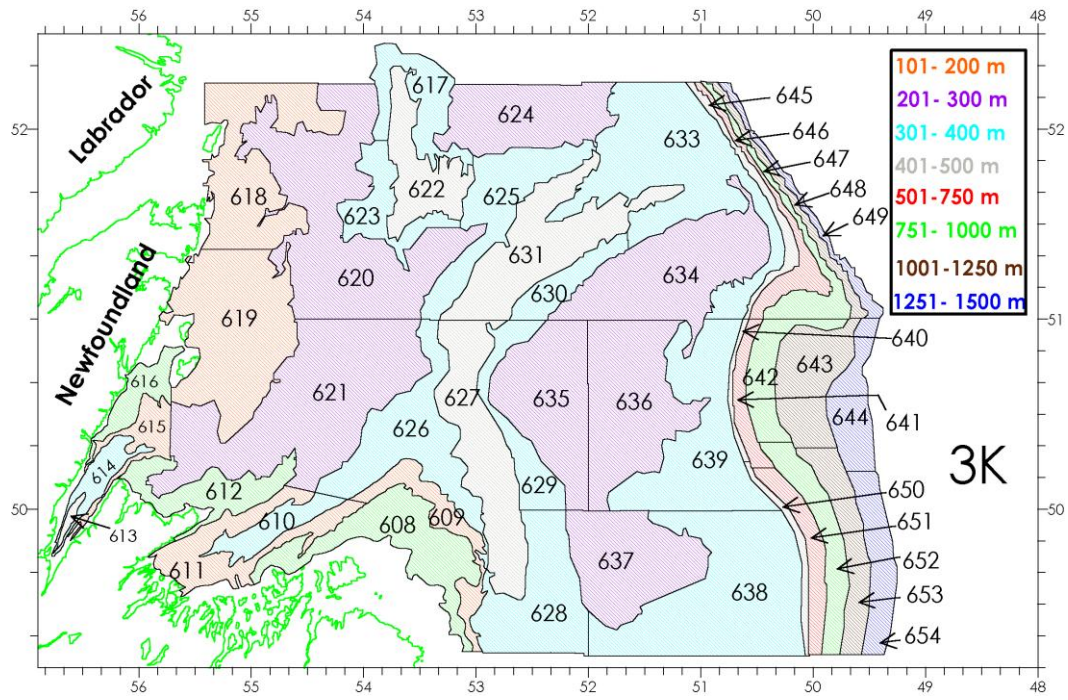


Fig 4. Stratification of Div. 3K

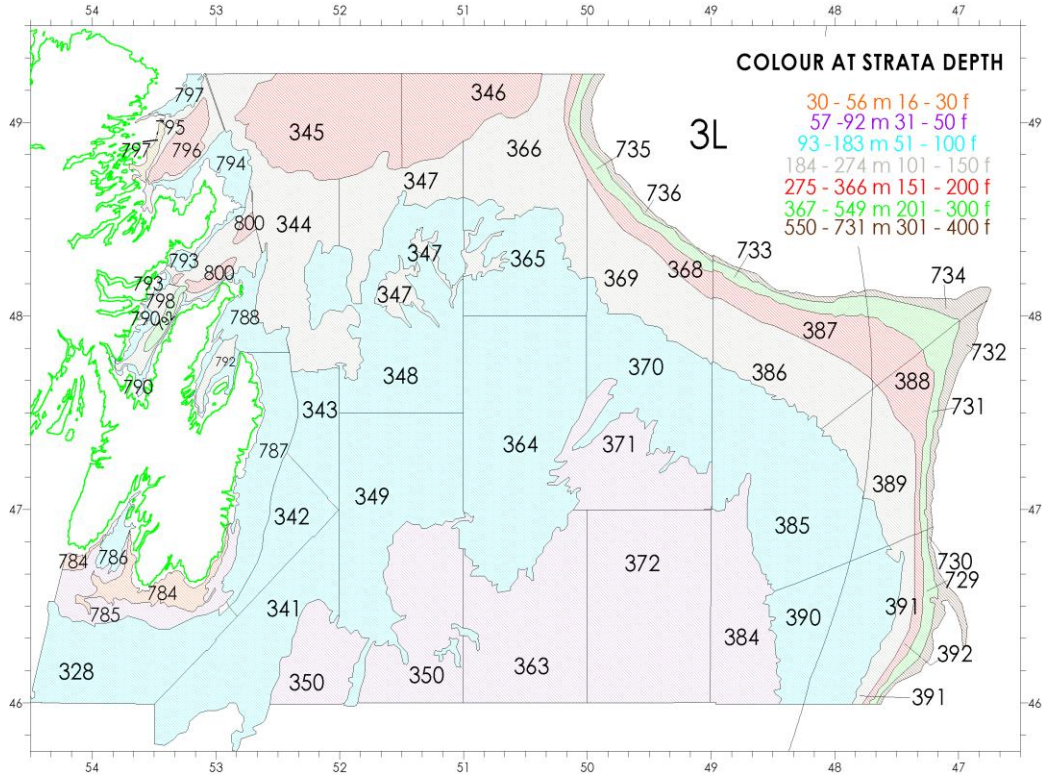


Fig 5. Stratification of Div. 3L

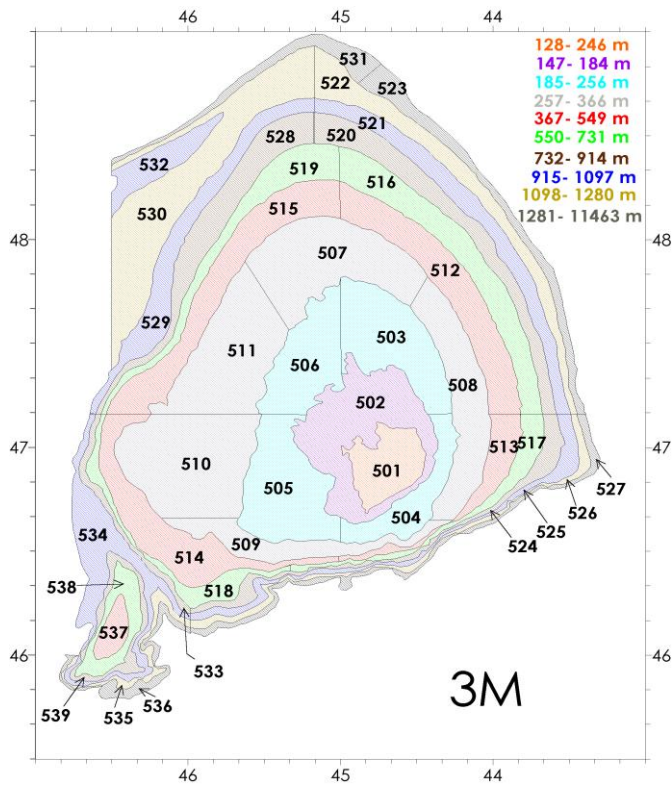


Fig 6. Stratification of Div. 3M

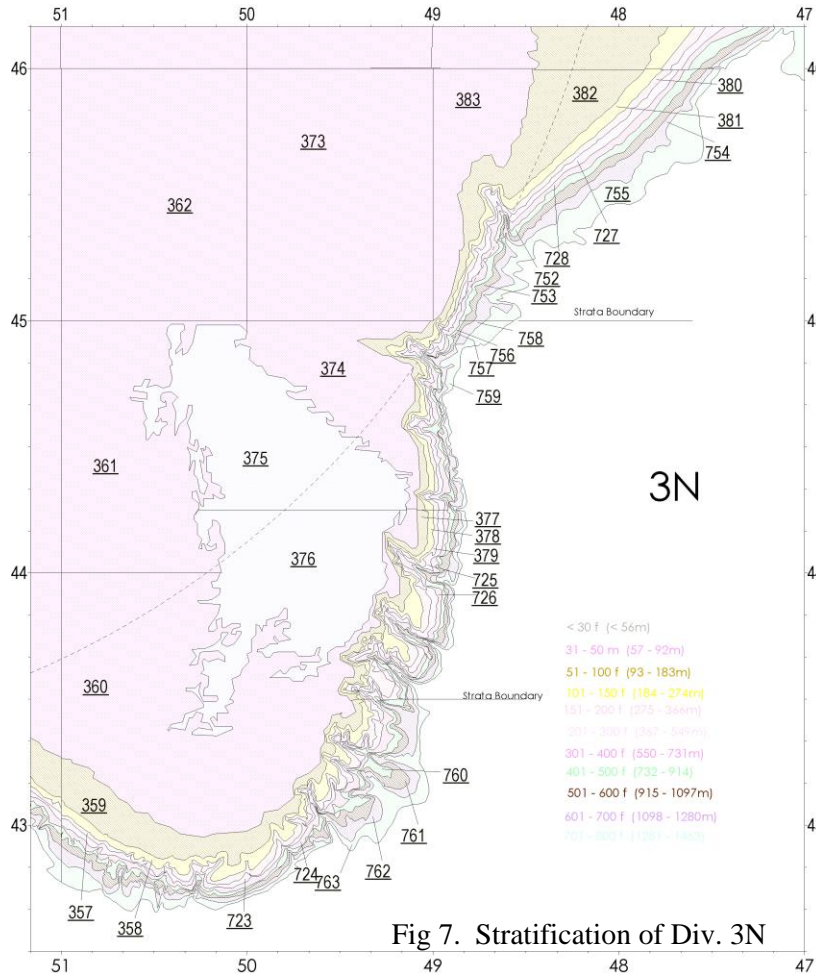


Fig 7. Stratification of Div. 3N

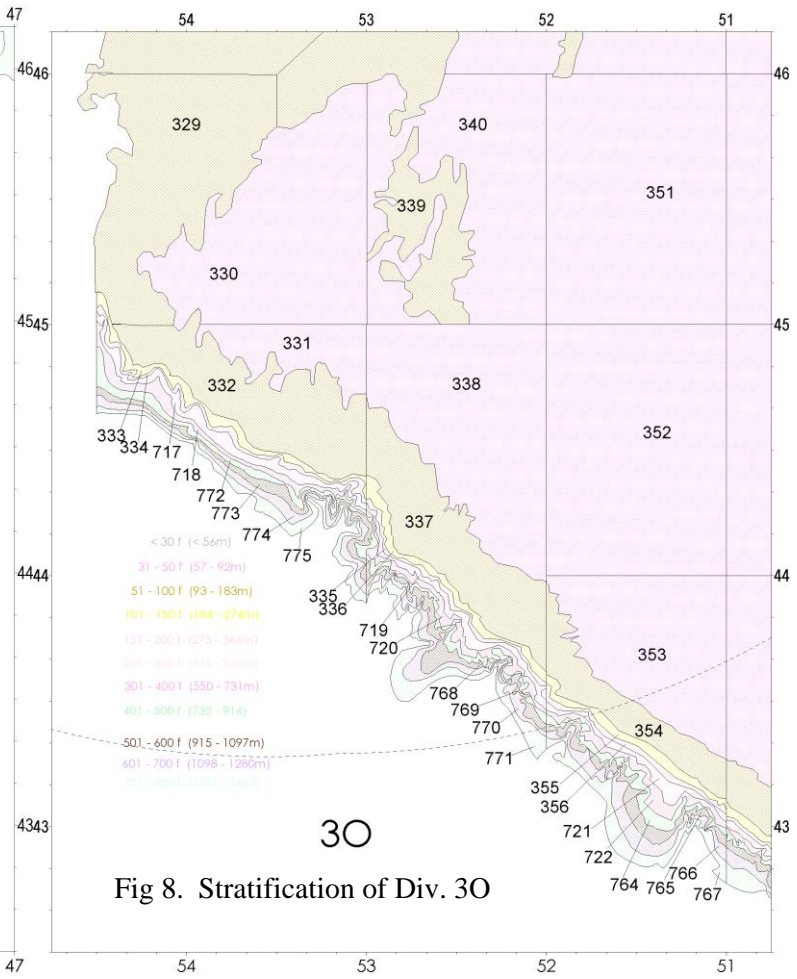


Fig 8. Stratification of Div. 3O

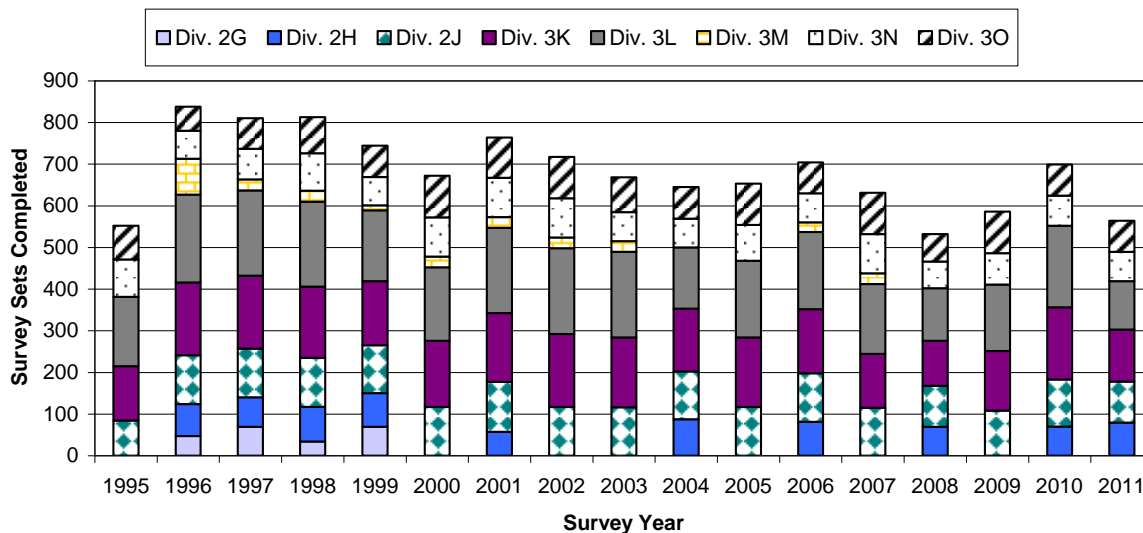


Figure 9a. Number of successful fall survey sets, by NAFO Division, 1995-2011.

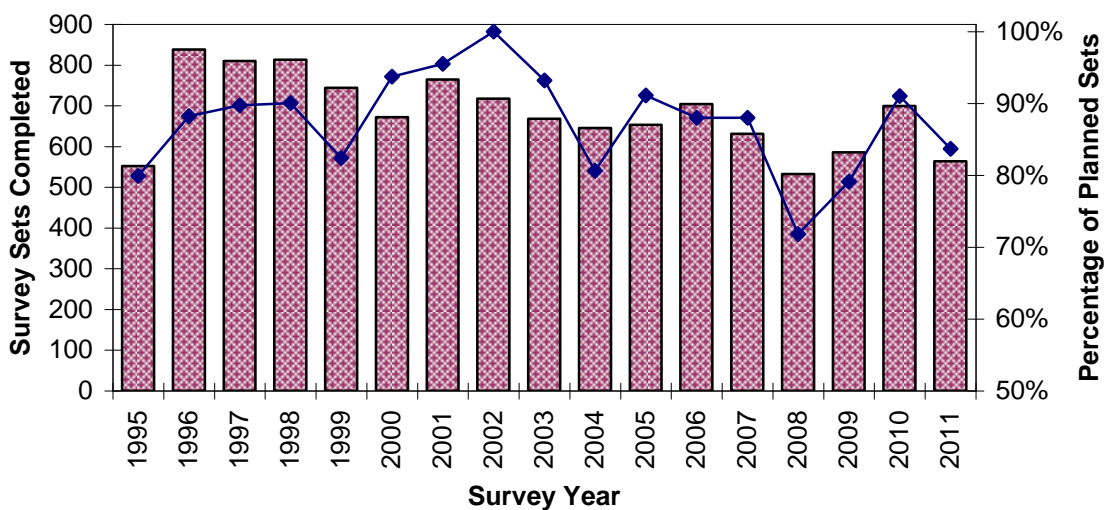


Figure 9b. Number of successful fall survey sets (bars), with percent of allocated sets realized (diamonds).

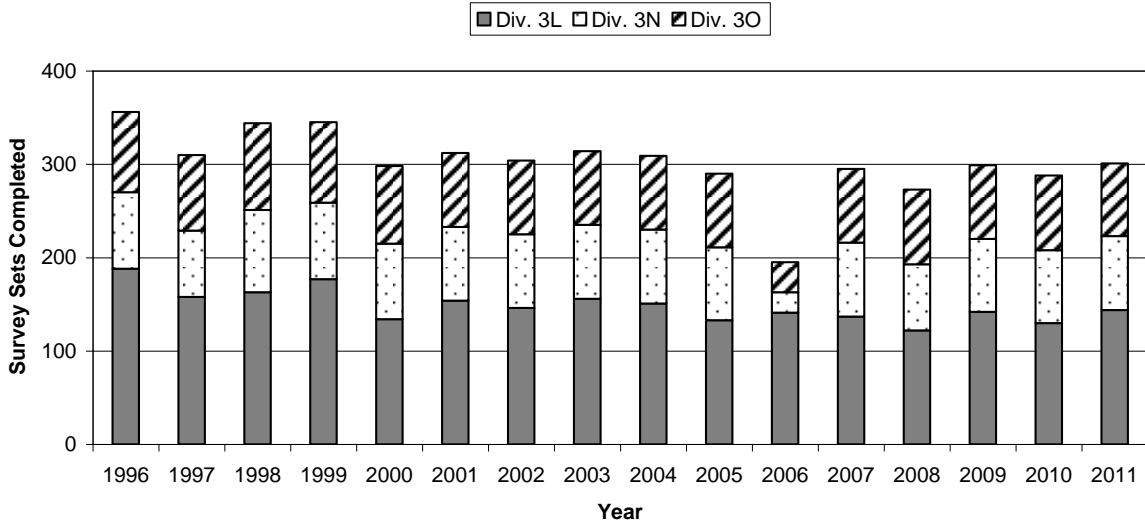


Figure 10a. Number of successful spring survey sets, by NAFO Division, 1996-2011.

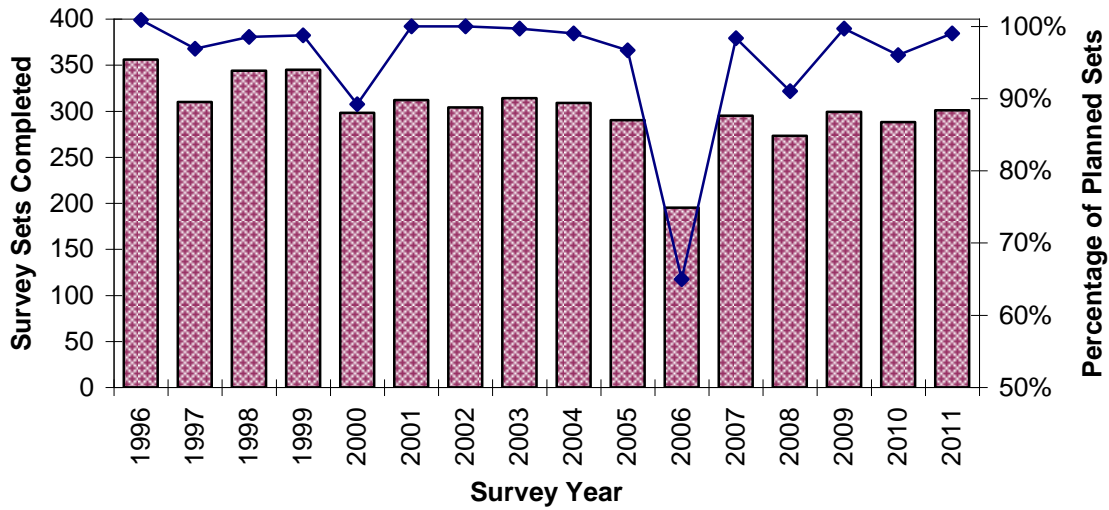


Figure 10b. Number of successful spring survey sets (bars), with percent of allocated sets realized (diamonds). (These figures exclude the inshore strata of Div. 3L, which are included in the annual allocations but are considered of lower priority and rarely covered.)