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# Cod in Divisions 2J+3KL -Estimates of Biomass and Age Composition for the portion of the Stock in the NAFO Regulatory Area from Canadian Research Vessel Surveys

by

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## Introduction

The Fisheries Commission has annually requested information on "the stock separation in Div. 2J+3KL and the cod stock in Div. 3L in the NAFO Regulatory Area and a projection, if possible , of the portion likely to be available in the Regulatory Area in future years". Information is also requested on "the age composition of that portion of the stock in the Regulatory Area'. This document updates information presented previously (Murphy and Bishop, 1995) on the proportion of the biomass occurring in the NAFO Regulatory Area (NRA) and the age composition of this biomass using data from the Canadian 1995 research surveys in the area.

## Results and Discussion

### Stock separation

The issue of stock separation has been addressed in some detail by the Scientific Council in the past (NAFO Scientific Council Reports, 1986) and the general conclusions have been that the stock be managed as a single stock complex (2J3KL). Recent work (Bentzen et al. 1996) has shown that within the northern cod complex , two pooled samples , NORTH (Hamilton , Funk and Belle Isle Banks) and SOUTH (the northern Grand Bank area) are distinguishable using microsatellite DNA techniques. This lends support to tagging work (Lear 1984, and Taggart et al. 1995) which showed that cod tagged in spawning aggregations on offshore banks show fidelity to these banks. Genetic work is continuing with the goals of identifing inshore or bay stocks and other distinct population in the offshore if they exist. The ability of being able to identify distinct elements of the stock complex may have implications on how this stock is managed in the future.

### Survey coverage

The area of NAFO Div 3L, in depths to 400 fathoms is 42,265 sq. naut. miles , of which 3,700 or 9% is in the NRA (Table 1, Fig. 1). All areas within this depth zone in both Div. 2J and 3K are on the shoreward side of the Canadian 200-mile fishery zone. The total area in the Div. 2J3KL to 400 fathoms is about 106,000 sq. naut. miles (Table 2.); therefore , the area to this depth in the NRA is about 3.5% of the total.

Stratified -random surveys have been conducted by Canada in Div. 2J, 3K and 3L during the autumn since 1977, 1978 and 1981 respectively . Stratified-random surveys have also been conducted during the spring since 1971 (excluding 1983-84) and during the winter in 1985 and 1986 . Surveys during the spring for 1971-1976 period were incomplete

with regards to strata coverage and have been excluded from analysis in this document.

Biomass estimates

Winter surveys are not regularly conducted in Division 3L. Results of winter surveys in 1985 and 1986 indicated that about 25% of the 3L biomass occurred in the NRA (Murphy et al., 1991). No stratified random surveys have been conducted during winter since that time.

Spring surveys conducted during the 1977-90 period show the portion of total 3L biomass in the NRA has ranged from 0.4% to 6.0% with a mean of 2.9 %. Since 1991 this percentage increased from 10.8% to a high of 63% in 1994 and was 26.2 % in 1995 (Table 3).

Autumn survey results for the years 1981-95 indicated that on average 3.5% of the 3L biomass occurs in the NRA with the 1994 value of 9.7% being the highest observed. The 1995 value was about 1.6 % . (Table 4).

Surveys conducted during autumn for the years 1981-92 in Div. 2J3KL indicated that only a small portion, less than 1%, of the total 2J3KL biomass occurs in the NRA at that time. In 1993 this portion increased to 5 % in the NRA and was < 1 % (Table 5).

The average Divisional biomass from the autumn surveys (Table 6) has been variable in recent years. Biomass has declined substantially since 1990 and is currently (1995) at an extremely low level.

Age composition

The age compositions from spring and autumn research vessel surveys in Div. 3L since 1986 (Tables 7-8; Figures 2-5) indicate for most years a higher proportion of younger cod are found in the NRA.

The 1985 and 1986 winter survey results, which indicated the highest seasonal proportion of 3L biomass in the NRA showed that the age compositions were similar in both areas.

REFERENCES

Age compositions for the entire 2J3KL cod research vessel survey biomass (Table 9) were similar to those which occur in Div. 3L inside the 200 mile fishing zone.

Bentzen P. , C.T. Taggart, D.E. Ruzzante and D. Cook. 1996. Microsatellite Polymorphism and Population Structure of Atlantic Cod (*Gadus morhua*) in the Northwest Atlantic. NAFO SCR Doc. 96/21. Ser.No. N2694. 20 p.

Lear, W.H. 1984 Discrimination of the stock complex of Atlantic cod (*Gadus morhua*) of southern Labrador and eastern Newfoundland, as inferred from tagging studies. J. Northw. Atl. Fish Sci. 5:143-159.

Murphy, E.F., C.A. Bishop, and J.W.Baird. 1991. Cod in Divisions 2J+3KL Estimates of biomass and age composition for the portion of the stock beyond the Canadian 200 mile fishery zone. NAFO SCR Doc. 91/51. Ser.No. N1934. 12 p.

Murphy, E.F and C.A.Bishop. Cod in Divisions 2J+3KL -Estimates of biomass and age composition for the portion of the stock in the NAFO Regulatory Area. NAFO SCR Doc. 95/46. Ser.No. N2557 8 p.

Table 1. Proportion of ares (square nautical miles) outside the 200 mile fishery zone in NAFO Div. 3L by depth range.

| Depth fathoms | Depth meters | Area total | Area outside | % outside |
|---|---|---|---|---|
| 31-50 | 56-91 | 8,552 | 0 | 0 |
| 51-100 | 92-183 | 17,452 | 933 | 5 |
| 101-150 | 184-274 | 6,918 | 791 | 11 |
| 151-200 | 275-366 | 3,855 | 768 | 20 |
| 201-300 | 367-549 | 1,142 | 636 | 56 |
| 301-400 | 550-732 | 804 | 554 | 69 |
| unstratified shoreward | | 3,542 | 0 | 0 |
| total | | 42,265 | 3,682 | 9 |

Table 2. Area in square nuatical miles in Div 2J, 3K and 3L.

| Division | Survey area (mi . sq.) (0-750 m | % |
|---|---|---|
| 2J | 27,633 | 26 |
| 3K | 36,545 | 34 |
| 3L | 42,262 | 40 |
| Total | 106,443 | 100 |

Table 3. Estimates of cod biomass outside the 200 mile fishery zone in Division 3L by strata and depth zone from Canadian RV surveys conducted in the spring over the period 1977-95. The number of successful set are in parentesis.

| Strata | Depth zone fath. | % Area outside 200 mi. zone | ATC 262 (102) 1977 | ATC 276 (94) 1978 | ATC 290 (141) 1979 | ATC 304-305 (115) 1980 | ATC 317-318 (77) 1981 | ATC 329 (103) 1982 | WT 28-30 (221) 1985 | WT 48 (211) 1986 | WT 59-60 (181) 1987 | WT 70-71 (154) 1988 | WT 83 (194) 1989 | WT 96 (156) 1990 | WT 106-107 (138) 1991 | WT 119-122 (178) 1992 | WT 137-138 (181) 1993 | WT 152-154 (160) 1994 | WT 168-170 (151) 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 385 | 51-100 | 5 | 21 | 4 | 56 | 314 | 21 | 0 | 104 | 21 | 53 | 107 | 154 | 40 | 325 | 2 | 5 | 0 | 0 |
| 390 | " | 55 | 278 | 437 | 1169 | 1539 | 275 | 119 | 144 | 223 | 277 | 0 | 109 | 35 | 202 | 20 | 16 | 0 | 0 |
| 389 | 101-150 | 62 | 833 | 659 | 681 | 4292 | 296 | 1031 | 3825 | 558 | 401 | 429 | 382 | 318 | 140 | 39 | 0 | 0 | 6 |
| 391 | " | 100 | 634 | 356 | 1048 | 2064 | 1212 | 95 | 429 | 826 | 201 | 41 | 95 | 621 | 283 | 0 | 0 | 0 | 0 |
| 387 | 151-200 | 37 | 45 | 68 | 170 | 95 | 90 | 871 | 7952 | 2425 | 72 | 192 | 927 | 10557 | 3422 | 3005 | 241 | 0 | 20 |
| 388 | " | 99 | 1169 | 179 | 346 | 107 | 188 | 1308 | 343 | 1556 | 10 | 177 | 121 | 1162 | 995 | 239 | 481 | 0 | 9 |
| 392 | " | 100 | 30 | 66 | 189 | 0 | 128 | 256 | 2237 | 435 | 3 | 98 | 57 | | 179 | 10 | 5 | 0 | 9 |
| 729 | 201-300 | 100 | | | | | | | 35 | | | | | | 170 | 552 | 15 | 6 | 0 |
| 731 | " | 100 | | | | | | | 36 | | | | | | 670 | 253 | 84 | 2094 | 0 |
| 733 | " | 50 | | not surveyed | | | | | 158 | | not surveyed | | | | 1290 | 384 | 55 | 62 | 46 |
| 730 | 301-400 | 100 | | | | | | | 0 | | | | | | 0 | 0 | 0 | 0 | 0 |
| 732 | " | 100 | | | | | | | 0 | | | | | | 0 | 0 | 0 | 0 | 0 |
| 734 | " | 67 | | | | | | | 0 | | | | | | 173 | 0 | 0 | 0 | 0 |
| biomass outside 200 mi. limit | | | 3010 | 1769 | 3659 | 8411 | 2210 | 3680 | 15263 | 6044 | 1017 | 1044 | 1845 | 12733 | 7849 | 4505 | 901 | 2162 | 90 |
| total 3L biomass | | | 70815 | 78212 | 129117 | 139030 | 220979 | 140578 | 267516 | 239857 | 257564 | 259080 | 192713 | 228865 | 72416 | 27919 | 2248 | 3429 | 343 |
| % outside | | | 4.3% | 2.3% | 2.8% | 6.0% | 1.0% | 2.6% | 5.7% | 2.5% | 0.4% | 0.4% | 1.0% | 5.6% | 10.8% | 16.1% | 40.1% | 63.1% | 26.2% |



Table 4. Estimates of cod biomass outside the 200 mile fishery zone in Division 3L by strata and depth zone from Canadian RV surveys conducted in the autumn over the period 1981-95. The number of successful set are in parentesis.

| Strata | Depth zone fath. | % Area outside 200 mi. zone | ATC 323-325 (99) 1981 | ATC 333-334 (120) 1982 | WT 7-9 (125) 1983 | WT 16-18 (208) 1984 | WT 37-39 (231) 1985 | AN 72 (142) 1986 | WT 65 (165) 1987 | WT 78 (189) 1988 | WT 87 (174) 1989 | WT 101 (161) 1990 | WT 114-115 (219) 1991 | WT 129-130 (215) 1992 | WT 145-146 (153) 1993 | WT 160-162 (200) 1994 | WT 176-181 (166) 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 385 | 51-100 | 5 | 2 | 2 | 51 | 94 | 5 | 55 | 48 | 16 | 3 | 36 | 6 | 14 | 0 | 0 | 0 |
| 390 | " | 55 | 5 | 32 | 469 | 622 | 5 | 19 | 152 | 112 | 59 | 36 | 0 | 14 | 0 | 0 | 7 |
| 389 | 101-150 | 62 | | 2125 | | 1697 | 1563 | 1068 | 1074 | 436 | 1246 | 1162 | 563 | 0 | 0 | 0 | 8 |
| 391 | " | 100 | | 487 | 159 | 79 | 325 | 370 | 70 | 6 | 23 | 165 | 15 | 1 | 10 | 0 | 0 |
| 387 | 151-200 | 37 | 494 | 3410 | | 2762 | 1501 | 7483 | 1014 | 477 | 176 | 3198 | 641 | 303 | 267 | 34 | 9 |
| 388 | " | 99 | | 456 | | 610 | 1892 | | 114 | 362 | 1348 | 1056 | 255 | 124 | 90 | 43 | 34 |
| 392 | " | 100 | | 220 | 109 | 68 | 106 | 11 | 8 | 41 | 22 | 120 | 30 | 2 | 6.0 | 0 | 15 |
| 729 | 201-300 | 100 | | | | 59 | 0 | 0 | | | | 57 | 0 | 27 | 83 | 0 | 0 |
| 731 | " | 100 | | | | 49 | 146 | | | | | 11 | 25 | 35 | 54 | 8 | 5 |
| 733 | " | 50 | not surveyed | | | 483 | 150 | | | | | 227 | 7 | 64 | 138 | 17 | 7 |
| 730 | 301-400 | 100 | | | | 0 | 0 | | not surveyed | | | | 0 | 0 | 0 | 5 | 0 |
| 732 | " | 100 | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| 734 | " | 67 | | | | 0 | 0 | | | | | 0 | 0 | 0 | 4 | 12 | 0 |
| biomass outside 200 mi. limit | | | 501 | 6732 | 788 | 6523 | 5693 | 9006 | 2480 | 1450 | 2877 | 6068 | 1542 | 584 | 651 | 119 | 85 |
| total 3L biomass | | | 109819 | 87997 | 131267 | 191702 | 165169 | 190732 | 151936 | 139726 | 73514 | 210725 | 52750 | 50506 | 10808 | 1232 | 5275 |
| % outside | | | 0.5% | 7.7% | 0.6% | 3.4% | 3.4% | 4.7% | 1.6% | 1.0% | 3.9% | 2.9% | 2.9% | 1.2% | 6.0% | 9.7% | 1.6% |

Table 5. Cod biomass distribution in NAFO Divisions 2J3KL derived from fall surveys in relation to the 200 mile fishery zone.

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| biomass outside 200 mi. limit | 501 | 6732 | 788 | 6523 | 5693 | 9006 | 2480 | 1450 | 2877 | 6068 | 1542 | 583.65 | 651 | 119 | 85 |
| Total 2J3KL | 518793 | 441702 | 598492 | 551626 | 387172 | 952231 | 450687 | 464295 | 504932 | 436175 | 206156 | 62260 | 12593 | 2704 | 13344 |
| % OUTSIDE | 0.10% | 1.52% | 0.13% | 1.18% | 1.47% | 0.95% | 0.55% | 0.31% | 0.57% | 1.39% | 0.75% | 0.94% | 5.17% | 4.40% | 0.64% |

Table 6. Biomass estimates (000 t) of cod from autumn research vessel surveys in NAFO Div. 2J3KL.

| | Biomass | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Divisions | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | |
| 2J | 229 | 217 | 267 | 182 | 137 | 405 | 175 | 249 | 141 | 33 | 29 | 2 | 1 | 0.5 | 3 | |
| 3K | 178 | 136 | 176 | 179 | 86 | 356 | 123 | 75 | 291 | 193 | 126 | 9 | 3 | 1 | 5 | |
| 3L | 112 | 89 | 155 | 190 | 164 | 191 | 152 | 140 | 74 | 210 | 52 | 51 | 9 | 1 | 5 | |
| Total | 519 | 442 | 598 | 551 | 387 | 952 | 450 | 464 | 506 | 436 | 207 | 62 | 13 | 2.5 | 13 | |
| | | | | | | | | | | | | | | | | AVERAGE |
| 2J | 44% | 49% | 45% | 33% | 35% | 43% | 39% | 54% | 28% | 8% | 14% | 3% | 8% | 20% | 23% | 30% |
| 3K | 34% | 31% | 29% | 32% | 22% | 37% | 27% | 16% | 58% | 44% | 61% | 15% | 23% | 40% | 38% | 34% |
| 3L | 22% | 20% | 26% | 34% | 42% | 20% | 34% | 30% | 15% | 48% | 25% | 82% | 69% | 40% | 38% | 36% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Table 7. Percent age compositions Divisions 3L inside and outside the 200 mile limit as derived from the 1986-95 spring RV surveys.

| | 1986 WT48 | | 1987 WT 59-60 | | 1988 WT 70 -71 | | 1989 WT 83 | | 1990 WT 96 | | 1991 WT 106 -107 | | 1992 WT 119-122 | | 1993 WT137 -138 | | 1994 WT152-154 | | 1995 WT168-170 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 1 | 1 | 6 | 0 | 5 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 15 | 5 |
| 3 | 6 | 19 | 5 | 40 | 10 | 57 | 10 | 39 | 10 | 22 | 8 | 19 | 7 | 10 | 29 | 14 | 15 | 7 | 14 | 11 |
| 4 | 24 | 42 | 11 | 30 | 9 | 19 | 20 | 43 | 29 | 36 | 25 | 46 | 31 | 20 | 28 | 34 | 35 | 36 | 31 | 36 |
| 5 | 26 | 20 | 29 | 13 | 15 | 5 | 9 | 6 | 21 | 24 | 30 | 21 | 46 | 37 | 16 | 26 | 37 | 38 | 25 | 25 |
| 6 | 19 | 10 | 27 | 5 | 33 | 6 | 9 | 2 | 8 | 6 | 18 | 8 | 12 | 22 | 15 | 19 | 8 | 12 | 12 | 14 |
| 7 | 9 | 4 | 14 | 3 | 16 | 3 | 23 | 2 | 8 | 4 | 6 | 1 | 3 | 8 | 8 | 4 | 3 | 7 | 2 | 2 |
| 8 | 7 | 3 | 5 | 1 | 8 | 2 | 17 | 2 | 11 | 3 | 5 | 1 | 1 | 1 | 3 | 3 | 0 | 1 | 2 | 6 |
| 9 | 2 | 1 | 4 | 1 | 3 | 1 | 5 | 2 | 6 | 2 | 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 10 | 1 | 0 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 2 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 8. Percent age compositions Divisions 3L inside and outside the 200 mile limit as derived from the 1986-95 autumn RV surveys.

| | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AN 72 | | WT65 | | WT 78 | | WT 87 | | WT 101 | | WT 114 -115 | | WT 129-130 | | WT 145-146 | | WT 160 -162 | | WT176-181 | |
| Age | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside | Inside | Outside |
| 1 | 0 | 0 | 0 | 7 | 0 | 4 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1 |
| 2 | 3 | 4 | 7 | 62 | 5 | 37 | 3 | 20 | 1 | 4 | 5 | 19 | 2 | 8 | 9 | 5 | 6 | 6 | 21 | 32 |
| 3 | 6 | 4 | 6 | 18 | 16 | 36 | 24 | 40 | 13 | 18 | 10 | 18 | 18 | 27 | 26 | 27 | 19 | 15 | 34 | 50 |
| 4 | 27 | 20 | 13 | 2 | 8 | 6 | 23 | 15 | 30 | 31 | 29 | 26 | 29 | 19 | 38 | 44 | 35 | 54 | 18 | 13 |
| 5 | 23 | 23 | 31 | 3 | 18 | 2 | 11 | 3 | 21 | 11 | 30 | 20 | 28 | 18 | 17 | 15 | 23 | 22 | 10 | 4 |
| 6 | 24 | 26 | 23 | 1 | 22 | 2 | 14 | 2 | 12 | 4 | 17 | 10 | 17 | 21 | 8 | 7 | 11 | 3 | 8 | 0 |
| 7 | 7 | 8 | 11 | 1 | 16 | 3 | 14 | 3 | 8 | 3 | 3 | 2 | 5 | 6 | 2 | 2 | 6 | 1 | 2 | 0 |
| 8 | 8 | 6 | 4 | 1 | 8 | 3 | 5 | 2 | 7 | 5 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 2 | 3 | 3 | 2 | 4 | 2 | 4 | 4 | 4 | 7 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 3 | 1 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 1 | 2 | 0 | 1 | 0 | 1 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 9. MEAN NUMBERS OF COD PER TOW AT AGE FROM AUTUMN RV SURVEYS IN DIVISIONS 2J3KL.

| Age | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.02 | 0.41 | 0.27 | 0.16 | 0.51 | 1.04 | 0.36 | 0.02 | 0.14 | 0.21 | 0.59 | 0.66 | 0.40 | 0.03 | 0.01 | 0.00 | 0.01 | 1.58 |
| 2 | 0.40 | 0.32 | 3.00 | 1.59 | 2.49 | 6.09 | 5.57 | 1.10 | 1.85 | 1.56 | 2.14 | 8.25 | 1.91 | 1.34 | 0.29 | 0.37 | 0.05 | 0.97 |
| 3 | 5.39 | 1.94 | 2.48 | 5.11 | 5.88 | 12.31 | 10.79 | 7.27 | 4.77 | 2.04 | 3.93 | 8.98 | 10.93 | 3.35 | 1.78 | 0.60 | 0.16 | 0.74 |
| 4 | 11.51 | 11.78 | 3.83 | 2.74 | 5.93 | 10.65 | 15.23 | 12.35 | 20.70 | 4.03 | 3.20 | 8.30 | 12.95 | 13.97 | 2.30 | 0.83 | 0.13 | 0.30 |
| 5 | 13.95 | 16.79 | 13.23 | 3.26 | 3.83 | 10.88 | 11.34 | 10.01 | 31.29 | 13.23 | 5.29 | 6.20 | 8.61 | 9.00 | 2.72 | 0.34 | 0.08 | 0.12 |
| 6 | 5.51 | 10.53 | 13.31 | 9.67 | 2.79 | 3.88 | 9.59 | 7.28 | 21.29 | 11.61 | 10.57 | 6.52 | 5.64 | 3.31 | 1.42 | 0.22 | 0.02 | 0.06 |
| 7 | 1.62 | 2.27 | 4.99 | 8.78 | 5.82 | 2.44 | 2.30 | 4.24 | 10.14 | 4.38 | 10.13 | 8.23 | 3.90 | 1.10 | 0.35 | 0.04 | 0.02 | 0.01 |
| 8 | 0.63 | 0.92 | 1.19 | 3.66 | 5.31 | 5.35 | 1.37 | 0.92 | 5.26 | 2.67 | 2.58 | 4.84 | 3.98 | 0.50 | 0.04 | 0.01 | 0.01 | 0.00 |
| 9 | 0.47 | 0.31 | 0.37 | 0.74 | 2.59 | 2.94 | 2.09 | 0.78 | 1.37 | 1.38 | 1.55 | 1.62 | 1.68 | 0.35 | 0.02 | 0.00 | 0.00 | 0.00 |
| 10 | 0.33 | 0.26 | 0.23 | 0.23 | 0.57 | 1.42 | 1.30 | 0.67 | 0.58 | 0.34 | 0.79 | 0.98 | 0.55 | 0.16 | 0.01 | 0.00 | 0.00 | 0.00 |
| 11 | 0.12 | 0.19 | 0.11 | 0.10 | 0.16 | 0.36 | 0.54 | 0.41 | 0.68 | 0.17 | 0.15 | 0.43 | 0.23 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | 0.09 | 0.06 | 0.16 | 0.11 | 0.09 | 0.14 | 0.28 | 0.15 | 0.42 | 0.19 | 0.11 | 0.16 | 0.12 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 |
| 13 | 0.06 | 0.04 | 0.05 | 0.10 | 0.07 | 0.13 | 0.12 | 0.06 | 0.19 | 0.13 | 0.08 | 0.10 | 0.04 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1+ | 40.11 | 45.80 | 43.21 | 36.23 | 36.03 | 57.63 | 60.87 | 45.25 | 98.68 | 41.96 | 41.11 | 55.29 | 50.93 | 33.18 | 8.96 | 2.41 | 0.48 | 3.79 |
| 2+ | 40.09 | 45.39 | 42.94 | 36.08 | 35.52 | 56.58 | 60.51 | 45.23 | 98.54 | 41.74 | 40.53 | 54.62 | 50.53 | 33.15 | 8.94 | 2.41 | 0.47 | 2.21 |
| 3+ | 39.69 | 45.07 | 39.94 | 34.49 | 33.03 | 50.49 | 54.94 | 44.13 | 96.69 | 40.18 | 38.38 | 46.37 | 48.62 | 31.81 | 8.65 | 2.03 | 0.42 | 1.24 |
| 4+ | 34.30 | 43.13 | 37.47 | 29.38 | 27.16 | 38.18 | 44.15 | 36.86 | 91.92 | 38.14 | 34.46 | 37.39 | 37.70 | 28.46 | 6.87 | 1.43 | 0.26 | 0.50 |
| 5+ | 22.79 | 31.35 | 33.64 | 26.64 | 21.23 | 27.53 | 23.93 | 24.52 | 71.22 | 34.11 | 31.26 | 29.09 | 24.75 | 14.49 | 4.57 | 0.61 | 0.13 | 0.20 |
| 6+ | 8.84 | 14.57 | 20.41 | 23.38 | 17.40 | 16.66 | 17.59 | 14.50 | 39.93 | 20.88 | 25.97 | 22.89 | 16.14 | 5.49 | 1.85 | 0.27 | 0.05 | 0.08 |

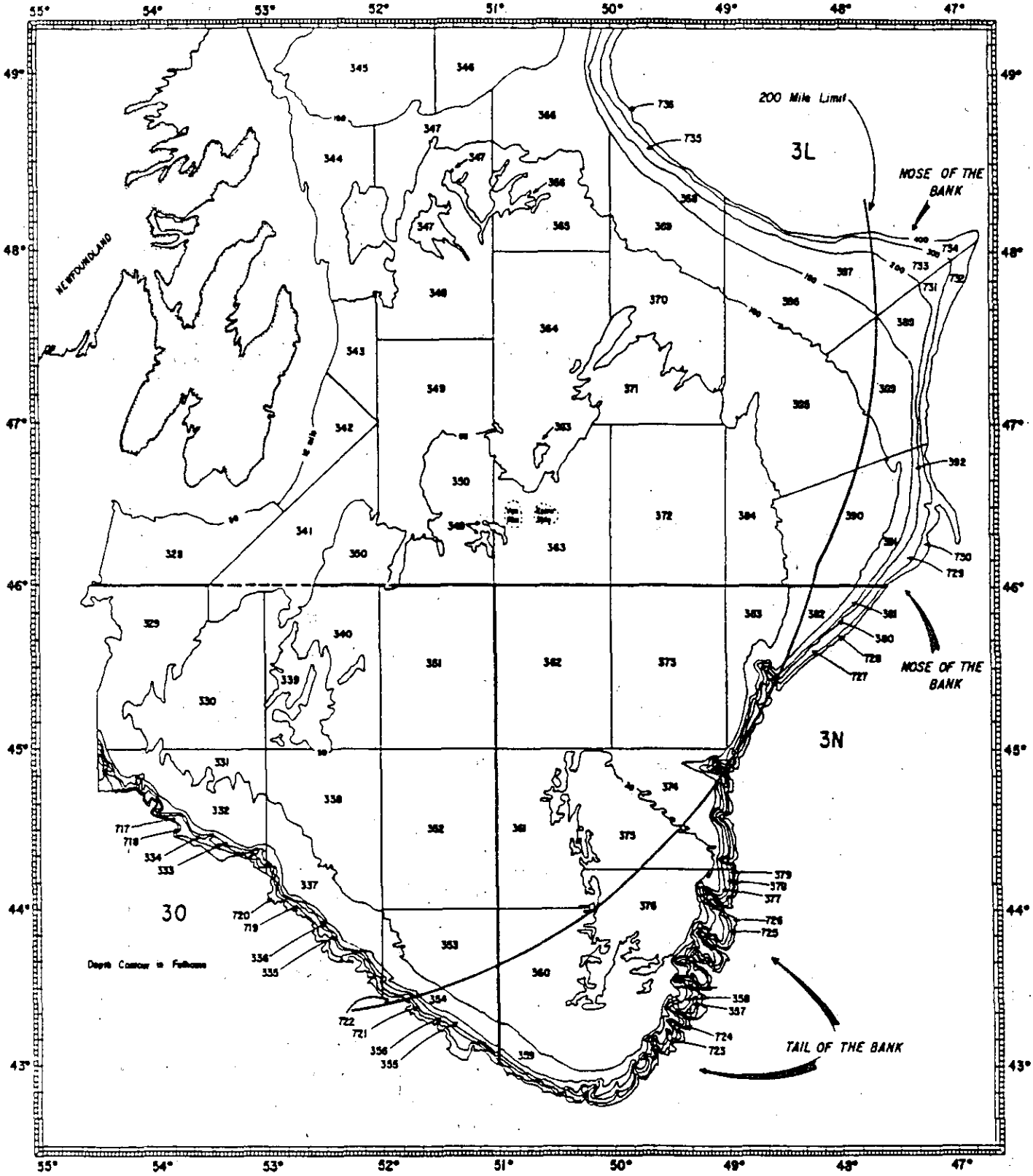


Figure 1. Stratification scheme for NAFO Divisions 3LNO showing the Canadian 200-mile limit.

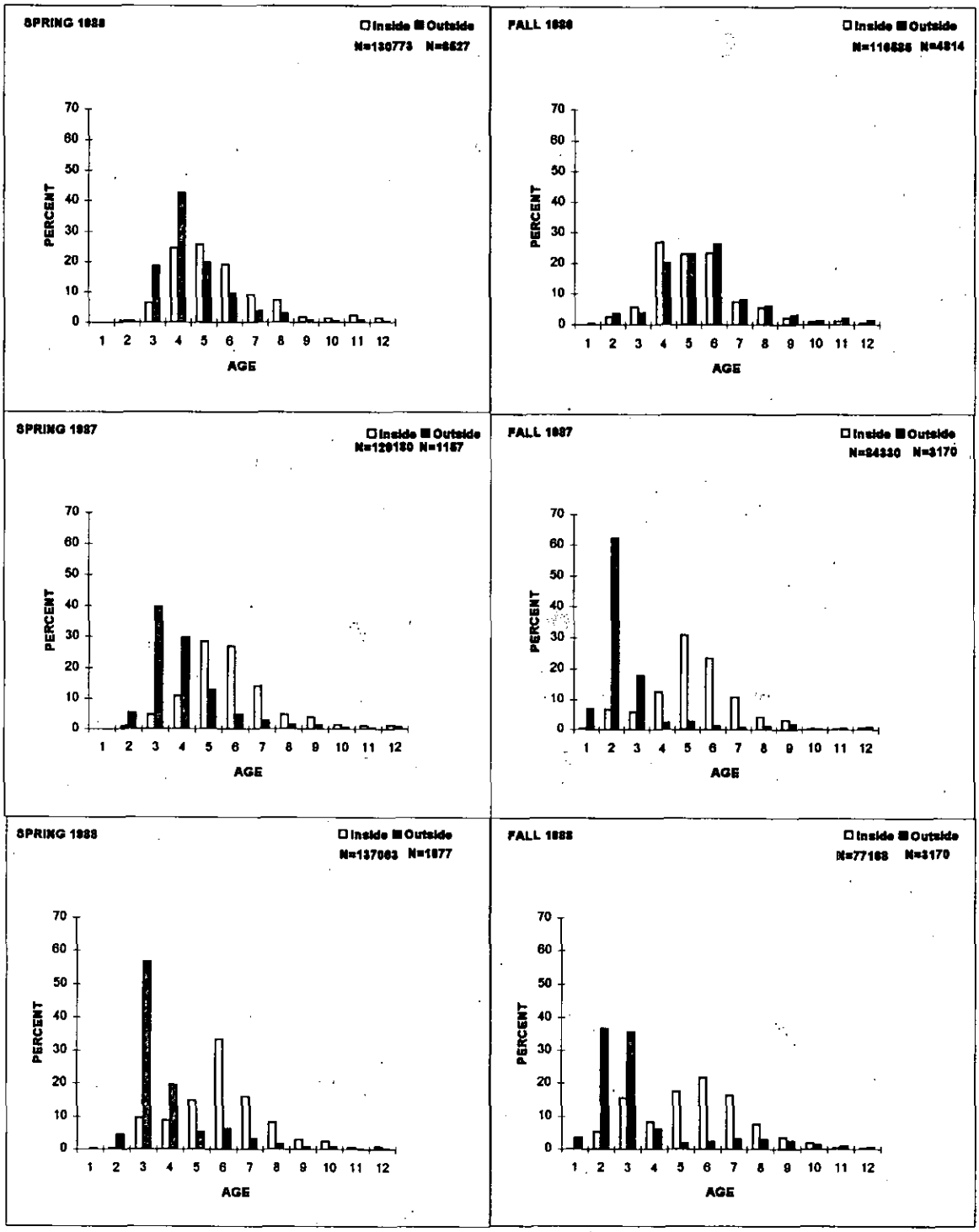


Fig 2. Percent at age composition for 3L inside and outside the 200-mile limit derived from 1986-1988 spring and fall Canadian RV surveys.

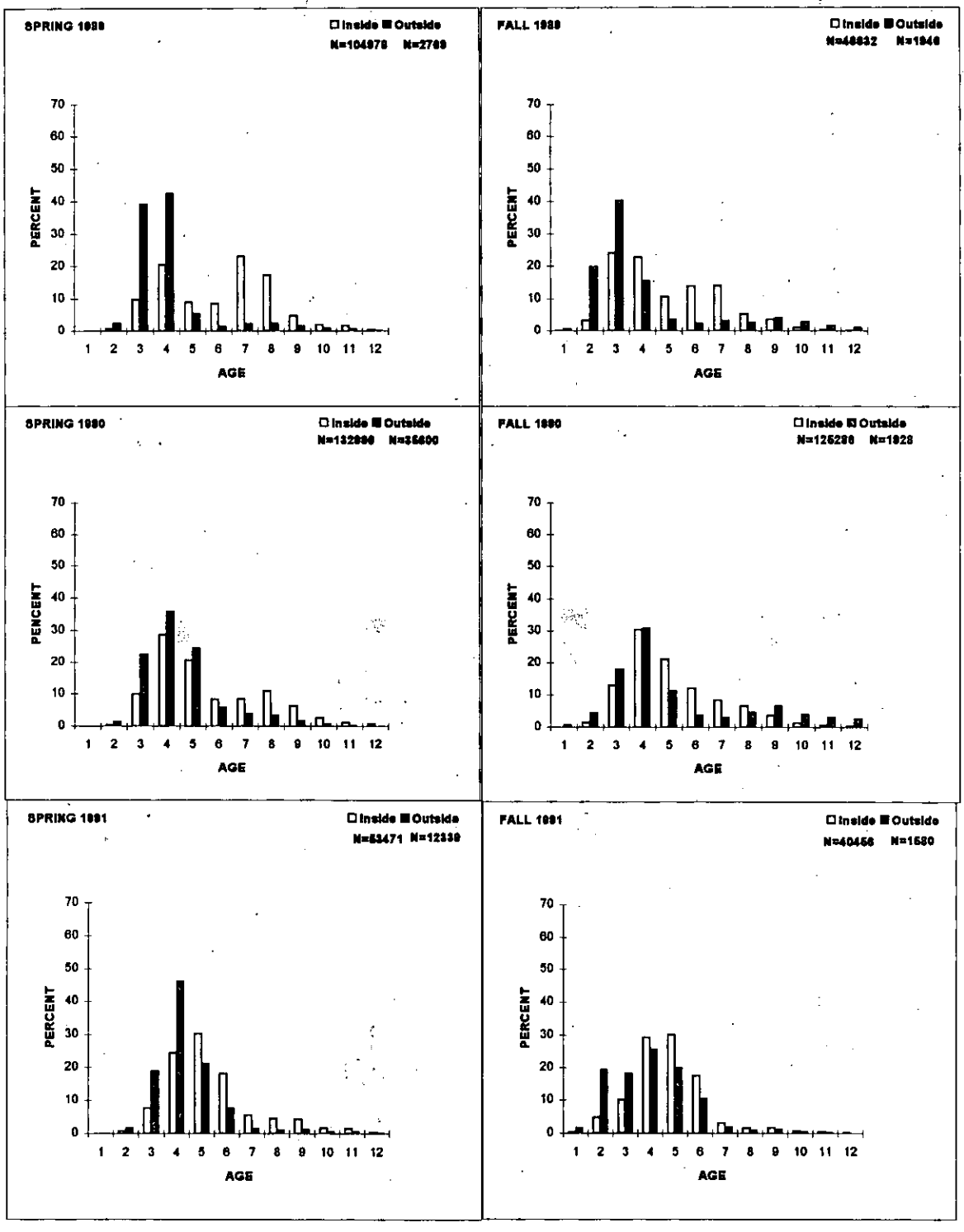


Fig 3. Percent at age composition for 3L inside and outside the 200-mile limit derived from 1989-1991 spring and fall Canadian RV surveys.

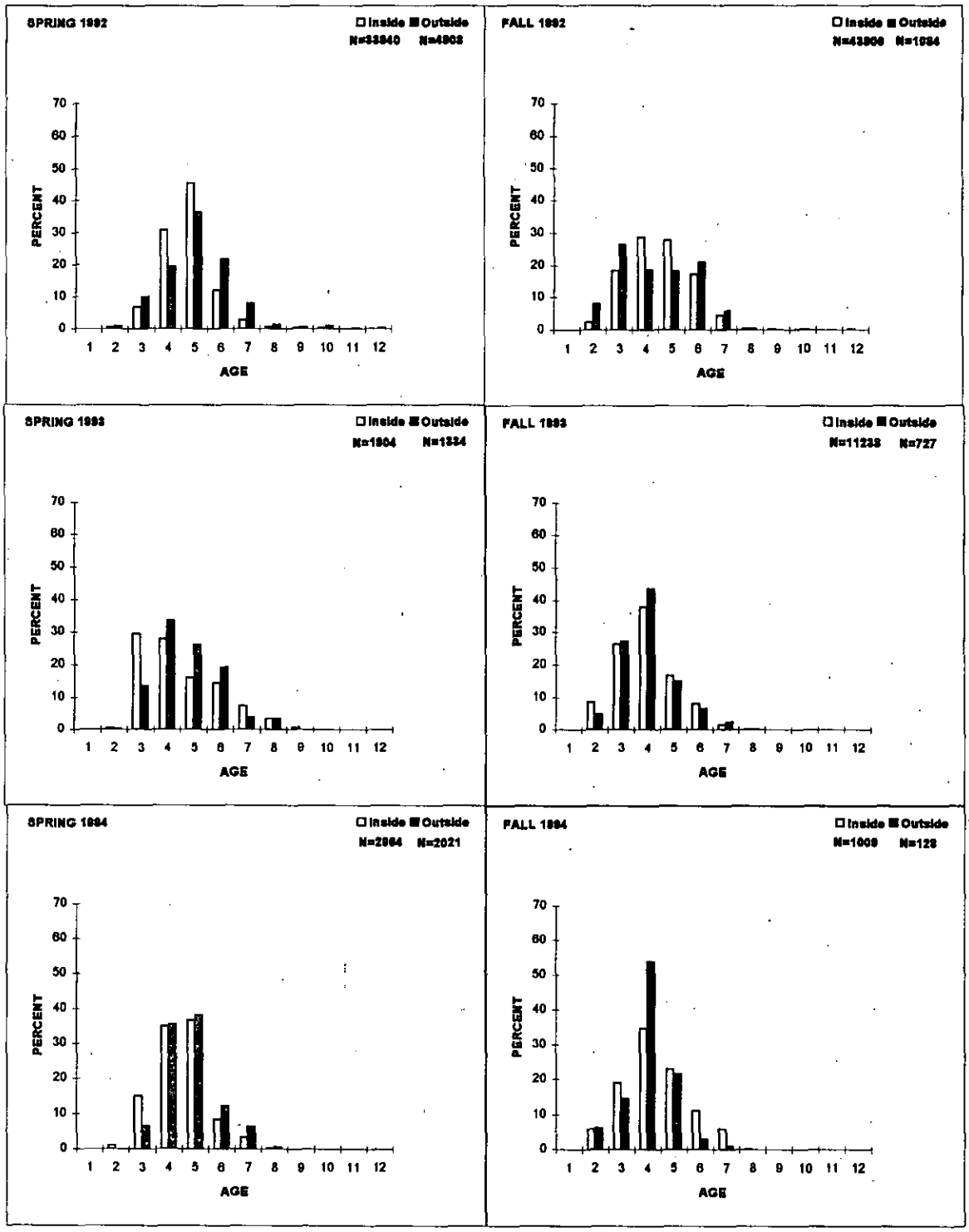


Fig 4. Percent at age composition for 3L inside and outside the 200-mile limit derived from 1992-1994 spring and fall Canadian RV surveys.

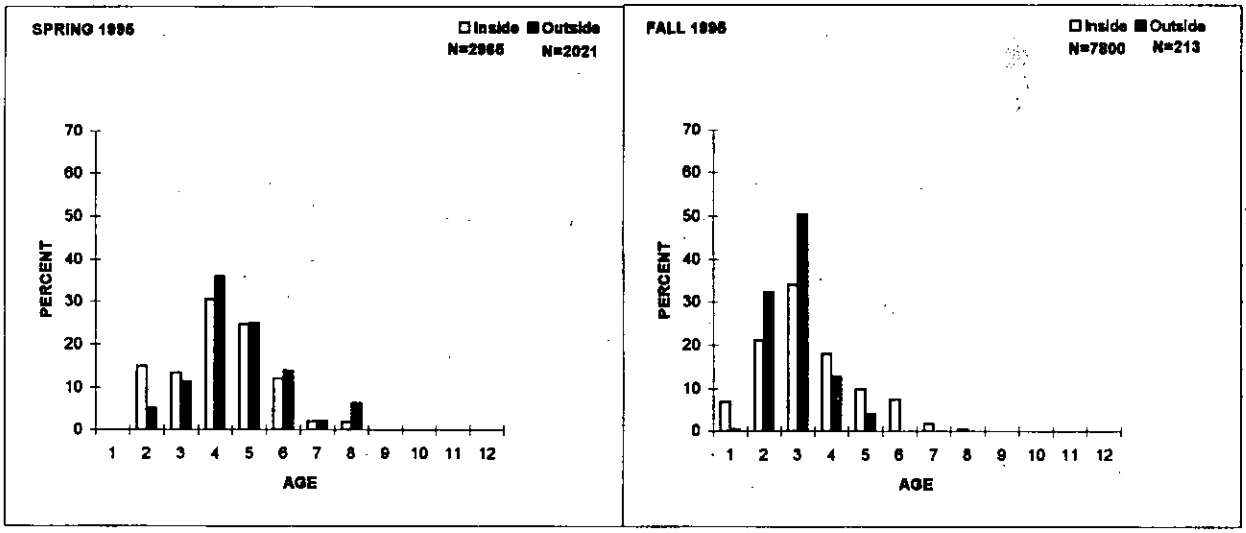


Fig 5. Percent at age composition for 3L inside and outside the 200-mile limit derived from 1995 spring and fall Canadian RV surveys.