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(Revised)

Revisions and additions to stratification schemes used during  
research vessel surveys in NAFO Subareas 2 and 3.

by

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### Introduction

Most research vessel groundfish surveys conducted in the northwest Atlantic use a stratified- random method of set selection. This method has been used since the early 1970's in Subarea 3 (3L, 3N, 3O, 3Ps) and since the late 1970's in Div. 3K, 3M and Subarea 2. This paper describes the revisions and/or additions that have been made to existing stratification charts.

### Background

Stratification schemes developed were based on depth contours using available navigational charts. The originally developed stratification schemes for the Northwest Atlantic are described in ICNAF Summ. Doc. 79/VI/24. Since that time additional stratification charts have been developed (2G and 2H) and corrections and/or additions to existing charts. Corrections to some existing charts have been necessary because of the many discrepancies observed during early surveys with respect to depth in the original navigational charts and the subsequent availability of more accurate charts. Other changes were introduced because they were considered to be improvements in design reflective of stock distributions.

The new charts are Natural Resource Maps produced by the Canadian Hydrographic Service (Figures 1 and 2). These Maps proved to be very accurate and indicated a significant different bottom configuration than that shown on navigational charts, particularly with respect to Divisions 2J and 3K.

Additions to existing stratification charts have been mainly that of depth zones up to 800 fath.

### Results

The stratification chart revisions by NAFO Div. are described as follows:

#### 2GH

A stratification scheme designed primarily to focus on deepwater species was described by Bowering (1987). At that time only the strata boundaries were defined (Figs.3 and 4). Additions to the stratification since that time include the development of units for individual strata (Tables 1 and 2). The most recent (autumn 1991) groundfish survey conducted in this area successfully employed this stratified scheme.

#### 2J

The stratification scheme used in this area was first used by Canada in 1977. The two charts used for this stratification as well as that for part of Div. 3K were nautical charts designated; 1) Cape Harrison to St. Michael Bay (L/C 8048) and 2) St. Michael Bay to Grey Islands (L/C 8049). These were found to have many inaccuracies with respect to depth at position which were only reconciled with the acquisition of more accurate charts. These new charts indicated substantial differences in the bottom contour configuration in Div. 2J as well as the northern part of 3K. Consequently, a revision of the stratification chart was necessary.

Where possible, the revised stratification followed that previously developed with reference to area and numbering scheme. Revisions to the 2J stratification scheme was the most extensive of all the Divisional changes as it was in this area that the new charts were at largest variance with the old. A comparison of the old and new schemes is shown in Table 3 and Figs. 5 and 6. Four new strata were added (237-240). These additions were mainly the result of realignment of old strata based on knowledge of fish distribution. A description of major changes is as follows:

- 1) New stratum - 237: Previously inshore part of 205.
- 2) " - 238: " " " " " 201.
- 3) " - 239: Depth zone (501-750) not indicated on old charts.
- 4) " - 240: Previously part of 227.
- 5) Strata 205 and 206 were divided on east-west basis (54 N.lat.line) rather than north-south (55 W.long.line).

Other strata changed with respect to area in varying degrees. Changes in shape of strata were also substantial on the slope areas in deeper water. The change in total area covered by the new stratification was less than 1% relative to the old.

### 3K

Similar to that for Div. 2J, the stratification for Div. 3K was first used by Canada in 1978. A large portion of the original stratification for Div. 3K has been based on new charts and required no revision. The stratification for the northern portion of Div. 3K was based on the St. Michael Bay to Grey Island (L/C 8049) chart. The new charts indicated substantial changes to the bottom topography and consequently the stratification scheme was revised. A comparison of the old and new schemes is shown in Table 4 and Figures 7 and 8. The major changes in the stratification were as follows:

- 1) New stratum 617: previously the northern part of 623.
- 2) Stratum 624 now includes Stratum 632 as well as parts of 625, 630 and 631.
- 3) Stratum 632 has been deleted.

As well, Strata 640 to 644 (long narrow strata in the slope area were divided on a north-south basis to permit more adequate survey coverage. The northern portion remains as previously numbered 640-644 while the southern portion includes strata numbered 650-654.

### 3L, 3M, and 3N

The original stratification schemes extended to depths of 400 fath. and the new scheme adds strata to depths of 800 fath. (Tables 5 to 7; Fig. 9). The new strata by Div. are as follows;

|                  |                  |                         |
|------------------|------------------|-------------------------|
| 3L - 737 to 751; | total new area = | 4420 mi. <sup>2</sup>   |
| 3M - 520 to 539; | "                | = 6496 mi. <sup>2</sup> |
| 3N - 752 to 763; | "                | = 2069 mi. <sup>2</sup> |

### 3O

Stratification was also extended to cover depths from 400 to 800 fath. (Table 8; Fig. 9). The additional strata were no's 764 to 775 adding an area of 1624 mi.<sup>2</sup>. As well, four original strata along the slope of the Bank (333, 334, 717, and 718) were revised as more accurate charts had become available.

### 3P

Stratification was extended to cover depths from 400 to 800 fath. (Tables 9 and 10; Fig. 10) as well as an inshore area (part of Placentia Bay). These additional strata were no's 710, 776-773 which added an area of 2434 mi. Other changes included the combination of strata 709 and 710 as new stratum 709. The new stratum 710 delineates a new stratum in the next deepest (400-500 fath) depth zone.

A summary of stratification schemes used in Subareas 2 + 3 is shown in Table 11. Surveys have been conducted successfully using the revised stratification but only in strata in depths up to 500 fathoms in Div. 3N, 3O and 3Ps.

### Reference

Bowering, W. R. 1987. A newly developed stratification scheme for NAFO Divisions 2G and 2H. *NAFO SCR Doc.*, No. 23, Serial No. N1306. 6 p.

Table 1: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 2G           | 901           | 201-300                 | 110-164                  | 1090                | 390                |
|              | 902           | 301-400                 | 164-219                  | 120                 | 40                 |
|              | 903           | 401-500                 | 219-273                  | 80                  | 30                 |
|              | 904           | 501-750                 | 274-410                  | 153                 | 50                 |
|              | 905           | 751-1000                | 410-546                  | 164                 | 60                 |
|              | 906           | 1001-1250               | 546-683                  | 229                 | 80                 |
|              | 907           | 1251-1500               | 684-820                  | 360                 | 140                |
|              | 908           | 201-300                 | 110-164                  | 585                 | 210                |
|              | 909           | <=200                   | <=109                    | 2773                | 1050               |
|              | 910           | <=200                   | <=109                    | 2339                | 930                |
|              | 911           | 201-300                 | 110-164                  | 692                 | 270                |
|              | 912           | 301-400                 | 164-219                  | 73                  | 30                 |
|              | 913           | 401-500                 | 219-273                  | 62                  | 20                 |
|              | 914           | 501-750                 | 274-410                  | 113                 | 40                 |
|              | 915           | 751-1000                | 410-546                  | 96                  | 30                 |
|              | 916           | 1001-1250               | 546-683                  | 146                 | 50                 |
|              | 917           | 1251-1500               | 684-820                  | 165                 | 60                 |
|              | 918           | 1251-1500               | 684-820                  | 515                 | 220                |
|              | 919           | 1001-1250               | 546-683                  | 316                 | 130                |
|              | 920           | 751-1000                | 410-546                  | 172                 | 70                 |
|              | 921           | 501-750                 | 274-410                  | 142                 | 50                 |
|              | 922           | 401-500                 | 219-273                  | 186                 | 70                 |
|              | 923           | 301-400                 | 164-219                  | 232                 | 90                 |
|              | 924           | 201-300                 | 110-164                  | 756                 | 320                |
|              | 925           | <=200                   | <=109                    | 1804                | 780                |
|              | 926           | 201-300                 | 110-164                  | 433                 | 170                |
|              | 927           | 301-400                 | 164-219                  | 832                 | 340                |
|              | 928           | 401-500                 | 219-273                  | 783                 | 320                |
|              | 929           | 501-750                 | 274-410                  | 1261                | 530                |
|              | Total         |                         |                          | 16672               | 6570               |

Table 2: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 2H           | 930           | <=200                   | <=109                    | 1028                | 380                |
|              | 931           | 201-300                 | 110-164                  | 276                 | 100                |
|              | 932           | 301-400                 | 164-219                  | 55                  | 20                 |
|              | 933           | 401-500                 | 219-273                  | 50                  | 20                 |
|              | 934           | 501-750                 | 274-410                  | 78                  | 30                 |
|              | 935           | 751-1000                | 410-546                  | 96                  | 30                 |
|              | 936           | 1001-1250               | 546-683                  | 78                  | 30                 |
|              | 937           | 1251-1500               | 684-820                  | 94                  | 30                 |
|              | 938           | 1251-1500               | 684-820                  | 191                 | 70                 |
|              | 939           | 1001-1250               | 546-683                  | 130                 | 40                 |
|              | 940           | 751-1000                | 410-546                  | 97                  | 30                 |
|              | 941           | 501-750                 | 274-410                  | 89                  | 30                 |
|              | 942           | 401-500                 | 219-273                  | 55                  | 20                 |
|              | 943           | 201-300                 | 110-164                  | 354                 | 130                |
|              | 944           | 301-400                 | 164-219                  | 860                 | 300                |
|              | 945           | 401-500                 | 219-273                  | 461                 | 160                |
|              | 946           | 501-750                 | 274-410                  | 721                 | 290                |
|              | 947           | 501-750                 | 274-410                  | 227                 | 80                 |
|              | 948           | 401-500                 | 219-273                  | 246                 | 70                 |
|              | 949           | 301-400                 | 164-219                  | 206                 | 70                 |
|              | 950           | 201-300                 | 110-164                  | 261                 | 90                 |
|              | 951           | 401-500                 | 219-273                  | 234                 | 80                 |
|              | 952           | 301-400                 | 164-219                  | 177                 | 60                 |
|              | 953           | 201-300                 | 110-164                  | 291                 | 100                |
|              | 954           | <=200                   | <=109                    | 971                 | 360                |
|              | 955           | 201-300                 | 110-164                  | 389                 | 140                |
|              | 956           | <=200                   | <=109                    | 1059                | 370                |
|              | 957           | <=200                   | <=109                    | 1371                | 490                |
|              | 958           | 201-300                 | 110-164                  | 294                 | 100                |
|              | 959           | 301-400                 | 164-219                  | 178                 | 60                 |
|              | 960           | 401-500                 | 219-273                  | 107                 | 30                 |
|              | 961           | 501-750                 | 274-410                  | 211                 | 70                 |
|              | 962           | 751-1000                | 410-546                  | 242                 | 80                 |
|              | 963           | 1001-1250               | 546-683                  | 265                 | 90                 |
|              | 964           | 1251-1500               | 684-820                  | 342                 | 120                |
|              | Total         |                         |                          | 11784               | 4170               |

Table 3. List of strata, depth zones, and stratum areas for NAFO Division 2J.

| Strata | Depth<br>Range (m) | New                     |       | Old                     |       |
|--------|--------------------|-------------------------|-------|-------------------------|-------|
|        |                    | Area (mi <sup>2</sup> ) | Units | Area (mi <sup>2</sup> ) | Units |
| 201    | 101-200            | 633                     | 200   | 1427                    | 480   |
| 202    | 201-300            | 621                     | 190   | 440                     | 150   |
| 203    | 301-400            | 487                     | 150   | 480                     | 160   |
| 204    | 401-500            | 288                     | 90    | 354                     | 120   |
| 205    | 101-200            | 1594                    | 510   | 1823                    | 580   |
| 206    | 101-200            | 1870                    | 600   | 2582                    | 860   |
| 207    | 101-200            | 2264                    | 700   | 2246                    | 750   |
| 208    | 301-400            | 588                     | 190   | 448                     | 150   |
| 209    | 201-300            | 680                     | 200   | 1608                    | 540   |
| 210    | 201-300            | 1035                    | 320   | 774                     | 260   |
| 211    | 301-400            | 251                     | 80    | 330                     | 110   |
| 212    | 501-750            | 557                     | 190   | 664                     | 220   |
| 213    | 201-300            | 1583                    | 510   | 1725                    | 570   |
| 214    | 201-300            | 1341                    | 440   | 1171                    | 390   |
| 215    | 201-300            | 1302                    | 400   | 1270                    | 420   |
| 216    | 301-400            | 360                     | 100   | 384                     | 130   |
| 217    | 401-500            | 241                     | 70    | 268                     | 90    |
| 218    | 501-750            | 362                     | 110   | 420                     | 140   |
| 219    | 751-1000           | 283                     | 90    | 213                     | 70    |
| 220    | 1001-1250          | 303                     | 90    | 324                     | 110   |
| 221    | 1251-1500          | 330                     | 100   | 268                     | 90    |
| 222    | 301-400            | 450                     | 140   | 441                     | 150   |
| 223    | 201-300            | 158                     | 50    | 180                     | 60    |
| 224    | 501-750            | 228                     | 70    | 270                     | 90    |
| 225    | 1001-1250          | 195                     | 60    | 177                     | 60    |
| 226    | 1251-1500          | 201                     | 60    | 180                     | 60    |
| 227    | 401-500            | 598                     | 190   | 686                     | 230   |
| 228    | 201-300            | 2196                    | 740   | 1428                    | 480   |
| 229    | 301-400            | 536                     | 160   | 567                     | 190   |
| 230    | 501-750            | 185                     | 50    | 237                     | 80    |
| 231    | 751-1000           | 186                     | 50    | 182                     | 60    |
| 232    | 1001-1250          | 228                     | 70    | 236                     | 80    |
| 233    | 1251-1500          | 237                     | 70    | 180                     | 60    |
| 234    | 201-300            | 530                     | 160   | 508                     | 170   |
| 235    | 401-500            | 414                     | 130   | 420                     | 140   |
| 236    | 751-1000           | 193                     | 60    | 122                     | 40    |
| 237    | 101-200            | 733                     | 220   | -                       | -     |
| 238    | 101-200            | 778                     | 240   | -                       | -     |
| 239    | 501-750            | 120                     | 40    | -                       | -     |
| 240    | 401-500            | 133                     | 40    | -                       | -     |
| Total  |                    | 25272                   |       | 25033                   |       |

Table 4. List of strata, depth zones, and stratum areas for NAFO Division 3K.

| Strata | Depth<br>Range (m) | New                     |       | Old                     |       |
|--------|--------------------|-------------------------|-------|-------------------------|-------|
|        |                    | Area (mi <sup>2</sup> ) | Units | Area (mi <sup>2</sup> ) | Units |
| 617    | 301-400            | 593                     | 190   | -                       | -     |
| 618    | 101-200            | 1347                    | 420   | 1455                    | 420   |
| 619    | 101-200            | 1753                    | 550   | 1588                    | 480   |
| 620    | 201-300            | 2545                    | 780   | 2709                    | 860   |
| 621    | 201-300            | 2736                    | 830   | 2859                    | 900   |
| 622    | 401-500            | 691                     | 220   | 632                     | 200   |
| 623    | 301-400            | 494                     | 150   | 1027                    | 320   |
| 624    | 201-300            | 1105                    | 350   | 668                     | 210   |
| 625    | 301-400            | 888                     | 270   | 850                     | 270   |
| 626    | 301-400            | 1113                    | 340   | 919                     | 290   |
| 627    | 401-500            | 1255                    | 390   | 1194                    | 380   |
| 628    | 301-400            | 1085                    | 340   | 1085                    | 340   |
| 629    | 301-400            | 495                     | 160   | 495                     | 160   |
| 630    | 301-400            | 332                     | 100   | 544                     | 170   |
| 631    | 401-500            | 1321                    | 420   | 1202                    | 380   |
| 632    | 201-300            | -                       | -     | 447                     | 140   |
| 633    | 301-400            | 2067                    | 660   | 2179                    | 690   |
| 634    | 201-300            | 1555                    | 500   | 1618                    | 510   |
| 635    | 201-300            | 1274                    | 400   | 1274                    | 400   |
| 636    | 201-300            | 1455                    | 460   | 1455                    | 460   |
| 637    | 201-300            | 1132                    | 360   | 1132                    | 360   |
| 638    | 301-400            | 2059                    | 650   | 2059                    | 650   |
| 639    | 301-400            | 1463                    | 460   | 1463                    | 460   |
| 640    | 401-500            | 69                      | 20    | 198                     | 60    |
| 641    | 501-750            | 230                     | 70    | 584                     | 180   |
| 642    | 751-1000           | 418                     | 130   | 931                     | 290   |
| 643    | 1001-1250          | 733                     | 230   | 1266                    | 400   |
| 644    | 1251-1500          | 474                     | 150   | 954                     | 300   |
| 645    | 401-500            | 216                     | 70    | 204                     | 60    |
| 646    | 501-750            | 325                     | 100   | 333                     | 110   |
| 647    | 751-1000           | 360                     | 110   | 409                     | 130   |
| 648    | 1001-1250          | 228                     | 70    | 232                     | 70    |
| 649    | 1251-1500          | 212                     | 60    | 263                     | 80    |
| 650    | 401-500            | 134                     | 40    |                         |       |
| 651    | 501-750            | 359                     | 110   |                         |       |
| 652    | 751-1000           | 516                     | 160   |                         |       |
| 653    | 1001-1250          | 531                     | 170   |                         |       |
| 654    | 1251-1500          | 479                     | 150   |                         |       |
| Total  |                    | 34042                   |       | 34228                   |       |

Table 5: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 3L           | 328           | 93-183                  | 51-100                   | 1519                | 380                |
|              | 341           | 93-183                  | 51-100                   | 1574                | 440                |
|              | 342           | 93-183                  | 51-100                   | 585                 | 170                |
|              | 343           | 93-183                  | 51-100                   | 525                 | 150                |
|              | 344           | 184-274                 | 101-150                  | 1494                | 450                |
|              | 345           | 275-366                 | 151-200                  | 1432                | 430                |
|              | 346           | 275-366                 | 151-200                  | 865                 | 260                |
|              | 347           | 184-274                 | 101-150                  | 983                 | 300                |
|              | 348           | 93-183                  | 51-100                   | 2120                | 630                |
|              | 349           | 93-183                  | 51-100                   | 2114                | 610                |
|              | 350           | 57-91                   | 31-50                    | 2071                | 610                |
|              | 363           | 57-91                   | 31-50                    | 1780                | 520                |
|              | 364           | 93-183                  | 51-100                   | 2817                | 820                |
|              | 365           | 93-183                  | 51-100                   | 1041                | 310                |
|              | 366           | 184-274                 | 101-150                  | 1394                | 410                |
|              | 368           | 275-366                 | 151-200                  | 334                 | 100                |
|              | 369           | 184-274                 | 101-150                  | 961                 | 290                |
|              | 370           | 93-183                  | 51-100                   | 1320                | 400                |
|              | 371           | 57-91                   | 31-50                    | 1121                | 320                |
|              | 372           | 57-91                   | 31-50                    | 2460                | 720                |
|              | 384           | 57-91                   | 31-50                    | 1120                | 320                |
|              | 385           | 93-183                  | 51-100                   | 2356                | 660                |
|              | 386           | 185-274                 | 101-150                  | 983                 | 290                |
|              | 387           | 275-366                 | 151-200                  | 718                 | 210                |
|              | 388           | 275-366                 | 151-200                  | 361                 | 100                |
|              | 389           | 185-274                 | 101-150                  | 821                 | 230                |
|              | 390           | 93-183                  | 51-100                   | 1481                | 420                |
|              | 391           | 185-274                 | 101-150                  | 282                 | 80                 |
|              | 392           | 275-366                 | 151-200                  | 145                 | 40                 |
|              | 729           | 367-549                 | 201-300                  | 186                 | 60                 |
|              | 730           | 550-731                 | 301-400                  | 170                 | 50                 |
|              | 731           | 367-549                 | 201-300                  | 216                 | 60                 |
|              | 732           | 550-731                 | 301-400                  | 231                 | 60                 |
|              | 733           | 367-549                 | 201-300                  | 468                 | 130                |
|              | 734           | 550-731                 | 301-400                  | 228                 | 60                 |
|              | 735           | 367-549                 | 201-300                  | 272                 | 80                 |
|              | 736           | 550-731                 | 301-400                  | 175                 | 50                 |
|              | 737           | 732-914                 | 401-500                  | 227                 | 70                 |
|              | 738           | 915-1097                | 501-600                  | 221                 | 70                 |
|              | 739           | 1098-1280               | 601-700                  | 254                 | 80                 |
|              | 740           | 1281-1463               | 701-800                  | 264                 | 80                 |
|              | 741           | 732-914                 | 401-500                  | 223                 | 70                 |
|              | 742           | 915-1097                | 501-600                  | 206                 | 60                 |
|              | 743           | 1098-1280               | 601-700                  | 211                 | 70                 |
|              | 744           | 1281-1463               | 701-800                  | 280                 | 90                 |
|              | 745           | 732-914                 | 401-500                  | 348                 | 110                |
|              | 746           | 915-1097                | 501-600                  | 392                 | 120                |
|              | 747           | 1098-1280               | 601-700                  | 724                 | 220                |
|              | 748           | 732-914                 | 401-500                  | 159                 | 50                 |
|              | 749           | 915-1097                | 501-600                  | 126                 | 40                 |
|              | 750           | 1098-1280               | 601-700                  | 556                 | 170                |
|              | 751           | 1281-1463               | 701-800                  | 229                 | 70                 |
|              | <b>Total</b>  |                         |                          | <b>43143</b>        | <b>12590</b>       |

Table 6: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 3M           | 501           | 128-146                 | 70-80                    | 342                 | 100                |
|              | 502           | 147-183                 | 81-100                   | 838                 | 250                |
|              | 503           | 185-256                 | 101-140                  | 628                 | 180                |
|              | 504           | 185-256                 | 101-140                  | 348                 | 100                |
|              | 505           | 185-256                 | 101-140                  | 703                 | 200                |
|              | 506           | 185-256                 | 101-140                  | 496                 | 150                |
|              | 507           | 258-366                 | 141-200                  | 822                 | 240                |
|              | 508           | 258-366                 | 141-200                  | 646                 | 190                |
|              | 509           | 258-366                 | 141-200                  | 314                 | 90                 |
|              | 510           | 258-366                 | 141-200                  | 951                 | 280                |
|              | 511           | 258-366                 | 141-200                  | 808                 | 240                |
|              | 512           | 367-549                 | 201-300                  | 670                 | 200                |
|              | 513           | 367-549                 | 201-300                  | 249                 | 70                 |
|              | 514           | 367-549                 | 201-300                  | 602                 | 170                |
|              | 515           | 367-549                 | 201-300                  | 666                 | 200                |
|              | 516           | 550-731                 | 301-400                  | 634                 | 190                |
|              | 517           | 550-731                 | 301-400                  | 216                 | 60                 |
|              | 518           | 550-731                 | 301-400                  | 210                 | 60                 |
|              | 519           | 550-731                 | 301-400                  | 414                 | 120                |
|              | 520           | 732-914                 | 401-500                  | 525                 | 160                |
|              | 521           | 915-1097                | 501-600                  | 517                 | 160                |
|              | 522           | 1098-1280               | 601-700                  | 533                 | 160                |
|              | 523           | 1281-1463               | 701-800                  | 284                 | 90                 |
|              | 524           | 732-914                 | 401-500                  | 253                 | 80                 |
|              | 525           | 915-1097                | 501-600                  | 226                 | 70                 |
|              | 526           | 1098-1280               | 601-700                  | 177                 | 50                 |
|              | 527           | 1281-1463               | 701-800                  | 171                 | 50                 |
|              | 528           | 732-914                 | 401-500                  | 530                 | 160                |
|              | 529           | 915-1097                | 501-600                  | 488                 | 150                |
|              | 530           | 1098-1280               | 601-700                  | 1134                | 350                |
|              | 531           | 1281-1463               | 701-800                  | 203                 | 60                 |
|              | 532           | 915-1097                | 501-600                  | 238                 | 70                 |
|              | 533           | 732-914                 | 401-500                  | 98                  | 30                 |
|              | 534           | 915-1097                | 501-600                  | 486                 | 150                |
|              | 535           | 1098-1280               | 601-700                  | 92                  | 30                 |
|              | 536           | 1281-1463               | 701-800                  | 112                 | 30                 |
|              | 537           | 367-549                 | 201-300                  | 102                 | 30                 |
|              | 538           | 550-731                 | 301-400                  | 194                 | 60                 |
|              | 539           | 732-914                 | 401-500                  | 133                 | 40                 |
|              | Total         |                         |                          | 17051               | 5070               |



Table 7: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth<br>(metres) | Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------|--------------------|---------------------|--------------------|
| 3N           | 357           | 275-366           | 151-200            | 164                 | 40                 |
|              | 358           | 185-274           | 101-150            | 225                 | 50                 |
|              | 359           | 93-183            | 51-100             | 421                 | 110                |
|              | 360           | 57-91             | 31-50              | 2992                | 810                |
|              | 361           | 57-91             | 31-50              | 1853                | 480                |
|              | 362           | 57-91             | 31-50              | 2520                | 720                |
|              | 373           | 57-91             | 31-50              | 2520                | 720                |
|              | 374           | 57-91             | 31-50              | 931                 | 240                |
|              | 375           | <56               | <30                | 1593                | 420                |
|              | 376           | <56               | <30                | 1499                | 400                |
|              | 377           | 93-183            | 51-100             | 100                 | 30                 |
|              | 378           | 185-274           | 101-150            | 139                 | 40                 |
|              | 379           | 275-366           | 151-200            | 106                 | 30                 |
|              | 380           | 275-366           | 151-200            | 116                 | 30                 |
|              | 381           | 185-274           | 101-150            | 182                 | 50                 |
|              | 382           | 93-183            | 51-100             | 647                 | 180                |
|              | 383           | 57-91             | 31-50              | 674                 | 190                |
|              | 723           | 367-549           | 201-300            | 155                 | 50                 |
|              | 724           | 550-731           | 301-400            | 124                 | 40                 |
|              | 725           | 367-549           | 201-300            | 105                 | 30                 |
|              | 726           | 550-731           | 301-400            | 72                  | 20                 |
|              | 727           | 367-549           | 201-300            | 160                 | 50                 |
|              | 728           | 550-731           | 301-400            | 156                 | 40                 |
|              | 752           | 732-914           | 401-500            | 134                 | 40                 |
|              | 753           | 915-1097          | 501-600            | 138                 | 40                 |
|              | 754           | 1098-1280         | 601-700            | 180                 | 50                 |
|              | 755           | 1281-1463         | 701-800            | 385                 | 110                |
|              | 756           | 732-914           | 401-500            | 106                 | 30                 |
|              | 757           | 915-1097          | 501-600            | 102                 | 30                 |
|              | 758           | 1098-1280         | 601-700            | 99                  | 30                 |
|              | 759           | 1281-1463         | 701-800            | 127                 | 40                 |
|              | 760           | 732-914           | 401-500            | 154                 | 40                 |
|              | 761           | 915-1097          | 501-600            | 171                 | 50                 |
|              | 762           | 1098-1280         | 601-700            | 212                 | 60                 |
|              | 763           | 1281-1463         | 701-800            | 261                 | 70                 |
|              | Total         |                   |                    |                     | 19523              |

Table 8: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 30           | 329           | 93-183                  | 51-100                   | 1721                | 450                |
|              | 330           | 57-91                   | 31-50                    | 2089                | 540                |
|              | 331           | 57-91                   | 31-50                    | 456                 | 120                |
|              | 332           | 93-183                  | 51-100                   | 1047                | 280                |
|              | 333           | 185-274                 | 101-150                  | 147                 | 40                 |
|              | 334           | 275-366                 | 151-200                  | 96                  | 30                 |
|              | 335           | 275-366                 | 151-200                  | 58                  | 20                 |
|              | 336           | 185-274                 | 101-150                  | 121                 | 30                 |
|              | 337           | 93-183                  | 51-100                   | 948                 | 250                |
|              | 338           | 57-91                   | 31-50                    | 1898                | 500                |
|              | 339           | 93-183                  | 51-100                   | 585                 | 170                |
|              | 340           | 57-91                   | 31-50                    | 1716                | 500                |
|              | 351           | 57-91                   | 31-50                    | 2520                | 720                |
|              | 352           | 57-91                   | 31-50                    | 2580                | 720                |
|              | 353           | 57-91                   | 31-50                    | 1282                | 340                |
|              | 354           | 93-183                  | 51-100                   | 474                 | 130                |
|              | 355           | 185-274                 | 101-150                  | 103                 | 30                 |
|              | 356           | 275-366                 | 151-200                  | 61                  | 20                 |
|              | 717           | 367-549                 | 201-300                  | 166                 | 50                 |
|              | 718           | 550-731                 | 301-400                  | 134                 | 40                 |
|              | 719           | 367-549                 | 201-300                  | 76                  | 20                 |
|              | 720           | 550-731                 | 301-400                  | 105                 | 30                 |
|              | 721           | 367-549                 | 201-300                  | 76                  | 20                 |
|              | 722           | 550-731                 | 301-400                  | 93                  | 30                 |
|              | 764           | 732-914                 | 401-500                  | 105                 | 30                 |
| 765          | 915-1097      | 501-600                 | 124                      | 30                  |                    |
| 766          | 1098-1280     | 601-700                 | 144                      | 40                  |                    |
| 767          | 1281-1463     | 701-800                 | 158                      | 40                  |                    |
| 768          | 732-914       | 401-500                 | 99                       | 30                  |                    |
| 769          | 915-1097      | 501-600                 | 138                      | 40                  |                    |
| 770          | 1098-1280     | 601-700                 | 128                      | 30                  |                    |
| 771          | 1281-1463     | 701-800                 | 175                      | 50                  |                    |
| 772          | 732-914       | 401-500                 | 135                      | 40                  |                    |
| 773          | 915-1097      | 501-600                 | 128                      | 30                  |                    |
| 774          | 1098-1280     | 601-700                 | 135                      | 40                  |                    |
| 775          | 1281-1463     | 701-800                 | 155                      | 40                  |                    |
| Total        |               |                         |                          | 20176               | 5520               |

Table 9: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 3Pn          | 301           | 93-183                  | 51-100                   | 77                  | 20                 |
|              | 302           | 93-183                  | 51-100                   | 281                 | 80                 |
|              | 303           | 185-274                 | 101-150                  | 496                 | 140                |
|              | 304           | 275-366                 | 151-200                  | 141                 | 40                 |
|              | 305           | 367+                    | 201+                     | 713                 | 210                |
|              | Total         |                         |                          |                     | 490                |

Table 10: Area , depth and number of units in survey strata.

| NAFO<br>Div. | Strata<br>No. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | Area<br>(sq. miles) | Number<br>of Units |
|--------------|---------------|-------------------------|--------------------------|---------------------|--------------------|
| 3Ps          | 306           | 185-274                 | 101-150                  | 419                 | 120                |
|              | 307           | 93-183                  | 51-100                   | 395                 | 110                |
|              | 308           | 57-91                   | 31-50                    | 112                 | 30                 |
|              | 309           | 185-274                 | 101-150                  | 296                 | 80                 |
|              | 310           | 185-274                 | 101-150                  | 170                 | 50                 |
|              | 311           | 93-183                  | 51-100                   | 317                 | 90                 |
|              | 312           | 57-91                   | 31-50                    | 272                 | 80                 |
|              | 313           | 185-274                 | 101-150                  | 165                 | 50                 |
|              | 314           | 0-56                    | 0-30                     | 974                 | 280                |
|              | 315           | 57-91                   | 31-50                    | 827                 | 240                |
|              | 316           | 185-274                 | 101-150                  | 189                 | 50                 |
|              | 317           | 93-183                  | 51-100                   | 193                 | 50                 |
|              | 318           | 185-274                 | 101-150                  | 129                 | 40                 |
|              | 319           | 93-183                  | 51-100                   | 984                 | 280                |
|              | 320           | 0-56                    | 0-30                     | 1320                | 390                |
|              | 321           | 57-91                   | 31-50                    | 1189                | 340                |
|              | 322           | 93-183                  | 51-100                   | 1567                | 450                |
|              | 323           | 93-183                  | 51-100                   | 696                 | 200                |
|              | 324           | 93-183                  | 51-100                   | 494                 | 140                |
|              | 325           | 57-91                   | 31-50                    | 944                 | 280                |
|              | 326           | 57-91                   | 31-50                    | 166                 | 50                 |
|              | 705           | 275-366                 | 151-200                  | 195                 | 50                 |
|              | 706           | 275-366                 | 151-200                  | 476                 | 140                |
|              | 707           | 275-366                 | 151-200                  | 74                  | 20                 |
|              | 708           | 367-549                 | 201-300                  | 126                 | 40                 |
|              | 709           | 550-731                 | 301-400                  | 158                 | 40                 |
|              | 710           | 732-914                 | 401-500                  | 176                 | 40                 |
|              | 711           | 367-549                 | 201-300                  | 961                 | 260                |
|              | 712           | 367-549                 | 210-300                  | 973                 | 270                |
|              | 713           | 367-549                 | 201-300                  | 950                 | 250                |
|              | 714           | 367-549                 | 201-300                  | 1195                | 340                |
|              | 715           | 275-366                 | 151-200                  | 132                 | 40                 |
|              | 716           | 275-366                 | 151-200                  | 539                 | 150                |
| 776          | 915-1097      | 501-600                 | 173                      | 50                  |                    |
| 777          | 1098-1280     | 601-700                 | 208                      | 60                  |                    |
| 778          | 1281-1463     | 701-800                 | 194                      | 50                  |                    |
| 779          | 184-274       | 101-150                 | 422                      | 130                 |                    |
| 780          | 184-274       | 101-150                 | 403                      | 120                 |                    |
| 781          | 93-183        | 51-100                  | 446                      | 130                 |                    |
| 782          | 93-183        | 51-100                  | 183                      | 50                  |                    |
| 783          | 57-91         | 31-50                   | 229                      | 70                  |                    |
| Total        |               |                         |                          | 21739               | 6680               |

Table 11: Summary of the stratification system used for groundfish surveys.

| NAFO<br>Div. | Depth Range<br>(metres) | Depth Range<br>(fathoms) | No. of<br>Strata | Area<br>(sq. miles) | No. of<br>Units |
|--------------|-------------------------|--------------------------|------------------|---------------------|-----------------|
| 2G           | <200-1500               | <109-820                 | 29               | 16672               | 6570            |
| 2H           | <200-1500               | <109-820                 | 35               | 11784               | 4170            |
| 2J           | 101-1500                | 55-820                   | 40               | 25272               | 7930            |
| 3K           | 101-1500                | 55-820                   | 37               | 34042               | 10640           |
| 3L           | 57-1463                 | 31-800                   | 52               | 43143               | 12590           |
| 3M           | 128-1463                | 70-800                   | 39               | 17051               | 5070            |
| 3N           | <56-1463                | <30-800                  | 35               | 19523               | 5360            |
| 3O           | 57-1463                 | 31-800                   | 36               | 20176               | 5520            |
| 3P           | 57-1463                 | 31-800                   | 41               | 20031               | 5700            |
| 3Pn          | 93-367+                 | 51-201+                  | 5                | 1708                | 490             |
| Totals       |                         |                          | 349              | 209402              | 64040           |

# BATHYMETRY INDEX BATHYMÉTRIE NATURAL RESOURCE MAPS CARTES DES RESSOURCES NATURELLES

1 : 250 000

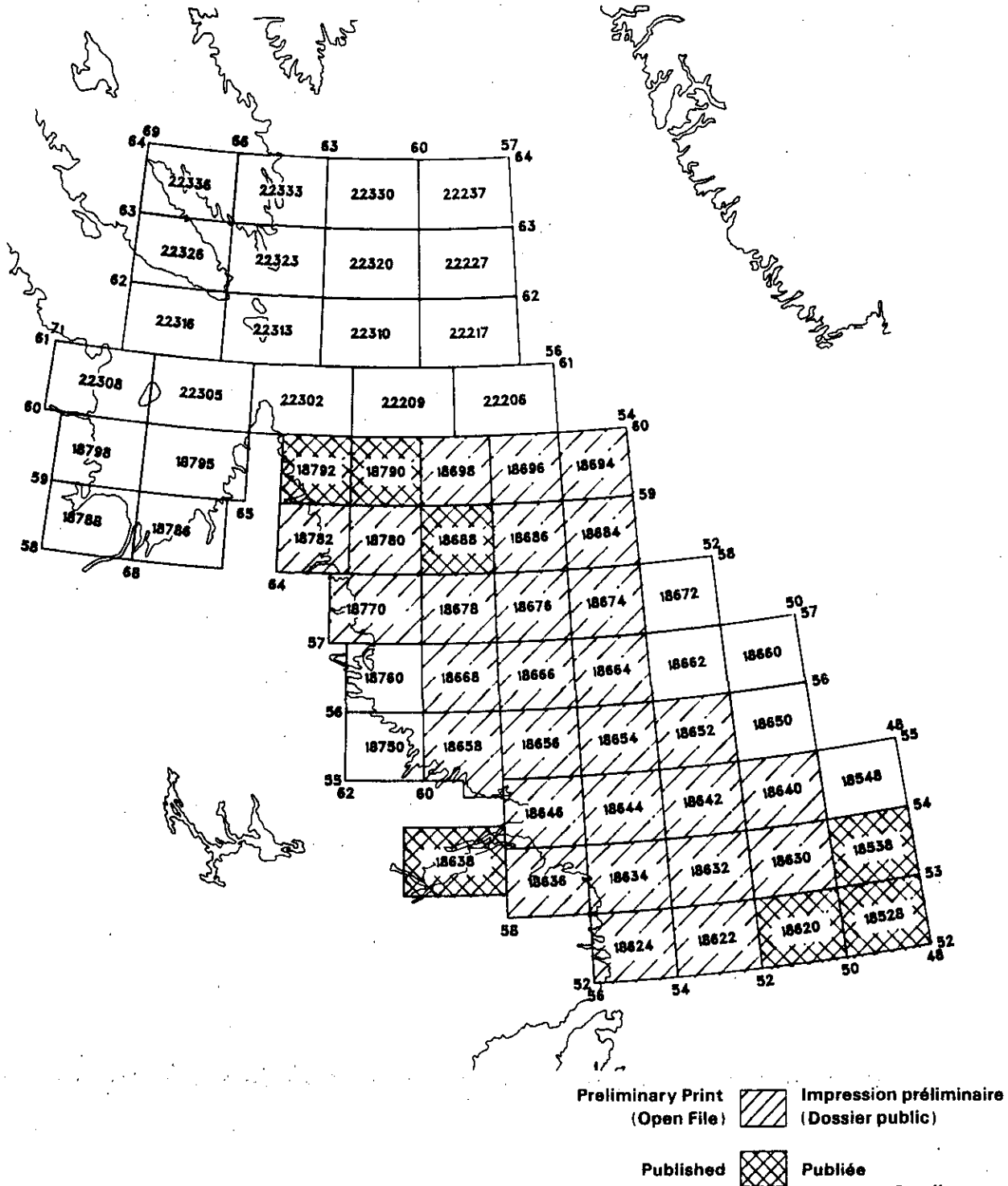


Figure 1. List of bathymetric maps used for revised stratification scheme in Div. 2J.

# BATHYMETRY INDEX BATHYMÉTRIE NATURAL RESOURCE MAPS CARTES DES RESSOURCES NATURELLES

1 : 250 000

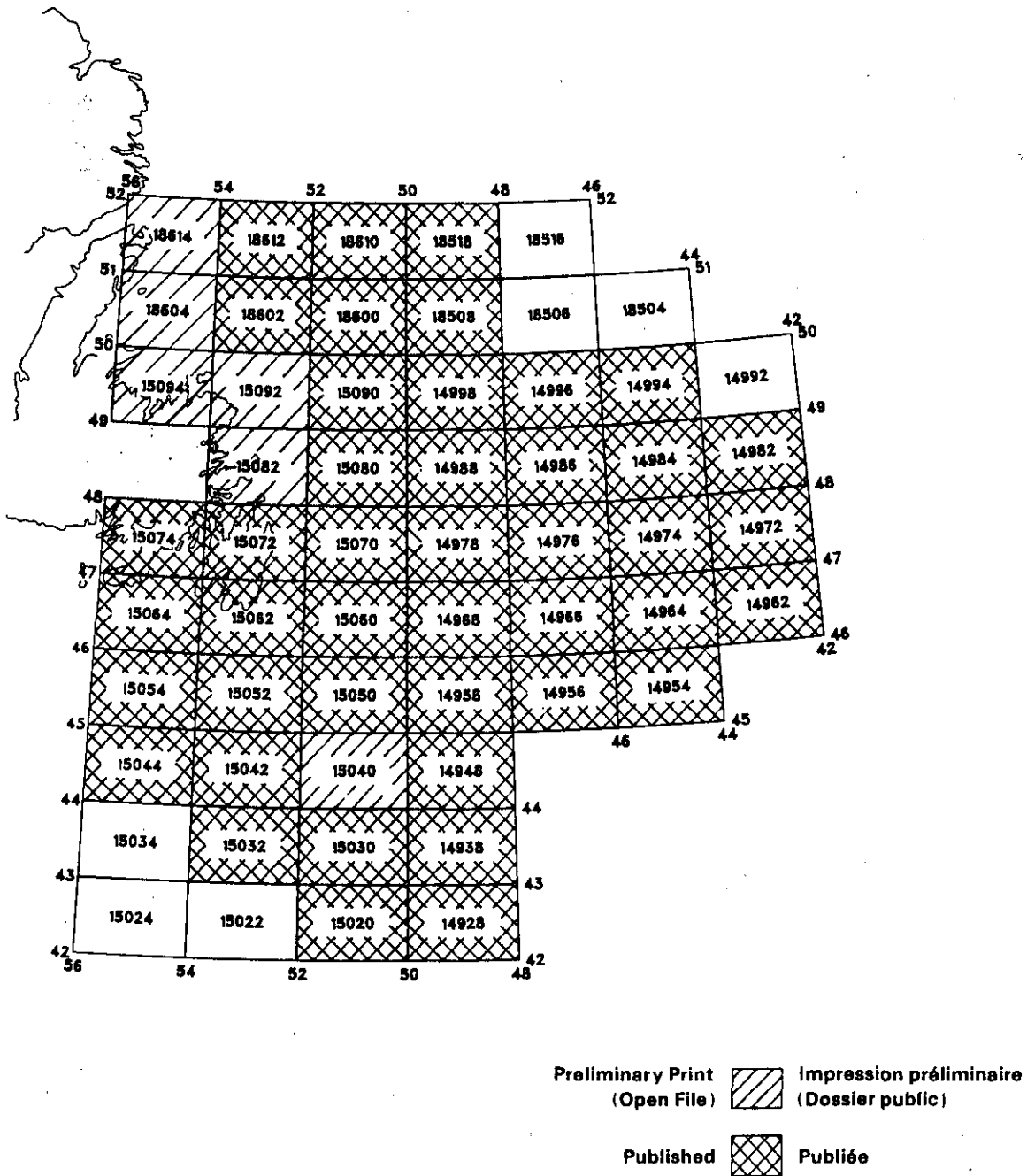


Figure 2. List of bathymetric maps used for revised stratification scheme in Div. 3K.

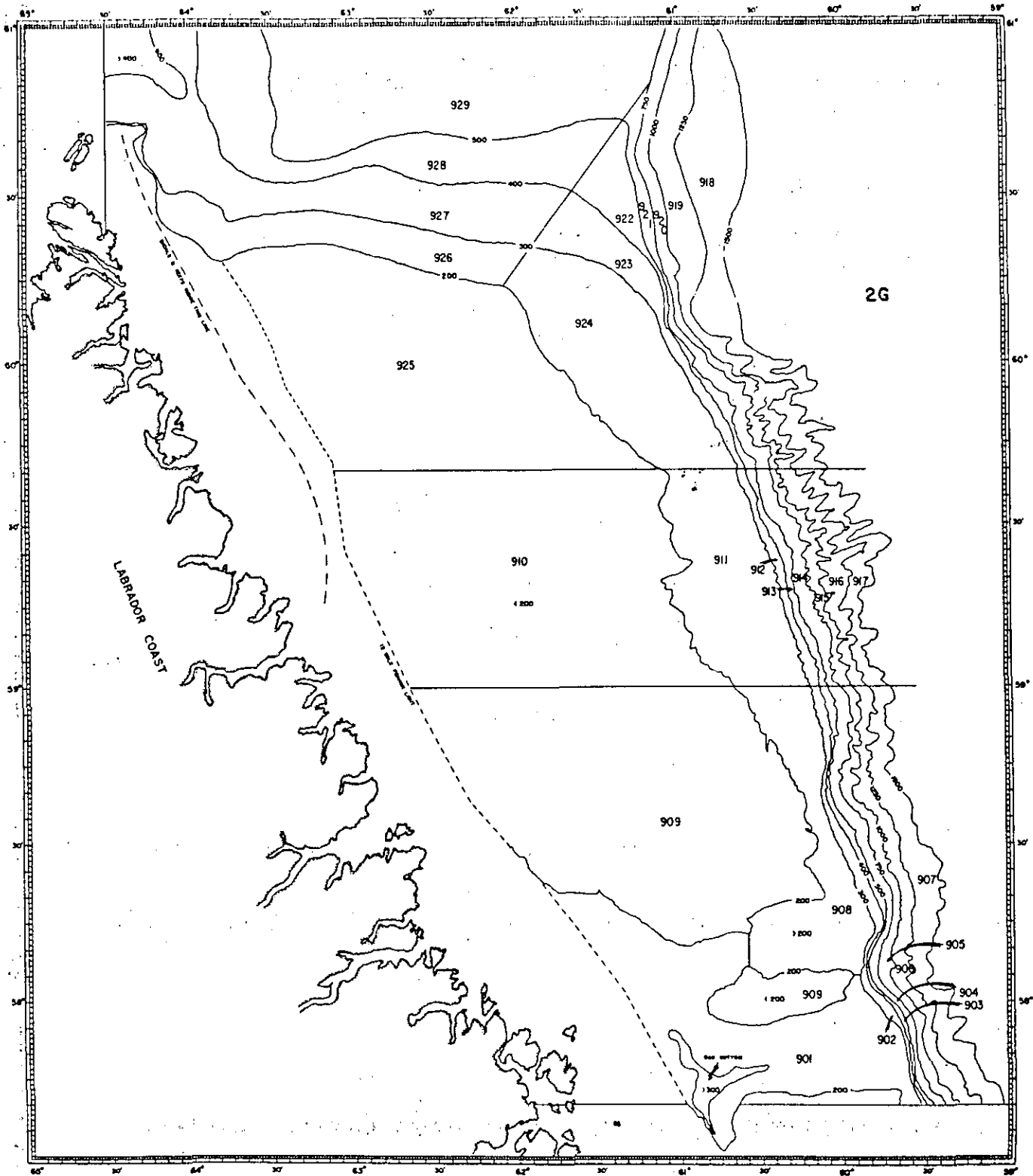


Figure 3. Stratification scheme used in stratified-random groundfish surveys in Div. 2G.



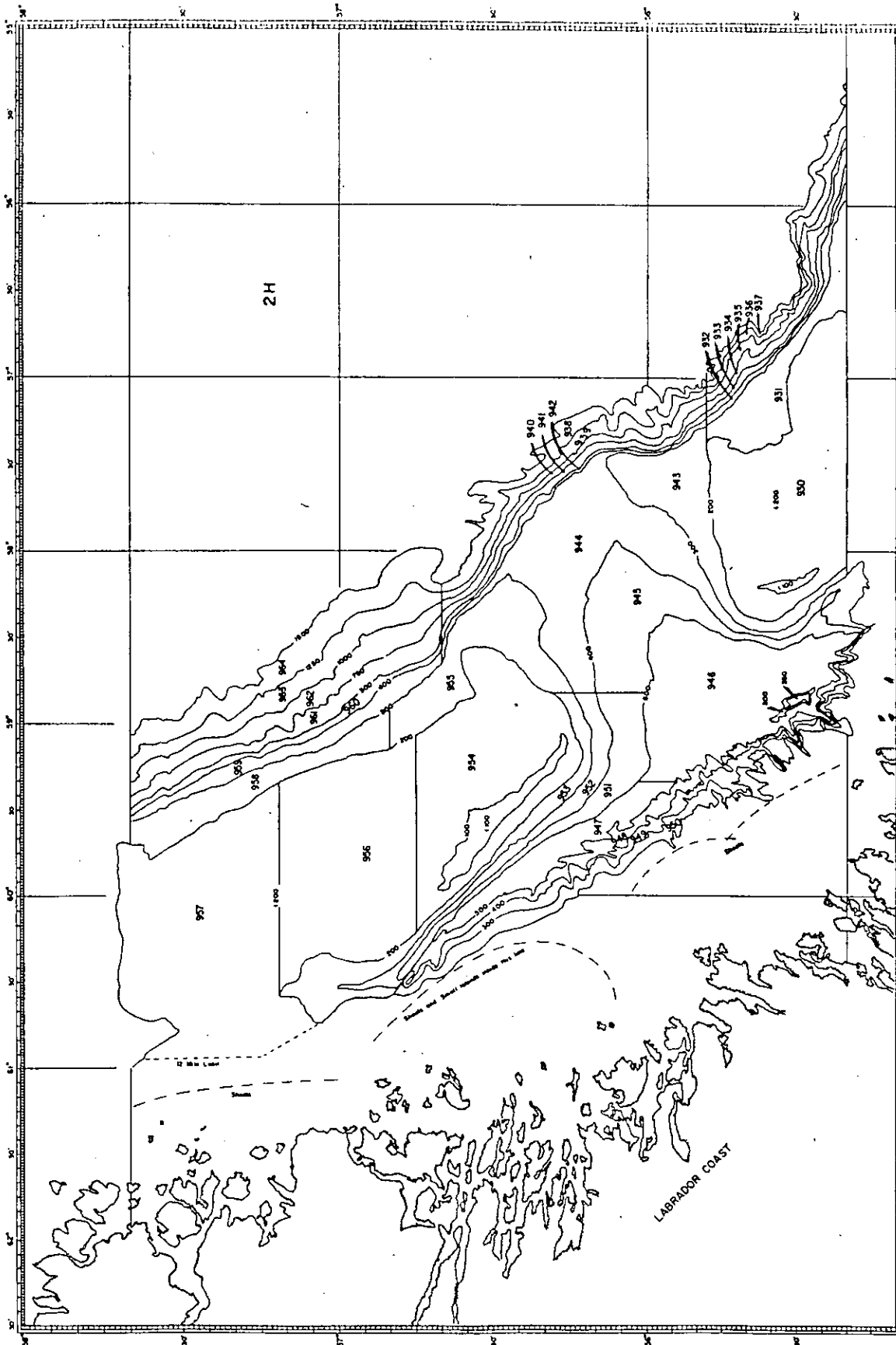


Figure 4. Stratification scheme used in stratified-random groundfish surveys in Div. 2H.

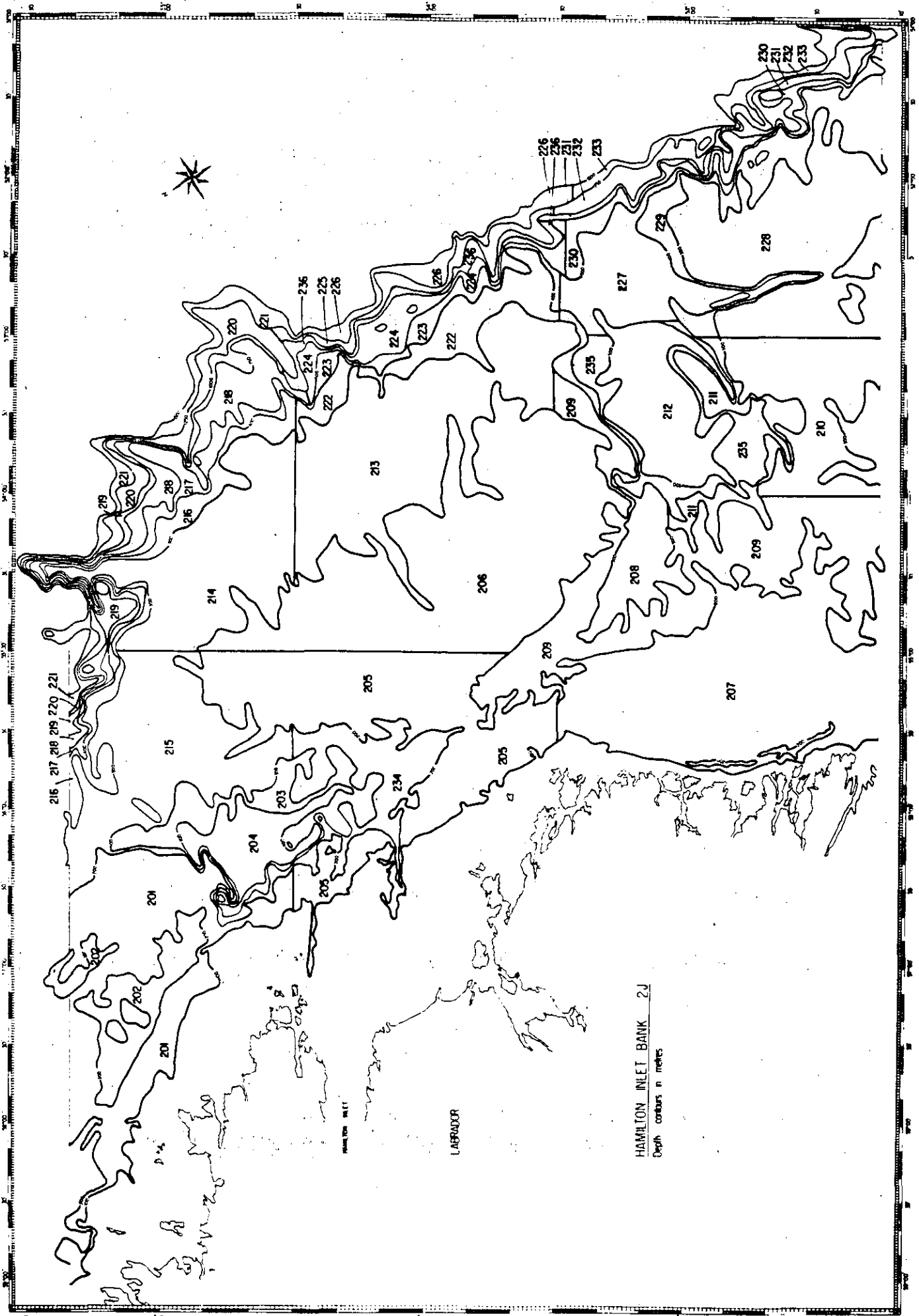


Figure 5. Stratification scheme used in stratified-random groundfish surveys in Div. 2J.

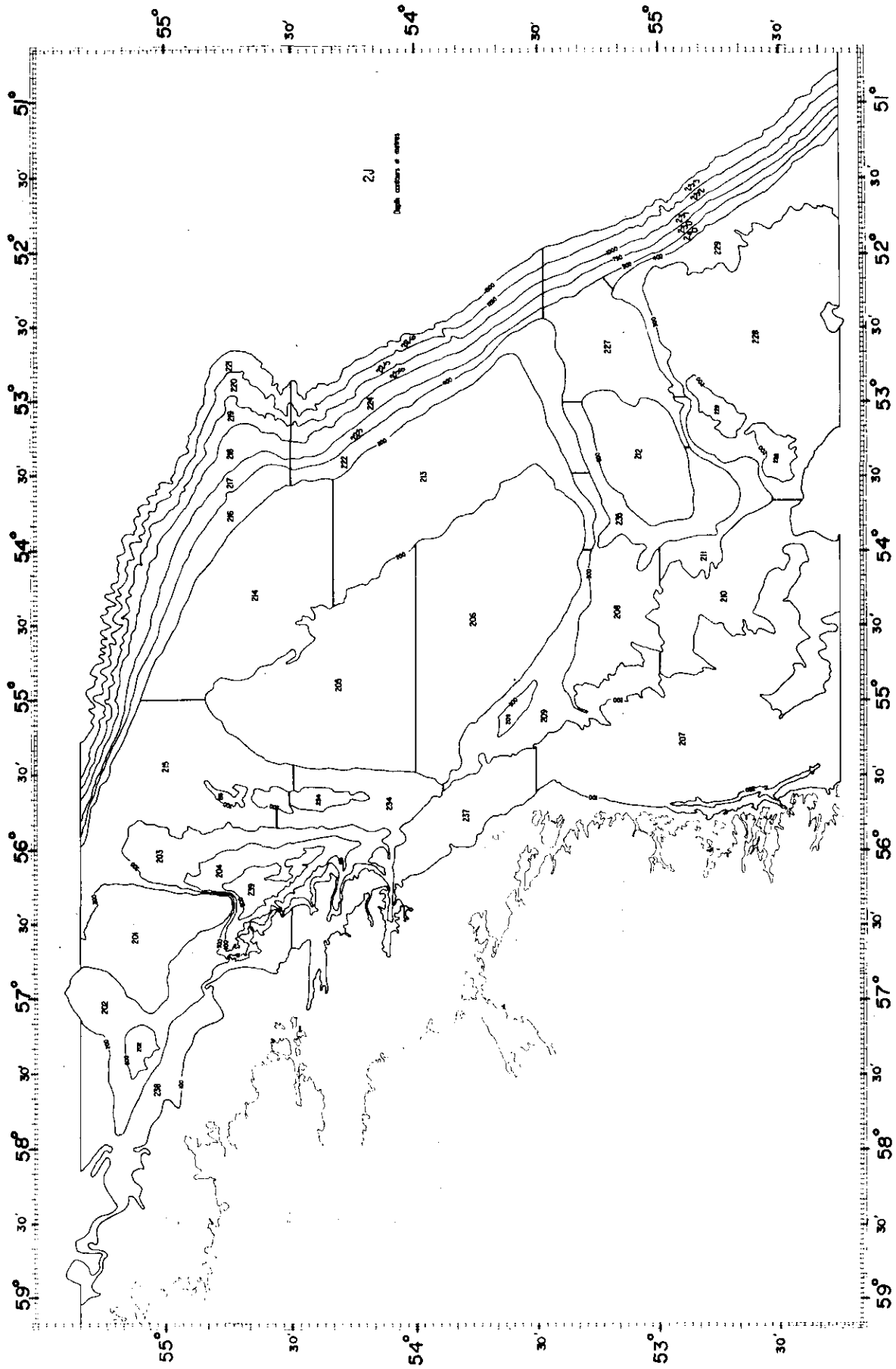


Figure 6. Revised stratification scheme for stratified-random groundfish surveys in Div. 2J.

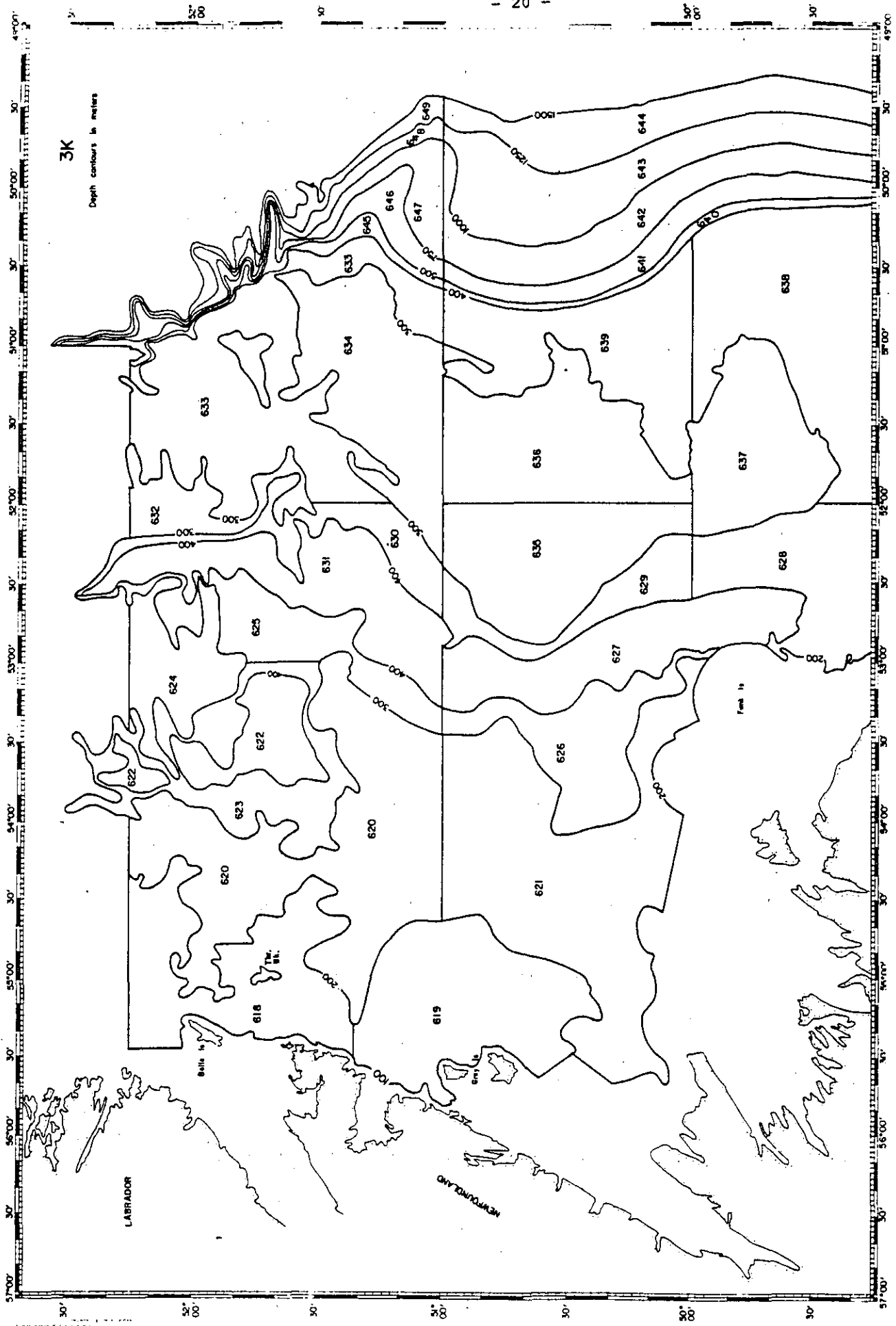


Figure 7. Stratification scheme used in stratified-random groundfish surveys in Div. 3K.

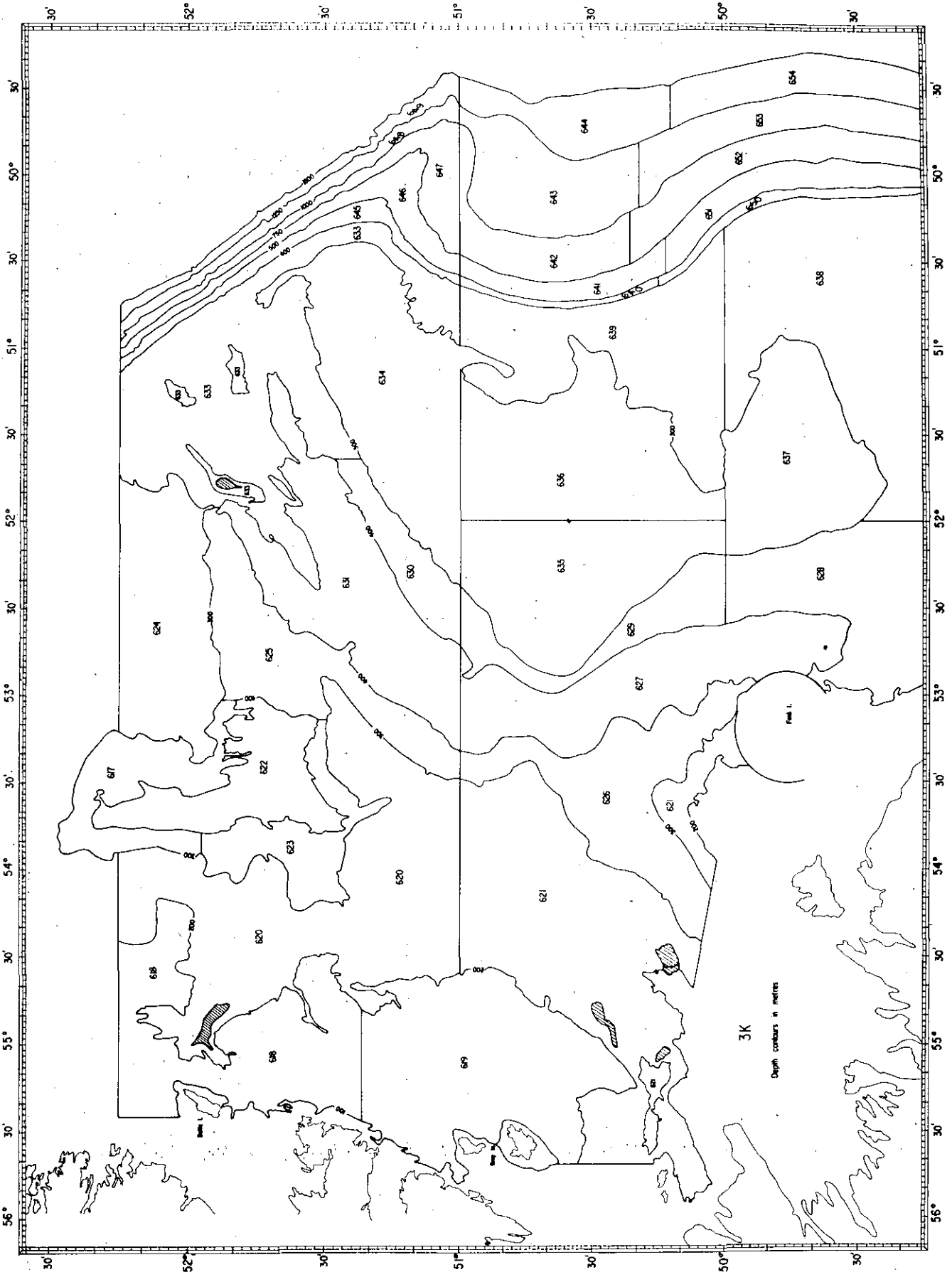


Figure 8. Revised stratification scheme for stratified-random groundfish surveys in Div. 3K.

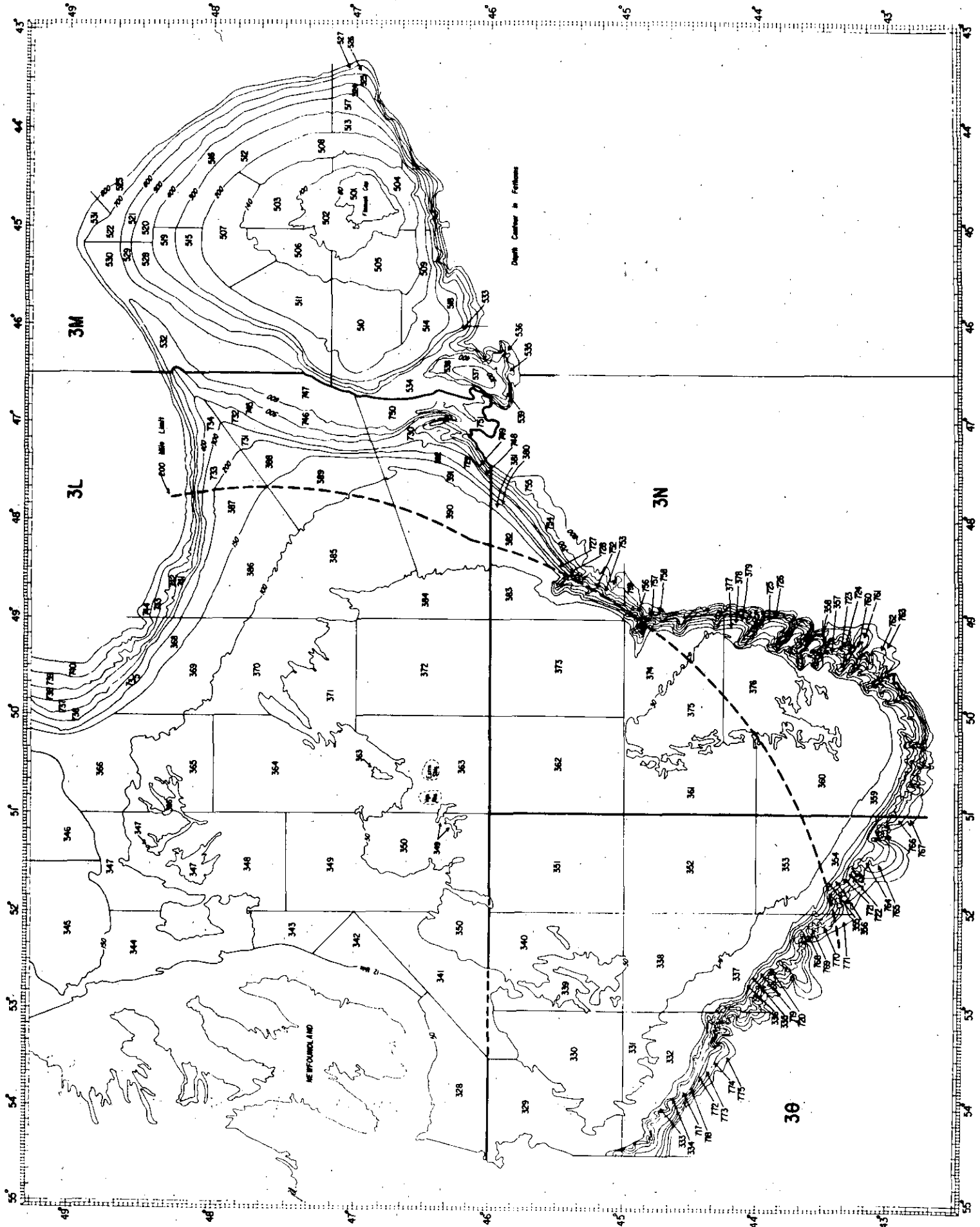


Figure 9. Revised stratification schemes for stratified-random groundfish surveys in Div. 3L, 3M, 3N and 3O.

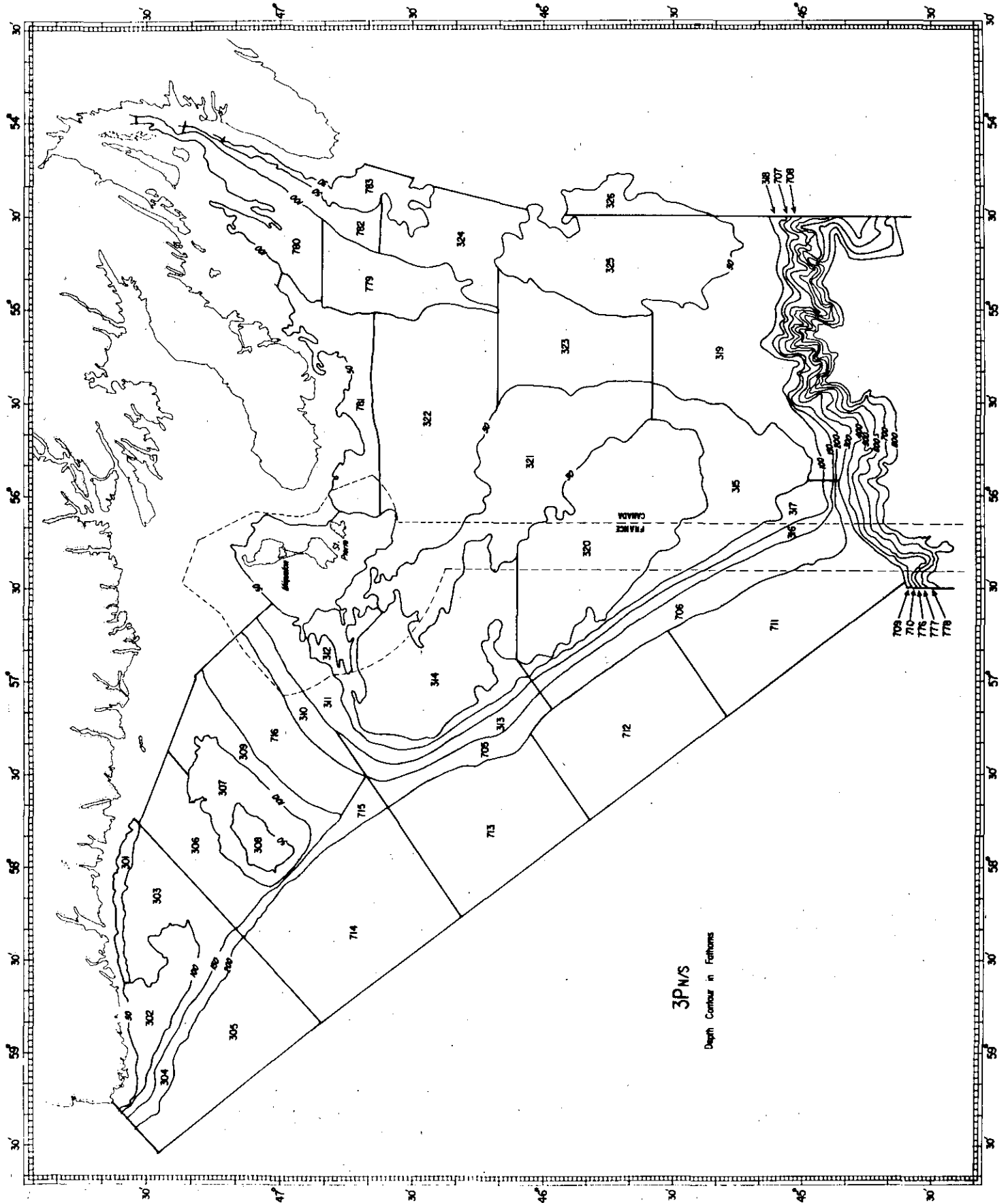


Figure 10. Revised stratification scheme for stratified-random groundfish surveys in Subdiv. 3Ps.