# DATA PRESENTLY AVAILABLE FOR THE SOUTH AFRICAN KINGKLIP RESOURCE ASSESSMENT

***A. Brandão and D.S. Butterworth***

*MARAM (Marine Resource Assessment and Management Group)*
*Department of Mathematics and Applied Mathematics,*
*University of Cape Town, Rondebosch 7701, South Africa*
*February 2008*

This paper sets out the data that are presently available and data that are still required for the assessment analyses of the South African kingklip resource.

## Catch Data

Total annual catches of kingklip for the West and South coasts from hake-directed trawls over the period 1932–2007 and from hake-directed longliners for the periods 1983–2007 are shown in Table 1 and Figure 1. The total annual catches for 2008 were not available; however, to be able to include the information from surveys for 2008 in future analyses, the assumption was made to allow the total annual catches for 2008 to change from that of 2007 in the same proportion as the catch for *M. paradoxus* for both coast combined. The proportion for the trawl catches is calculated using data from the offshore hake catches.

## Survey abundance data

Survey abundance data for each of the West and South coasts from 1986–2008 obtained from Marine and Coastal Management are given in Table 2. Previously no distinction had been made between surveys that surveyed the coast up to 200m and those that surveyed the coast up to 500m. The choice made here between using abundance indices for the 200 or 500m coastal area was based on selecting the longest series. Thus, for the South coast surveys conducted in May/June (autumn) a 500m coastal area was selected, while for those in Sept/Oct (spring) a 200m coastal area was chosen.

## Survey catch-at-length data

Figures 2–5 show the survey catch-at-length distributions for the West and South coasts that are available and that can possibly be used in an assessment.

## CPUE data

CPUE abundance data for the years 1983 to 1991 for the trawl and longline fisheries from Punt and Japp (1994) are given in Table 3.

## Biological data

The biological parameters used in previous assessments are those used by Punt and Japp (1994). These values, including those for selectivity (to be used for models in which they cannot be estimated), are listed in Table 4.

**Data still required**

Commercial and/or observer catch-at-length data, disaggregated by coast, for both longline and trawl fisheries has still not been made available.

## REFERENCE

Punt, A.E. and Japp, D.W. 1994. Stock assessment of the kingklip *Genypterus capensis* off South Africa. *S.Afr.J.mar.Sci*. 14: 133–149.

**Table 1.** Yearly catches (in tons) of kingklip taken by the trawl and longline fisheries on the West and South coasts of South Africa (R. Leslie, pers. commn).

| Year | West coast | | South coast | | Year | West coast | | South coast | |
|---|---|---|---|---|---|---|---|---|---|
| | Trawl | Longline | Trawl | Longline | | Trawl | Longline | Trawl | Longline |
| **1932** | 480 | 0 | 120 | 0 | **1971** | 2 940 | 0 | 1 960 | 0 |
| **1933** | 320 | 0 | 80 | 0 | **1972** | 3 120 | 0 | 2 080 | 0 |
| **1934** | 320 | 0 | 80 | 0 | **1973** | 3 480 | 0 | 2 320 | 0 |
| **1935** | 560 | 0 | 140 | 0 | **1974** | 2 093 | 0 | 1 395 | 0 |
| **1936** | 560 | 0 | 140 | 0 | **1975** | 2 149 | 0 | 1 433 | 0 |
| **1937** | 560 | 0 | 140 | 0 | **1976** | 1 520 | 0 | 1 951 | 0 |
| **1938** | 560 | 0 | 140 | 0 | **1977** | 1 690 | 0 | 1 000 | 0 |
| **1939** | 560 | 0 | 140 | 0 | **1978** | 2 030 | 0 | 2 280 | 0 |
| **1940** | 560 | 0 | 140 | 0 | **1979** | 2 369 | 0 | 2 243 | 0 |
| **1941** | 480 | 0 | 120 | 0 | **1980** | 3 147 | 0 | 2 146 | 0 |
| **1942** | 480 | 0 | 120 | 0 | **1981** | 2 621 | 0 | 1 491 | 0 |
| **1943** | 480 | 0 | 120 | 0 | **1982** | 2 000 | 0 | 1 131 | 0 |
| **1944** | 480 | 0 | 120 | 0 | **1983** | 1 983 | 842 | 1 432 | 200 |
| **1945** | 1 040 | 0 | 260 | 0 | **1984** | 2 159 | 1 881 | 1 433 | 1 159 |
| **1946** | 800 | 0 | 200 | 0 | **1985** | 1 400 | 1 314 | 2 000 | 5 656 |
| **1947** | 880 | 0 | 220 | 0 | **1986** | 1 709 | 1 231 | 977 | 7 453 |
| **1948** | 1 200 | 0 | 300 | 0 | **1987** | 1 676 | 1 948 | 799 | 4 504 |
| **1949** | 1 260 | 0 | 540 | 0 | **1988** | 1 264 | 2 091 | 663 | 3 311 |
| **1950** | 1 330 | 0 | 570 | 0 | **1989** | 1 144 | 1 607 | 486 | 2 209 |
| **1951** | 1 680 | 0 | 720 | 0 | **1990** | 740 | 557 | 528 | 708 |
| **1952** | 1 960 | 0 | 840 | 0 | **1991** | 973 | 0 | 978 | 0 |
| **1953** | 1 890 | 0 | 810 | 0 | **1992** | 1 517 | 0 | 1 043 | 0 |
| **1954** | 1 400 | 0 | 600 | 0 | **1993** | 1 947 | 0 | 1 144 | 0 |
| **1955** | 1 610 | 0 | 690 | 0 | **1994** | 1 183 | 92 | 1 822 | 48 |
| **1956** | 1 400 | 0 | 600 | 0 | **1995** | 1 480 | 65 | 1 658 | 48 |
| **1957** | 1 050 | 0 | 450 | 0 | **1996** | 1 191 | 170 | 2 386 | 60 |
| **1958** | 1 190 | 0 | 510 | 0 | **1997** | 1 465 | 155 | 2 635 | 120 |
| **1959** | 1 400 | 0 | 600 | 0 | **1998** | 1 387 | 53 | 1 611 | 87 |
| **1960** | 1 050 | 0 | 450 | 0 | **1999** | 1 352 | 141 | 2 489 | 171 |
| **1961** | 1 470 | 0 | 630 | 0 | **2000** | 1 507 | 199 | 2 142 | 103 |
| **1962** | 1 190 | 0 | 510 | 0 | **2001** | 1 747 | 183 | 3 166 | 57 |
| **1963** | 1 260 | 0 | 540 | 0 | **2002** | 1 586 | 312 | 3 440 | 202 |
| **1964** | 980 | 0 | 420 | 0 | **2003** | 1 267 | 317 | 3 162 | 160 |
| **1965** | 1 750 | 0 | 750 | 0 | **2004** | 1 473 | 266 | 2 889 | 141 |
| **1966** | 2 220 | 0 | 1 480 | 0 | **2005** | 1 561 | 255 | 2 086 | 121 |
| **1967** | 1 920 | 0 | 1 280 | 0 | **2006** | 1 131 | 81 | 1 660 | 103 |
| **1968** | 1 740 | 0 | 1 160 | 0 | **2007** | 942 | 81 | 1 484 | 95 |
| **1969** | 1 740 | 0 | 1 160 | 0 | **2008** | 870† | 75† | 1 371† | 88† |
| **1970** | 1 740 | 0 | 1 160 | 0 | | | | | |

† Catch data for 2008 assumed to change from 2007 in the same proportion as the catch for *M. paradoxus* for both coast combined. The proportion for the trawl catches is calculated using data from the offshore hake catches.

**Table 2.** Abundance indices of kingklip in tons together with CVs obtained from surveys (separated by season) for the West and South coasts of South Africa. Values in bold denote abundance estimates obtained using the new rather than the old gear on *Africana*, while italicised values denote abundance estimates obtained from surveys carried out on the *Nansen*.

| Year | West coast | | | | South coast | | | |
|---|---|---|---|---|---|---|---|---|
| | Jan/Feb (summer) | | Jul/Aug (winter) | | Sep/Oct (spring) (0 – 200 m) | | May/Jun (autumn) (0 – 500 m) | |
| | Index | CV | Index | CV | Index | CV | Index | CV |
| **1986** | 3 749 | 0.159 | 2 917 | 0.156 | 4 800 | 0.229 | — | — |
| **1987** | 2 883 | 0.184 | 5 800 | 0.250 | 3 551 | 0.172 | — | — |
| **1988** | 6 154 | 0.199 | 1 651 | 0.266 | — | — | 6 373 | 0.450 |
| **1989** | — | — | 997 | 0.324 | — | — | — | — |
| **1990** | 3 885 | 0.258 | 1 443 | 0.397 | 1 258 | 0.357 | — | — |
| **1991** | 3 468 | 0.306 | — | — | 1 992 | 0.248 | 8 140 | 0.148 |
| **1992** | 8 731 | 0.190 | — | — | 2 001 | 0.217 | 4 415 | 0.372 |
| **1993** | 10 155 | 0.180 | — | — | 1 210 | 0.205 | 10 047 | 0.392 |
| **1994** | 8 208 | 0.183 | — | — | 1 319 | 0.276 | 30 494 | 0.596 |
| **1995** | 7 642 | 0.256 | — | — | 1 290 | 0.434 | 19 606 | 0.408 |
| **1996** | 12 724 | 0.282 | — | — | — | — | 3 714 | 0.176 |
| **1997** | 7 023 | 0.218 | — | — | — | — | 5 077 | 0.257 |
| **1998** | — | — | — | — | — | — | — | — |
| **1999** | 14 242 | 0.288 | — | — | — | — | 11 479 | 0.604 |
| **2000** | *14 983* | *0.415* | — | — | — | — | *12 807* | *0.256* |
| **2001** | *8 780* | *0.264* | — | — | 1 581 | 0.198 | — | — |
| **2002** | 12 763 | 0.159 | — | — | — | — | — | — |
| **2003** | 14 363 | 0.249 | — | — | **1 735** | **0.352** | 6 256 | 0.523 |
| **2004** | **7 460** | **0.180** | — | — | **530** | **0.334** | **3 598** | **0.555** |
| **2005** | **5 699** | **0.156** | — | — | — | — | **4 133** | **0.759** |
| **2006** | 9 485 | 0.359 | — | — | 1 966 | 0.433 | 2 213 | 0.378 |
| **2007** | **5 604** | **0.224** | — | — | **729** | **0.298** | **4 118** | **0.391** |
| **2008** | **5 429** | **0.121** | | | | | **3 395** | **0.211** |

**Table 3.** Standardised commercial CPUE indices of relative abundance for kingklip for the trawl and longline fishery for the South and West coasts of South Africa. These data have been obtained from Punt and Japp (1994).

| Year | West coast | | South coast | |
|---|---|---|---|---|
| | **Trawl** | **Longline** | **Trawl** | **Longline** |
| **1983** | 1.786 | | 1.294 | |
| **1984** | 2.147 | 2.253 | 1.230 | 2.276 |
| **1985** | 2.193 | 1.302 | 1.250 | 3.082 |
| **1986** | 1.829 | 1.394 | 1.190 | 3.113 |
| **1987** | 1.530 | 1.300 | 0.906 | 2.397 |
| **1988** | 1.420 | 1.294 | 0.826 | 2.202 |
| **1989** | 0.897 | 1.234 | 0.763 | 1.551 |
| **1990** | 0.720 | 1.000 | 0.520 | 1.000 |
| **1991** | 1.000 | | 1.000 | |

**Table 4.** Biological parameters values for kingklip for the West and South coasts of South Africa. Parameter values assumed for the trawl and the longline selectivity functions are also given. Note that for simplicity, maturity is assumed to be knife-edge in age. These values are as used by Punt and Japp (1994).

| Parameter | West coast | South coast | Coasts combined |
|---|---|---|---|
| Natural mortality $M$ ($yr^{-1}$) | 0.2 | 0.2 | 0.2 |
| Von Bertalanffy growth | | | |
| $L_\infty$ (cm) | 129.2 | 136.0 | 132.6 |
| $\kappa$ ($yr^{-1}$) | 0.141 | 0.142 | 0.142 |
| $t_0$ (yr) | -0.32 | 0.22 | 0.05 |
| Weight (in gm) length relationship | | | |
| $e$ ($g.cm^{-1}$) | 0.00083 | 0.00162 | 0.00132 |
| $f$ | 3.41 | 3.26 | 3.31 |
| Age of “plus group” (yr) | 30 | 30 | 30 |
| Age at maturity (yr) | 5 | 5 | 5 |
| Steepness parameter ($h$) | 0.5 | 0.5 | 0.5 |
| Selectivity parameters | | | |
| $a_{50}^L$ (years) | 5.5 | 5.5 | 5.5 |
| $a_{50}^T$ (years) | 2.5 | 2.5 | 2.5 |
| $\delta^L$ (years) | 0.333 | 0.333 | 0.333 |
| $\delta^T$ (years) | 0.167 | 0.167 | 0.167 |
| $\gamma$ ($year^{-1}$) | 0.07 | 0.07 | 0.07 |

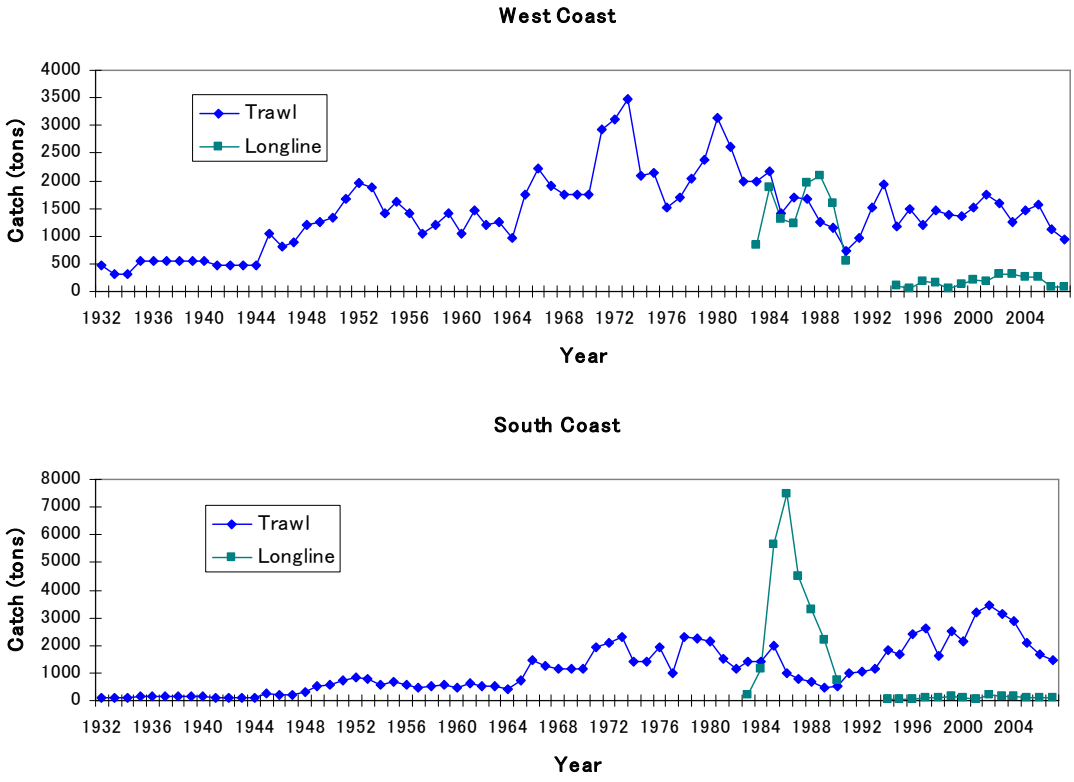


**Figure 1.** Historical catches of kingklip in the West and South coasts of South Africa separated by gear type (i.e. trawl or longline).

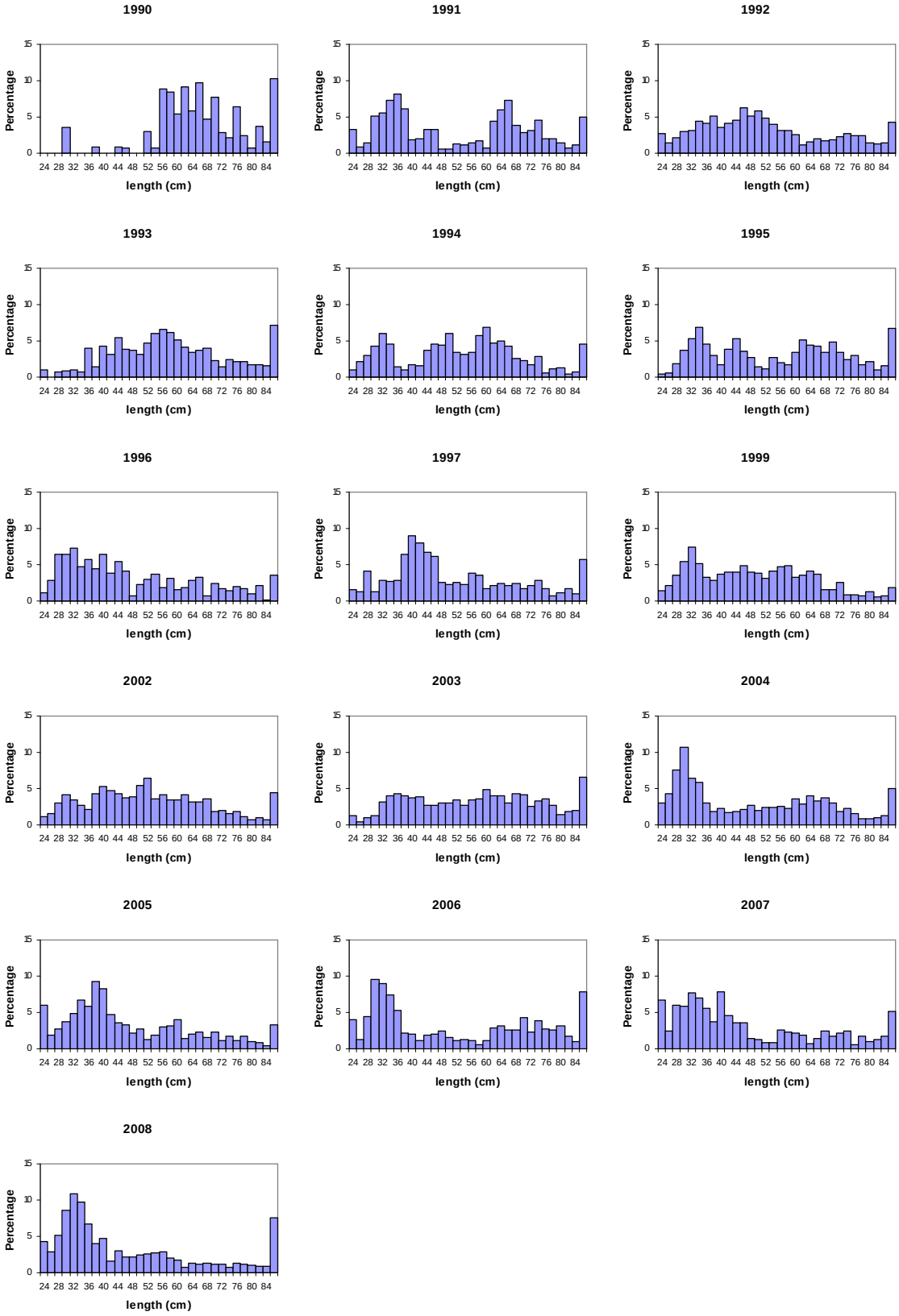


**Figure 2.** Observed annual catch-at-length proportions for the West Coast summer surveys. Note that lengths below 24 and above 86 cm are combined into minus- and plus-groups.

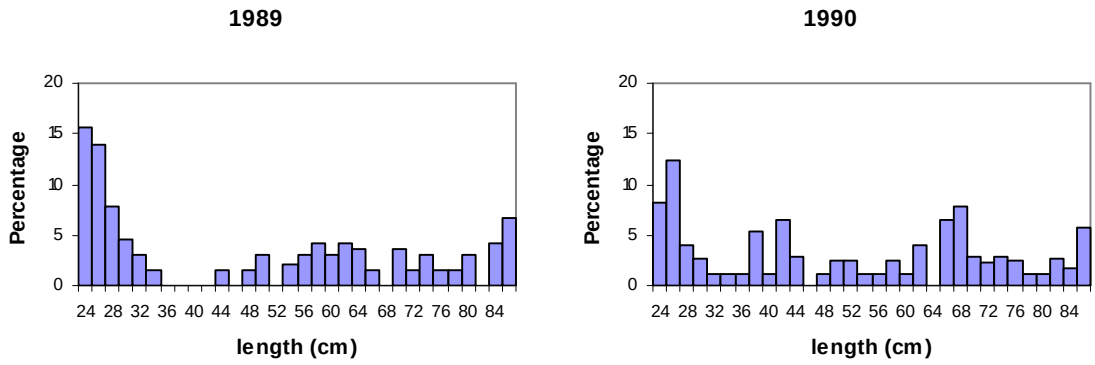


**Figure 3.** Observed annual catch-at-length proportions for the West Coast winter surveys. Note that lengths below 24 and above 86 cm are combined into minus- and plus-groups.

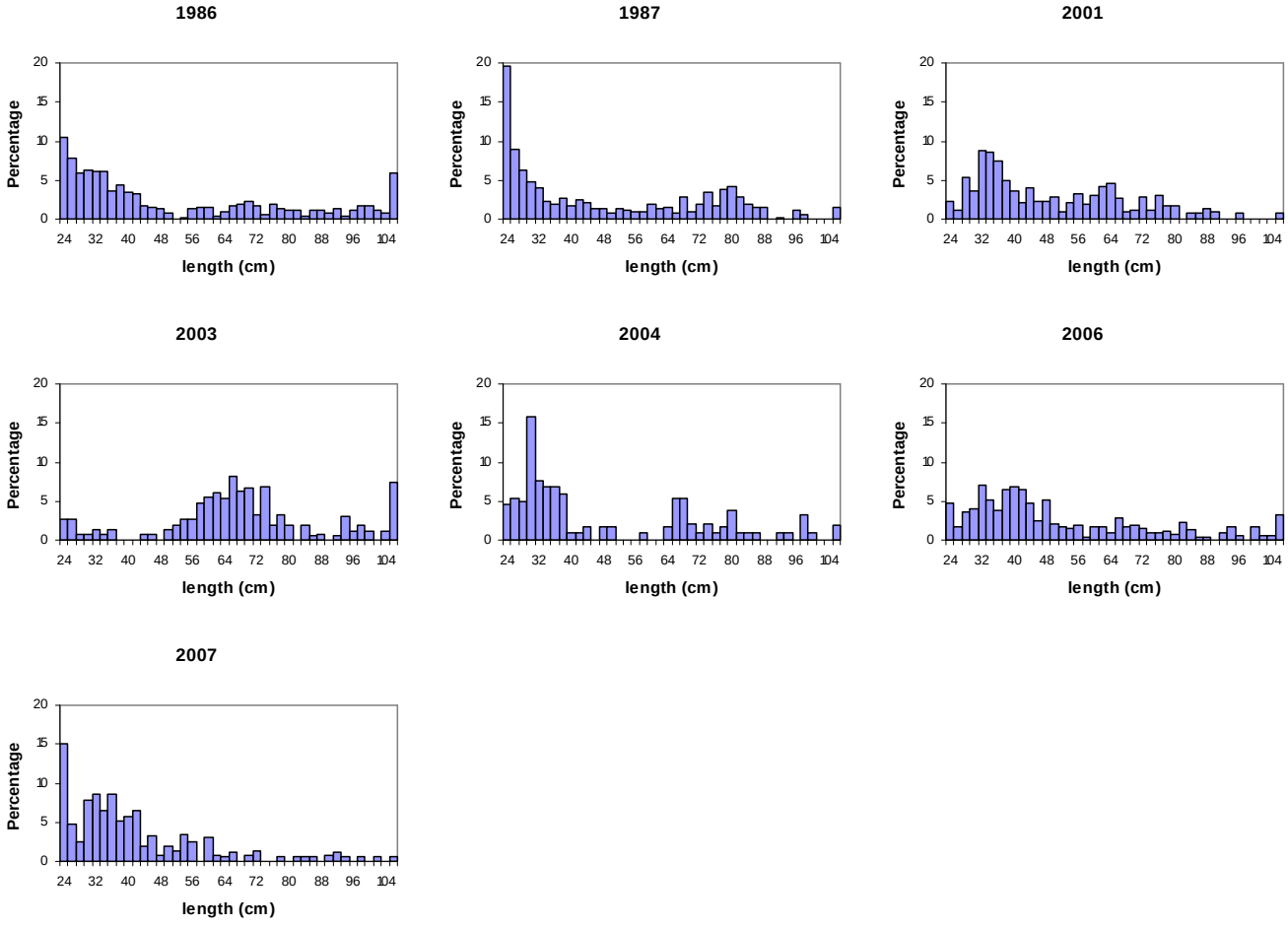


**Figure 4.** Observed annual catch-at-length proportions for the South Coast spring surveys. Note that lengths below 24 and above 106 cm are combined into minus- and plus-groups.

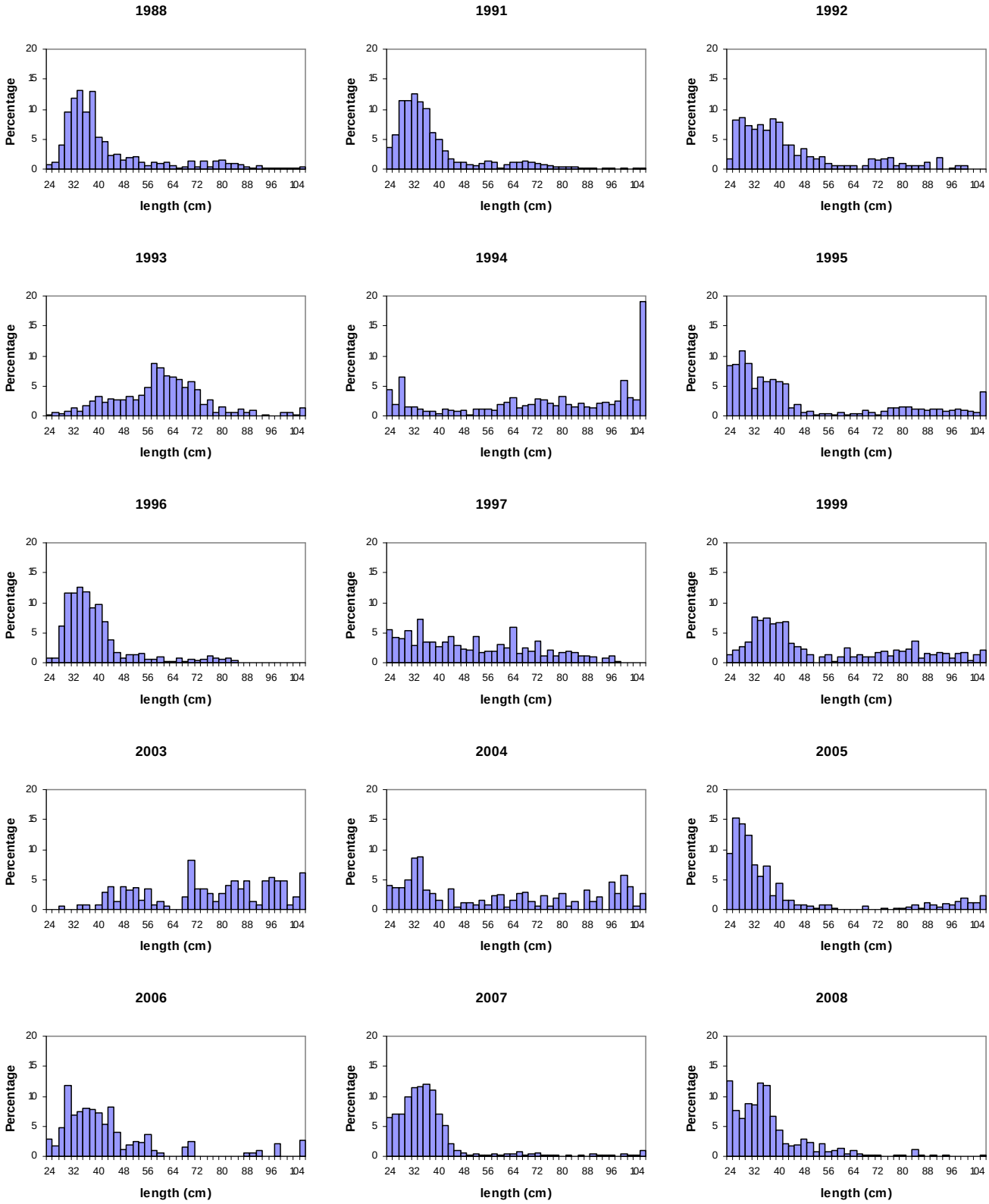


**Figure 5.** Observed annual catch-at-length proportions for the South Coast autumn surveys. Note that lengths below 24 and above 106 cm are combined into minus- and plus-groups.