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A Description of the 1995 Fall Groundfish Survey in Division 2J3KLNO

by

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Introduction

Annual stratified random (S-R) trawl surveys of groundfish resources have been conducted during autumn in the Newfoundland Region since 1977. Over time, these surveys have gradually expanded, and from 1990 onward have covered the offshore areas of Divs. 2J, 3K, 3L, 3N, and 3O (Table 1). A separate S-R survey, directed primarily at juvenile flatfish, started in 1985 in Div. 3LNO. As well, a fixed station survey aimed mainly at juvenile cod began in 1992, with fishing sets located in various bays in Div. 3KL and some offshore sites in these areas. Besides the differences in survey design, these three survey series were all done with different trawl gear; Engels 145 high-lift otter trawl for groundfish (different versions for the *RV Gadus Atlantica* and *RV Wilfred Templeman*), modified Yankee 80/104 shrimp trawl for juvenile flatfish, and Campelen 1800 shrimp trawl for juvenile cod.

In 1995, the *Gadus* was replaced with the *RV Teleost*. As a result of this change, it was decided to replace the Engels 145 trawls used on both the *Gadus* and *Templeman* with a Campelen 1800 shrimp trawl, in order to improve estimates of abundance of smaller fish of many species. It was also decided in 1995 to discontinue separate surveys for juvenile flatfish, and for juvenile cod in the offshore areas. However, in order to maintain continuity with these two survey series, the fall survey in 1995 included enhanced coverage in the Southeast Shoal area of Div. 3NO, and the fixed stations in the inshore areas of Div. 3KL. were also completed.

Methods

The 1995 survey was scheduled to run from Sep. 25 to Dec. 20, beginning in Div. 3NO and ending in Div. 3K. The survey design was S-R, with the allocation of sets to be proportional to stratum area within a Division, and a minimum of 2 sets in all strata. For the first time, nine strata on the western side of Div. 3M were to be covered as part of the fall survey. Coverage was planned to a maximum depth of about 1500 m in all Divisions, which was substantially deeper than the maximum depth fished in virtually all previous fall surveys. Exceptions to proportional allocation were made in Strata 360, 361, 375, and 376 in Div. 3N, and stratum 352 in Div. 3O. In these 5 strata, an additional 40 sets were assigned and all sets in these strata were given either a day or night designation; both these features were added to maintain comparability with previous offshore juvenile surveys.

A total of 727 S-R sets was chosen, using the Divisional allocations in Table 2. Although fixed stations were done for various reasons during the fall survey in some areas, these were not included with the sets allocated in the S-R survey for the purposes of sample collection or calculation of abundance indices.

The plan called for the *Templeman* to survey Div. 3LNO out to 915 m (500 fm), as well as a substantial part of Div. 3K. The *Teleost* was to survey Div. 2J, part of Div. 3K, Div. 3LNO (916-1464 m, or 501-800 fm), and the strata in Div. 3M. Some comparative fishing between the 2 boats was scheduled for Div. 3K, because the *Templeman* had not worked in Div. 3K in previous fall surveys, and its comparability with the *Teleost* is unknown. Another concern was the large interval in time between survey sets in the shallow portions of Div. 3NO (late Sept. to early Oct.) and the sets in adjacent deep waters (scheduled for mid-December).

Modifications to the fishing protocols in the 1995 survey were extensive, and included changes to the survey trawl (Engels to Campelen), as well as to the speed and duration of tows (3.5 knots for 30 min. to 3.0 knots for 15 min.). In addition, a new scope ratio (warp length to depth fished) was implemented and active use was made of SCANMAR data to determine net contact with the seabed, ie. start and end of tows.

Results

The survey began, as scheduled, on Sep. 25, 1996 in the Southeast Shoal area of Div. 3NO, on the *Templeman*. Apart from some minor mechanical problems and poor weather conditions later in the fall, the work scheduled for this vessel proceeded without difficulty, although sets deeper than 731 m could not be carried out due to the amount of main warp carried on the winch drums. However, the start of the *Teleost* work was delayed by almost three weeks, and thus the portion of the survey in Div. 2J3K did commence until late November. Several factors contributed to additional down-time on this vessel, resulting in some work being completed as late as Jan. 25, 1996, almost 6 weeks later than any other data in the fall surveys of previous years.

Table 2 shows a summary, by Division, of the number of S-R sets allocated versus the number actually completed, and the geographical distribution of these sets is shown in Fig. 1. Given the ongoing difficulties with the *Teleost* portion of the survey, much of the new work planned for 1995 was severely reduced or eliminated. This included all sets in Div. 3M, comparative fishing between the *Teleost* and *Templeman*, and most of the sets >1000 m in Div. 2J3K, and >731 m in Div. 3LNO. Of the 122 new sets planned for deepwater coverage, only 14 were completed (9 in Div. 3K and 5 in Div. 3L). With the exception of the deepwater sets, virtually all planned coverage in Div. 3LNO was completed. However, it was necessary to further reduce survey coverage in Div. 2J and 3K, particularly in northern 2J where ice coverage hampered trawling in January 1996. As a result, four strata usually surveyed in Div. 2J (201, 205, 234, and 238; see Fig. 2) were not covered, and a number of planned sets in other strata were not done.

Catches with the Campelen trawl contained many more small fish and benthic animals than catches with the Engel trawl in previous surveys. This was also observed in the comparative fishing results obtained with the *Gadus* and *Teleost* earlier in 1995. Comparison of the 1995/96 survey results with the existing suvey series depends on further analysis of these comparative fishing data.

A problem with the operation of the trawl doors while towing was observed during the first half of the *Templeman* work. It was decided to replace these doors with a set from the Teleost, which appeared to correct the problem. However, the SCANMAR measurements of mean wing and door spread from the first 3 *Templeman* trips were about 14% and 24% lower respectively than the values of these parameters from the last 3 trips. Approximately 278 of the 432 S-R tows were made during the first 3 trips, with the old doors, in Div. 3LNO.

Biological sampling of groundfish was conducted with few changes, although subsampling of the total trawl catch was often required due to the high numbers of fish and invertebrates caught by the Campelen trawl. Detailed information on shrimp and crab was collected for the first time during a groundfish survey.

Discussion

The original survey plan provided an acceptable compromise between the timing of previous juvenile flatfish surveys (Aug-Sep) and fall groundfish surveys (Oct-Nov) in Div. 3NO, and matched the timing of past surveys in Div. 2J3KL (Nov-Dec) reasonably well. However, with delays in the Teleost schedule, extension of the Div. 2J3K survey to late January put some results for these areas about 6 weeks later than usual. This raises concerns not only with the discrepancy in timing compared to previous surveys, but also with the length of time (about 9 weeks) required to conduct the 1995 survey in Div. 2J3K, compared to the norm of about 6 weeks. Despite the additional time, overall coverage in these 2 Divisions was poor by recent standards, particularly in Div. 2J.

Concerns about timing and survey coverage in Div. 3LNO are not as serious. Factors to be considered in the analysis of these data are the different wing spreads observed, and the inclusion of elements of the juvenile S-R survey design (diel, enhanced coverage) for the 5 strata in Div. 3NO noted above. The concern about differences in timing of shallow and deep sets in Div. 3LNO did not matter, because virtually all the deep sets were cancelled. The overall lack of deepwater coverage in almost all Divisions does not result in the interruption of any time series, but will delay by another year the incorporation of these data into abundance and biomass estimates for species such as G. halibut, grenadiers, and A. plaice.

Proper comparison of the 1995/96 survey results with the existing survey series depends on further analysis of comparative fishing data. Three sets of comparative fishing will be required to produce the necessary conversion factors: *Gadus (Engels) vs. Teleost (Campelen), Templeman (Engels vs. Campelen),* and *Templeman (modified Yankee vs. Campelen)*. The first set has been conducted and partially analysed, the second has been conducted but not yet evaluated, and the third set should be completed prior to March 1997. However, an additional factor to consider is the introduction in 1995 of the *Templeman* in the survey series for Div. 3K, which had been surveyed only by the *Gadus* in all previous years (Table 1). As noted above, the comparability of the *Templeman* and *Teleost* is unknown, even for the same trawl gear.

Acknowledgments

Thanks to David Orr for tabulation of data and production of the ACON map in Fig.1.

Table 1. Information on fall groundfish surveys, Div. 2J3KLMNO, 1977-94.

Div.	Years surveyed	Research Vessel*	Usual Max. Depth(m)	# sets (min, max)	# sets 1994
2J	1977-94	GA	1000	53 - 157	101
3K	1978-94	GA	1000	69 - 181	152
3L	1981-94	ATC (81,82), WT/AN (83-94)	731	99 - 231	200
3M	-	-	-	-	-
3N	1990-94	WT	731	34 - 80	73
3O	1990-94	WT	731	54 - 91	75
					601

* GA = Gadus Atlantica
ATC = A.T.Cameron
WT = Wilfred Templeman
AN = Alfred Needler

Table 2. Breakdown of S-R sets in 1995 fall groundfish survey.

Div.	# sets allocated	# sets completed			# strata not surveyed	
		Teleost	*Templeman*	Total	Regular	Deepwater
2J	124	84	0	84	4	6
3K	162	31	100	131	0	2
3L	200	5	161	166	0	12
3M	21	0	0	0		9
3N	114	0	90	90	0	12
3O	106	0	81	81	0	12
Totals	727	120	432	552	4	53

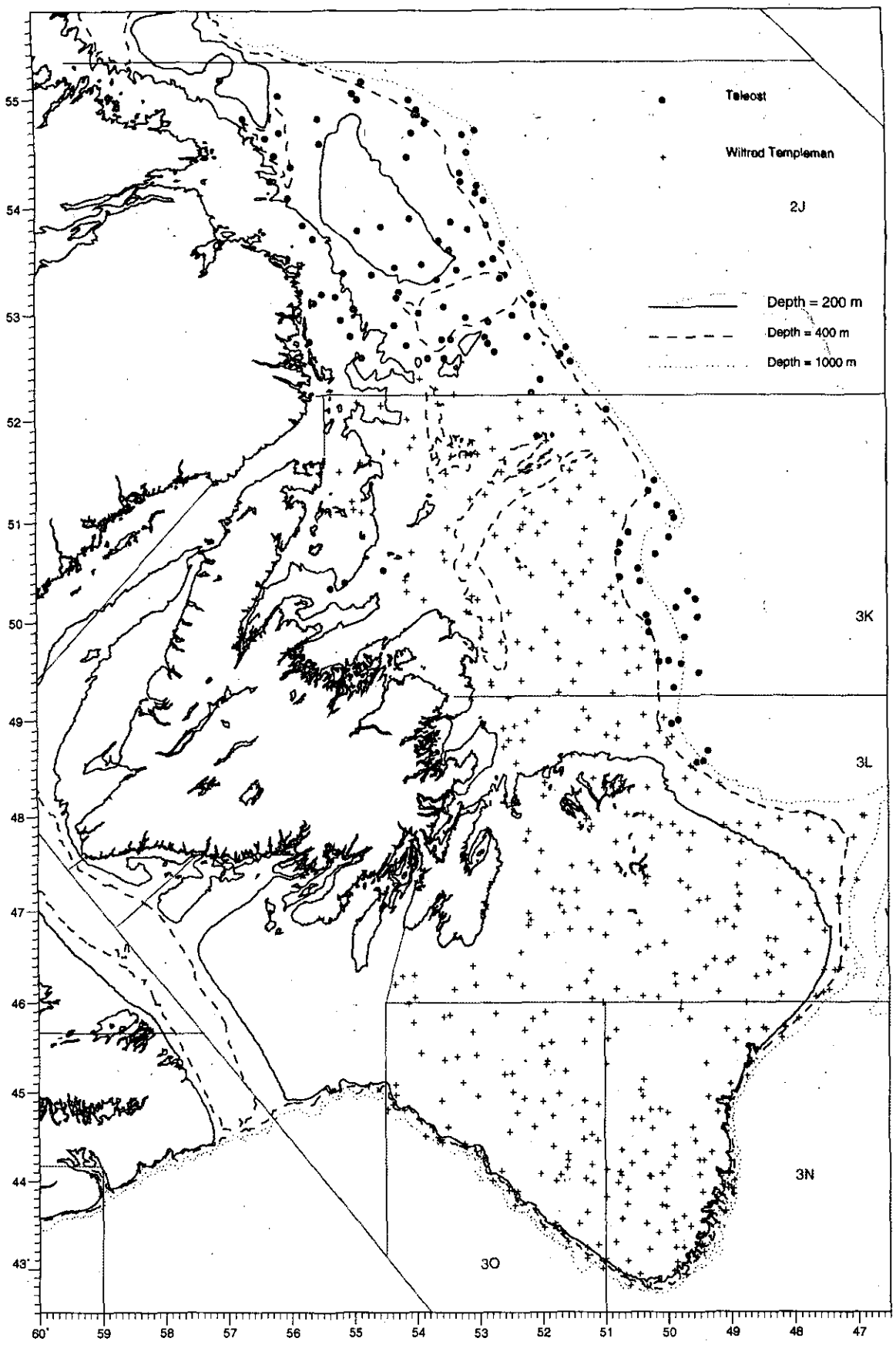

Figure 1 - Stratified set positions for the 1995 Fall Survey

Teleost trips 20 - 23 and Wilfred Templeman trips 176 - 181

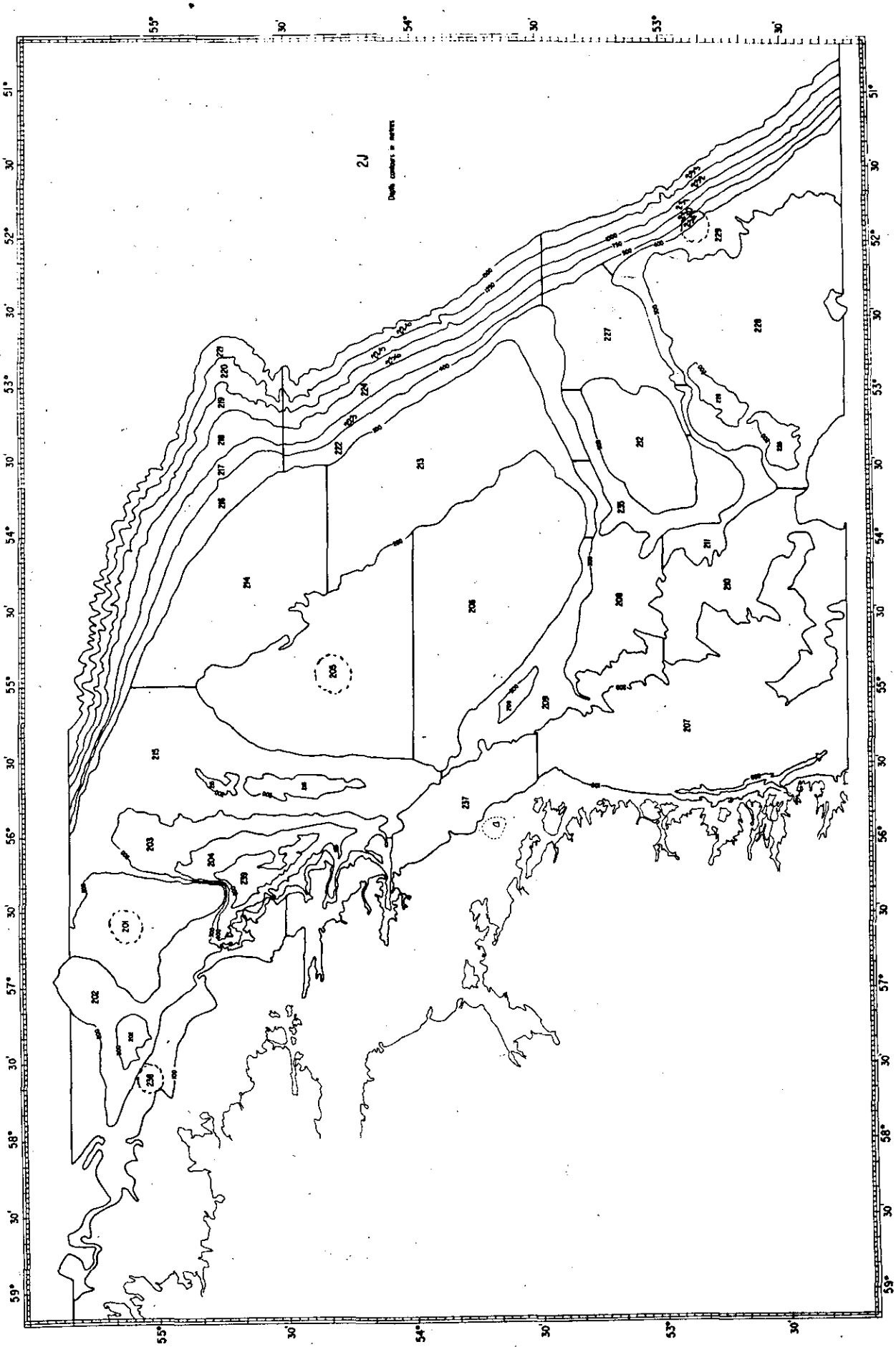

Fig. 2. Stratification for Div. 2J, adopted prior to 1993 survey. The 4 circled strata were not surveyed in 1995.

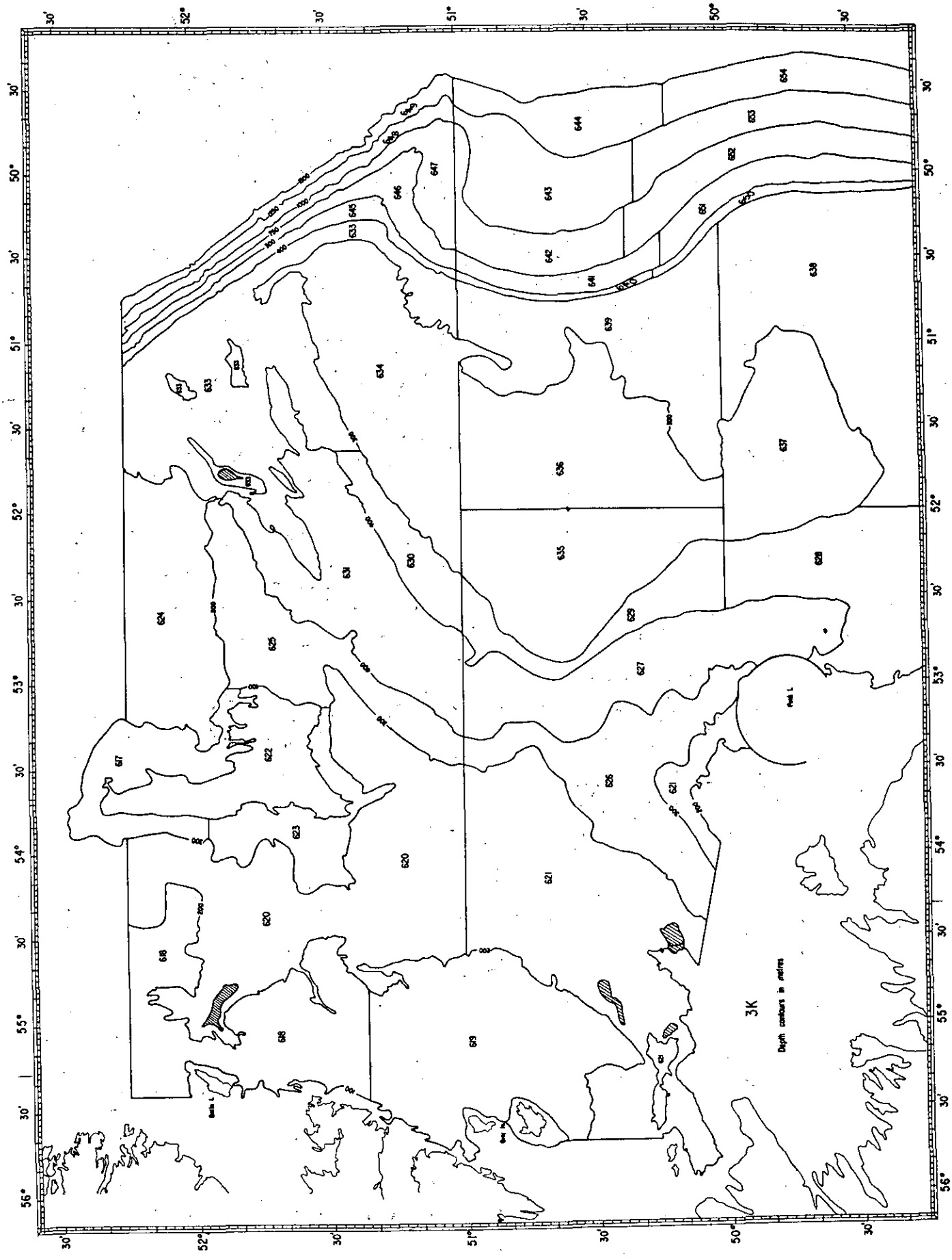

Fig. 3. Stratification scheme for Div. 3K, adopted prior to 1993 survey.

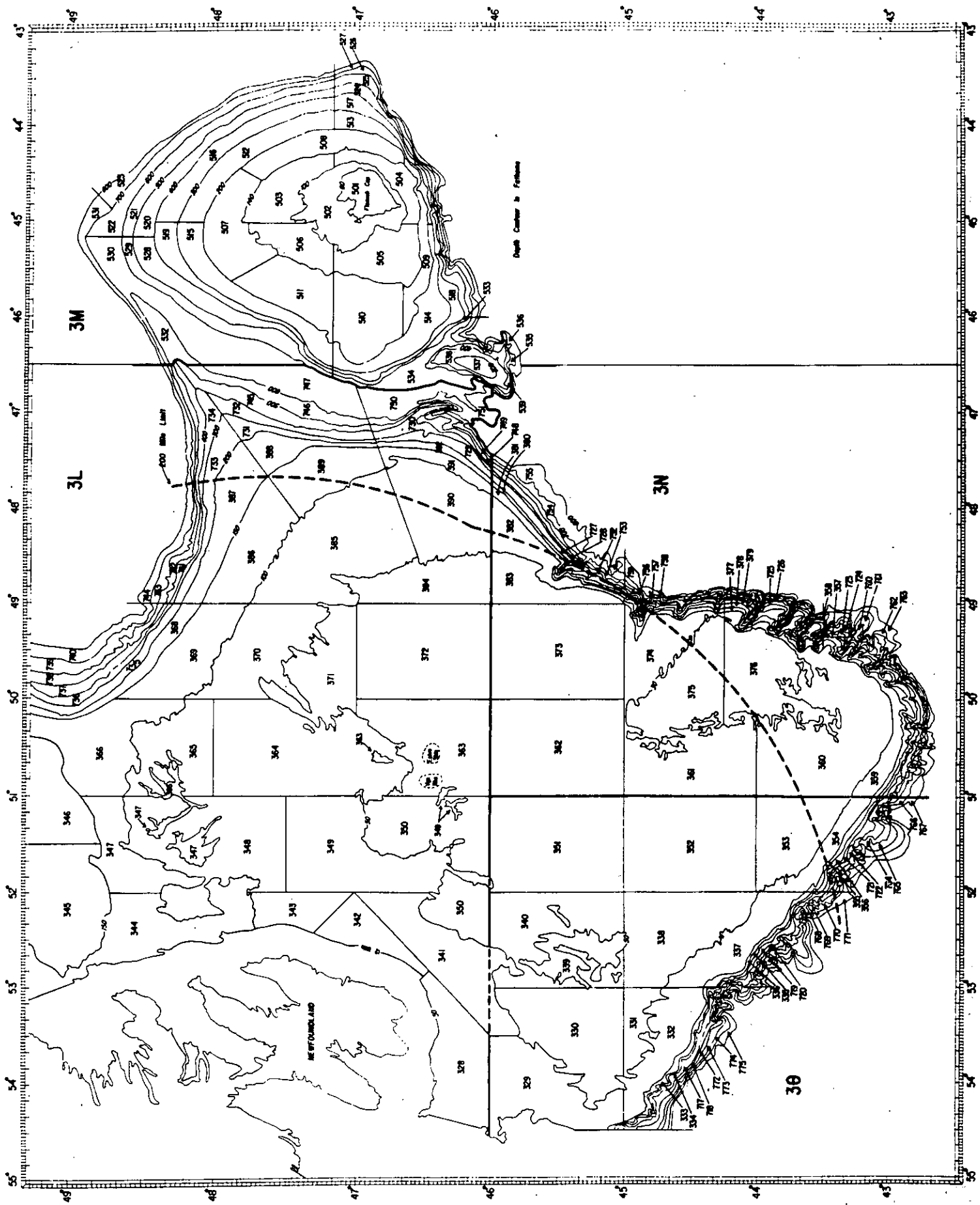

Fig. 4. Stratification scheme for Div. 3LMNO. Deepwater strata added/modified in 1994.