New Zealand Fisheries Assessment Research Document 88/35

Black and smooth oreos

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December 1988

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BLACK AND SMOOTH OREOS
(Allocyttus niger and Pseudocyttus maculatus)

INTRODUCTION

Previous summaries of background information on the biology and fishing history of the two oreo species were given by McMillan (1985, 1986) and McMillan and Fincham (1988).

Separate management of black and smooth oreos was considered in last years fish stock assessment paper (McMillan and Fincham 1988), but the management regime for oreos for the 1987-88 fishing year was not changed. That regime includes three species, black oreo, smooth oreo and spiky oreo (Neocyttus rhomboidalis) combined as "Oreo dory" and quotas which are based on the 1981/82 reported catch, with the addition of an area E quota in 1985/86 based on 1983/84 catch (see Table 1 and Figure 1).

The present paper again considers a change from managing oreos as a group ("oreos") to that where the two main species are managed separately throughout the EEZ, as black oreo and smooth oreo. In addition, the removal of spiky oreo (Neocyttus rhomboidalis) from the list of quota species is considered.

Separate management of black and smooth oreos is advantageous because a combined TAC does not take into account the fact that the two species are separate populations and that parameters such as biomass, productivity, growth, mortality and recruitment may be different. Thus, the two species may respond differently to fishing pressure; e.g., the biomass of one species may decline much more rapidly than the other if it has a lower mortality and slower growth. Catches of smooth oreo, which are favoured over black oreo, increased in 1983-84 (Table 2 and Figure 3).

It is now possible to consider separate TACs for black and smooth oreos because improved and revised catch statistics are available for each species (Fincham 1988). Biomass estimates have also been made for the two species on the south Chatham Rise from stratified random trawl surveys in November-December 1986 (Fincham et al 1987), and in November 1987 (Fenaughty et al 1988).

FISHERY SUMMARY

Catch statistics for oreos have been revised and are summarised in Tables 1-4. Tables 3 and 4 use the old A-H area notation. See Fincham (1988) for an explanation of how the figures were compiled and for additional statistics.

Total oreo catch

Catch for oreos combined peaked in 1981-82, declined somewhat then peaked again in 1983-84 and has subsequently shown a further decline (Table 2).

Catch by species

Black oreo was the largest catch from 1979-80 to 1983, peaking in 1981-82 at 21 440 tonnes (Table 2 and Figure 3). Smooth oreo has taken over from black oreo as the greater catch from 1983-84 to the present. This is probably because of increasing interest in smooth oreo, especially by domestic operators. The decline of black oreo catches is probably a result of decreased interest in the species (lower value).

The catches of spiky oreo in 1979-80 and 1981-82 from area C probably should be black oreo, as the latter was the species caught in the area during research surveys. Spiky oreo catches in other years are a negligible component of total oreo catches (Table 2).

Catch per unit of effort (CPUE) trends

Analyses of catch and effort data have been carried out using the programme SUM.PASCAL. This accesses estimated catch from "Deepwater" logbook data (i.e. vessels which process and freeze their catch) and has not been extensively tested for errors.

This is a first attempt at analysis of CPUE for oreos and certain problems with the data are acknowledged including the difficulty of comparing vessels of different sizes which fish with different nets. Tonnage class has been adopted as an approximation to "fishing power" and the data presented in Figures 4 and 5 are those of tonnage class 6 vessels (2000-2500 tonnes), mainly Soviet, which have caught substantial proportions of the oreo target catch (Tables 5-8). "Target" species is of dubious value in areas where orange roughy, and the two oreo species may be caught in any one trawl as for instance can happen on the mid and eastern south slope of Chatham Rise.

CPUE for black oreo has apparently been relatively low and has changed little from 1981-82 to 1986-87 in either area. CPUE for smooth oreo from area C shows an increasing trend to 1985-86 and a marked decline in 1986-87. CPUE from area D shows considerable fluctuations but with an overall decline, marked in 1986-87.

Catch by area

Fishstock area OEO 3A, equivalent to area C, produced the largest oreo catch in 1979-80 and from 1981-1982 to 1984-85 (Table 1). Catches from OEO 4 (area D) were largest in 1978-79, 1985-86 and 1986-87 (Table 1). The increasing catch from OEO 4 reflects the increased interest by domestic vessels in the area.

Licensed catch

This was highest in 1978-79 and 1979-80 but has declined as a result of Soviet licensed vessels being confined to area E since 1980-81 (Table 2 and Figure 2). Recent catches have been very low.

Charter catch

This has been the largest component of the oreo catch since 1981-82, (Figure 2).

Black oreo catch in area C has declined in the period 1981-82 to 1985-86 from 11 419 to 1 765 tonnes (Table 3). Black oreo catch in D was high in 1981-82 but has fluctuated around the 1 000 tonne level since then (Table 3).

Smooth oreo catch from area C has increased slightly but has not changed much in D in the period 1981-82 to 1985-86 (Table 4).

Domestic catch

This was small prior to 1982-83 but has steadily increased from that date (Table 2 and Figure 2). Smooth oreo in area D has been the major area of expansion for the domestic fishery (Tables 3 and 4). Most of the catch has been taken by large ice vessels and freezer trawlers. An important orange roughy catch is also made on the south Chatham Rise in area D.

RESEARCH DATA SUMMARY

Earlier research is listed in McMillan and Fincham (1988). The only new information gathered in 1987 was from a second stratified random trawl survey of the south Chatham Rise carried out using the Amaltal Explorer in November (Fenaughty et al 1988).

Distribution, reproductive biology, length frequency

Results from the 1987 survey are very similar to those from the 1986 south Rise survey and therefore will not be discussed (see Fincham et al 1987 and Fenaughty et al 1988).

STOCK ASSESSMENT

South Chatham Rise

(a) Stocks

The present management of "Oreo dory" includes three definite stocks, that is the three species black, smooth and spiky oreos. These should be managed separately.

Only black and smooth oreo stocks are large enough to attract attention by fishers. The stock of spiky oreo is relatively small and widely distributed and the species is not known to support a fishery. Reported catch of spiky oreo from 1982-83 to 1986-87 has been less than 10 t per annum (Table 2). Reported catch in 1979-80 and 1981-82 was probably black oreo.

Spiky oreo should be removed from the list of quota species. At present it is a minor by-catch in some areas; e.g., on the east coast of the North Island and, because it is a quota species, it has to be retained by fishers.

Removal of spiky oreo from the list of quota species draws the slight risk of fishers deliberately recording black oreo, (quota species) as spiky oreo (non quota). This practise should be easy to detect, as spiky oreo is not caught in quantity, in contrast to black oreo. This risk has to be balanced against the "nuisance value" of a low abundance, low valued fish stock which has to be retained because it is a quota species. Spiky oreo was apparently included as a quota species initially because of potential problems distinguishing it from black oreo. The two species are readily distinguished (Paulin 1987) and are seldom caught together. Catch statistics have been collected for the two species separately since 1979-80 and have recently been compiled up to 1985-86 by Fincham (1988).

Black and smooth oreos undoubtedly have different stock sizes and probably have different growth rates, mortalities and levels of recruitment. Therefore the productivities of the two species could be significantly different. The two species are being exploited at different rates by fishers, with smooth oreo favoured because it is higher valued.

A combined quota for black and smooth oreos has the major disadvantage that it allows fishers to discard black oreo and take their entire allocation of "Oreo dory" as the more highly valued smooth oreo. If quotas were separate, fishers could only record catch of smooth oreo against their smooth oreo allocation. Mis-labelling of smooth oreo cartons as black oreo is a possibility but the two species have readily distinguishable skin and flesh.

In this paper we have assessed stocks of black and smooth oreos separately.

(b) Areas

The existing management areas should be retained. The rationale for establishing the oreo management areas still applies and is as follows:

1. The management areas enclose or contain discrete fisheries:

Fishery	Fishstock code
Off the Otago/Southland coast	OEO 1
Western end of south Chatham Rise	OEO 3A
Mid and eastern south Chatham Rise	OEO 4
Pukaki Rise and Campbell Plateau	OEO 6

2. Separate area quotas spreads the catch and makes local depletion of any one fishery less likely.

   It would be undesirable for all or most of the oreo quota to come from one fishery if quotas for two areas were combined. Our knowledge of possible migration of oreos is negligible but the fact that spawning fish are relatively abundant at the western and at the mid to eastern ends of the south Rise in November/December suggests that adults may be relatively sedentary.

(c) Estimation of maximum constant yield (MCY)

Criteria for assessing MCY are outlined in Mace (in press). MCY = cY was used for calculation, where Y is the average catch and c = 0.8 (c is a constant assessed by the following: catches show moderate variability; species are probably long lived).

Methods including estimates of biomass were not used because:

(a) we did not consider the biomass estimates from the 1986 and 1987 south Rise surveys could approximate absolute biomass because of a likely sampling bias underestimating adult black oreo

(b) there are no estimates of F0.1 or natural mortality (M) available Y is calculated for the fishing seasons 1981-82 to 1985-86, including the 6 month season in 1983. Figures for black oreo are taken from Table 3 and those for smooth oreo from Table

4. Calculations were as follows:

Black oreo

Fish stock area	Catch 1981-82 to 1985-86 (t)	$\bar{Y}$	MCY
OEO 1	3 362	611	489
OEO 3A	33 155	6 028	4 823
OEO 4	11 895	2 163	1 730
OEO 6	9 317	1 694	1 355
OEO 10	0	0	0

Smooth oreo

Fish stock area	Catch 1981-82 to 1985-86 (t)	$\bar{Y}$	MCY
OEO 1	6 389	1 162	929
OEO 3A	15 182	2 760	2 208
OEO 4	22 530	4 096	3 277
OEO 6	1 921	349	279
OEO 10	0	0	0

(d) Estimation of current annual yield (CAY)

Criteria for assessing CAY are outlined in Mace (in press). CAY cannot be calculated because we lack estimates of biomass for the two species.

(e) Other factors

We still lack data on age, growth and biomass. This information is required for further understanding of the state of oreo stocks.

Quota over-run may occur in OEO 4 where most black oreo is probably dumped.

FACTORS MODIFYING YIELD ESTIMATES

(a) Interdependence of stocks

There is a by-catch problem on the south slope of Chatham Rise where the two oreo species are caught together with orange roughy. Vessels attempting to catch orange roughy are limited by the oreo quota.

(b) Other relevant factors

Species reporting will continue to be a problem for the lower valued black oreo. It will probably continue to be dumped. Problems may also arise with catching in one area and declaring in another.

MAORI, RECREATIONAL AND OTHER NON-COMMERCIAL INTERESTS

Not known.

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Table 1: Total reported oreo catch by fishstock code by fishing season

Fishstock code	78/79 Catch	79/80 Catch	80/81 Catch	81/82 Catch	82/83 Catch	83/83 Catch	83/84 Catch	84/85 Catch	85/86 Catch	86/87 Catch*	87/88 TAC
OEO 1	2,808	134	no	21	162	39	3,241	1,480	5,390	456	4,000
OEO 3A	1,366	10,958	data	12,750	8,576	4,409	9,190	8,284	5,331	6,167	10,000
OEO 4	8 041	680		9,296	3,927	3,209	6,104	6,390	5,883	6,048	7,000
OEO 6	17	18		4,380	765	354	3,568	2,044	126	0	3,000
OEO 10	0	0		0	0	0	0	0	0	0	10
Undefined	-	-		66	251	4	7	5	91	15	
Totals	12,231	11,791		26,514	13,680	8,015	22,111	18,204	16,820	12,686	24,010

* Provisional (incomplete)

Table 2: Total oreo catch by fleet by species by fishing season

Species	1978-1979 LIC	JV/CH	DOM	Total	1979-1980 LIC	JV/CH	DOM	Total	1980-1981 LIC	JV/CH	DOM	Total
BOE	8	*	0	9	4 788	1 303	0	6 290				
SSO	*	0	0	*	3 648	1 557	0	5 205				
OEO	12 223	0	0	12 223	0	8	0	8		no data		
SOR	0	0	0	0	283	5	0	288				
Total	12 231	*	0	12 231	8 919	2 872	0	11 791				

Species	1981-1982 LIC	JV/CH	DOM	Total	1982-1983 LIC	JV/CH	DOM	Total	1983 LIC	JV/CH	DOM	Total
BOE	4 230	17 209	1	21 440	622	7 208	449	8 279	360	4 993	36	5 388
SSO	2	4 664	0	4 665	60	4 531	476	5 067	0	2 445	138	2 582
OEO	0	50	63	114	0	0	332	332	0	0	44	44
SOR	0	295	0	295	1	0	0	1	0	0	*	*
WOE	0	*	0	*	0	0	0	0	0	0	0	0
Total	4 231	22 218	64	26 514	683	11 739	1 258	13 680	360	7 437	218	8 015

Species	1983-1984 LIC	JV/CH	DOM	Total	1984-1985 LIC	JV/CH	DOM	Total	1985-1986 LIC	JV/CH	DOM	Total
BOE	532	10 113	98	10 743	1 566	5 144	954	7 665	21	3 555	709	4 285
SSO	186	9 230	1 612	11 028	349	7 319	2 675	10 343	1	9 691	2 741	12 432
OEO	0	0	340	340	0	0	192	192	0	0	93	93
SOR	0	0	0	0	0	0	5	5	0	0	9	9
Total	718	19 343	2 050	22 111	1 915	12 463	3 826	18 204	21	13 246	3 552	16 820

Species	1986-1987* LIC	JV/CH	DOM	Total
BOE	0	4 054	603	4 657
SSO	0	3 890	4 099	7 989
OEO	0	0	31	31
SOR	0	0	8	8
Total	0	7 944	4 741	12 685

Table 3: Black oreo catch by nation by EEZ area by fishing season

	1978-1979				1979-1980				1980-1981			
Area	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total
B	1	0	0	1	0	0	0	0				
C	0	*	0	*	4 312	1 276	0	5 588				
D	0	0	0	0	544	22	0	566				
E	*	0	0	*	18	0	0	18		no data		
F	*	0	0	*	113	0	0	113				
G	1	0	0	1	0	*	0	*				
H	7	0	0	7	*	4	0	5				
Total	8	*	0	9	4 988	1 303	0	6 290				

	1981-1982				1982-1983				1983			
Area	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total
B	0	0	0	0	0	0	0	0	0	0	1	1
C	0	11 419	0	11 419	0	6 436	2	6 438	0	3 693	*	3 693
D	1	5 640	0	5 641	*	1675	413	1 088	6	1 299	35	1 340
E	4 229	150	0	4 378	622	83	0	705	354	0	0	354
F	0	*	0	*	0	0	0	0	0	0	0	0
G	0	0	0	0	0	*	0	*	0	0	0	0
H	0	0	0	0	0	6	0	6	0	0	0	0
Undef	0	*	1	1	0	8	35	43	0	*	0	*
Total	4 230	17 209	1	21 440	622	7 208	449	8 279	360	4 993	36	5 388

	1983-1984				1984-1985				1985-1986			
Area	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total
B	0	0	0	0	0	0	16	16	0	0	11	11
C	0	5 512	11	5 524	0	3 079	817	3 897	0	1 765	420	2 184
D	0	1 127	87	1 214	0	1 532	120	1 651	2	723	236	961
E	528	1 726	0	2 254	1 556	16	0	1 572	19	35	0	54
F	2	1 726	0	1 728	4	518	0	522	*	1 032	0	1 032
G	0	0	0	0	0	0	*	*	0	0	15	15
H	2	21	0	23	6	0	*	6	0	0	2	2
Undef			0	1	0	0	1	1	0	0	24	24
Total	532	10 113	98	10 743	1 566	5 144	954	7 665	21	3 555	709	4 285

Table 4: Smooth oreo catch by nation by EEZ area by fishing season

	1978-1979				1979-1980				1980-1981			
Area	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total
A	0	0	0	0	0	0	0	0				
C	0	0	0	0	3 526	1 548	0	5 075				
D	0	0	0	0	106	8	0	114				
E	0	0	0	0	0	0	0	0		no data		
F	0	0	0	0	16	0	0	16				
G	*	0	0	*	0	0	0	0				
H	*	0	0	*	3 648	1 557	0	5 205				

	1981-1982				1982-1983				1983			
Area	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total
B	0	21	0	21	0	22	0	22	0	0	9	9
C	0	1 283	0	1 283	0	2 101	37	2 138	0	700	13	713
D	0	3 352	0	3 352	*	2 396	400	2 796	0	1 745	116	1 861
E	2	*	0	2	60	0	0	60	0	0	0	0
F	0	0	0	0	*	0	0	*	0	0	0	0
G	0	*	0	*	0	*	0	*	0	*	0	*
H	0	0	0	0	0	6	0	6	0	0	0	0
Undef	0	0	0	0	0	7	39	46	0	0	0	0
Total	2	4 656	0	4 658	60	4 531	476	5 067	0	2 445	138	2 582

	1983-1984				1984-1985				1985-1986			
Area	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total	LIC	JV/CH	DOM	Total
B	0	0	51	51	0	0	128	128	0	0	93	93
C	0	3 502	92	3 594	0	3 648	663	4 311	0	2 795	340	3 135
D	7	3 397	1 467	4 871	34	2 831	1 863	4 729	0	2 699	2 222	4 921
E	178	1 137	0	1 315	311	162	0	472	1	71	0	72
F	1	1 166	0	1 167	4	677	*	681	0	4 126	0	4 126
G	0	0	0	0	0	*	18	19	0	0	33	33
H	0	28	*	28	0	0	*	*	0	*	5	5
Undef	0	*	*	*	0	0	2	2	0	0	47	47
Total	186	9 230	1 612	11 028	349	7 319	2 675	10 343	1	9 691	2 741	12 432

Table 5: Black oreo target estimated catch, hours fished, and catch per unit of effort (CPUE) (t/hour) for charter and licensed class 6 vessels by fishing season.

EEZ Area		1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
C	Catch (t)	7 856	5 319	2 092	904	418	1 593
	Hours	1 699	1 593	451	278	88	523
	CPUE	4.6	3.3	4.6	3.3	4.8	3.0
D	Catch (t)	2 791	995	618	187	263	691
	Hours	1 042	315	252	132	126	335
	CPUE	2.7	3.2	2.5	1.4	2.1	2.1

Table 6: Smooth oreo target estimated catch, hours fished, and catch per unit of effort (CPUE) (t/hour) for charter and licensed class 6 vessels by fishing season.

EEZ Area		1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
C	Catch (t)	134	867	1 071	1 833	1 688	786
	Hours	24	137	219	242	204	201
	CPUE	5.6	6.3	4.9	7.6	8.3	3.9
D	Catch (t)	865	1 580	924	883	633	178
	Hours	142	333	141	240	96	129
	CPUE	6.1	4.7	6.6	3.7	6.6	1.4

Table 7: Black oreo target estimated catch, hours and catch per unit of effort (CPUE) for charter and licensed vessels of all tonnage classes combined by fishing season.

EEZ Area		1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
C	Catch (t)	8 678	9 274	4 823	2 129	921	2 249
	Hours	2 398	3 802	2 221	626	383	898
	CPUE	3.6	2.4	2.2	3.4	2.4	2.5
D	Catch (t)	2 832	1 148	829	474	379	691
	Hours	1 247	404	321	441	162	335
	CPUE	2.3	2.8	2.5	1.1	2.3	2.1

Table 8: Smooth oreo target estimated catch, hours and catch per unit of effort (CPUE) for charter and licensed vessels of all tonnage classes combined by fishing season.

EEZ Area		1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
C	Catch (t)	134	1 117	1 516	2 520	2 317	814
	Hours	24	267	405	382	564	246
	CPUE	5.6	4.2	3.7	6.6	4.1	3.3
D	Catch (t)	1 011	2 066	2 010	1 679	1 415	850
	Hours	281	740	505	501	336	364
	CPUE	3.6	2.8	4.0	3.4	4.2	2.3

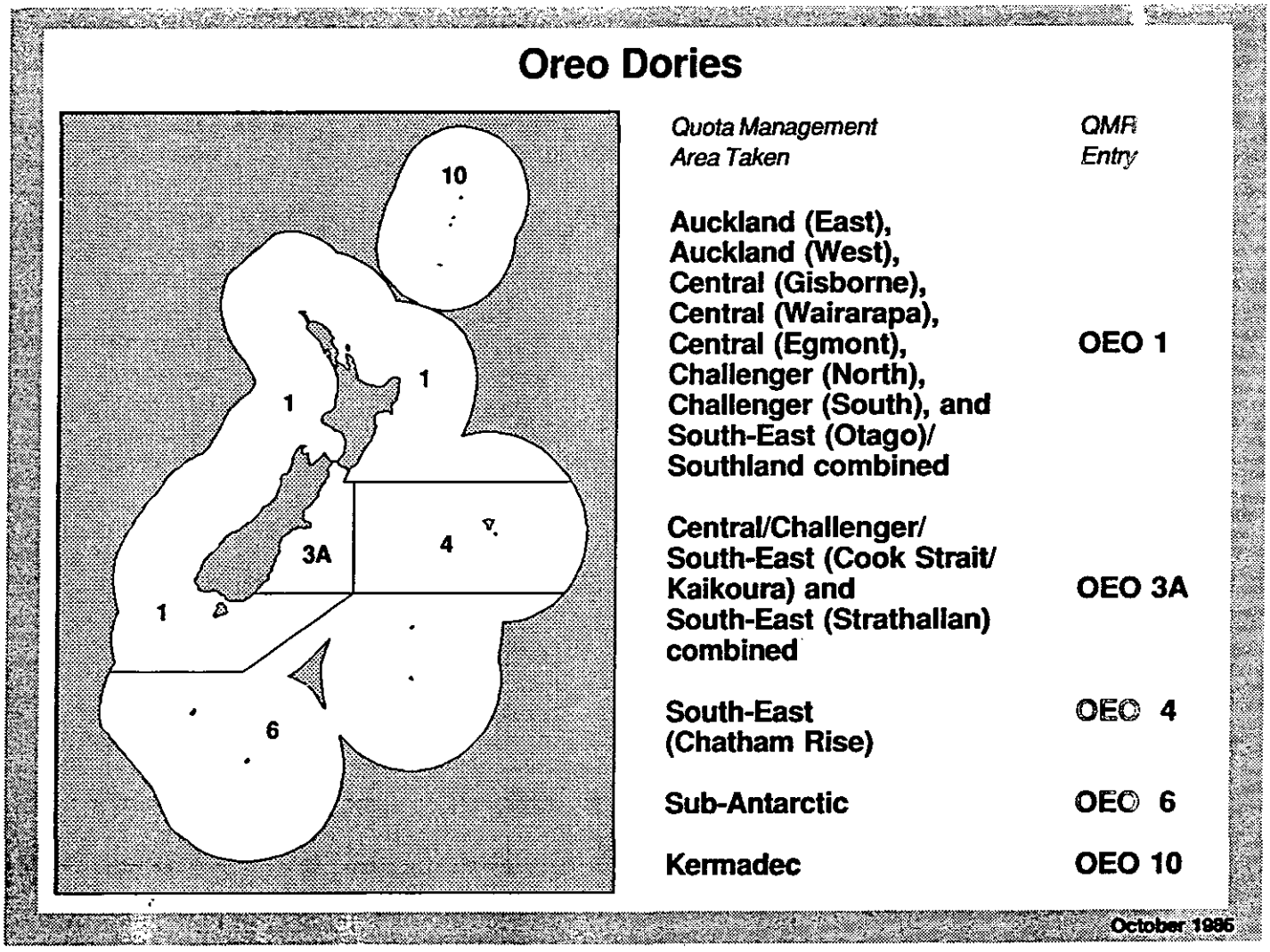

Fig 1: Quota management areas for oreos.

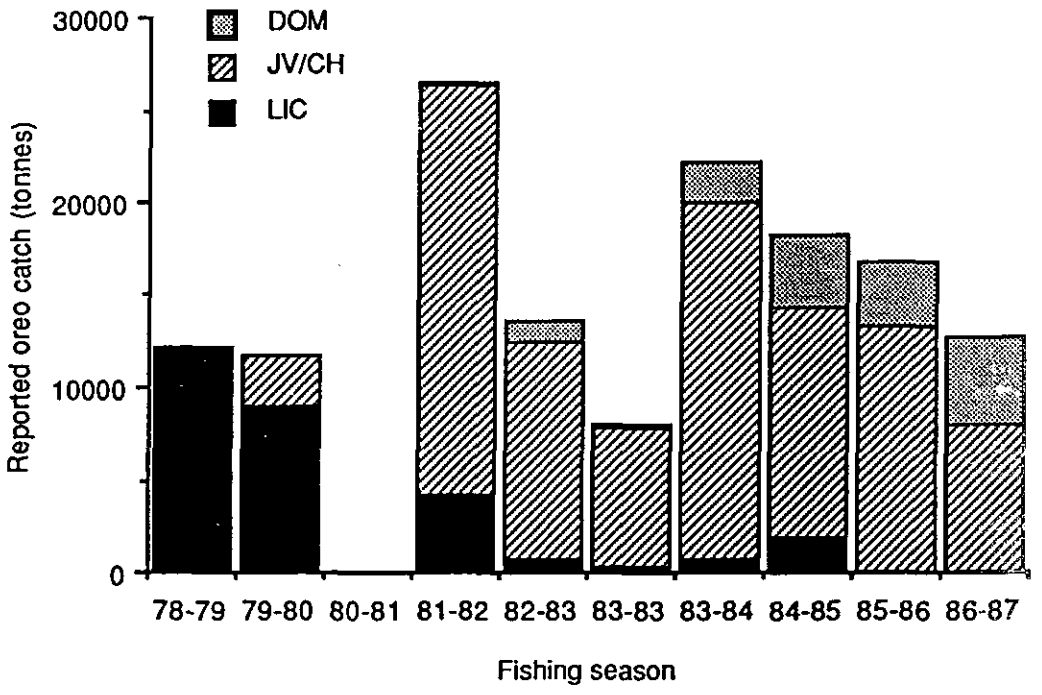

Figure 2: Black and smooth oreo catch from the New Zealand EEZ, see Table 2.
DOM - domestic, JV/CH - joint venture and charter, LIC - licenced vessels

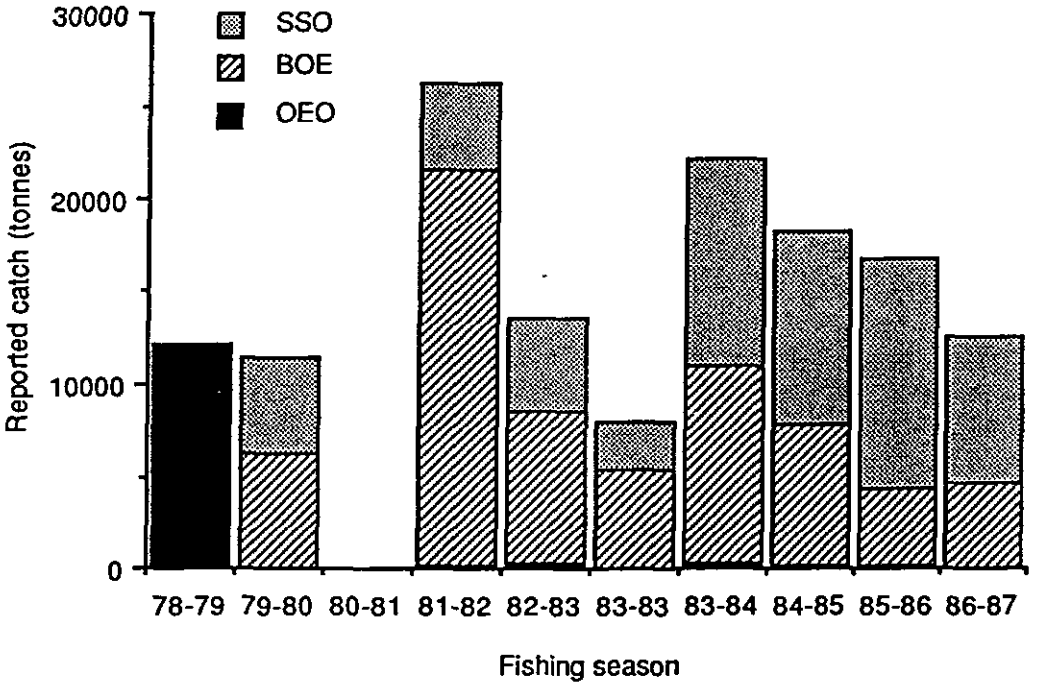

Figure 3: Reported catch of smooth (SSO), black (BOE) and undefined oreo (OEO) from the New Zealand EEZ, see Table 2.

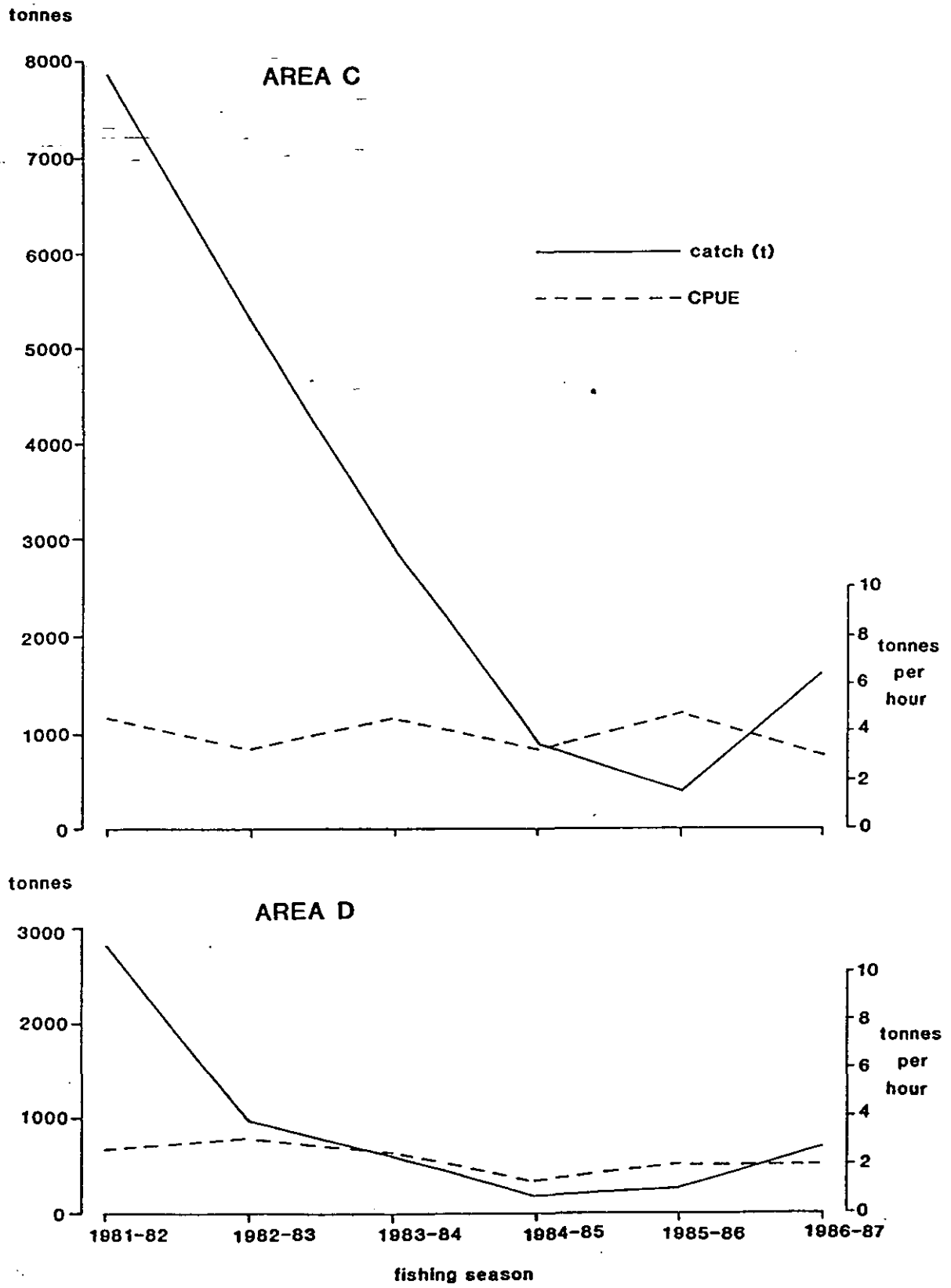

Fig 4 Black oreo estimated target catch and CPUE from joint venture/charter and foreign licensed tonnage class six vessels

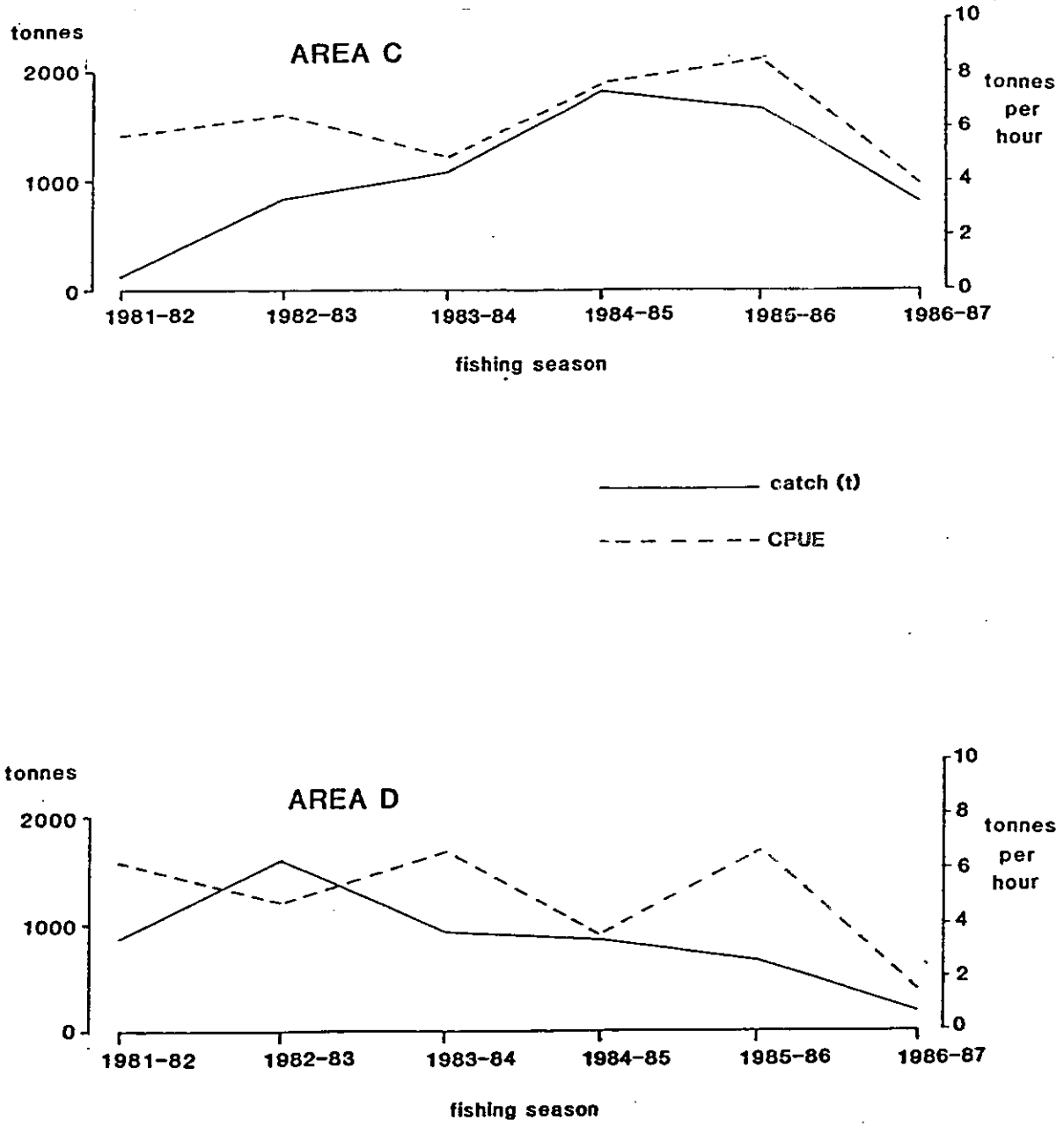

Fig 5 Smooth oreo estimated target catch and CPUE from joint venture/charter and foreign licensed tonnage class six vessels