Coleraine fit to the current SSO 4 input data

Arni Magnusson, 4 June 2002

Introduction

This year's assessment of smooth oreo on the Chatham Rise (SSO 4) is going to be based on considerably more complex models than in the past. Observer length frequencies are going to be used for the first time (Magnusson 2002) and the available maturity data have been reanalyzed (Hicks et al. 2002). NIWA and SeaFIC have been developing models that are in many ways comparable, being statistical catch-at-age models fitted to length data, but NIWA is going to explore the spatial aspects of the fishery, while SeaFIC is going to estimate the von Bertalanffy growth parameters inside the Coleraine model. The purpose of estimating the growth parameters is to incorporate the uncertainty around these estimates, instead of assuming they are known without error.

The results presented below are preliminary, as data are still being processed and alternative methods explored.

Data and methods

The current input data for the Coleraine model are annual landings (Table 1), standardized CPUE index of abundance (Table 2), acoustic survey index of abundance (Table 3), proportional catch at length in the commercial catch (Magnusson 2002), length at age (Allan Hicks email 24 Apr 2002) and the maturity ogive presented by Hicks et al. (2002). All of these datasets are subject to revision, especially the acoustic survey data and proportional catch at length which has not been stratified yet. The reasoning for not using the trawl survey data was explained in the 2001 plenary report (Annala et al. 2001, p. 317).

The model starts in 1979, the highest age is 80 and length bins are 1 cm wide. Fifteen parameters are estimated, of which 10 are reparametrised von Bertalanffy parameters:

R_0	Average recruitment in unfished population
S_{full}	Age at full selectivity by commercial gear
S_{left}	Left shape parameter of selectivity by commercial gear
q_1	Catchability coefficient of preGPS CPUE
q_2	Catchability coefficient of postGPS CPUE

L_{1F}	L_{1M}	Length at age 1 (females and males)
L_{80F}	L_{80M}	Length at age 80
K_F	K_M	Von Bertalanffy Growth coefficient
CV_{1F}	CV_{1M}	Coefficient of length variation at age 1
CV_{ratioF}	CV_{ratioM}	Coefficient of length variation at age 80, as a ratio of CV_1

The purpose of the von Bertalanffy reparametrisation is to improve the model convergence, following the suggestion of Smith et al. (2001).

The fixed parameters are:

h	= 0.75	Beverton-Holt Recruitment function steepness
M	= 0.063	Natural mortality
A_{full}	= 1	Age at full selectivity by acoustic survey, i.e. all fish are fully selected
qA	= 1	Catchability coefficient of acoustic survey, i.e. absolute estimate
a_F	= 0.029	Weight-at-length linear coefficient for females
a_M	= 0.032	Weight-at-length linear coefficient for males
b_F	= 2.90	Weight-at-length exponential coefficient for females
b_M	= 2.87	Weight-at-length exponential coefficient for males

Since no recruitment deviances are estimated, recruitment is determined by the Beverton-Holt function. The objective function is a product of four likelihood components, describing the model fit to the data:

CPUE abundance indices	(lognormal error)
Acoustic abundance index	(lognormal error)
Proportional catch at length	(robust multinomial error)
Length at age	(lognormal error)

Preliminary results

The parameter estimates at the best fit are:

R_0	31500
S_{full}	25.5
S_{left}	3.42
q_1	8.61×10^{-6}
q_2	10.88×10^{-6}
$L_{\infty F}$	43.0
K_F	0.0740
t_{0F}	–0.977
$L_{\infty M}$	38.8
K_M	0.0946
t_{0M}	–0.453

The model fit to the data is graphed in Figures 1–5 and Figure 6 shows the spawning biomass trajectory.

References

Annala, J.H., K.J. Sullivan, C.J. O'Brien, and N.W.M. Smith (eds.) 2001. Report from the Fishery Assessment Plenary, April 2001: Stock assessments and yield estimates. Wellington: Ministry of Fisheries.

Hicks, A., I. Doonan, and P. McMillan. Analysis of the maturity of smooth oreo. Presented to the Deepwater Working Group on 28 May 2002, #02/46.

Magnusson, A. 2002. Observer length frequency data used in the 2002 assessment of smooth oreo on the Chatham Rise (SSO4). Presented to the Deepwater Working Group on 28 May 2002, #02/45.

Smith, A.D.M., A.E. Punt, S.E. Wayte, P.J. Starr, R.I.C.C. Francis, T.K. Stokes, R. Hilborn, and A. Langley. 2001. Stock Assessment of the Northeast Chatham Rise Orange Roughy for 2001 New Zealand Fisheries Assessment Report 2001/xx.

Appendix I: Tables

Table 1. Landed smooth oreo catch from the Chatham rise fishery (Peter McMillan email 13 March 2002).

Year	Catch (t)
1979	1348
1980	114
1981	1436
1982	3465
1983	3757
1984	5817
1985	4736
1986	4922
1987	5670
1988	7771
1989	7225
1990	6788
1991	6028
1992	5504
1993	5918
1994	6287
1995	6961
1996	6364
1997	6339
1998	6159
1999	6025
2000	6366
2001	6479

Table 2. Standardized CPUE index of abundance. The preGPS series is taken from the 2001 plenary report and the postGPS series is from Allan Hicks's 8 May 2002 email.

Series	Year	Index	CV
preGPS	1982	1.66	0.274
"	1983	1.61	0.229
"	1984	1.24	0.400
"	1985	1.00	0.287
"	1986	1.19	0.348
"	1987	1.17	0.552
"	1988	1.05	0.598
"	1989	0.81	0.285
postGPS	1993	0.95	0.610
"	1995	1.16	0.240
"	1996	0.69	0.680
"	1997	1.00	0.390
"	1998	0.82	1.000
"	1999	0.87	0.220
"	2000	1.10	0.410
"	2001	1.04	0.190

Table 3. Acoustic survey index of abundance (Paul Starr 28 May 2002 email).

Year	Index	CV
1998	220000	0.35
2001	230000	0.23

Appendix II: Graphs

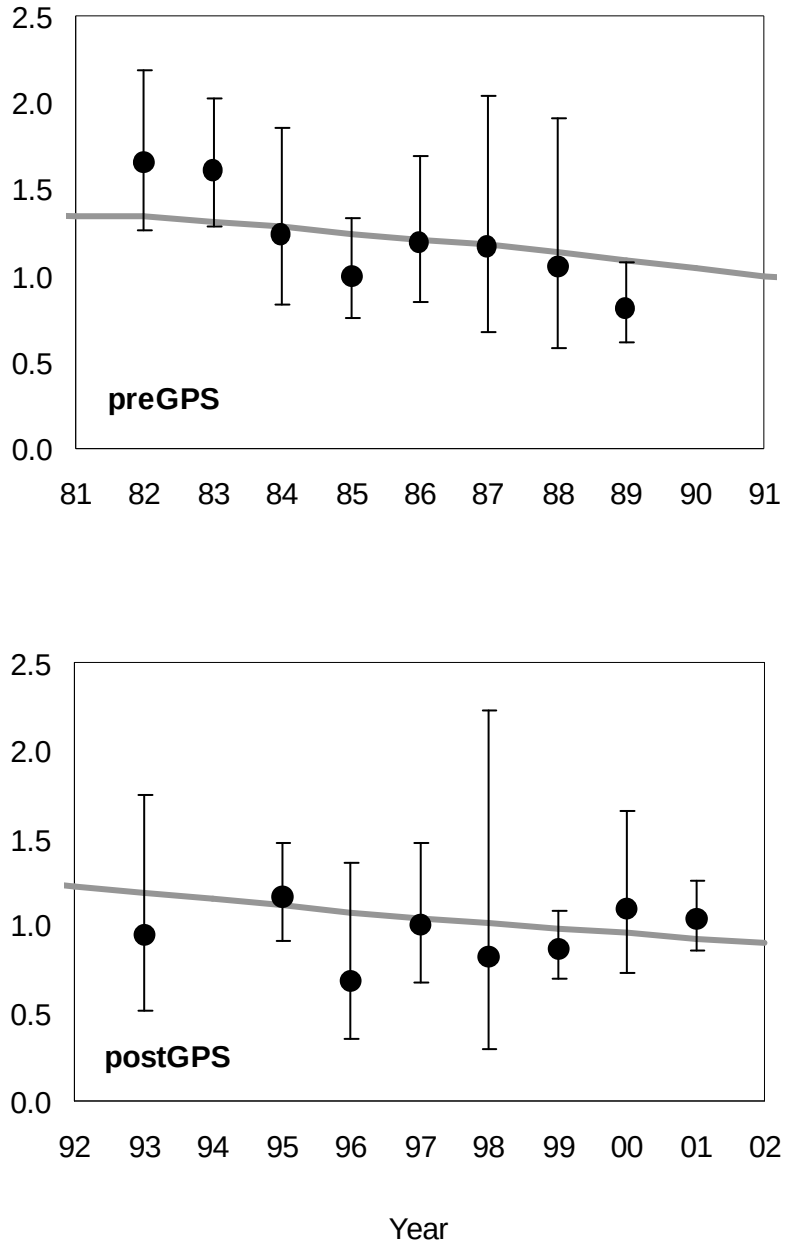


Figure 1. Model fit to CPUE abundance indices.

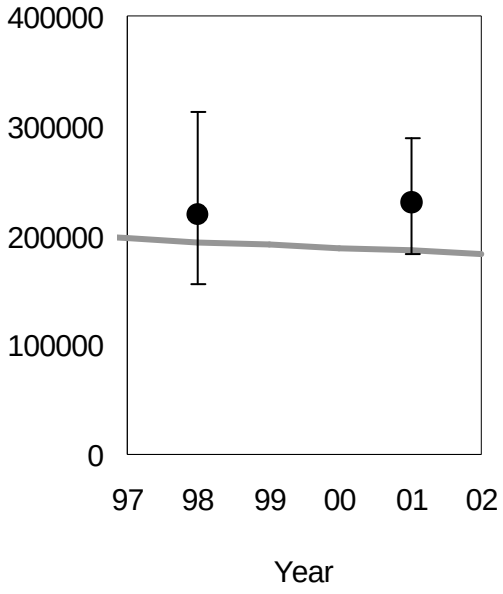


Figure 2. Model fit to acoustic survey biomass indices.

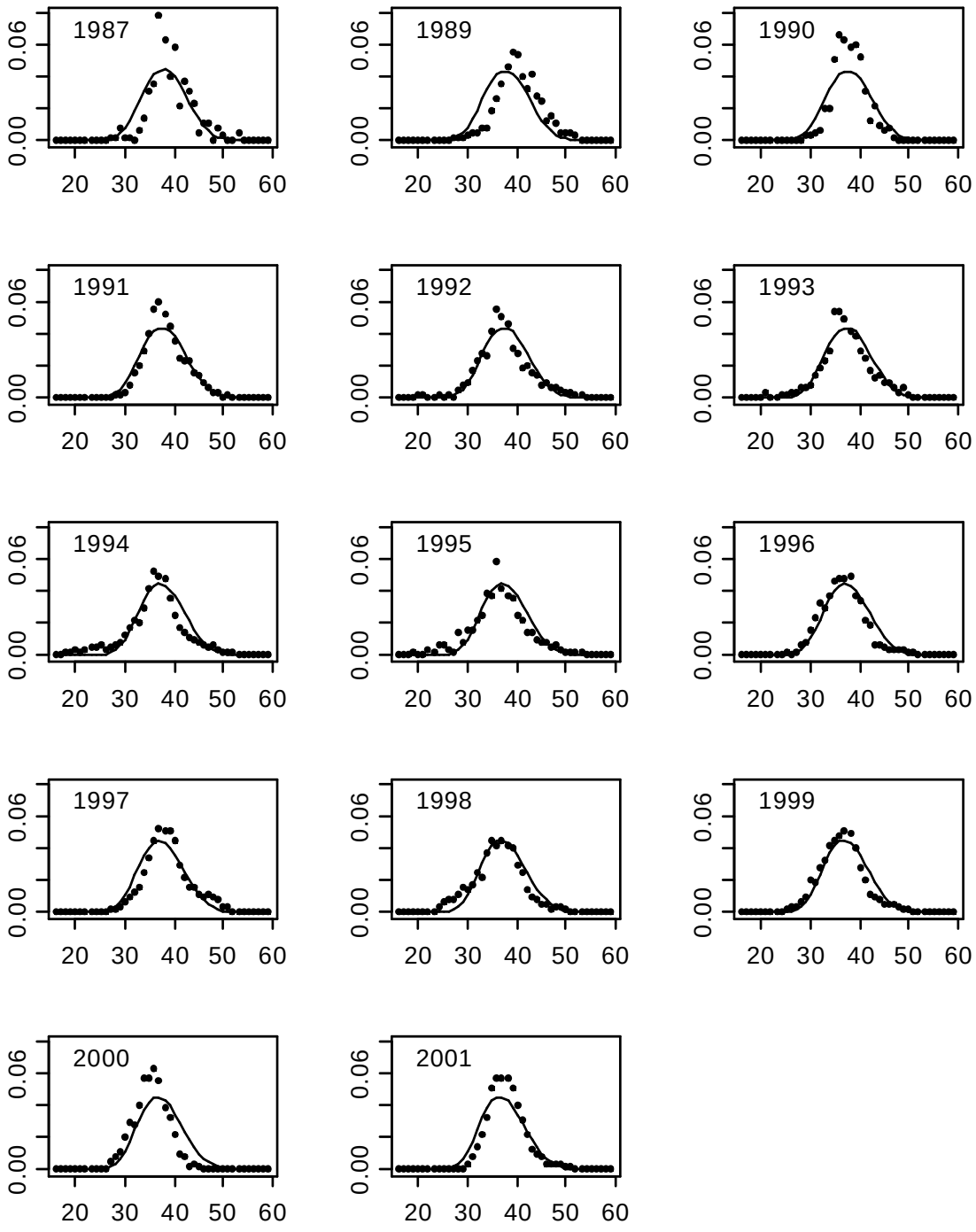


Figure 3. Model fit to female catch-at-length data. The X-axis is length (cm) and the Y-axis is proportion in commercial catch.

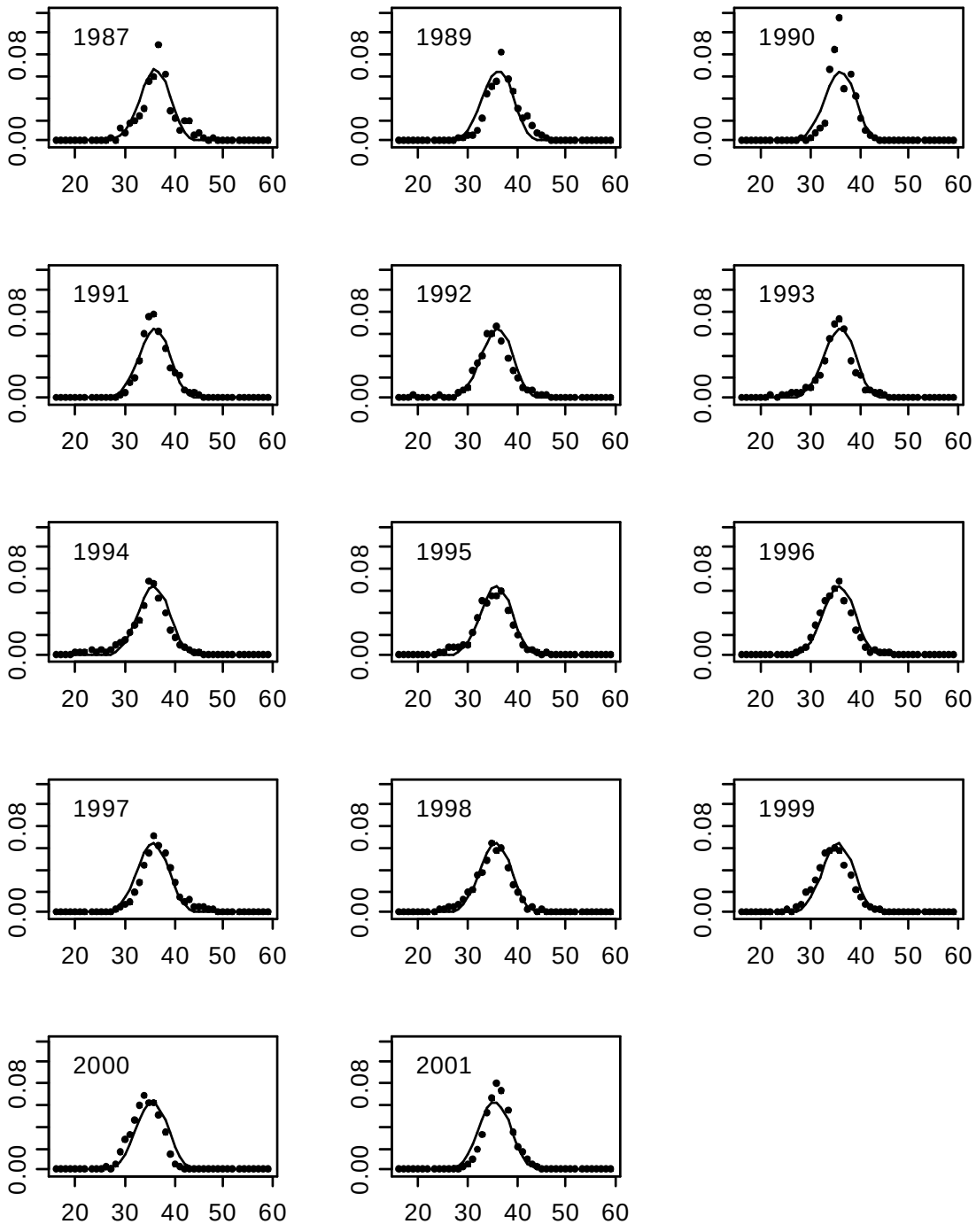


Figure 4. Model fit to male catch-at-length data. The X-axis is length (cm) and the Y-axis is proportion in commercial catch.

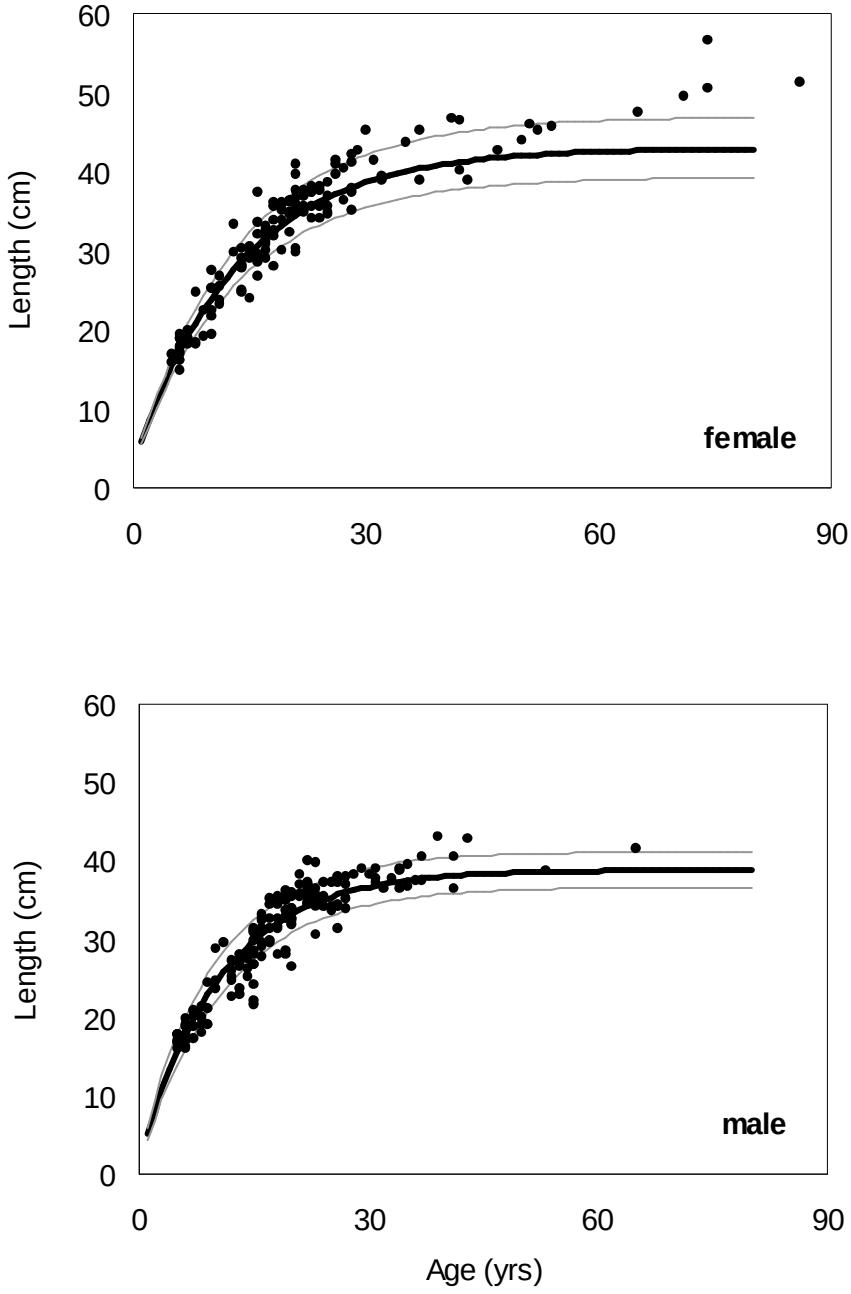


Figure 5. Model fit to length-at-age data.

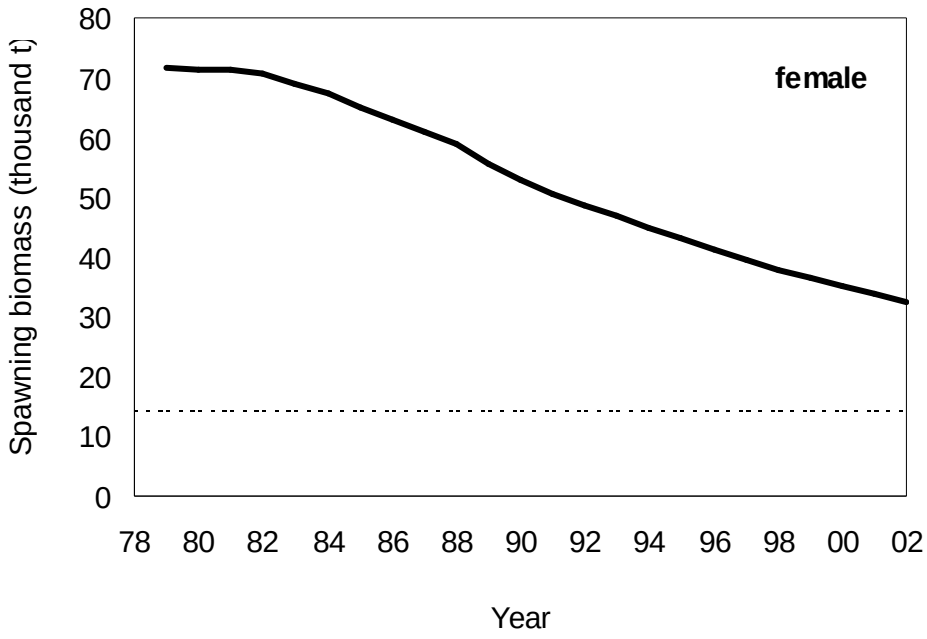


Figure 6. Female spawning biomass trajectory. The dotted line shows 20% of virgin spawning biomass.

Observer length frequency data used in the 2002 assessment of smooth oreo on the Chatham Rise (SSO4)

Arni Magnusson, 2 May 2002

Introduction

The last assessment of smooth oreo on the Chatham Rise (SSO4) was based on a stock reduction analysis (Doonan et al. 2001), which does not incorporate length frequency data. The statistical catch-at-length models developed by NIWA and SeaFIC in 2002 do incorporate these data and the analysis presented here summarizes the observer length frequency dataset used by both the NIWA and SeaFIC models. The role of these sex-specific data is to give information about the fishing selectivity and long-term trends in mean length.

Data and Methods

The data were queried directly from the *obs_lfs* Marine Research Database by Allan Hicks at NIWA and processed by Arni Magnusson at SeaFIC. Tows sampled from the northern slopes of the Chatham Rise (north of 44°S) were excluded, to ensure consistency with survey data used in stock assessment. Some tows did not distinguish between the sexes and were thus excluded.

The sample weight from the database was replaced with estimates using the weight-at-length parameters from the 2001 Plenary Report (Annala et al. 2001) and then each sample was expanded to represent the total catch from that tow. All references to years are fishing years, starting on 1 October in the preceding calendar year. Mean length was calculated as the mid-point between the mean length of males and the mean length of females within a given stratum.

Dataset Outline

Table 1. Outline of the observer length frequency data used in the 2002 assessment of smooth oreo on the Chatham Rise (SSO4). The fishing year starts on 1 October in the preceding year and length is in centimetres.

Fishing year	Trips sampled	Tows sampled	Mean length
1987	2	4	37.71
1988	0	0	-
1989	4	16	37.84
1990	2	4	37.62
1991	6	46	36.73
1992	3	59	37.29
1993	5	29	36.44
1994	10	98	36.24
1995	11	71	36.51
1996	5	32	35.92
1997	4	42	37.87
1998	4	40	35.19
1999	4	58	35.46
2000	4	32	34.54
2001	7	87	37.52

A total of 618 tows were sampled from the fishing year 1987 to 2001 and the average number of fish sampled from each tow is 109. The target species was orange roughy for 455 tows and oreos for the other 189 tows, primarily smooth oreo. The sex ratio is not significantly biased, with the average proportion of females in each sample being 50.2%, and shows no long-term trend.

Spatial and Temporal Distribution of Sampled Tows

There is some variation of the tow locations between years (Fig. 1) as can be expected in a commercial fishery. During the first few years, the sampled tows shift eastward and the tow depth decreases at the same time (Fig. 2).

Many tows are sampled in October and November (Fig. 3), as the spawning period and fishing year start, but this pattern fluctuates between years. In 2001, for example, more tows were sampled in February than any other month.

Trends in Mean Length

The mean length of each sex, after samples have been expanded to represent the whole catch from each tow, is 37.09 cm for females and 35.40 for males (Fig. 4 shows the distribution of mean length where all tows are weighted equally). Other trends in mean length apply to both sexes, so mean length refers to the mid-point between the sexes in the rest of this section.

Mean length shows a downward trend over time (Fig. 5, Table 2), but large mean lengths are still observed in the later years, such as 1997 and 2001. Within years, the mean length of sampled fish is slightly larger in the summer than in the winter (Fig. 6).

Table 2. Mean length (in cm) by sex and fishing year.

Fishing	Mean length (cm)	
Year	Female	Male
1987	39.26	36.76
1989	40.26	37.13
1990	37.92	36.25
1991	38.21	36.13
1992	37.33	35.25
1993	37.11	35.11
1994	36.22	34.78
1995	36.46	34.93
1996	36.63	35.21
1997	38.70	36.71
1998	36.00	34.88
1999	36.35	34.57
2000	35.23	34.17
2001	37.85	36.26

A positive relationship between mean length and tow depth (Fig. 7) is statistically significant, although it explains little of the total variability (linear regression $p<0.001$, $R^2=0.06$).

NIWA staff have chosen the split point 178°40'W within management area 4 for use in their spatially explicit stock assessment model of Chatham Rise smooth oreo (A. Hicks, pers. comm.) Fish in the eastern part are larger (Fig. 8) and mean length has declined in the western region (linear regression $p<0.001$), but not in the eastern region (Fig.9, linear regression $p=0.843$).

References

Annala, J.H., K.J. Sullivan, C.J. O'Brien, and N.W.M. Smith (eds.) 2001. Report from the Fishery Assessment Plenary, April 2001: Stock assessments and yield estimates. Wellington: Ministry of Fisheries.

Doonan, I.J., P.J. McMillan, R.P. Coburn, and A.C. Hart. 2001. Assessment of OEO 4 smooth oreo for 2000–01. N.Z. Fish. Assmt. Rep. 2001/21.

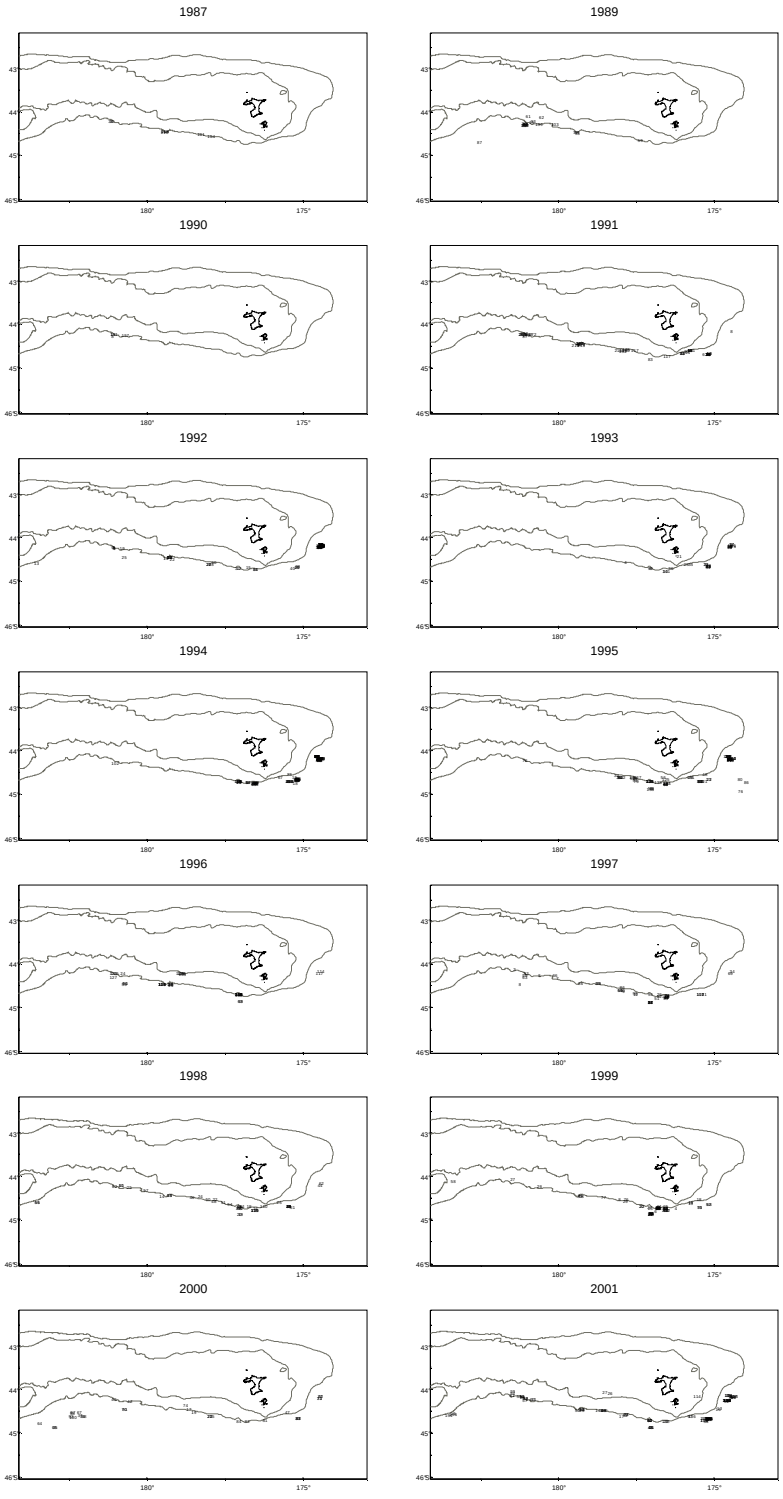


Figure 1. Geographical locations of sampled tows in each fishing year. Text labels show the tow locations, solid lines are the Chatham Islands and the dotted lines are 500 and 1000 m contour lines.

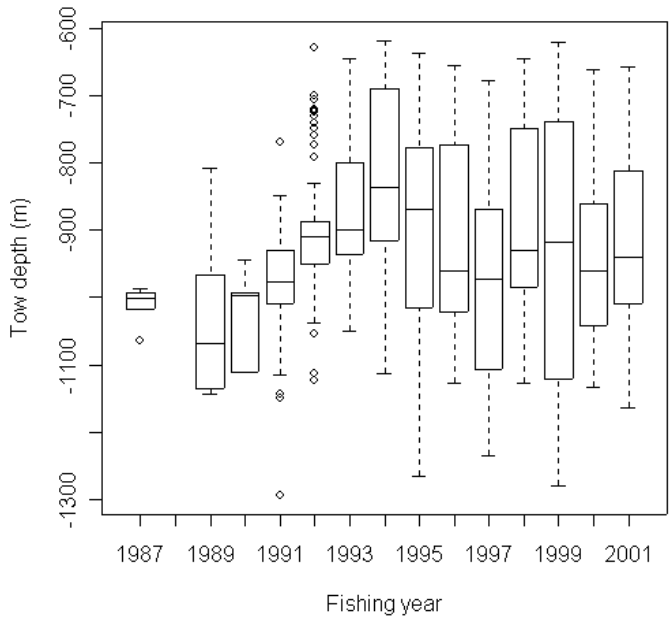


Figure 2. Gear depth of sampled tows.

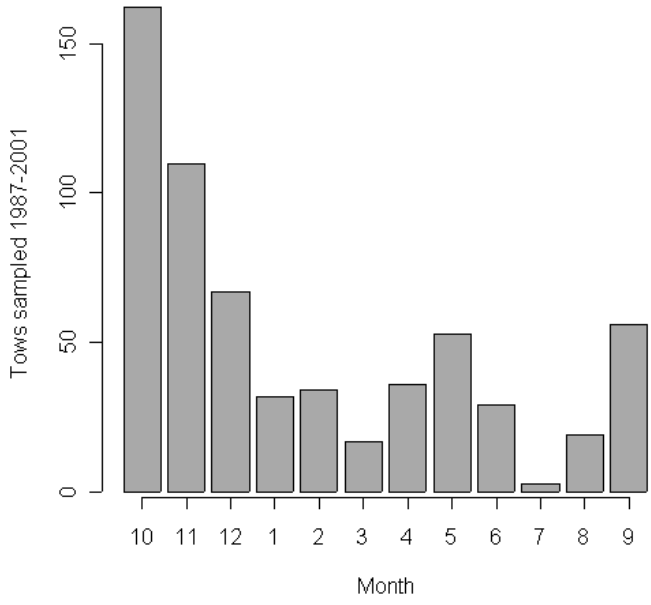


Figure 3. Number of tows sampled in each month (fishing year order).

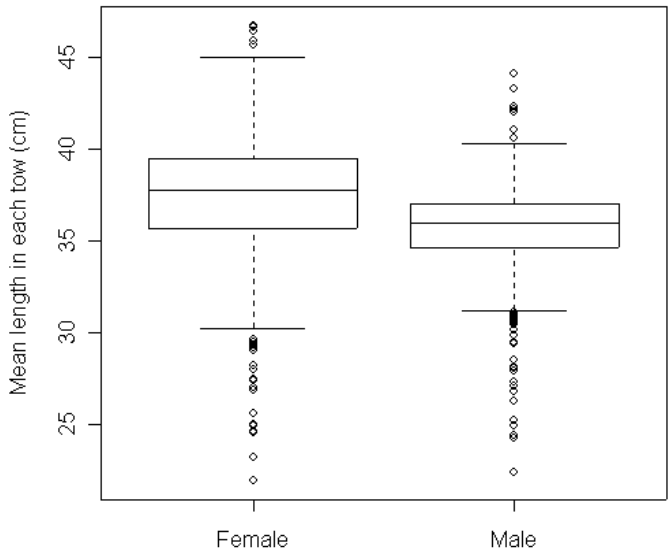


Figure 4. Mean length by sex.

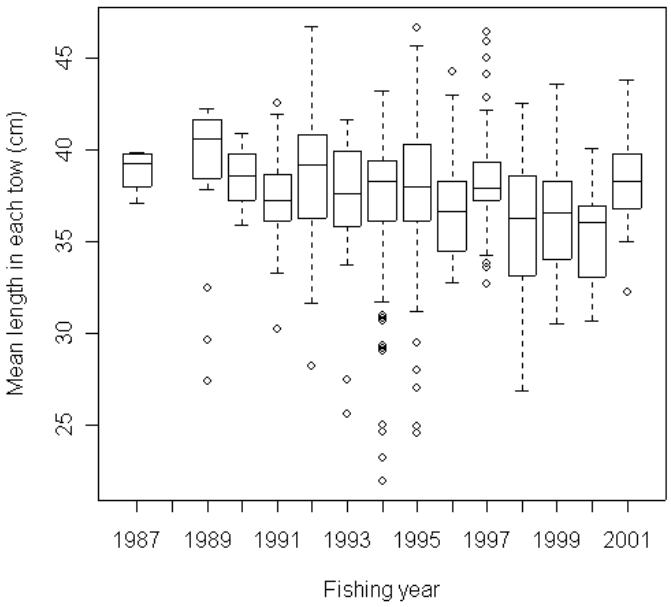


Figure 5. Mean length by fishing year.

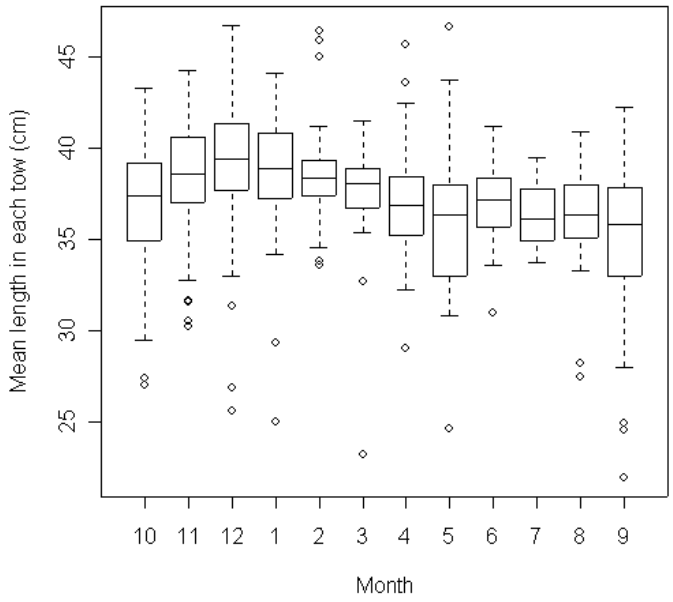


Figure 6. Mean length by month (fishing year order).

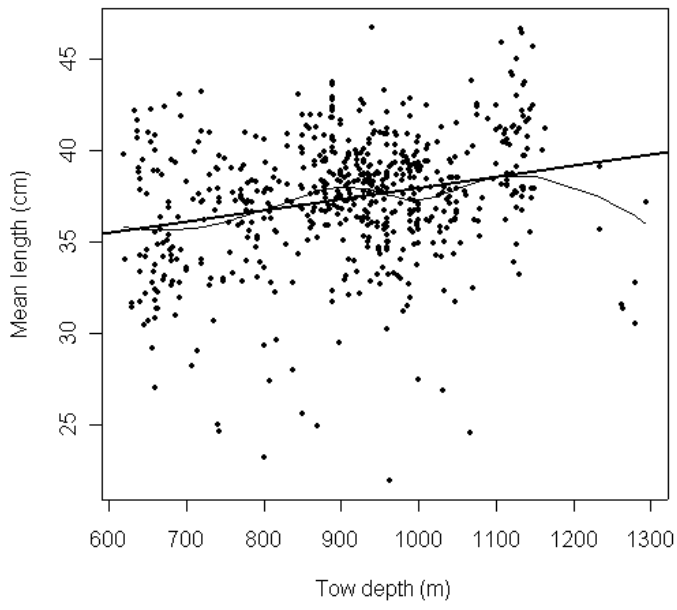


Figure 7. Relationship between mean length and tow depth. Linear and local regression lines are overlaid.

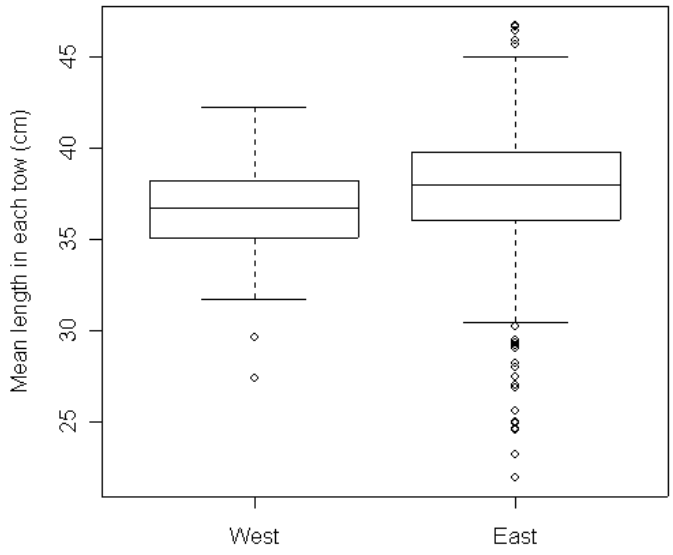


Figure 8. Mean length stratified by two regions within management area 4. Longitude 178°40'W marks the division line.

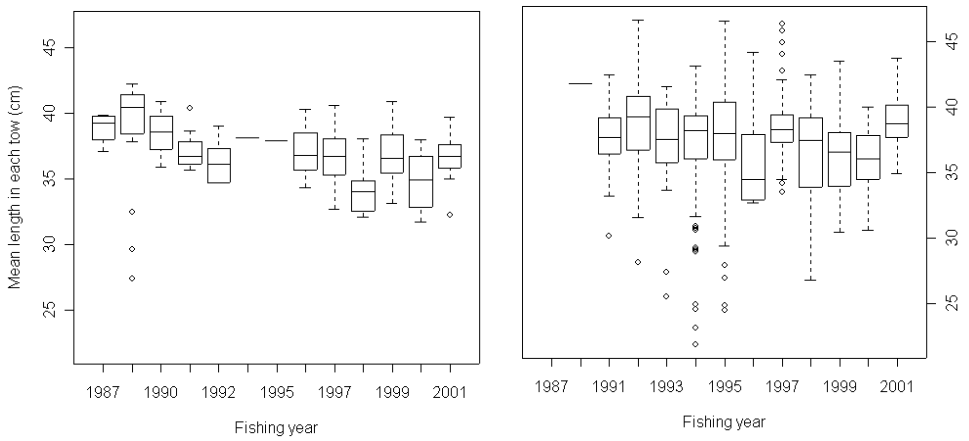
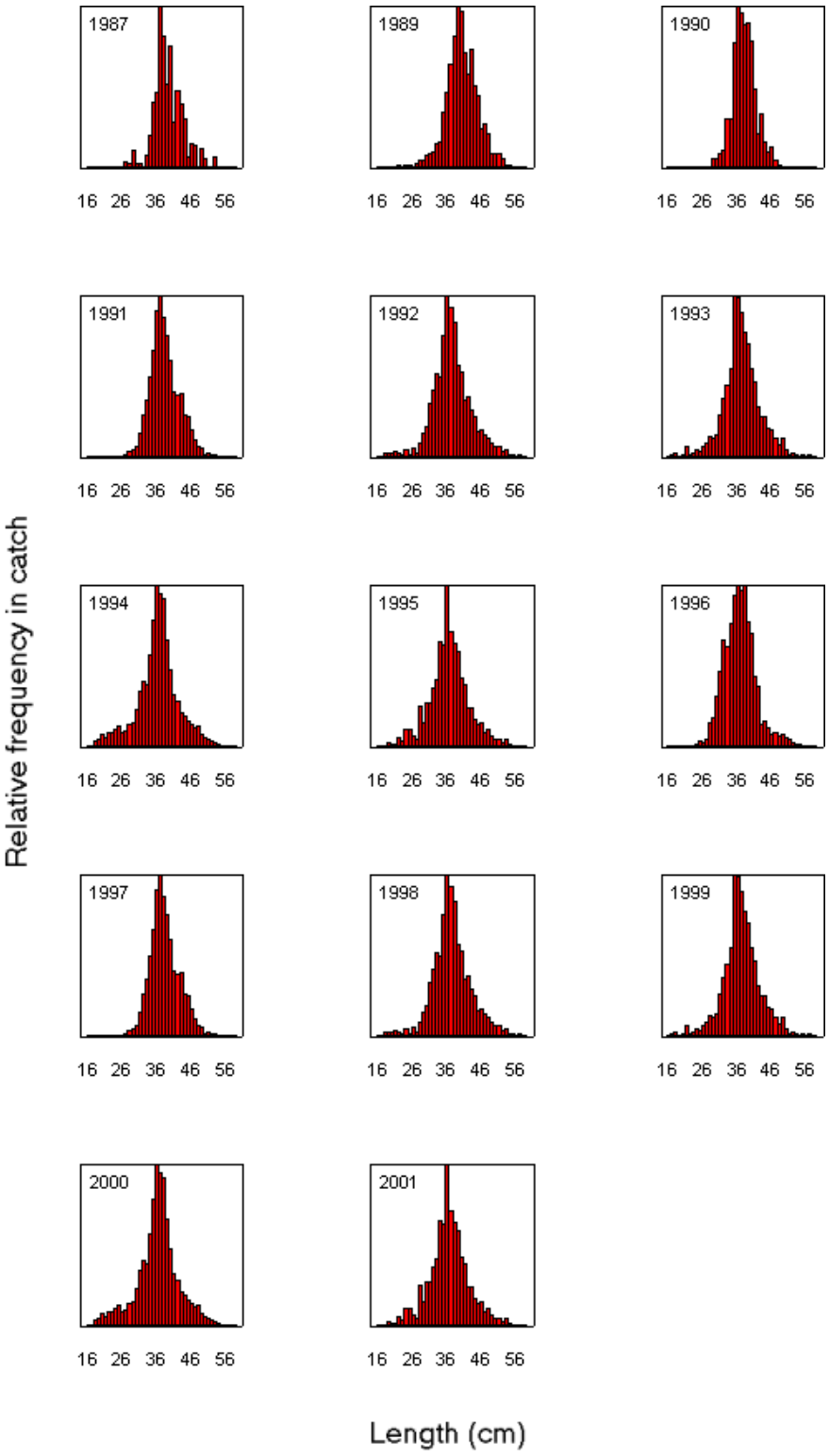


Figure 9. Mean length by fishing year in each region. West is on the left and East is on the right.

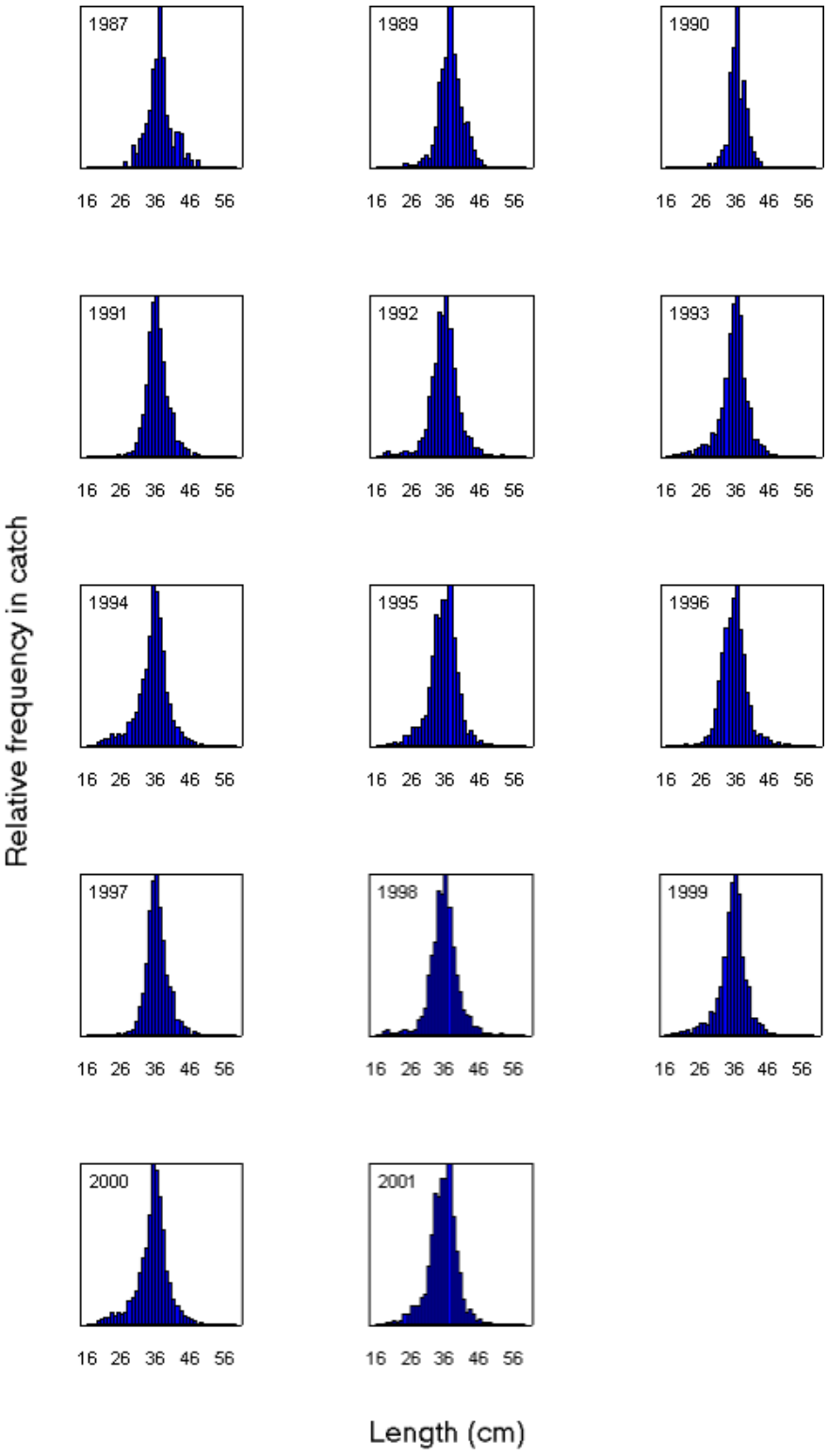
Appendix 1: Female catch-at-length histograms



Appendix 2: Female catch-at-length relative frequency distribution

Length	1987	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.002	0.002	0.004	0.000	0.001	0.000	0.001	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.002	0.000	0.004	0.003	0.000	0.001	0.001	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.003	0.001	0.008	0.001	0.000	0.000	0.003	0.000	0.002	0.000
21	0.000	0.000	0.000	0.000	0.003	0.006	0.006	0.002	0.000	0.001	0.002	0.000	0.000	0.000
22	0.000	0.001	0.000	0.000	0.002	0.001	0.008	0.006	0.000	0.000	0.003	0.001	0.000	0.000
23	0.000	0.001	0.000	0.000	0.002	0.002	0.009	0.004	0.000	0.000	0.002	0.001	0.000	0.001
24	0.000	0.001	0.000	0.000	0.005	0.004	0.011	0.012	0.001	0.000	0.007	0.001	0.000	0.000
25	0.000	0.001	0.000	0.000	0.002	0.003	0.013	0.012	0.003	0.000	0.013	0.003	0.001	0.001
26	0.000	0.001	0.000	0.001	0.005	0.006	0.009	0.007	0.002	0.002	0.016	0.007	0.002	0.001
27	0.006	0.003	0.000	0.002	0.002	0.009	0.010	0.005	0.005	0.004	0.017	0.008	0.011	0.001
28	0.003	0.005	0.000	0.004	0.009	0.014	0.014	0.029	0.014	0.004	0.023	0.014	0.017	0.002
29	0.016	0.005	0.007	0.005	0.016	0.012	0.015	0.017	0.017	0.007	0.031	0.020	0.022	0.002
30	0.003	0.009	0.007	0.007	0.020	0.015	0.024	0.032	0.030	0.014	0.029	0.040	0.041	0.007
31	0.003	0.009	0.011	0.017	0.036	0.028	0.035	0.031	0.045	0.018	0.035	0.037	0.058	0.017
32	0.000	0.011	0.013	0.031	0.045	0.039	0.043	0.042	0.064	0.025	0.048	0.057	0.056	0.027
33	0.012	0.016	0.040	0.042	0.056	0.048	0.040	0.049	0.060	0.031	0.044	0.064	0.080	0.044
34	0.030	0.017	0.040	0.060	0.054	0.059	0.059	0.077	0.074	0.050	0.073	0.084	0.114	0.064
35	0.062	0.038	0.101	0.079	0.082	0.108	0.082	0.074	0.091	0.069	0.089	0.088	0.114	0.102
36	0.072	0.052	0.131	0.109	0.109	0.107	0.105	0.117	0.096	0.089	0.083	0.095	0.126	0.112
37	0.156	0.072	0.125	0.120	0.101	0.097	0.100	0.083	0.094	0.105	0.090	0.100	0.111	0.113
38	0.127	0.091	0.116	0.104	0.092	0.083	0.096	0.075	0.097	0.102	0.084	0.098	0.077	0.113
39	0.080	0.112	0.118	0.090	0.062	0.076	0.070	0.069	0.075	0.102	0.081	0.080	0.064	0.102
40	0.116	0.108	0.103	0.072	0.057	0.060	0.050	0.050	0.068	0.088	0.058	0.055	0.043	0.081
41	0.043	0.079	0.063	0.048	0.038	0.050	0.033	0.045	0.042	0.059	0.050	0.040	0.018	0.061
42	0.075	0.064	0.027	0.046	0.040	0.033	0.029	0.028	0.036	0.045	0.029	0.021	0.018	0.045
43	0.061	0.082	0.043	0.047	0.031	0.026	0.022	0.028	0.013	0.032	0.021	0.018	0.005	0.027
44	0.047	0.057	0.020	0.031	0.027	0.027	0.020	0.019	0.015	0.030	0.017	0.016	0.008	0.018
45	0.010	0.049	0.012	0.030	0.017	0.019	0.017	0.016	0.011	0.024	0.012	0.011	0.005	0.017
46	0.023	0.027	0.016	0.020	0.018	0.018	0.014	0.017	0.007	0.021	0.011	0.010	0.002	0.008
47	0.021	0.030	0.006	0.013	0.015	0.013	0.012	0.009	0.008	0.021	0.005	0.010	0.001	0.008
48	0.000	0.023	0.002	0.008	0.013	0.008	0.013	0.012	0.006	0.020	0.009	0.006	0.001	0.008
49	0.018	0.010	0.000	0.007	0.010	0.012	0.007	0.007	0.007	0.016	0.009	0.004	0.000	0.006
50	0.008	0.009	0.000	0.001	0.007	0.004	0.005	0.004	0.006	0.008	0.003	0.004	0.001	0.004
51	0.000	0.009	0.000	0.003	0.006	0.001	0.004	0.004	0.004	0.007	0.001	0.003	0.000	0.003
52	0.000	0.006	0.000	0.001	0.003	0.002	0.004	0.003	0.003	0.002	0.000	0.002	0.000	0.001
53	0.010	0.002	0.000	0.001	0.004	0.001	0.002	0.005	0.002	0.002	0.001	0.001	0.000	0.001
54	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001
55	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.000
56	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
57	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
59	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 3: Male catch-at-length histograms



Appendix 4: Male catch-at-length relative frequency distributions

Length	1987	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.005	0.002	0.003	0.002	0.000	0.000	0.001	0.000	0.001	0.000
20	0.000	0.000	0.000	0.000	0.002	0.003	0.004	0.001	0.000	0.001	0.002	0.000	0.001	0.000
21	0.000	0.001	0.000	0.001	0.002	0.003	0.006	0.002	0.001	0.000	0.003	0.000	0.001	0.000
22	0.000	0.001	0.000	0.001	0.002	0.005	0.005	0.002	0.000	0.001	0.001	0.001	0.000	0.000
23	0.000	0.000	0.000	0.000	0.002	0.002	0.009	0.003	0.001	0.000	0.002	0.001	0.001	0.000
24	0.000	0.003	0.000	0.000	0.005	0.007	0.008	0.008	0.002	0.001	0.006	0.001	0.000	0.002
25	0.000	0.001	0.000	0.002	0.003	0.008	0.010	0.008	0.001	0.001	0.007	0.006	0.001	0.000
26	0.000	0.002	0.000	0.001	0.003	0.010	0.008	0.014	0.003	0.002	0.011	0.004	0.006	0.001
27	0.007	0.002	0.000	0.002	0.004	0.011	0.009	0.014	0.007	0.002	0.010	0.012	0.003	0.002
28	0.000	0.005	0.005	0.003	0.013	0.009	0.019	0.014	0.009	0.005	0.017	0.016	0.012	0.003
29	0.024	0.008	0.000	0.005	0.016	0.021	0.023	0.020	0.015	0.010	0.024	0.037	0.034	0.005
30	0.015	0.012	0.005	0.013	0.022	0.019	0.028	0.022	0.032	0.016	0.039	0.044	0.058	0.010
31	0.032	0.010	0.015	0.027	0.051	0.034	0.043	0.044	0.056	0.022	0.042	0.059	0.067	0.019
32	0.037	0.022	0.023	0.040	0.067	0.045	0.057	0.068	0.081	0.040	0.072	0.084	0.090	0.039
33	0.048	0.041	0.031	0.070	0.078	0.072	0.065	0.100	0.101	0.058	0.074	0.111	0.119	0.067
34	0.063	0.087	0.134	0.121	0.122	0.111	0.093	0.097	0.110	0.087	0.098	0.117	0.136	0.108
35	0.111	0.100	0.170	0.150	0.118	0.140	0.137	0.110	0.127	0.109	0.129	0.118	0.123	0.133
36	0.121	0.112	0.229	0.157	0.135	0.147	0.132	0.111	0.139	0.144	0.116	0.114	0.123	0.162
37	0.181	0.166	0.097	0.125	0.107	0.129	0.108	0.122	0.100	0.126	0.120	0.089	0.102	0.146
38	0.123	0.117	0.123	0.092	0.074	0.071	0.081	0.082	0.078	0.113	0.085	0.069	0.069	0.109
39	0.058	0.091	0.082	0.058	0.051	0.049	0.046	0.055	0.046	0.086	0.054	0.042	0.031	0.070
40	0.043	0.061	0.042	0.047	0.036	0.044	0.036	0.040	0.034	0.056	0.036	0.028	0.011	0.044
41	0.022	0.044	0.022	0.041	0.022	0.015	0.021	0.019	0.013	0.028	0.023	0.014	0.008	0.032
42	0.039	0.046	0.012	0.015	0.017	0.015	0.015	0.009	0.009	0.019	0.008	0.012	0.004	0.022
43	0.037	0.031	0.007	0.013	0.015	0.010	0.011	0.012	0.010	0.022	0.011	0.007	0.001	0.011
44	0.010	0.017	0.000	0.009	0.007	0.010	0.008	0.008	0.007	0.012	0.003	0.004	0.000	0.005
45	0.015	0.010	0.001	0.006	0.007	0.004	0.005	0.003	0.007	0.011	0.004	0.004	0.000	0.002
46	0.008	0.007	0.001	0.000	0.005	0.002	0.004	0.004	0.005	0.011	0.001	0.003	0.000	0.002
47	0.000	0.001	0.000	0.003	0.002	0.001	0.002	0.002	0.002	0.007	0.000	0.001	0.000	0.003
48	0.008	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.002	0.008	0.001	0.001	0.000	0.001
49	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.002	0.001	0.001	0.000	0.001	0.000	0.001
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000