

**FISHERY REPORT: *DISSOSTICHUS ELEGINOIDES* PRINCE EDWARD ISLANDS
SOUTH AFRICAN EEZ (SUBAREAS 58.6 AND 58.7)**

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1. Details of the fishery

A licensed fishery within the South African EEZ at the Prince Edward Islands started in October 1996. Part of the South African EEZ is outside the CCAMLR Convention Area (Area 51) and part falls within Subareas 58.6 and 58.7 and Division 58.4.4 (Figure 1).

2. Although the fishery began in 1996, intelligence reports indicated that IUU vessels were operating in the area in 1995 and possibly 1994. Since the start of the licensed fishery, the estimated IUU catch has exceeded the reported catch for most years (Table 1). Since the start of the fishery, a maximum of five operators have been licensed by South Africa to fish in any one year. During the 2003/04 and 2004/05 fishing seasons, two licensed vessels were active in the fishery.

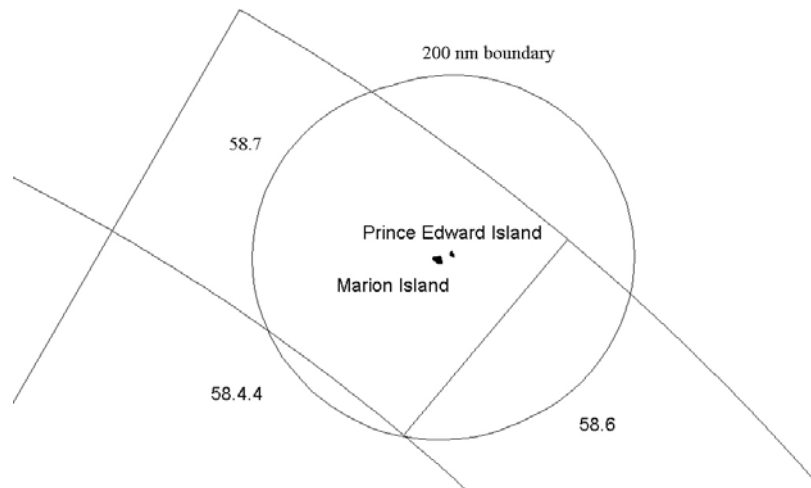


Figure 1: Map showing the position of the South African EEZ at the Prince Edward Islands and the boundaries of the relevant CCAMLR areas.

1.1 Reported catch (time series)

3. The total annual catches taken in Subarea 58.7 as reported to CCAMLR are presented in Table 1.

Table 1: Catch history for *Dissostichus eleginoides* in Subarea 58.7 (source: WG-FSA-05/6 Rev. 1 and SCIC-05/10). Fishing season is from 1 December to 30 November.

Fishing season	Total reported catch (tonnes)	IUU catch (tonnes)	Total removals (tonnes)
1995/96	869	4958	5827
1996/97	1193	7327	8520
1997/98	637	598	1235
1998/99	301	173	474
1999/00	1015	191	1206
2000/01	235	120	355
2001/02	98	78	176
2002/03	219	138	357
2003/04	133	58	191
2004/05	91	72	163

4. The status of the resource within the South African EEZ was assessed in WG-FSA-05/58. For that assessment, the removals from the South African EEZ were estimated (Table 2). The reported catch column includes catches taken in the South African EEZ within Subareas 58.6 and 58.7 as well as catches from Area 51 outside the CCAMLR region. In WG-FSA-05/58 the authors noted that the reported catches underestimate total mortality as losses through depredation by cetaceans are not included.

Table 2: Catch history for *Dissostichus eleginoides* in the South African EEZ as used in the assessment (source: WG-FSA-05/58). The limited data for 1996 have been pooled with the 1997/98 season.

Fishing season	Vessels (non-IUU)	Catch limit (tonnes)	Reported landed catch (tonnes)	IUU catch (tonnes)	Total removals (tonnes)
1996/97	7	2 500	2 921	21 350	24 271
1997/98	4	3 000	1 011	1 808	2 819
1998/99	4	2 750	956	1 014	1 970
1999/00	3	2 250	1 562	1 210	2 772
2000/01	5	2 250	352	352	704
2001/02	2	600	200	306	506
2002/03	2	500	313	256	569
2003/04	2	500	268	156	424
2004/05	2	450	141	156	297

1.2 IUU catch

5. The estimated IUU catch in Subarea 58.7 is presented in Table 1, whereas the estimated IUU catch from the South African EEZ (as used in the assessment in WG-FSA-05/58) is presented in Table 2.

6. IUU fishing has occurred since at least 1995 (and possibly 1994), and in most years the estimated IUU catch within the South African EEZ has exceeded the reported catch (Table 2). The IUU catch in the South African EEZ prior to 2003 (Table 2) was estimated as

the sum of the IUU catch estimated for Subarea 58.7 and 50% of that estimated for Subarea 58.6 (Brandão et al., 2002). For 2003 to 2005 the IUU catch estimates are based on the number and duration of fishing activities of illegal vessels known, or believed, to have operated in the South African EEZ and on the average green weight tonnages of vessels operating legally in that area in the corresponding years (WG-FSA-05/58). Note that CCAMLR records indicated only one reported IUU vessel in this area during 2004, whereas other intelligence reports indicated that at least three IUU vessels were seen within the South African EEZ (WG-FSA-05/58).

1.3 Size distribution of catches (time series)

7. Annual estimated catch length frequencies are presented in Figure 2.

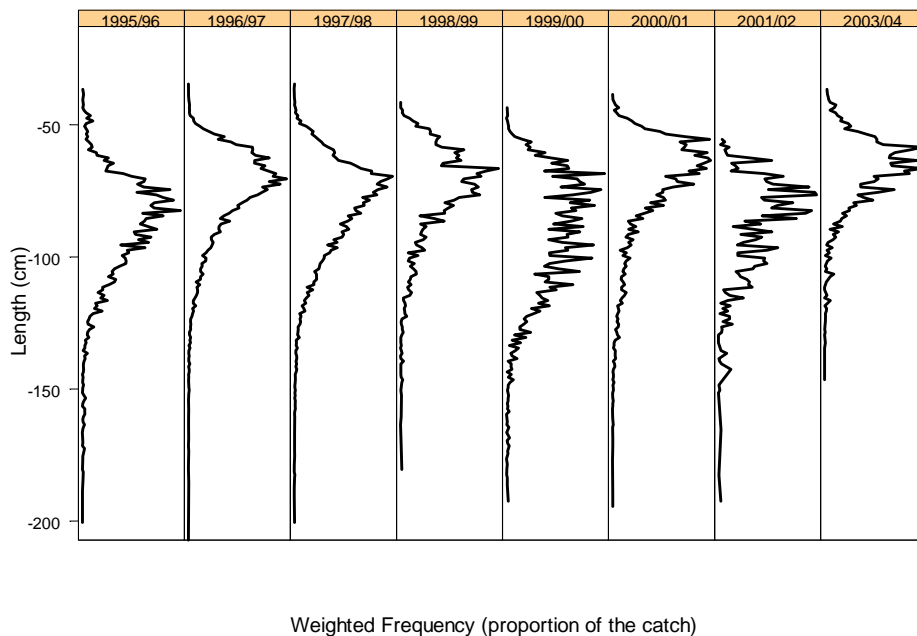


Figure 2: Catch-weighted length frequencies for *Dissostichus eleginoides* in Subarea 58.7 derived from observer, fine-scale and STATLANT data reported by 6 October 2004. The data in 1995/96 to 1997/98 have been updated by including data from all resolutions of reporting size class. There were no fine-scale data currently available for the 2004/05 season.

2. Stocks and areas

8. The South African EEZ around the Prince Edward Islands is mainly in Subarea 58.7 but extends east into Subarea 58.6, south into Division 58.4.4, and north of the Convention Area in to Area 51 (Figure 1). However, there are currently no fishing grounds in the south of the South African EEZ. The majority of the fishery occurs down to about 1 500 m, but fishing depths in excess of 2 000 m have been recorded.

3. Parameter estimation

3.1 Biological parameters

9. None of the parameters used in the assessment were derived specifically from this fishery, rather they have been assumed from work on toothfish in other areas within the CAMLR Convention Area. However, the value for natural mortality that has been generally used elsewhere is 0.165.

Table 3: Parameter values used in the assessment of the toothfish stock in the South African EEZ at the Prince Edward Islands (source: WG-FSA-05/58).

Component	Parameter	Value	Units
Natural mortality	M	0.2	y^{-1}
VBGF	K	0.066	y^{-1}
VBGF	t_0	-0.21	y
VBGF	L_{∞}	194.6	cm
Length to mass	' a '	2.5E-05	cm, kg
Length to mass	' b '	2.8	
Age at maturity	t_m	10	y
Steepness	h	0.6	

Standardised CPUE

10. CPUE was standardised by applying the GLM approach described in Appendix 2 of WG-FSA-05/58.

Table 4: Standardised longline CPUE by season for *Dissostichus eleginoides* in the South African EEZ at the Prince Edward Islands (source: WG-FSA-05/58).

Fishing season	Standardised CPUE
1996/97	3.914
1997/98	1.083
1998/99	0.962
1999/00	0.581
2000/01	0.350
2001/02	0.364
2002/03	0.459
2003/04	0.287
2004/05	0.257

4. Stock assessment

4.1 Model structure and assumptions

11. An ASPM was used to assess the status of the *D. eleginoides* resource in the South African EEZ at the Prince Edward Islands (WG-FSA-05/58). The methodology is thoroughly

presented in Appendix 1 of that paper. The Working Group noted that in refinements added since WG-FSA-04/37 was presented at WG-FSA-04, the model now takes account of data from a new pot fishery as well as those from longlining. In addition, a sensitivity test on the effects of including cetacean predation was presented based on industry observations of cetacean predation rates on line-hauled toothfish.

4.2 Model estimates

12. Estimated exploited biomass and projections under three levels of future catches for the base-case ASPM models from WG-FSA-04/37 and 05/58 are presented in Figure 3. Further model estimates are available in WG-FSA-05/58.

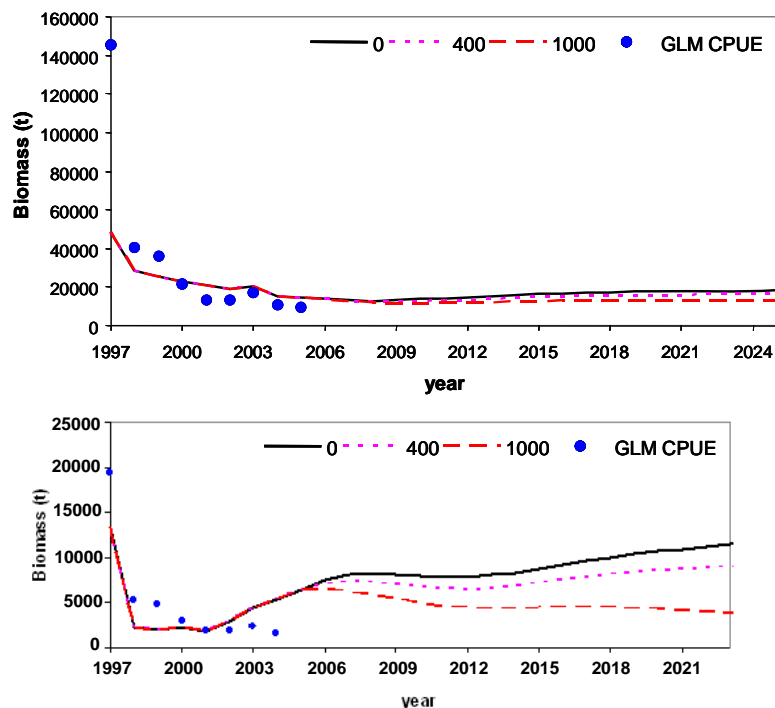


Figure 3: GLM-standardised CPUE indices to which the ASPM was fitted (divided by the estimated catchability q to express them in biomass units) and estimated longline exploitable biomass, together with projections under future annual catches of 0, 400 and 1 000 tonnes. Source: top-panel WG-FSA-05/58, bottom-panel WG-FSA-04/37. The two graphs derive from the 2004 and 2005 base-case assessments. The base-case in 2004 was fitted to CPUE only with deterministic recruitment and a change in selectivity in 1999 onwards, in 2005 the base-case was fitted to CPUE and catch-at-length data (with a weight of 1.0 on the latter) with stochastic recruitment and a change in selectivity from 2003 onwards.

4.3 Sensitivity analyses

13. Several sensitivity analyses were explored in WG-FSA-05/58. Three were especially influential. The results from the model were sensitive to the relative weighting given to

CPUE and catch-at-length data, to reducing the natural mortality from 0.2 to 0.165, and to the inclusion of cetacean predation rate estimates on catches and catch rates.

4.4 Discussion of model results

14. The Working Group noted that the results of the ASPM remained very sensitive to the relative weightings given to CPUE and catch-at-length data, because these two sources of data suggest different degrees of resource depletion. The length distributions from the pot fishery were reported as being appreciably larger than those of the longline fishery. The inclusion of an alternative standardisation of the catch rate series (SC-CAMLR-XXII/BG/27, section 5.3.8 to 5.3.10) may improve the ability of the model to fit to the early part of the time series.

4.5 Future research requirements

15. While making some suggestions for further investigations related to the assessment, the Working Group noted that the limited (and conflicting) data available for such analyses meant that considerable uncertainty would remain associated with the results for some time. For this reason the Working Group encouraged further development of the feedback control management procedure approach of which an initial account is given in WG-FSA-SAM-05/15, particularly as this might also prove informative for other toothfish fisheries.

16. The Working Group encouraged South Africa to consider:

- (i) requesting the scientific observers on board its vessels to report on the extent of cetacean activity and to collect data on toothfish remains on longline hooks evidencing cetacean predation;
- (ii) in the absence of research surveys to consider a ‘commercial survey’ conducted as a component of commercial operations whereby certain locations are fished in a systematic manner each year to provide an index that is comparable over time.

5. By-catch of fish and invertebrates

5.1 Estimation of by-catch removals

17. Estimated annual by-catch removals for the South African EEZ in Subareas 58.6 and 58.7, but excluding Area 51, are reported in Table 5. The Working Group noted that the voluntary submission of fine-scale data has been poor in some recent years and continued to encourage South Africa to submit more fine-scale data in future.

Table 5: Reported by-catch landings from toothfish directed longline fishing by South African vessels fishing in Subareas 58.6 and 58.7. Source: fine-scale and STATLANT data.

Fishing season	<i>Macrourus</i> spp.	Rajids	Other species
1995/96	0	0	0
1996/97	0	0	0
1997/98	0	1	1
1998/99	0	0	0
1999/00	203	18	54
2000/01	72	2	7
2001/02	8	0	0
2002/03	no fine-scale data submitted		
2003/04	1	0	0
2004/05	no fine-scale data submitted		

5.2 Assessments of impact on affected populations

18. It was not possible to assess the impacts on affected populations.

5.3 Mitigation measures

19. There are no mitigation measures in force.

6. By-catch of birds and mammals

6.1 Estimation of longline by-catch removals

20. Details of seabird by-catch (Table O3, paragraph O14) are summarised in Table 6. Estimated potential seabird removals in the IUU fishery are summarised in SC-CAMLR-XXIV/BG/27.

Table 6: Estimated by-catch of seabirds in the South African EEZ in Subareas 58.6 and 58.7.

Fishing season	By-catch rate (birds/thousand hooks)	Estimated by-catch
1996/97	0.52	834
1997/98	0.194	528
1998/99	0.034	156
1999/00	0.046	516
2000/01	0.018	199
2001/02	0	0
2002/03	0.003	7
2003/04	0.025	39
2004/05	0.149	76

21. Ad hoc WG-IMAF assessed the level of risk of incidental mortality of seabirds in the fishery in the South African EEZ at the Prince Edward Islands (in both Subareas 58.6 and 58.7) as category 5 (SC-CAMLR-XXIV/BG/26). For new and exploratory fisheries in areas of this risk level category the WG-IMAF recommendations are set out in Table O19.

6.2 Pot fishery by-catch

22. No by-catch of seabirds or mammals has been observed in this fishery (paragraph O16).

6.3 Mitigation measures

23. South Africa has consistently required the application in this area of the mitigation measures recommended by CCAMLR with the exception of a closed season. It was noted that the pot fishery reported no by-catch of birds or mammals in the fishing gear (WG-FSA-05/10).

6.4 Interactions involving marine mammals with longline fishing operations

24. On one vessel, some limited observations by industry indicated a loss of two toothfish to toothed cetaceans for each whole toothfish landed when longlines were hauled. Longline operations are now concentrated in shallower water to attempt to minimise such losses. The Working Group noted that this level of cetacean predation is much greater than suspected for other toothfish fisheries, and encouraged the deployment of a scientific observer by South Africa to gather further data on this (see also paragraph 16).

25. Table O3 reported no marine mammal injuries or deaths during the 2004/05 season.

Reference

Brandão, A., D.S. Butterworth, B.P. Watkins and D.G.M. Miller. 2002. A first attempt at an assessment of the Patagonian toothfish (*Dissostichus eleginoides*) resource in the Prince Edward Islands EEZ. *CCAMLR Science*, 9: 11–32.