

Northwest Atlantic



Fisheries Organization

Serial No. N5366

NAFO SCR Doc. 07/ 18

SCIENTIFIC COUNCIL MEETING – JUNE 2007

A Brief Description of Canadian Multispecies Surveys in SA2+ Divisions 3KLMNO from 1995-2006

by

W. Brodie and D Stansbury

Fisheries and Oceans Canada
Science Branch
P. O. Box 5667
St. John's NL Canada A1C 5X1

Abstract

Stratified random multispecies trawl surveys have been conducted by the Department of Fisheries and Oceans in the Newfoundland and Labrador Region annually in spring since 1971, and in autumn since 1977. Spring surveys cover NAFO Divisions 3L, 3N, 3O, and 3P. Since 1990 the autumn surveys have covered the offshore areas of NAFO Divisions 2J, 3K, 3L, 3N, and 3O. During 1995, the Campelen 1800 shrimp trawl was adopted as the standard survey gear, and coverage was extended to include the inshore areas of Div. 3K and 3L, parts of Div. 3M, Div. 2GH, and areas deeper than 1 000 m.

Some changes, planned and unplanned, have occurred to both survey series since 1995. Many of these unplanned changes have occurred because vessel breakdowns have not allowed full or timely completion of the entire survey area. The main problems with the 2004-06 fall surveys were the complete absence of survey sets deeper than 731 m in Div. 3LMNO, the lack of coverage in several other strata in Div. 3L, the reduction in coverage in some strata in Div. 3K, and the extension of the timing into January in 2005 and 2006. The approximately 650 sets completed in 2004 and 2005 surveys were the lowest numbers since the 1995 survey, although the number of sets in 2006 improved to 704. Coverage in the spring survey series has generally been more consistent, although the 2006 survey had minimal coverage in Div. 3NO, and at a later time than usual.

There are at least three sources of uncertainty resulting from the problems encountered during the surveys of recent years: gaps in coverage (missed strata, reduced numbers of sets); changes in timing (survey coverage extended later, coverage of some strata/Divisions often spread out over a much longer period than planned); and vessel effects (few direct comparisons of the 3 vessels used, using vessels in areas where they have little or no coverage in previous years).

Careful attention to survey gear and fishing protocols, along with set-by-set monitoring with trawl sensors ensures minimal variability during tows. However, the problems with survey coverage and timing have introduced a further degree of uncertainty into the survey estimates, and therefore stock assessment advice, for many species.

Introduction

Annual stratified random trawl surveys have been conducted in the Newfoundland and Labrador area by the Canadian Department of Fisheries and Oceans since 1971. The main objectives are to determine the distribution and abundance of various groundfish and shellfish species and to collect biological samples. Over time, the fall surveys have expanded, and from 1990 onward have covered the offshore areas of Div. 2J, 3K, and 3LNO (Table 1).

In 1995, the chartered research vessel (RV) *Gadus Atlantica* was replaced with the Canadian Coast Guard ship *Teleost*. As a result of this change, it was decided to replace the Engel 145 trawls used on both the *Gadus* and CCGS *Wilfred Templeman* with a Campelen 1800 shrimp trawl, in order to improve estimates of abundance for numerous species, as well as for smaller fish of many species (McCallum and Walsh, 1996). Conversion factors based on extensive comparative fishing experiments were derived for most of the main commercial fish species, to allow some comparability between the old and new survey series (Warren, 1997; Warren *et al.*, MS 1997; Morgan *et al.*, 1998).

Since the change in vessel and gear, there have been some additions to the fall survey, including coverage in Div. 2GH, Div. 3M, new strata in inshore areas of Div. 3KL, and some coverage of strata deeper than 1 000 m in most areas. Planned coverage for spring surveys has remained constant at NAFO Divisions 3L, 3N, 3O, and 3P, to a depth of 731 m. This paper focuses mainly on the fall survey series, with more limited information on the spring series.

Methods

From 1995, fall surveys were generally scheduled to run from late September to mid-December. The survey design is stratified random, with the allocation of sets proportional to stratum area within a Division, and a minimum of 2 sets in all strata. Coverage was usually planned to a maximum depth of about 1500 m in all Divisions, which is substantially deeper than the maximum depth fished in virtually all previous fall surveys. A maximum of 903 sets is possible each year using the Divisional allocations in Table 2, covering a maximum area of about 180,000 square nautical miles, at a density of roughly 1 set per 200 square nautical miles. Excluding Div. 2G, which has not been surveyed since 1999, gives a maximum number of 800 sets, while exclusion of Div. 2GH (approx. every second year) gives a maximum of 717 possible sets. Maximum allocation in the spring survey of 3LNO is 334 sets, or 300 if inshore sets in 3L, which are not usually surveyed in spring, are excluded. Total allocation for Div 3P is 193 sets, 15 of which are in Subdiv. 3Pn.

The fall survey is designed to be carried out by two vessels, both using an identical Campelen trawl, monitored with Scanmar trawl sensors. The usual plan was for the CCGS *W. Templeman* to survey Div. 3LNO out to 731 m (400 fm), as well as a substantial part of Div. 3K, generally the inshore and western strata. The CCGS *Teleost* was usually scheduled to survey Subarea 2, most of Div. 3K, Div. 3LNO (deeper than 731 m), and the 9 deep strata in Div. 3M (Flemish Pass and adjacent area). On three occasions (1996, 2001, 2005), CCGS *Alfred Needler*, outfitted with an identical Campelen 1800 trawl, was used in the survey. The spring survey in Div. 3LNO was carried out on *W. Templeman* from 1996-2005, although *Alfred Needler* has been used previously, including in 2006. *Teleost* has been used in Div 3P, but not in 3LNO during spring surveys.

Results of 2006 fall survey: The survey began on schedule, on September 30, 2006 in Div. 3O, on the *Wilfred Templeman* (Table 3). The survey on the *Teleost* began a few days later, on Oct. 5, in Div 2H. No sets were completed after Dec 21, 2006. Loss of the last 16 days of scheduled survey time on *Wilfred Templeman*, due to mechanical problems, resulted in incomplete coverage in inshore 3L, deepwater 3LMNO, and some strata in southern 3K. However, none of the coverage in 2006 was far outside usual timing. The 704 sets completed in 2006 was an improvement over the 655 sets averaged in the 3 previous autumn surveys, but still well below the 770 averaged in the 1996-1998 period (excludes Div. 2G, which was no longer covered after 1999).

Results of 2006 spring survey: The survey began in April in Div. 3P, but was cut short after about 2 weeks due to problems with the ship's potable water tanks. The survey did not resume until June 10, in Div. 3L, where survey coverage was complete and on par with the timing of previous years (Table 4). However, only minimal coverage in Div. 3NO was possible, with some sets being made only in the shallowest strata (Table 4). CCGS *Alfred Needler* was used for 47 of the 52 sets in Div. 3NO. The minimal coverage in Div. 3NO in 2006 was near the end of June, which is much later than normal.

Results of previous fall surveys: The coverage in the surveys from 1995-2005 has undergone some changes over the years, some planned and some unplanned (Brodie, MS 1996, MS 2005). For example, a decision was made after 1999 that Div. 2G could(would?) no longer be included in this survey, and that Div. 2H would be surveyed every second year. Also, a survey of most of Div. 3M was carried out only in 1996; since then only the deep strata in the western and northern areas of Div. 3M have been included in the survey design. Vessel breakdowns and other

problems resulted in missed coverage in some years, notably 2004, as well as the extension of the survey into January of the following year on 5 occasions, including each survey from 2002 to 2005 (Table 3).

Results of previous spring surveys: In general, coverage was reasonable in spring surveys in Div 3LNO from 1996-2005 (Table 4). The number of sets in Div. 3LNO (excluding inshore, which was sampled only occasionally), ranged from 290 to 356, averaging 300 per year, which has been the allocation from 2001 onward. Temporal survey coverage has ranged from April 27 to June 30, with minor variation between years. Div. 3P is generally surveyed from early April to early May.

The following is a brief synopsis of each fall survey from 1995-2005:

1995: Late start, no coverage of Div. 2GH, 3M, and inshore Div. 3KL. Coverage in Div. 2J and 3K lower than other years. Coverage extended into January for first time in fall series. Lowest number of sets (552) in fall Campelen series.

1996: Low coverage in Div. 2G, no deepwater coverage in Div. 3NO. CCGS *Alfred Needler* used for 69 sets in Div. 3NO. Most complete survey of Div. 3M. First year of inshore coverage in Div. 3KL. Highest number of sets ever completed in fall survey (838).

1997: No shallow coverage in Div 2GH, no deepwater coverage in Div. 3NO. In Div 3M, only deepwater strata surveyed from this year onward.

1998: Poor coverage in Div. 2G. Some coverage of deep strata in Div. 3NO. Over 800 sets in total for third consecutive year.

1999: No deep coverage in Div 2G, no inshore coverage in Div. 3KL, reduced coverage in Div. 3M, no deep coverage in Div. 3NO. 744 sets completed in total.

2000: No coverage of Div. 2G planned from 2000 onward. Div 2H not surveyed every year, beginning in 2000. Some sets missed in Div. 3K and central part of Div. 3L. First complete coverage of deepwater sets in Div. 3NO. 672 sets in total, out of an allocation of 717 (2H not included in allocation in 2000).

2001: Poor coverage in Div 2H, and later than usual. CCGS *Alfred Needler* used for 126 sets in Div. 2J and 3KL. 764 sets completed in total.

2002: Div. 2H not surveyed. All other scheduled coverage completed, but 128 sets of 717 total were done in January 2003, after scheduled end-date of survey.

2003: Div. 2H not surveyed. A few sets dropped in Div. 3K. Almost no deep coverage in Div 3NO. 31% of 668 sets completed in January 2004.

2004: No sets deeper than 731 m in Div. 3LMNO, lack of coverage in several other strata in Div 3L, reduction in coverage in some strata in Div. 3K. Timing was extended until February 1, 2005, the latest in the time series. The 645 sets fished in 2004/05 was the lowest number for a fall survey since 1995.

2005: Div. 2H, 3M not surveyed. Incomplete deepwater coverage in Div. 3LN. Coverage reduced in some strata in 3KL. 86 sets completed in January 2006. RV *Alfred Needler* used for 57 sets in Div. 3L. Total of 653 sets very similar to lowest number (in 2004).

Tables 5 to 12 give the set coverage, by stratum, for Divisions 2G, 2H, 2J, 3K, 3L, 3M, 3N, and 3O. The corresponding stratification charts are shown in Fig. 1-8 (Fig 5, Div. 3L, only shows strata to 731 m).

Discussion

There are perhaps three major sources of uncertainty resulting from the problems encountered during the fall surveys of recent years (and in the spring survey of 2006): gaps in coverage (missed strata, reduced numbers of sets), changes in timing (survey coverage extended later, coverage of some strata/Divisions often spread out over a longer period than planned), and vessel effects (incomplete comparisons among the 3 vessels used, using vessels in areas where they have little or no coverage in previous years).

On the first point, the major gaps in the recent fall surveys have been described above, as well as in Brodie (2005), and Healy and Dwyer (2005). Deep-water coverage in Div. 3NO was cancelled in both 2003 and 2004, as well as in 2006. Several other key strata in Div. 3L were missed in 2004, and this impacted abundance and biomass estimates for a number of shellfish and groundfish stocks (see Healey and Dwyer 2005, Orr et al. 2005). Other notable gaps include poor coverage in Div. 2G (none after 1999), spatial and temporal gaps in Div. 2H, no inshore strata fished in Div. 3KL in 1995 and 1999 as well as gaps in inshore coverage in 3L in 2006, and generally poor coverage of deep strata in Div. 3NO (except in 1998, 2000-02, and 2005). One additional point to consider is the differential impact of these coverage variations on the mean-per-set estimates compared to the swept area estimates. Missed coverage of wide areas mainly outside the distribution of a species would have a large impact on mean number per tow, but little on the actual swept area estimates. An example of this would be the spring survey estimates for 3LNO yellowtail flounder in spring 2006, where mean per tow estimates would be biased upwards by the elimination of coverage outside the yellowtail distribution.

Regarding changes in timing, the surveys of 1995, and 2002 to 2005 were all extended into the following year. This did not happen at all in the earlier survey series, from 1977-1994. As noted in Brodie (2005), the timing of coverage in Div. 2GH was generally variable, ranging from late September (1996) to mid-December (2004). In Div. 2J, the usual timing of late October to mid-November was generally followed in 1996-2000, 2004 and 2006, but was later in 1995, 2001-03, and 2005. In Div 3K, the timing of the surveys affected most were those of 1995, and 2002-05. In addition, the coverage in 2004 was spread out over a period of 81 days, by far the longest in the time period. In Div 3L, coverage in 1995, 2003, and 2005 extended into January, and this has not occurred at all in Div. 3NO.

Estimates of abundance and biomass in the survey are calculated assuming that there are no vessel effects, i.e. all three vessels are treated equally. If there was no variation in the coverage by vessel, this would not be an issue. However, because of vessel breakdowns, it has often been necessary for a vessel to survey an area normally covered by the other. Examples include the CCGS *Alfred Needler* sets in autumn surveys of 1996, 2001, and 2005, and in the spring survey of 2006, and sets by *W. Templeman* in Div. 2J in the 2002 and 2005 surveys (Table 3). As well, Div. 3K is often a mixed bag, with the proportion of sets done by *Teleost* vs. *Templeman* varying over time (e.g. no *WT* sets in 1999 and 2000, and over 100 per year in 1995, 2002 and 2005). In general, the shallow sets in Div. 3LNO are done by the *W. Templeman*, and the deeper sets by *Teleost*, and although exceptions to this are frequent, *W. Templeman* has rarely surveyed beyond 731 m.

With respect to possible vessel effects, all three vessels used in the fall surveys from 1995 onward have used the same version of the Campelen 1800 trawl, which undergoes an extensive mensuration program before and during each survey trip (McCallum and Walsh, 1996). In addition, a trawl standardization workshop was held in Jan. 2007 in St. John's, which focused on the usage and measurement of DFO survey trawls, Scanmar, etc. As well, standard survey protocols are followed strictly for each tow, and each set is monitored with a set of Scanmar trawl sensors, and the data collected and analysed periodically. Despite these controls, McCallum and Walsh (MS 2002) found that there were differences in trawl performance between vessels, and sometimes between surveys on the same vessel. They concluded that some of this difference was likely due to depth and bottom type, and some was due to different vessel characteristics of the three research vessel. They concluded that further analysis of the trawl data was required, although this has not yet been completed. Effects of these differences on abundance and biomass estimates are not known. In any case, the standard tow parameters (Tow = 15 minutes @ 3.0 knots) have been used in all analyses, and are not adjusted by observed differences in the tow data collected. To look for vessel effects, some comparative fishing has been conducted during recent spring and fall surveys between *Alfred Needler* and *W. Templeman*, both using the standard Campelen trawl. An analysis of these data (Cadigan et al. 2006) suggests no significant differences in the relative catchability of these 2 vessels.

It is difficult to measure the effects on survey results that these problems have caused. Surveys are intended to be carried out using the same methodology and timing to minimise the design effects on the populations being studied. Measurement of biological variables (maturation, growth, etc.) would be influenced by changes in survey timing, as would the effects of migration of fish stocks on abundance estimates. The effects of these delays and shifts in timing cannot always be quantified, but often they have destroyed the synoptic two-vessel element in fall survey coverage which is part of the design. As well, these problems have introduced a further degree of uncertainty into the survey estimates, and therefore into assessments of stocks such as cod, crab, shrimp, flounders, redfish, and Greenland halibut.

References

- BRODIE, W. MS 1996. A description of the 1995 fall groundfish survey in Div. 2J3KLNO. *NAFO SCR Doc.*, No. 27, Serial No. N2700, 7 p.
- BRODIE, W. MS 2005. A description of the autumn multispecies surveys in SA 2 + Div. 3KLMNO from 1995-2004. *NAFO SCR Doc.*, No. 05/8, Serial No. N5083.
- CADIGAN, N.G., S.J. WALSH and W. BRODIE. MS 2006. Relative efficiency of the Wilfred Templeman and Alfred Needler research vessels using a Campelen 1800 shrimp trawl in NAFO Subdivision 3Ps and Divisions 3LN. *CSAS Res Doc.* 2006/085. 59 p.
- HEALEY, B.P. and K.S. DWYER. 2005. A Simple Examination of Canadian Autumn Survey Trends in NAFO Divisions 3LNO for Greenland Halibut and American Plaice: The Impact of Incomplete Coverage of this Survey in 2004. *NAFO SCR Doc.* 05/34. Ser. No. N5117.
- MCCALLUM, B., and S. J. WALSH. MS 2002. An update on the performance of the Campelen 1800 during bottom trawl surveys in Subareas 2 and 3 in 2001. *NAFO SCR Doc.*, No. 32, Serial No. N4643, 16 p.
- MCCALLUM, B. R., and S. J. WALSH. 1996. Groundfish survey trawls used at the Northwest Atlantic Fisheries Centre, 1971-present. *NAFO Sci. Coun. Studies*, **29**: 93-104.
- MORGAN, M. J., W. B. BRODIE, W. R. BOWERING, D. MADDOCK PARSONS, and D. C. ORR. MS 1998. Results of data conversions for American plaice in Div. 3LNO from comparative fishing trials between the Engel Otter Trawl and the Campelen 1800 Shrimp Trawl. *NAFO SCR Doc.*, No. 70, Serial No. N3062, 10 p.
- ORR, D. C., P. J. VEITCH, and D. J. SULLIVAN. MS 2005. An update of information pertaining to northern shrimp (*Pandalus borealis*, Krøyer) and groundfish in NAFO Divisions 3LNO. *NAFO SCR Doc.* 05/88, Ser. No. 5193.
- WALSH, S. J., M. F. VEITCH, W. B. BRODIE, and K. S. DWYER. MS 2004. Canadian bottom trawl survey estimates of the distribution and abundance of yellowtail flounder (*Limanda ferruginea*) on the Grand Bank, in NAFO Divisions 3LNO, from 1984-2003. *NAFO SCR Doc.*, No. 36, Serial No. N4986, 50 p.
- WARREN, W. G. 1997. Report on the comparative fishing trial between the *Gadus Atlantica* and *Teleost*. *NAFO Sci. Coun. Studies*, **2**: 81-92.
- WARREN, W. G., W. BRODIE, D. STANSBURY, S. WALSH, J. MORGAN, and D. ORR. MS 1997. Analysis of the 1996 comparative fishing trial between the *Alfred Needler* with the Engel 145 trawl and the *Wilfred Templeman* with the Campelen 1800 trawl. *NAFO SCR Doc.*, No. 68, Serial No. N2902, 12 p.

Table 1. Information on Canadian fall surveys, Div. 2J3KLNO, 1977-94.

Div.	Years surveyed	Research Vessel*	Usual Max. Depth(m)	# sets (min, max)
2J	1977-94	GA	1000	53 - 157
3K	1978-94	GA	1000	69 - 181
3L	1981-94	ATC (81,82), WT/AN (83-94)	731	99 - 231
3M	-	-	-	-
3N	1990-94	WT	731	34 - 80
3O	1990-94	WT	731	54 - 91

* GA = Gadus Atlantica

ATC = A.T.Cameron

WT = Wilfred Templeman

AN = Alfred Needler

Table 2. Stratified Random surveys, NF Region, autumn 1995 to present.
Area of NAFO Divisions, set allocations, and Campelen tow parameters.

Div.	Area (sq n mi)	# of sets	# of strata
2G	16749	103	29
2H	11776	83	35
2J	25272	117	40
3K	37051	175	46
3L	46338	206	69
3M (F.Pass)	3381	26	9
3N	19523	94	35
3O	20176	99	36
Total	180266	903	299

Tow parameters, Campelen 1800 trawl

Tow time = 15 minutes

Tow Speed = 3 knots

Tow distance = 0.75 n. mile

Standard Wingspread = 55.25 feet

Based on 1 n.mi = 6076.11 feet, 1 standard tow covers 0.00682 square n. miles.

Table 3. Summary of sets in Campelen fall surveys in SA 2+3 in 1995 - 2006.
Depth range is given in meters, numbers of sets appear in parentheses. Only successful survey sets are shown here.

Year	Division	Ship			Total	Year	Division	Ship			Total
		Teleost	W. Templeman	A. Needler				Teleost	W. Templeman	A. Needler	
1995	2G	Not surveyed in 1995				2001	2G	Not surveyed in 2001			
	2H						2H	999-1466 (8)		117-655 (49)	57
	2J	145-948 (84)			84		2J	120-1389 (49)		105-574 (71)	120
	3K	166-1444 (31)	162-494 (100)		131		3K	146-1479 (106)	128-439 (55)	170-252 (4)	165
	3L	733-1210 (5)	63-640 (161)		166		3L	146-1457 (34)	38-702 (169)	187-203 (2)	205
	3M	Not surveyed in 1995					3M	763-1407 (26)			26
	3N		40-650 (90)		90		3N	739-1410 (24)	45-660 (70)		94
	3O		63-730 (81)		81		3O	803-1391 (22)	67-703 (75)		97
1995 fall survey extended into January 1996 (66 sets)					552						764
1996	2G	127 - 1436 (47)			47	2002	2G	Not surveyed in 2002			
	2H	122 - 1415 (77)			77		2H				
	2J	126 - 1410 (117)			117		2J	102-1372 (98)	136-572 (19)		117
	3K	111 - 1368 (115)	126 - 472 (60)		175		3K	156-1395 (64)	121-481 (111)		175
	3L	805 - 1433 (31)	51 - 671 (180)		211		3L	763-1431 (30)	35-670 (176)		206
	3M	784 - 1400 (18)	127 - 707 (68)		86		3M	818-1403 (26)			26
	3N	390 - 1147 (13)		37 - 309 (54)	67		3N	811-1429 (24)	44-675 (70)		94
	3O	68 - 690 (24)	65 - 139 (19)	63 - 304 (15)	58		3O	775-1504 (24)	65-696 (75)		99
					838	2002 fall survey extended into January 2003 (128 sets)					717
1997	2G	201-1209 (69)			69	2003	2G	Not surveyed in 2003			
	2H	220-1382 (71)			71		2H				
	2J	123-1488 (117)			117		2J	123-1404 (116)			116
	3K	143-1431 (155)	117-421 (20)		175		3K	151-1474 (118)	115-489 (50)		168
	3L	161-1436 (71)	35-714 (134)		205		3L	753-1446 (30)	32-702 (175)		205
	3M	799-1379 (26)			26		3M	795-1455 (26)			26
	3N		41-769 (74)		74		3N		43-727 (70)		70
	3O		62-611 (73)		73		3O	761-1382 (8)	63-650 (75)		83
					810	2003 fall survey extended into January 2004 (210 sets)					668
1998	2G	143-1488 (34)			34	2004	2G	Not surveyed in 2004			
	2H	98-1473 (83)			83		2H	109-1415 (87)			87
	2J	126-1398 (118)			118		2J	127-1365 (115)			115
	3K	122-1415 (154)	121-346 (17)		171		3K	112-1412 (135)	212-549 (16)		151
	3L	691-1437 (32)	34-675 (172)		204		3L	151-522 (4)	44-653 (143)		147
	3M	768-1436 (26)			26		3M	Not surveyed in 2004			
	3N	834-1447 (12)	37-1079 (78)		90		3N		40-659 (69)		69
	3O		82-1076 (87)		87		3O		63-634 (76)		76
					813	2004 fall survey extended into February 2005 (36 sets)					645
1999	2G	142-1415(69)			69	2005	2G	Not surveyed in 2005			
	2H	104-1454(81)			81		2H				
	2J	109-1375(115)			115		2J	118-1427 (108)	172-416 (9)		117
	3K	146-1477(154)			154		3K	150-1334 (26)	136-669 (141)		167
	3L	1366(1)	63-1407 (169)		170		3L	803-1351 (7)	50-706 (120)	121-667 (57)	184
	3M	853-1403(12)			12		3M	Not surveyed in 2005			
	3N		39-664(68)		68		3N	776-1445 (17)	42-633 (69)		86
	3O		58-692(75)		75		3O	754-1410 (24)	69-649 (75)		99
					744	2005 fall survey extended into January 2006 (86 sets)					653
2000	2G	Not surveyed in 2000				2006	2G	Not surveyed in 2006			
	2H						2H	107-1437 (81)			81
	2J	127-1400 (117)			117		2J	107-1443 (117)			117
	3K	113-1379 (159)			159		3K	153-1384 (93)	109-480 (61)		154
	3L	152-1430 (74)	42-447 (102)		176		3L	111-1401 (34)	61-641 (151)		185
	3M	764-1401 (26)			26		3M	756-1352 (23)			23
	3N	747-1419 (24)	46-642 (70)		94		3N		46-650 (70)		70
	3O	752-1424 (24)	62-654 (76)		100		3O		63-674 (74)		74
					672						704

Table 4. Number of successful sets, 3LNO spring surveys 1996-2006 (Campelen time-series)
 Except for 47 sets by Alfred Needler in 2006, all surveys conducted by *RV Wilfred Templeman*
 Range of dates (earliest to latest day each year) shown in lower panel.

	# of inshore		3N	3O	Tot Excl insh	earliest	latest
	3L	sets included					
1996	188	0	82	86	356	7-May	27-Jun
1997	158	0	71	81	310	30-Apr	26-Jun
1998	163	8	88	93	336	12-May	30-Jun
1999	177	32	82	86	313	11-May	29-Jun
2000	134	0	81	83	298	11-May	29-Jun
2001	154	12	79	79	300	29-Apr	24-Jun
2002	146	4	79	79	300	27-Apr	22-Jun
2003	155	14	79	79	299	8-May	26-Jun
2004	151	12	79	79	297	12-May	26-Jun
2005	133	0	78	79	290	9-May	29-Jun
2006	141	0	22	32	195	10-Jun	30-Jun
<i>mean</i>	154.5		74.5	77.8	299.5		
<i>allocation 2006</i>	176	34	79	79	300		

Depth range (m), Campelen spring surveys 1996-2006, Div. 3LNO.

	3L		3N		3O	
	min	max	min	max	min	max
1996	66	664	42	665	65	685
1997	60	681	35	689	62	669
1998	53	721	38	682	64	657
1999	41	692	40	659	62	679
2000	61	681	45	664	61	694
2001	34	695	40	650	74	699
2002	42	710	40	641	63	628
2003	62	698	39	681	63	726
2004	47	710	44	675	61	636
2005	64	672	45	691	66	719
2006	60	701	46	77	64	103

Date range, Campelen spring surveys 1996-2006, Div. 3LNO.

	3L		3N		3O	
	1'st set	last set	1'st set	last set	1'st set	last set
1996	30-May	27-Jun	22-May	30-May	7-May	22-May
1997	4-Jun	26-Jun	18-May	4-Jun	30-Apr	17-May
1998	6-Jun	30-Jun	24-May	4-Jun	12-May	30-May
1999	6-Jun	29-Jun	19-May	7-Jun	11-May	28-May
2000	3-Jun	29-Jun	23-May	9-Jun	11-May	5-Jun
2001	26-May	24-Jun	14-May	6-Jun	29-Apr	13-May
2002	29-May	22-Jun	13-May	29-May	27-Apr	14-May
2003	4-Jun	26-Jun	18-May	4-Jun	8-May	15-May
2004	4-Jun	26-Jun	24-May	8-Jun	12-May	24-May
2005	11-Jun	29-Jun	22-May	19-Jun	9-May	22-May
2006	10-Jun	29-Jun	27-Jun	29-Jun	25-Jun	30-Jun

Table 5. Summary of coverage, by stratum, in Div. 2G during 1995-2006 fall surveys

Stratum	Area (sq n mi)	Depth (m)	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
Total	16749		47	69	34	69

Table 6. Summary of coverage, by stratum, in Div 2H during 1995-2006 fall surveys

Stratum	Area (sq n mi)	Depth (m)	1996	1997	1998	1999	2001	2004	2006	Allocation 2006
			Sep 18-30	Oct 9-19	Oct 7-30	Oct 22-Nov 9	Dec 8-15	Oct 8-26	Oct 5-20	
930	1028	<=200	4	0	5	4	3	5	4	4
931	276	201-300	2	2	2	2	0	2	2	2
932	55	301-400	2	2	2	2	0	2	2	2
933	50	501-750	2	2	2	2	0	2	2	2
934	78	501-750	2	2	2	2	0	2	2	2
935	96	751-1000	1	2	2	2	0	2	2	2
936	78	1001-1250	1	2	2	1	2	2	2	2
937	94	1251-1500	1	2	2	1	2	2	2	2
938	191	1251-1500	2	2	2	2	2	2	2	2
939	130	1001-1250	2	2	1	2	1	2	1	2
940	97	751-1000	2	2	2	2	1	2	2	2
941	89	501-750	2	2	2	2	2	2	2	2
942	55	501-750	2	2	2	2	2	2	2	2
943	354	201-300	2	2	2	2	0	2	2	2
944	860	301-400	3	6	4	4	1	4	4	4
945	461	501-750	2	3	2	2	2	2	2	2
946	721	501-750	3	5	4	4	3	4	3	3
947	227	501-750	2	2	2	2	2	2	2	2
948	246	501-750	2	2	2	1	2	1	2	2
949	206	301-400	2	2	0	1	2	2	1	2
950	261	201-300	2	2	0	2	2	2	2	2
951	234	501-750	2	2	2	2	2	2	2	2
952	177	301-400	2	2	2	2	2	2	2	2
953	291	201-300	2	2	2	2	2	2	2	2
954	971	<=200	4	0	5	4	3	5	4	4
955	389	201-300	2	3	2	2	2	2	2	2
956	1051	<=200	3	0	5	4	4	5	4	4
957	1371	<=200	5	0	7	7	5	7	6	6
958	294	201-300	2	2	2	2	2	2	2	2
959	178	301-400	2	2	2	2	2	2	2	2
960	107	501-750	2	2	2	2	2	2	2	2
961	211	501-750	2	2	2	2	2	2	2	2
962	242	751-1000	2	2	2	2	0	2	2	2
963	265	1001-1250	2	2	2	2	0	2	2	2
964	342	1251-1500	2	2	2	2	0	2	2	2
Total	11776		77	71	83	81	57	87	81	83

Table 7. Summary of coverage, by stratum, in Div. 2J during 1995-2006 fall surveys.

Stratum	Area (sq n mi)	Depth (m)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Allocation 2006
			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 19	No 17-Dec 16	Oc 20-No 14	
201	633	<=200	0	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
203	487	301-400	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
205	1594	<=200	0	6	6	6	6	6	6	6	6	6	6	6	6
206	1870	<=200	5	7	7	7	7	7	7	7	7	7	7	7	7
207	2264	<=200	8	9	9	9	9	9	9	9	9	8	9	9	9
208	588	301-400	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
210	1035	201-300	3	4	4	4	4	4	4	4	4	4	4	4	4
211	251	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2
212	557	501-750	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
214	1341	201-300	4	5	5	5	5	5	6	5	5	5	5	5	5
215	1302	201-300	2	5	5	5	5	5	5	5	5	5	5	5	5
216	360	301-400	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
218	362	501-750	3	2	2	3	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
220	303	1001-1250	0	2	2	2	1	2	2	2	2	2	2	2	2
221	330	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2
222	450	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2
223	158	501-750	2	2	2	2	2	1	2	2	2	2	2	2	2
224	228	501-750	3	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
226	201	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2
227	598	501-750	2	2	2	2	2	3	2	2	2	2	2	2	2
228	2196	201-300	7	8	8	8	8	8	7	8	8	8	8	8	8
229	536	301-400	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
231	186	751-1000	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
233	237	1251-1500	0	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
235	414	501-750	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
237	733	<=200	3	3	3	3	3	3	4	3	3	3	3	3	3
238	778	<=200	0	3	3	3	2	3	3	3	2	3	3	3	3
239	120	501-750	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
Total	25272		84	117	117	118	115	117	120	117	116	115	117	117	117

Table 8. Summary of coverage, by stratum, in Div. 3K during 1995-2006 fall surveys

Stratum	Area (sq n mi)	Depth (m)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Allocation 2006
			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	
608	798	<=200	0	3	3	3	0	3	2	3	2	3	2	3	3
609	342	201-300	0	2	2	2	0	2	2	2	2	2	2	2	2
610	256	301-400	0	2	2	2	0	2	2	2	2	2	2	2	2
611	573	201-300	0	3	3	2	0	2	2	2	2	2	2	2	2
612	445	<=200	0	2	2	2	0	2	2	2	2	2	2	2	2
613	30	501-750	0	2	2	2	0	2	2	2	2	2	2	2	2
614	263	301-400	0	2	2	2	0	2	2	2	2	2	2	2	2
615	251	201-300	0	2	2	2	0	2	2	2	2	2	2	2	2
616	250	<=200	0	2	2	2	0	2	2	2	2	2	1	2	2
617	593	301-400	2	3	3	3	3	3	3	3	3	3	3	3	3
618	1347	<=200	5	6	6	4	6	6	3	6	4	6	6	5	6
619	1753	<=200	4	7	7	6	6	8	8	8	6	8	8	8	8
620	2545	201-300	3	11	11	11	11	11	11	11	11	8	11	11	11
621	2537	201-300	6	11	11	11	11	11	6	11	11	8	10	11	11
622	691	501-750	3	3	3	3	3	3	3	3	3	3	3	3	3
623	494	301-400	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
625	888	301-400	3	4	4	4	4	4	4	4	4	4	4	4	4
626	1113	301-400	4	5	5	5	5	5	4	5	5	4	5	5	5
627	1255	501-750	5	5	5	5	5	5	3	5	5	4	5	4	5
628	1085	301-400	5	5	5	5	5	5	3	5	5	5	5	3	5
629	495	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2
630	332	301-400	2	2	2	2	2	2	3	2	2	2	2	2	2
631	1321	501-750	5	6	6	6	6	6	10	6	6	4	5	6	6
633	2067	301-400	8	9	9	9	9	9	9	9	9	9	9	8	9
634	1555	201-300	7	7	7	7	7	7	7	7	5	2	7	6	7
635	1274	201-300	6	5	5	5	5	5	5	5	5	2	3	1	5
636	1455	201-300	7	6	6	6	6	6	6	6	6	3	5	3	6
637	1132	201-300	5	5	5	5	5	1	5	5	5	5	5	4	5
638	2059	301-400	9	9	9	9	8	5	8	9	9	9	9	5	9
639	1463	301-400	7	6	6	6	7	3	5	6	6	3	5	3	6
640	69	501-750	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
642	418	751-1000	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
644	474	1251-1500	2	2	2	2	2	2	2	2	2	2	2	2	2
645	216	501-750	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
647	360	751-1000	2	2	2	2	2	2	2	2	2	2	2	2	2
648	228	1001-1250	0	2	2	2	2	2	2	2	2	2	2	2	2
649	212	1251-1500	0	2	2	2	2	2	2	2	2	2	2	2	2
650	134	501-750	2	2	2	2	2	0	2	2	2	2	2	2	2
651	359	501-750	2	2	2	2	2	1	2	2	2	2	2	2	2
652	516	751-1000	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
654	479	1251-1500	2	2	2	2	2	2	2	2	2	2	2	2	2
Total	37051		131	175	175	171	154	159	165	175	168	151	167	154	175

Table 9. Summary of coverage, by stratum, in Div. 3L during 1995-2006 fall surveys.

Stratum	Area (sq n mi)	Depth (m)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Allocation 2006
			Oc 3 - Ja 25	Oc 9 - De 5	Oc 23 - De 20	No 2 - De 15	No 7 - De 12	Oc 24 - De 18	Oc 4 - De 6	Oc 23 - De 2	No 7 - Ja 20	No 24 - De 19	Oc 29-Ja 29	Oc 21-De 18	
328	1519	92-183	6	5	5	5	5	5	5	5	5	5	5	5	5
341	1574	92-183	6	6	4	5	5	5	5	5	5	4	5	5	5
342	585	92-183	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
344	1582	184-274	5	6	5	5	5	3	4	5	5	5	5	5	5
345	1432	275-366	7	5	5	5	5	3	5	5	5	5	5	5	5
346	865	275-366	3	3	3	2	3	3	3	3	2	3	3	3	3
347	983	184-274	4	3	3	3	3	3	3	3	3	2	3	3	3
348	2120	92-183	7	7	7	6	7	4	7	7	7	7	7	7	7
349	2114	92-183	9	7	7	7	7	7	7	7	7	7	7	7	7
350	2071	56-91	8	7	7	7	7	7	7	7	7	7	7	7	7
363	1780	56-91	7	6	6	6	6	4	6	6	6	6	6	6	6
364	2817	92-183	9	10	9	9	9	2	9	9	9	9	9	9	9
365	1041	92-183	4	4	3	3	3	1	3	3	3	0	3	3	3
366	1394	184-274	5	5	5	5	5	2	5	5	5	0	5	5	5
368	334	275-366	2	3	2	2	2	2	2	2	2	0	2	2	2
369	961	184-274	3	2	3	3	3	2	3	3	3	0	3	3	3
370	1320	92-183	5	4	4	4	4	4	4	4	4	1	4	4	4
371	1121	56-91	5	4	4	4	4	3	4	4	4	4	4	4	4
372	2460	56-91	10	9	8	8	8	2	8	8	8	8	8	8	8
384	1120	56-91	5	4	4	4	4	4	4	4	4	4	4	4	4
385	2356	92-183	9	9	8	8	8	8	8	8	8	8	8	8	8
386	983	184-274	4	3	3	3	3	3	3	3	3	0	3	3	3
387	718	275-366	3	2	2	2	2	2	2	2	2	0	2	2	2
388	361	275-366	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
390	1481	92-183	6	5	5	5	5	5	5	5	5	5	5	5	5
391	282	184-274	2	2	2	2	2	2	2	2	2	2	3	2	2
392	145	275-366	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
730	170	550-731	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
732	231	550-731	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
734	228	550-731	2	2	2	2	2	2	2	2	2	0	2	2	2
735	272	367-549	2	2	2	2	2	2	2	2	2	0	2	2	2
736	175	550-731	2	2	2	2	2	2	2	2	2	0	2	2	2
737	227	732-914	2	2	2	2	2	2	2	2	2	0	2	2	2
738	221	915-1097	2	2	2	2	2	2	2	2	2	0	1	2	2
739	254	1098-1280	1	2	2	2	2	2	2	2	2	0	2	2	2
740	264	1281-1463	0	2	2	2	2	2	2	2	2	0	2	2	2
741	223	732-914	0	2	2	2	2	2	2	2	2	0	0	2	2
742	206	915-1097	0	2	2	2	2	2	2	2	2	0	0	2	2
743	211	1098-1280	0	2	2	2	3	2	2	2	2	0	0	2	2
744	280	1281-1463	0	2	2	2	1	2	2	2	2	0	0	2	2
745	348	732-914	0	2	2	2	2	2	2	2	2	0	0	2	2
746	392	915-1097	0	2	2	2	2	2	2	2	2	0	0	2	2
747	724	1098-1280	0	3	2	2	2	2	2	2	2	0	0	2	2
748	159	732-914	0	2	2	2	2	2	2	2	2	0	0	2	2
749	126	915-1097	0	2	2	2	1	2	2	2	2	0	0	1	2
750	556	1098-1280	0	2	2	2	2	2	2	2	2	0	0	1	2
751	229	1281-1463	0	2	2	2	1	2	2	2	2	0	0	0	2
784	268	<=55	0	2	2	2	0	2	2	2	2	2	2	0	2
785	465	56-91	0	2	2	2	0	2	2	2	2	2	2	0	2
786	84	92-183	0	2	2	2	0	2	2	2	2	2	2	0	2
787	613	92-183	0	2	2	2	0	2	2	2	2	2	2	2	2
788	261	92-183	0	2	2	2	0	2	2	2	2	2	2	2	2
789	72	275-366	0	2	2	2	0	2	2	2	2	2	2	2	2
790	89	92-183	0	2	2	2	0	2	2	2	2	2	2	0	2
791	227	184-274	0	2	2	2	0	2	2	2	2	2	2	0	2
792	50	367-549	0	2	2	2	0	2	2	2	2	2	2	0	2
793	72	92-183	0	2	2	2	0	2	2	2	2	2	2	0	2
794	216	92-183	0	2	2	2	0	1	2	2	2	2	2	2	2
795	164	184-274	0	2	2	2	0	2	2	2	2	2	2	2	2
796	175	275-366	0	2	2	2	0	2	2	2	2	2	2	2	2
797	98	92-183	0	2	2	2	0	2	2	2	2	2	2	2	2
798	100	275-366	0	2	2	2	0	2	2	2	2	2	2	0	2
799	72	92-183	0	2	2	2	0	2	2	2	2	2	2	2	2
800	81	275-366	0	0	2	2	0	2	2	2	2	2	2	1	2
Total	46338		166	211	205	204	170	176	205	206	205	147	184	185	206

Table 10. Summary of coverage, by stratum, in Div. 3M during 1995-2006 fall surveys.

Stratum	Area (sq n mi)	Depth (m)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Allocation 2006
			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 (2004)			No 26 - De 2	
501	342	<=146	2	0	0	0	0	0	0	0	0	0	0	0
502	838	147-183	6	0	0	0	0	0	0	0	0	0	0	0
503	628	184-256	4	0	0	0	0	0	0	0	0	0	0	0
504	348	184-256	2	0	0	0	0	0	0	0	0	0	0	0
505	703	184-256	5	0	0	0	0	0	0	0	0	0	0	0
506	496	184-256	3	0	0	0	0	0	0	0	0	0	0	0
507	822	257-366	5	0	0	0	0	0	0	0	0	0	0	0
508	646	257-366	4	0	0	0	0	0	0	0	0	0	0	0
509	314	257-366	2	0	0	0	0	0	0	0	0	0	0	0
510	951	257-366	6	0	0	0	0	0	0	0	0	0	0	0
511	806	257-366	5	0	0	0	0	0	0	0	0	0	0	0
512	670	367-549	4	0	0	0	0	0	0	0	0	0	0	0
513	249	367-549	2	0	0	0	0	0	0	0	0	0	0	0
514	602	367-549	4	0	0	0	0	0	0	0	0	0	0	0
515	666	367-549	3	0	0	0	0	0	0	0	0	0	0	0
516	634	550-731	4	0	0	0	0	0	0	0	0	0	0	0
517	216	550-731	2	0	0	0	0	0	0	0	0	0	0	0
518	210	550-731	2	0	0	0	0	0	0	0	0	0	0	0
519	414	550-731	3	0	0	0	0	0	0	0	0	0	0	0
520	525	732-914	0	0	0	0	0	0	0	0	0	0	0	0
521	517	915-1097	0	0	0	0	0	0	0	0	0	0	0	0
522	533	1098-1280	0	0	0	0	0	0	0	0	0	0	0	0
523	284	1281-1463	0	0	0	0	0	0	0	0	0	0	0	0
524	253	732-914	0	0	0	0	0	0	0	0	0	0	0	0
525	226	915-1097	0	0	0	0	0	0	0	0	0	0	0	0
526	177	1098-1280	0	0	0	0	0	0	0	0	0	0	0	0
527	171	1281-1463	0	0	0	0	0	0	0	0	0	0	0	0
528	530	732-914	2	3	3	1	3	3	3	3	0	0	3	3
529	488	915-1097	2	3	3	2	3	3	3	3	0	0	3	3
530	1134	1098-1280	2	7	7	5	7	7	7	7	0	0	7	7
531	203	1281-1463	2	2	2	2	2	2	2	2	0	0	2	2
532	238	915-1097	2	2	2	2	2	2	2	2	0	0	2	2
533	98	732-914	2	2	2	0	2	2	2	2	0	0	2	2
534	486	915-1097	2	3	3	0	3	3	3	3	0	0	2	3
535	92	1098-1280	2	2	2	0	2	2	2	2	0	0	2	2
536	112	1281-1463	2	2	2	0	2	2	2	2	0	0	0	2
537	102	367-549	0	0	0	0	0	0	0	0	0	0	0	0
538	194	550-731	0	0	0	0	0	0	0	0	0	0	0	0
539	133	732-914	0	0	0	0	0	0	0	0	0	0	0	0
Total	17051		86	26	26	12	26	26	26	26	0	0	23	26

Table 11. Summary of coverage, by stratum, in Div. 3N during 1995-2006 fall surveys

Stratum	Area (sq n mi)	Depth (m)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Allocation 2006
			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	
357	164	275-366	2	2	2	2	1	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
359	421	92-183	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	8
361	1853	56-91	11	5	5	5	5	5	5	5	5	5	5	5	5
362	2520	56-91	5	6	7	7	7	7	7	7	7	7	7	7	7
373	2520	56-91	5	7	7	7	6	7	7	7	7	7	7	7	7
374	931	56-91	2	2	3	3	3	3	3	3	3	3	2	3	3
375	1593	<=55	9	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	4
377	100	92-183	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
379	106	275-366	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
381	182	184-274	2	2	3	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
383	674	56-91	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
724	124	550-731	2	2	2	2	2	2	2	2	1	2	2	2	2
725	105	367-549	2	2	2	2	2	2	2	2	2	1	2	2	2
726	72	550-731	2	2	2	2	2	2	2	2	3	2	2	2	2
727	160	367-549	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
752	134	732-914	0	0	0	2	0	2	2	2	0	0	0	0	2
753	138	915-1097	0	0	0	2	0	2	2	2	0	0	1	0	2
754	180	1098-1280	0	1	0	2	0	2	2	2	0	0	0	0	2
755	385	1281-1463	0	0	0	2	0	2	2	2	0	0	0	0	2
756	106	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2
757	102	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2
758	99	1098-1280	0	0	0	2	0	2	2	2	0	0	2	0	2
759	127	1281-1463	0	0	0	2	0	2	2	2	0	0	2	0	2
760	154	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2
761	171	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2
762	212	1098-1280	0	0	0	0	0	2	2	2	0	0	2	0	2
763	261	1281-1463	0	0	0	0	0	2	2	2	0	0	2	0	2
Total	19523		90	67	74	90	68	94	94	94	70	69	86	70	94

Stratum	Area (sq n mi)	Depth (m)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Allocation 2006
			Se 26 - Oc 20	No 24 - De 17	Se 26 - Oc 19	Oc 10 - De 13	Oc 13 - No 13	Oc 11 - No 24	Se 22 - Oc 14	Oct 5-16	Se 23 - Oc 21	Oc 31 - No 10	Oct 4-17	Se 30 - Oc 9	
329	1721	92-183	5	5	5	5	5	5	5	5	5	5	5	5	5
330	2089	56-91	5	6	6	6	6	6	6	6	6	7	6	6	6
331	456	56-91	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
333	147	184-274	2	0	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
335	58	275-366	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
337	948	92-183	2	2	3	3	3	3	3	3	3	3	3	3	3
338	1898	56-91	5	2	5	5	5	5	5	5	5	5	5	4	5
339	585	92-183	2	3	2	2	1	2	2	2	2	2	2	2	2
340	1716	56-91	4	5	5	5	7	5	5	5	5	5	5	5	5
351	2520	56-91	7	6	7	7	6	7	7	7	7	7	7	7	7
352	2580	56-91	17	5	6	7	7	7	7	7	7	7	7	8	7
353	1282	56-91	3	2	4	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	2	2
355	103	184-274	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
717	166	367-549	2	0	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
719	76	367-549	2	2	2	2	2	3	2	2	2	2	2	2	2
720	105	550-731	2	2	1	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
722	93	550-731	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
765	124	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2
766	144	1098-1280	0	0	0	0	0	2	2	2	0	0	2	0	2
767	158	1281-1463	0	0	0	0	0	2	2	2	0	0	2	0	2
768	99	732-914	0	0	0	2	0	2	2	2	0	0	2	0	2
769	138	915-1097	0	0	0	2	0	2	2	2	0	0	2	0	2
770	128	1098-1280	0	0	0	0	0	2	2	2	0	0	2	0	2
771	175	1281-1463	0	0	0	0	0	2	2	2	0	0	2	0	2
772	135	732-914	0	0	0	2	0	2	0	2	2	0	2	0	2
773	128	915-1097	0	0	0	2	0	2	2	2	2	0	2	0	2
774	135	1098-1280	0	0	0	0	0	2	2	2	2	0	2	0	2
775	155	1281-1463	0	0	0	0	0	2	2	2	2	0	2	0	2
Total	20176		81	58	73	87	75	100	97	99	83	76	99	74	99

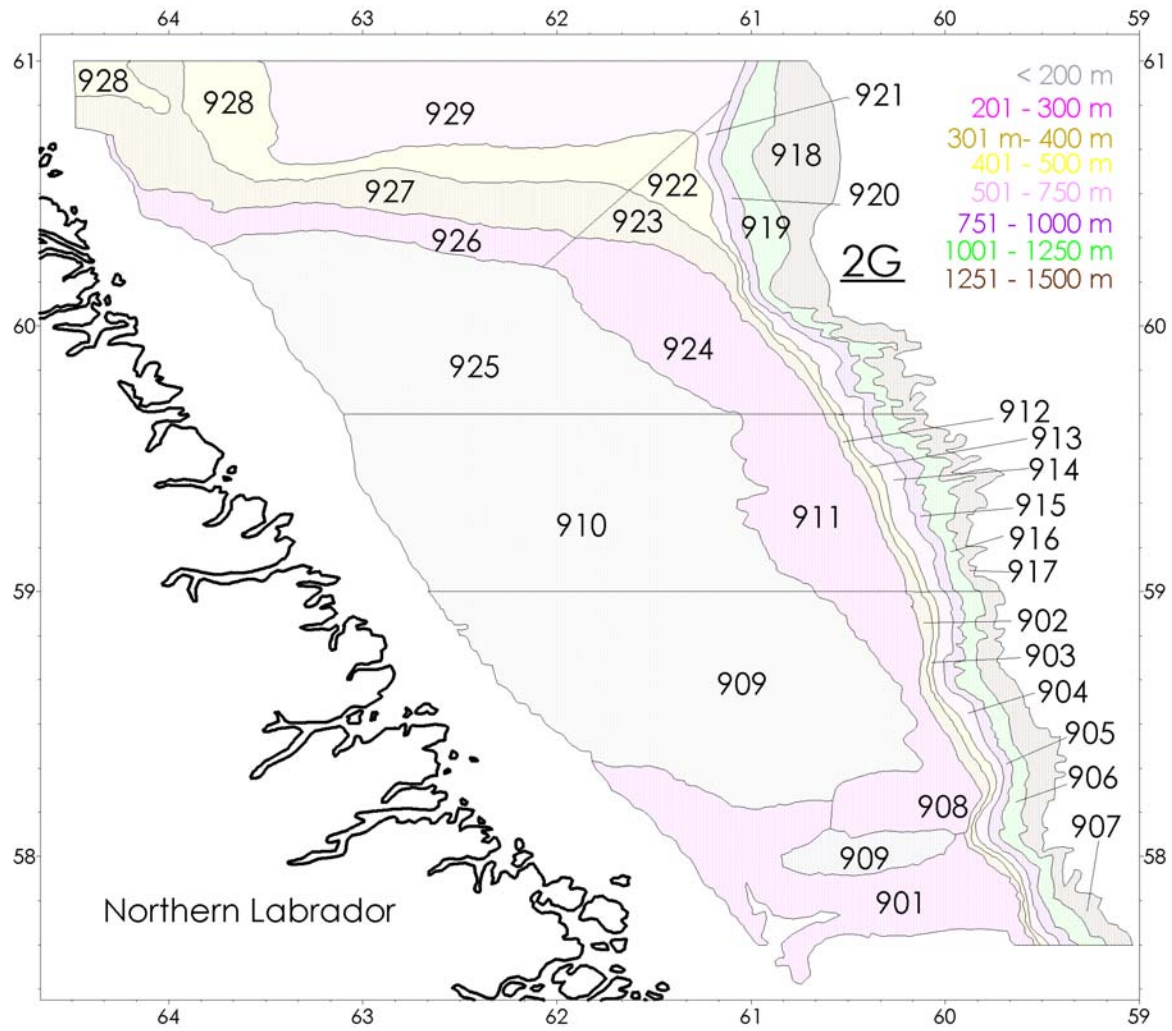


Fig 1. Stratification of Div. 2G

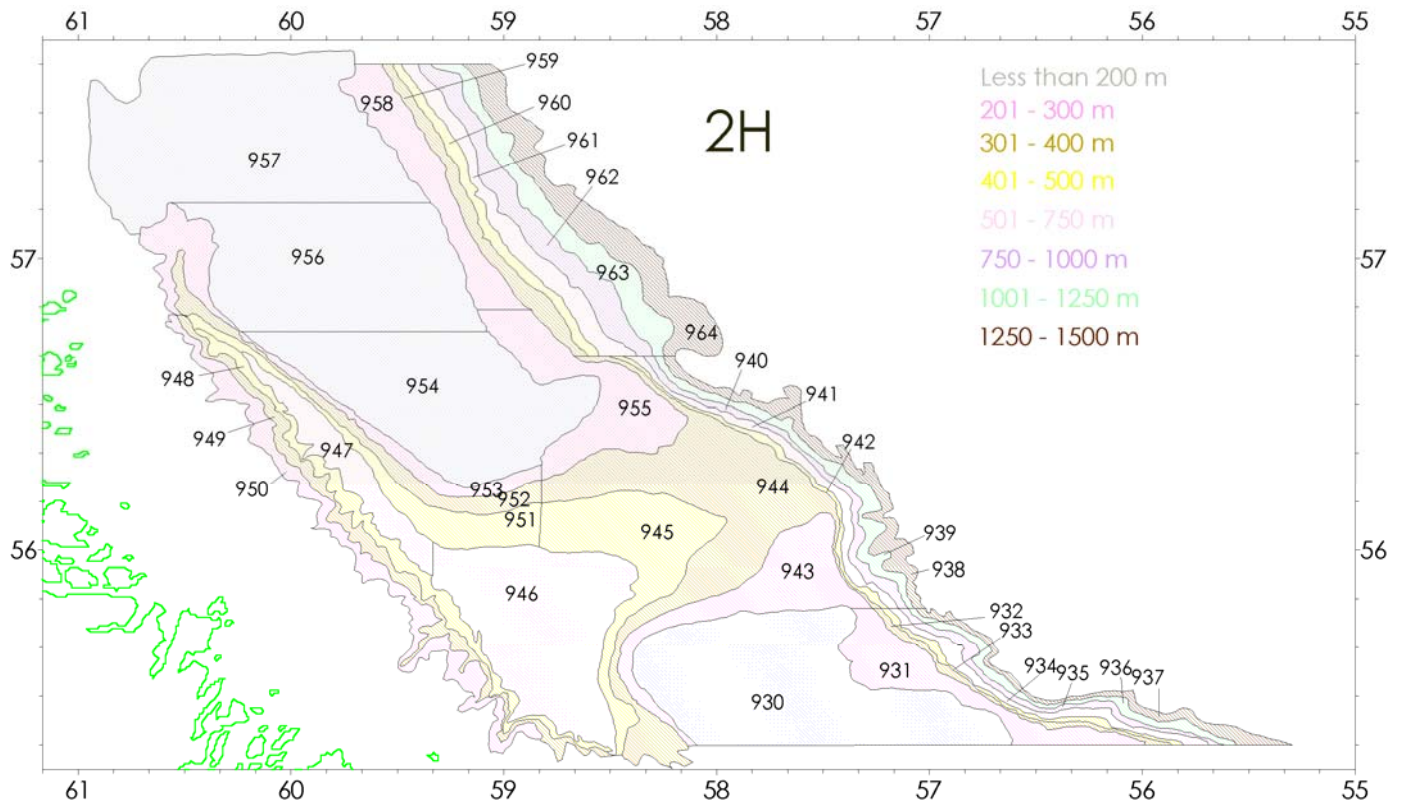


Fig 2. Stratification of Div. 2H

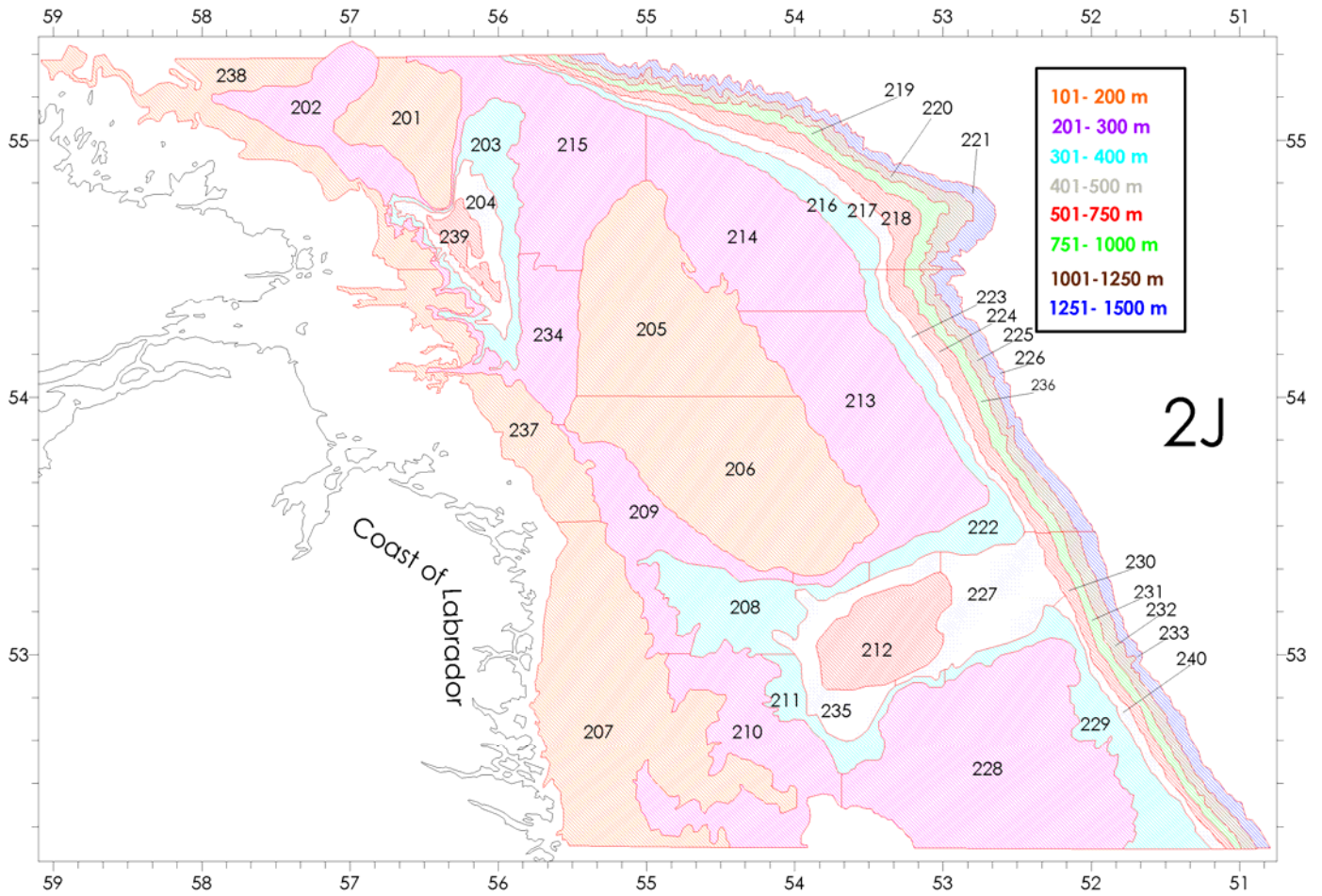


Fig 3. Stratification of Div. 2J

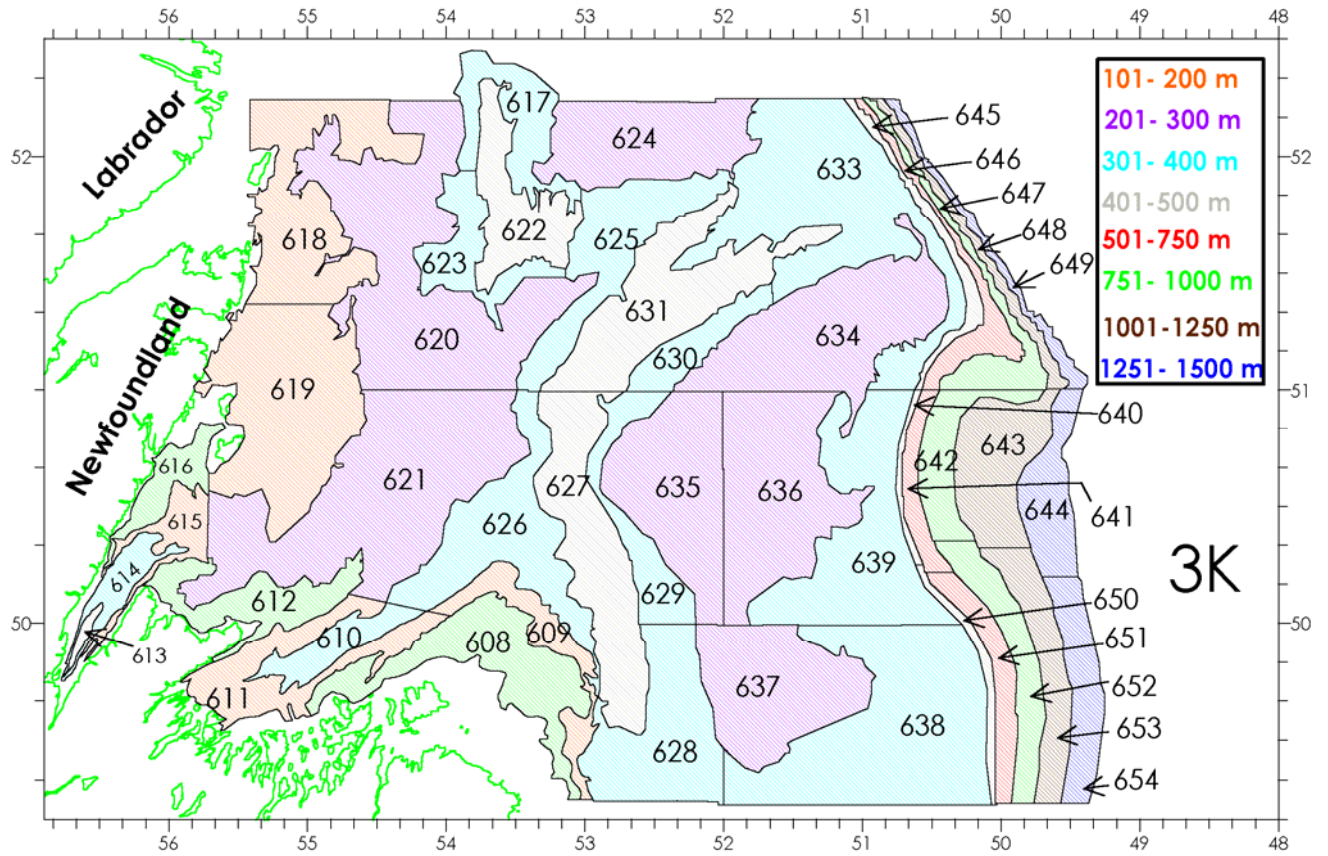


Fig 4. Stratification of Div. 3K

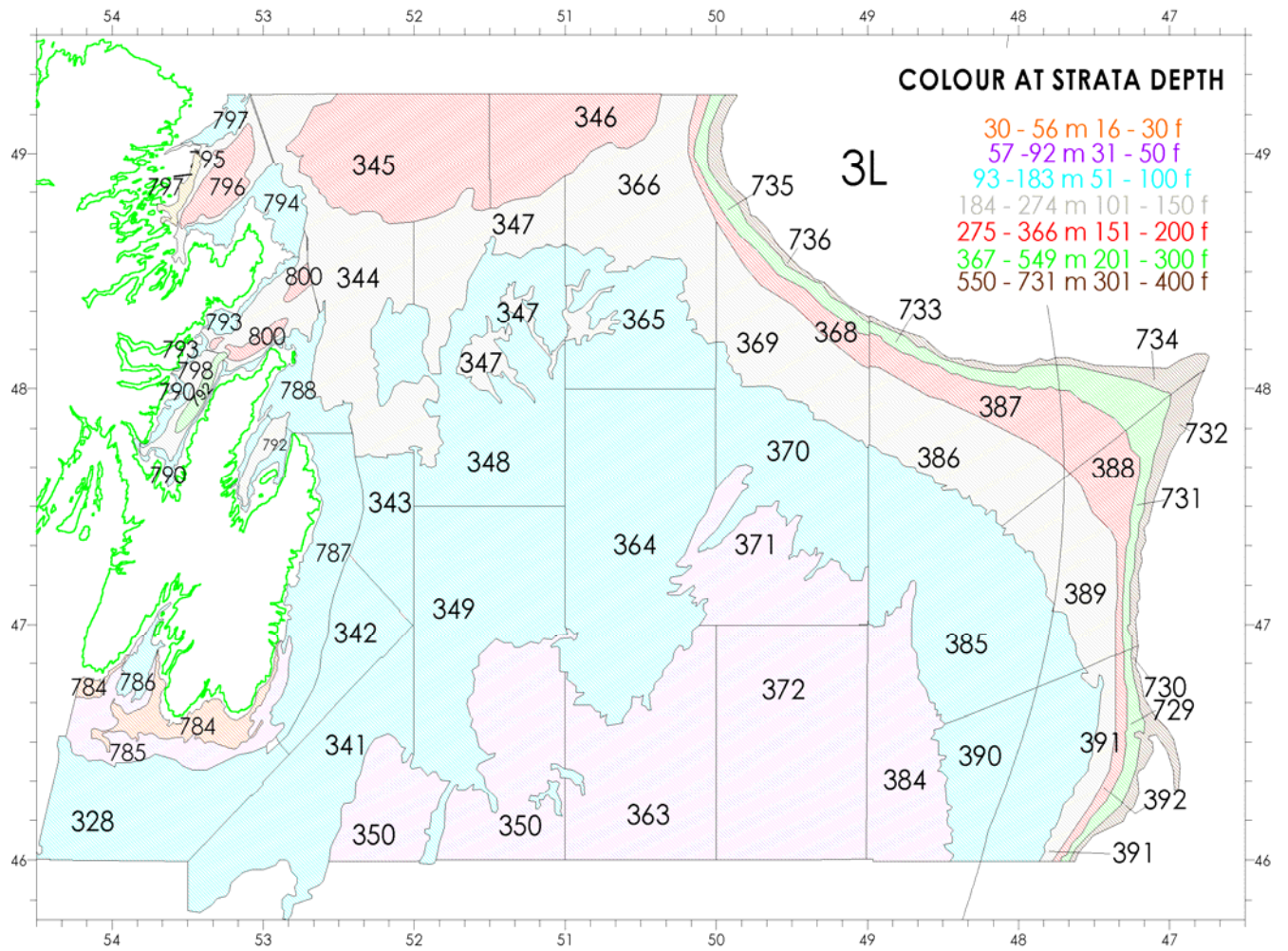


Fig 5. Stratification of Div. 3L

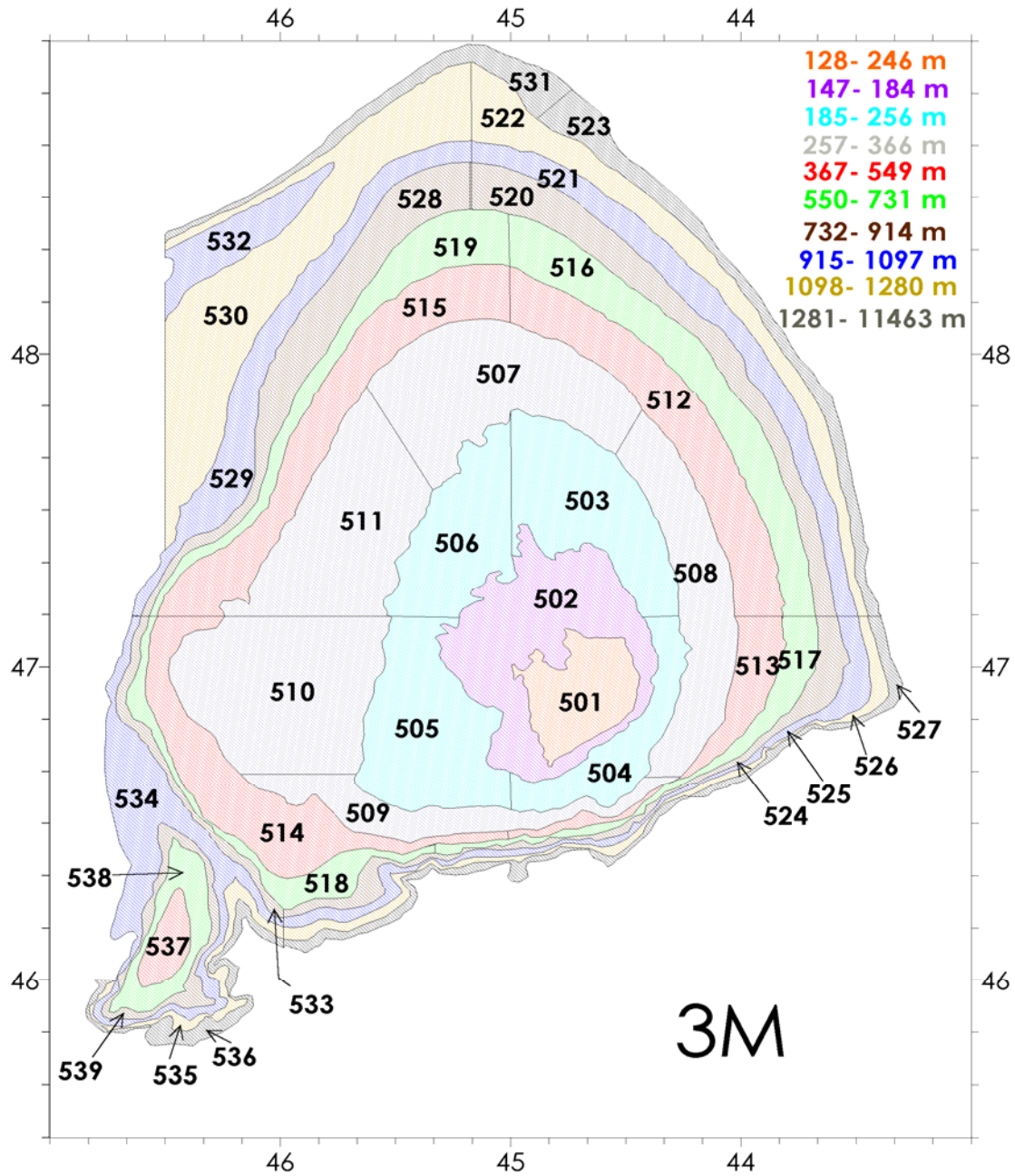


Fig 6. Stratification of Div. 3M

