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**Descriptions of black oreo and smooth oreo fisheries in
OEO 1, OEO 3A, OEO 4, and OEO 6
from 1977-78 to the 2000-01 fishing year**

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EXECUTIVE SUMMARY

McMillan, P.J.; Coburn, R.P.; Hart, A.C.; Doonan, I.J. (2002). Descriptions of black oreo and smooth oreo fisheries in OEO 1, OEO 3A, OEO 4, and OEO 6 from 1977–78 to the 2000–01 fishing year.

New Zealand Fisheries Assessment Report 2002/40. 54 p.

Descriptions of black oreo and smooth oreo fisheries in oreo management areas OEO 1, OEO 3A, OEO 4, and OEO 6 are presented with data from the 1977–78 to the 2000–01 fishing years.

The analyses summarise MFish commercial tow-by-tow estimated catch data. All tows used in the analyses either targeted or caught unspecified oreo (OEO), black oreo (BOE), or smooth oreo (SSO).

Regions of fishing activity were identified as individual fisheries within the large management areas OEO 1 and OEO 6 and were analysed separately. For OEO 1 these fisheries included Southland, Puysegur, Snares, Wairarapa (new), and the rest of OEO 1 north of 45° S. Fisheries in OEO 6 included Pukaki Rise (East and West), Bounty Plateau, Auckland Island hills, and Macquarie Ridge (new). Fisheries within OEO 3A and OEO 4 were the subject of previous separate unstandardised and standardised CPUE analyses so are only briefly described here.

Trends in fleet composition, vessel tonnage, target species, catch, and unstandardised catch rate (tonnes per tow) were analysed and reported for each fishery. A mix of different target species was used (OEO, SSO, or BOE) in several fisheries and oreos were also caught as a bycatch of orange roughly target fishing in OEO 1, OEO 6, and OEO 4. Inferring trends in target catch rate is therefore difficult.

1. BACKGROUND

Smooth oreo and black oreo have been commercially fished in New Zealand waters since 1972, making this probably the oldest New Zealand deepwater fishery. The largest oreo fishery is on the South Chatham Rise, but other areas with substantial oreo catch occur throughout the EEZ as a result of target oreo fishing or as bycatch in orange roughy fisheries. This report summarises commercial oreo catch data for the main oreo fisheries around New Zealand. This work was undertaken by NIWA as part of the Ministry of Fisheries Project OEO2001/02 (Oreo stock assessment).

2. OBJECTIVE

To update the descriptive analysis of the commercial catch and effort data for black oreo and smooth oreo from selected fisheries with the inclusion of data up to the end of the 1999–2000 fishing year. These fisheries include OEO 1, OEO 3A, OEO 4, and OEO 6.

3. METHODS

Descriptive analyses of oreo catch and effort were updated from those reported by McMillan et al. (2001) by including new data from the 2000–01 fishing year and revised data from the 1999–2000 fishing year for OEO 1, OEO 3A, OEO 4, and OEO 6. The oreo management areas (OEO 1 to OEO 6) are shown in Figure 1.

The patterns of oreo fishing over time in the New Zealand Exclusive Economic Zone (EEZ) were analysed by summing the number of trawls that caught or targeted oreos from each 0.4 x 0.4 degree bin. The number of tows per bin were plotted as a circle at the centre of each bin where the circle area was proportional to the number of tows bin. All tows from 1977–78 to 2000–01 (with a threshold values of 10 tows per bin) were summed to provide a picture of fishing over the length of the known fishery and tows from the last three years (1998–99 to 2000–01, with a threshold value of 5 tows per bin) were also analysed to provide an indication of recent activity.

Management areas OEO 1 and OEO 6 cover large geographical regions and parts of these areas were fished spasmodically or for only a short period. Within each management area, regions of fishing activity were characterised as “fisheries” and were analysed separately. This was done to simplify the analysis and does not imply biological stocks. For OEO 1 these fisheries are Southland, Puysegur, Snares, a newly defined fishery called Wairarapa, and the remainder of OEO 1 north of 45° S. Fisheries in OEO 6 are Auckland Island hills, Bounty Plateau, Pukaki Rise (East), and Pukaki Rise (West), and a newly defined fishery called Macquarie Ridge. These fisheries are shown in Figures 2–5. Fisheries within OEO 3A and OEO 4 were not identified because these areas were the subject of previous separate unstandardised and standardised CPUE analyses (Coburn et al. 1999, 2001a, 2001b, Doonan et al. 1995).

3.1 Standard data analysis

For each fishery within OEO 1 and OEO 6, and for OEO 3A and OEO 4 separately, a standard set of analyses is presented. Results for each fishery are presented in a summary and in tables.

The tables contain the following:

- 1) The percentage of combined oreo (smooth oreo, SSO; black oreo, BOE; and smooth oreo plus black oreo plus spiky oreo, OEO) catch by nation by fishing year. All fishing years used in this report are 1 October to 30 September. “Nation” is the registered nationality of the vessel(s) catching or targeting oreos. DOM = New Zealand vessels, JAP = Japanese, KOR = Korean, NOR = Norwegian, POL = Polish, RUS = Soviet/Russian, BZE = Belizean, PAN = Panamanian, NA = unspecified.

- 2) The percentage of combined oreo catch by vessel tonnage class by fishing year, and the number of main fishing vessels (smallest number of vessels to account for at least 98% of the catch).
- 3) The number of tows where combined oreo was caught, the number of tows where oreos were targeted, and percentage of tows by target species for all tows targeting or catching oreos, by fishing year.
- 4) The catch in tonnes of unspecified oreo, smooth oreo, and black oreo.
- 5) The CPUE (target catch per tow) and number of target tows by species and fishing year. OEO target catch per tow is the sum of all oreo (OEO, SSO, and BOE) catch from tows where OEO was the nominated target species divided by the sum of the number of tows targeting OEO.

Trends in fleet composition, vessel tonnage, target species, catch, and catch rate are reported for each fishery within OEO 1 and OEO 6 and for OEO 3A and OEO 4. More detailed information on the OEO 3A and OEO 4 black and smooth oreo stocks including stock structure, abundance, and sustainable catch levels was provided in past stock assessments (e.g., Annala et al. 2001).

In the tables, catches under 0.5 t were rounded to zero. Zero also included tows with no recorded catch. Catch rates under 0.1 t per tow were rounded to zero. Zero t per tow also included tows with no recorded catch. The first fishing year listed in each table was the year in which recorded annual total catch was 1 t or more.

3.2 Data sources

Commercial tow-by-tow estimated catch data for all tows that targeted or caught unspecified oreo, black oreo, or smooth oreo were requested from MFish and were transferred and loaded into an Empress database at NIWA, Greta Point. Data from small vessels not completing tow-by-tow catch returns were not included in this analysis. Estimated catch from tow-by-tow data averaged 83% of reported landed catch for OEO 1, 92% for OEO 3A, 98% for OEO 4, and 97% for OEO 6, with variation year by year (Tables 1 and 2).

The data used in this study were checked by MFish and also by NIWA, but some errors remain and can be seen in Figure 2 where some tow positions are on land or in water too shallow or too deep to have been oreo tows. The erroneous data were not considered in the analyses as only data within the area defined for each fishery were analysed.

4. RESULTS

Data from the oreo fisheries from 1977–78 onwards were used in the analyses. Plots of the number of trawls that caught or targeted oreos from for all years (1977–78 to 2000–01) and for the last three fishing years (1998–99 to 2000–01) are shown in Figures 2–5.

The OEO 1 fishstock TACC increased from 5033 to 6044 t in 1992–93 but reverted back to the previous TAC levels in 1998–99. There was a voluntary agreement between the fishing industry and the Minister of Fisheries not to fish for oreos (and orange roughy) in the Puysegur area in 1998–99. The TACC for OEO 6 was increased from 3000 to 6000 t in 1996–97 to encourage exploratory fishing for orange roughy and oreos in the Subantarctic region. The OEO 3A fishstock TAC reduced from 10 106 to 6600 t in 1996–97, to 5900 t in 1999–2000, and to 4400 t in 2000–01 because of concerns about sustainability of the fishery. Total reported landings of oreos and TACs for OEO 1 and OEO 6 are given in Table 3 and for OEO 3A and OEO 4 in Table 4.

4.1 OEO 1 – Southland

Summary

This is primarily a target oreo fishery on flat bottom and dropoffs along the eastern continental slope of the South Island from Timaru to Southland on ground characterised by undersea canyons. It is the largest of the oreo fisheries in OEO 1 and OEO 6 with data from 6415 tows. Peak annual catch was 5302 t in 1985–86. Catches from 1986–87 to 2000–01 have fluctuated with another high of 4786 in 1991–92 and a low of 265 t in 1988–89. Catch rates of smooth oreo and unspecified oreo were mostly higher in the mid 1980s and early 1990s than in the late 1990s. Catch rates of black oreo declined in the mid 1980s, but there are too few target tows to analyse at other times.

Area

The Southland fishery is contained in a polygon that has a northernmost point at 44° 41.3' S, 170° 51.0' E and a southernmost point at 47° 38.1' S, 170° 20.9' E (see Figures 2 and 4). This fishery includes part of OEO 3A due to fishing extending north past the OEO 1-OEO 3A boundary line at 46° S in the last few years of the fishery.

Nation

The Southland area was fished solely by foreign licensed and joint venture vessels up to 1986–87, when New Zealand vessels started fishing. Soviet vessels took most of the catch from 1977–78 to 1987–88. New Zealand catch then increased to dominate from 1991–92 on (Table 5).

Vessel tonnage

Changes in catch by vessel tonnage reflected the change from large Soviet vessels (over 2000 t) at the beginning of the fishery to small and medium New Zealand vessels from about 1987–88 on. Seven fishing years record 10 or more vessels catching oreo (Table 6).

Target species

The main target species was oreo but a small percentage of oreo was caught by tows that targeted orange roughy. The target species switched from mainly black oreo to mainly smooth oreo in 1987–88. An increasing percentage of unspecified oreo target was reported from 1990–91 on (Table 7).

Catch and catch rate

Annual reported catches of black oreo fluctuated throughout the time series with a median of 389 t (1983–84 to 2000–01) and a peak of 2106 t in 1983–84. Smooth oreo made up the largest proportion of oreo catch since 1985–86, except in 1996–97 when the black oreo catch was larger. Total catch of smooth oreo fluctuated about a median of 860 t (from 1983–84 to 1990–2000) and peaked at 4244 t in 1985–86 (Table 8 and Figure 6).

Black oreo catch rates from 1983–84 to 1986–87, when black oreo was the main target species, showed a downward trend in tonnes per tow. The remaining black oreo catch history has insufficient target tows to derive long-term trends in CPUE. A relatively unbroken series of target tows for smooth oreo from 1984–85 on shows an inconsistent trend in target catch rate, although the last nine years had low values compared with previous years (Figure 7). Target catch rate of unspecified oreo from 1991–92 onward also showed an inconsistent, but generally downward, trend up to 1999–2000 but increased in 2000–01 (Table 9).

4.2 OEO 1 – Puysegur

Summary

This fishery occurs on the hills and slopes of the Puysegur Bank area where oreos are caught as the main bycatch of the orange roughy fishery. First reported target fishing for orange roughy was in 1989–90. Oreo catch switched from mainly black oreo to mainly smooth oreo after 1992–93. Oreo target catch rates were variable, and were low for smooth oreo compared to other smooth oreo

fisheries. Catch dropped to 19 t in the 1997–98 fishing year as a result of a voluntary closure of the orange roughy fishery but climbed to 322 t in 1999–2000.

Area

This fishery is contained between 46° 25.2' S – 47° 30.5' S and 164° 46.0' E – 166° 29.5' E (see Figures 2 and 4).

Nation

Fishing was carried out entirely by New Zealand vessels, apart from eight tows by the Japanese in the 1980s (Tables 10 and 12).

Vessels

Vessels in the fishery were mainly under 2000 t (Table 11).

Target species

Oreos were largely a bycatch of the orange roughy fishery, except in 1990–91 when tows catching oreos mainly targeted black oreo and unspecified oreo, and from 1997–98 when orange roughy were no longer targeted due to the closure of the orange roughy fishery (Table 12).

Catch and catch rate

Catches of black oreo were higher than those for smooth oreo up to 1992–93, after which smooth oreo predominated. Peak oreo catch was in 1991–92 (Table 13 and Figure 8). Catch per tow data from targeted tows are available for few years and are variable. Smooth oreo catch rate ranged from 0.28 to 7.64 t per tow (Table 14).

4.3 OEO 1 – Snares

Summary

This is a hill fishery for orange roughy and oreos west of the Snares Islands. The fishery was started in 1990–91 by New Zealand vessels and is closely associated with the Puysegur fishery. Most oreo were caught as a bycatch of orange roughy fishing, with black oreo being the largest component of oreo catch. There was a switch to mainly target fishing for unspecified oreo in the last five fishing years. Black oreo catch peaked at 2298 t in 1992–93. There are insufficient data to infer trends in target CPUE for black oreo and smooth oreo.

Area

This fishery is contained between 47° 41.9' S–48° 24.6' S and 164° 29.1' E–165° 42.5' W (see Figures 2 and 4).

Nation

This fishery was carried out entirely by New Zealand vessels (Table 15).

Vessels

A small number of mainly medium sized (1000–2000 t) vessels carried out this fishery (Table 16).

Target species

Oreos (OEO, SSO, and BOE) were the main target for 7 of the 11 years of the fishery, including the last five years and orange roughy was the main target for the other years (Table 17).

Catch and catch rate

Black oreo was the main oreo species reported caught. Oreo catch peaked in 1992–93 at 2298 t of black oreo and 720 t of smooth oreo, but catches from the last seven years have been much lower (Table 18 and Figure 9). The practice of recording unspecified oreo as target species for most of the series resulted in insufficient data to infer long-term trends in target CPUE for black oreo and smooth oreo (Table 19).

4.4 OEO 1 – Wairarapa

Summary

Oreo was taken mainly as a bycatch to orange roughy target fishing, but there was some target fishing for OEO and SSO from 1995–96 on. The main catch was smooth oreo and less than 200 t per year was taken from 1980–81 to 1999–2000, but this jumped to 813 t in 2000–01.

Area

This fishery is contained within the polygon defined by 41° 17.4' S, 175° 18.4' E; 42° 4.7' S, 175° 20.4' E; 42° 3.2' S, 176° 38.1' E; 41° 26.6' S, 177° 49.7' E; 40° 43.5' S, 177° 57.9' E; 40° 24.9' S, 176° 15.6' E (see Figures 2 and 4).

Nation

Soviet and Japanese vessels were involved in the first three years of the fishery, but the rest of the series was carried out by New Zealand vessels (Table 20).

Vessels

The New Zealand vessels were mainly under 1000 t (Table 21).

Target species

Oreos were caught mainly during target fishing for orange roughy. There was some target fishing for OEO and SSO from 1995–96 on (Table 22).

Catch and catch rate

Smooth oreo was the main species caught with annual catches less than 200 t from 1980–81 to 1999–2000. Smooth oreo catch jumped to 813 t in 2000–01 (Table 23 and Figure 10). Before 1999–2000, catch rates for OEO and SSO were low, less than 3 t per tow (Table 24).

4.5 OEO 1 – North of 45° S excluding Wairarapa

Summary

Oreo was caught mainly as a bycatch to orange roughy fishing on the west coasts of the North and South Islands, the Challenger Plateau, and the east coast of the North Island. A fishery developed within this area concentrating on deep hills on the abyssal plain north of the mid Chatham Rise with reported catch from only the last six years. This fishery (Abyssal Hills) area is not reported in detail due to the commercial sensitivity of these data. Some unspecified oreo and smooth oreo target fishing by New Zealand vessels started from 1995–96 onwards. Insufficient data are available to characterise separate fisheries within this area, other than for the Abyssal Hills fishery, or to infer trends in CPUE for black oreo and smooth oreo.

Area

This area comprises the remainder of oreo management area OEO 1 north of 45° S (see Figures 2 and 4).

Nation

This fishery was carried out by vessels of various nationalities from 1977–78 to 1983–84, and was then carried predominantly by New Zealand vessels (Table 25).

Vessels

A mix of vessel sizes was used throughout the fishery (Table 26). New Zealand vessels were mainly under 1000 t.

Target species

Oreos were caught mainly during target fishing for orange roughy. There was some targeting of OEO and SSO from 1995–96 onwards (Table 27).

Catch and catch rate

Smooth oreo was the main oreo species caught in this fishery, with a peak catch of 724 t in 1996–97 (Table 28). There are insufficient oreo target catch data to derive long-term trends in target CPUE (Table 29).

4.6 OEO 6 – Auckland Islands

Summary

This is a target hill fishery for smooth oreo and orange roughly and was carried out mainly by New Zealand vessels from 1990–91 on. The highest smooth oreo catch was 658 t in 1998–99. There were insufficient target catch rate data to derive long-term trends in CPUE.

Area

This fishery lies between 49° 25.9' S–51° 37.5' S and 164° 11.3' E–167° 11.9' E (see Figures 3 and 5).

Nation

There was limited Soviet fishing in 1981–82 and 1985–86. New Zealand vessels fished on hills from 1990–91 onwards (Table 30).

Vessels

This fishery included a variety of vessel sizes. There was a maximum of six main vessels in 1996–97 (Table 31).

Target species

The early Soviet fishing targeted smooth oreo and black oreo. SSO and OEO were the main target species in 1992–93, 1994–95, and 1999–2000, but oreo was caught mostly as a bycatch of orange roughly target fishing for the remainder of the time (Table 32).

Catch and catch rate

Catches of black oreo were small or zero. Catches of smooth oreo were in the hundreds of tonnes from 1992–93 onwards with a peak of 658 t in 1998–99 (Table 33 and Figure 11). There are insufficient data to derive long-term trends in CPUE (Table 34).

4.7 OEO 6 – Bounty Plateau

Summary

This flat bottom and dropoff target oreo fishery along the north slope of the Bounty Plateau was fished infrequently by foreign vessels in early years, with increased New Zealand effort and a peak total oreo catch of 1282 t in 1994–95. There are insufficient target tows to derive long-term trends in CPUE.

Area

This fishery lies between 46° 29.3' S–47° 60.0' S and 176° 23.8' E–178° 8.4' W (see Figures 3 and 5).

Nation

Soviet vessels undertook some trawling in the early 1980s with a peak of 59 tows in 1983–84. Mainly New Zealand vessels were involved from 1990–91 onward (Table 35).

Vessels

Most vessels fishing in this area were over 1000 t, except from 1995–96 to 1997–98 when vessels less than 1000 t predominated. A maximum of eight vessels were involved in 1998–99 (Table 36).

Target species

Soviet vessels targeted black oreo and smooth oreo with similar catches of each species in 1983–84. New Zealand vessels targeted mainly smooth oreo and unspecified oreo, but there was some targeting of orange roughy after 1993–94 (Table 37).

Catch and catch rate

The Soviet catch in 1983–84 was 628 t of black oreo and 525 t of smooth oreo. New Zealand catches of smooth oreo increased in recent years due to exploratory fishing in OEO 6, but little black oreo was reported caught (Table 38 and Figure 12). From 1993–94 onwards target CPUE for smooth oreo and unspecified oreo appears variable (Table 39).

4.8 OEO 6 – Pukaki Rise (east)

Summary

This flat bottom and dropoff target oreo fishery along the northeast slope of the Pukaki Rise was fished by Soviet vessels from 1978–79 to 1985–86, mainly catching black oreo. Peak black oreo catch was 3118 t in 1980–81. Substantial New Zealand fishing began in 1994–95. The target species switched to mainly orange roughy in 1995–96 and 1996–97. Soviet black oreo target CPUE showed a downward trend. New Zealand unspecified oreo target CPUE had a declining trend and smooth oreo target CPUE was variable.

Area

This fishery lies between 47° 57.8' S–50° 17.6' S and 174° 20.1' E–176° 27.2' E (see Figures 3 and 5).

Nation

This fishery involved mainly Soviet vessels from 1978–79 to 1985–86 and New Zealand vessels from 1994–95 on (Table 40).

Vessels

Large Soviet vessels (over 2000 t) were used in the early years with medium sized New Zealand vessels (1000–2000 t) in later years (Table 41).

Target species

Soviet vessels mostly targeted black oreo from 1980–81 to 1985–86 and New Zealand vessels targeted unspecified oreo or smooth oreo from 1994–95 on, except in 1995–96 and 1996–97 when orange roughy was the main target species (Table 42).

Catch and catch rate

There were two years of substantial catch of black oreo (1980–81 and 1981–82) by Soviet vessels and increasing catches of black oreo and smooth oreo were reported by New Zealand vessels from 1994–95 on (Table 43 and Figure 13). There was a declining trend in target CPUE for black oreo from 1980–81 to 1984–85. Target catch per tow for unspecified oreo declined from 1994–95 on but remained relatively high and smooth oreo target CPUE was variable (Table 44 and Figure 14).

4.9 OEO 6 – Pukaki Rise (west)

Summary

This is a flat bottom and dropoff target oreo fishery along the north slope of the Pukaki Rise and Korean and Soviet vessels took substantial catches in 1983–84 and 1984–85, but recent catches are small and there was a low level of fishing effort by all nations. Main target species was black oreo or other species. The peak black oreo catch of 1196 t was in 1984–85. There was little New Zealand fishing in the area and there are insufficient data available to infer trends in target CPUE.

Area

This fishery lies between 47° 55.5' S–49° 43.2' S and 167° 52.1' E–173° 16.5' E (see Figures 3 and 5).

Nation

Effort by Koreans plus Soviets peaked in 1983–84 and by Koreans only in 1984–85. Various nationalities fished in other years, including Norway and New Zealand (Table 45).

Vessels

Large Soviet vessels (over 2000 t) were used from 1978–79 to 1983–84 and small Korean vessels (under 1000 t) from 1983–84 to 1985–86. Various sized vessels fished from 1987–88 onwards (Table 46).

Target species

There was target fishing for species other than oreos or orange roughy throughout the time series. Black oreo and other species were targeted during the main period of fishing from 1977–78 to 1985–86. There was some target fishing for orange roughy in 1992–93 and 1995–96 and some target fishing for OEO in the last three years (Table 47).

Catch and catch rate

Substantial catches of black oreo were made in 1983–84, with a peak catch of 1196 t in 1984–85 (Table 48). There are insufficient data to infer trends in oreo target CPUE (Table 49).

4.10 OEO 6 – Macquarie Ridge

Summary

This is a developing New Zealand fishery on hills and dropoffs. The main target was unspecified oreo, but there was also some orange roughy target fishing. Smooth oreo was the main catch with 615 t in 1996–97, which rose to 1294 t in 2000–01.

Area

This fishery is contained between 48° 59.2' S, 162° 57.7' E; 51° 17.5' S, 160° 48.5' E; 52° 34.1' S, 162° 31.5' E; 48° 59.2' S, 165° 44.5' E, (see Figures 3 and 5).

Nation

This fishery was carried out almost entirely by New Zealand vessels (Table 50).

Vessels

Mainly medium sized (1000–2000 t) vessels (Table 51).

Target species

There were relatively few (less than 50 per year) target tows before 1996–97. From 1996–97 on, the main target was OEO or SSO with some (9–21%) orange roughy target tows (Table 52).

Catch and catch rate

Substantial catches of smooth oreo were made from 1996–97 on (Table 53 and Figure 15). Target CPUE for unspecified oreo and smooth oreo was variable (Table 54).

4.11 OEO 3A and OEO 4 – South Chatham Rise

Summary

This fishery is a flat bottom, dropoff, and hill fishery with target oreo fishing predominating at the west end of the south Chatham Rise (OEO 3A), and oreo bycatch to orange roughy fishing at the east end (OEO 4). It is the largest (reported oreo catch of 14 832 t in OEO 3A and 10 269 t in OEO 4 in

1980–81) and oldest (from 1972 to the present) deepwater fishery in the EEZ. It was dominated by Soviet vessels in the early years, but is now almost entirely fished by New Zealand vessels.

Area

The OEO 3A fishery covers the Chatham Rise west of 176° E, excluding the part of OEO 3A that falls within the Southland fishery. The OEO 4 fishery is on the Chatham Rise east of 176° E (see Figures 2 and 4).

Nation

The OEO 3A fishery was dominated by Soviet vessels up to 1986–87, and then by New Zealand vessels (Table 55). The OEO 4 fishery was predominantly Soviet up to 1984–85 and New Zealand thereafter (Table 56).

Vessels

Soviet vessels in OEO 3A and OEO 4 were mainly large (over 2000 t) and New Zealand vessels a mix of small (under 1000 t) and medium sized (under 2000 t) (Tables 57 and 58).

Target species

Soviet vessels (mainly) fishing in OEO 3A initially targeted unspecified oreo, then black oreo, then black oreo and smooth oreo. New Zealand vessels targeted smooth oreo initially then unspecified oreo and smooth oreo. In the last three years there was an increase in the proportion of black oreo target fishing (and decrease in the smooth oreo target fishing) because of a voluntary catch limit of 1300 t smooth oreo introduced in 1998–99 (Table 59). In OEO 4 Soviet vessels initially targeted unspecified oreo, then black oreo, smooth oreo, and increasingly orange roughy. New Zealand vessels mostly targeted orange roughy (Table 60).

Catch and catch rate

In OEO 3A, black oreo dominated catches from 1979–80 to 1983–84, reflecting the Soviet preference for that species. Smooth oreo predominated in all but four of the years to 1997–98. In the last three years the catch of smooth oreo was lower because of the catch limit for that species (Table 61 and Figure 16). In OEO 4, black oreo catches were predominant in only 1979–80 and 1980–81 with smooth oreo then predominant (Table 62 and Figure 17).

Target catch per tow for black oreo in OEO 3A declined initially, but fluctuated in later years (Table 63 and Figure 18) although that for smooth oreo appears to have declined (Table 63 and Figure 19). Target catch per tow for black oreo in OEO 4 fluctuated and there are too few data in the last 11 years of the fishery to comment. Target catch per tow for smooth oreo appears to have declined in the early years (1979–80 to 1990–91) (Table 64), but fluctuated in later years (Table 64 and Figure 20).

5. REFERENCES

- Annala, J.H.; Sullivan, K.J.; O'Brien, C.J.; Smith, N.W.McL (comps) (2001). Report from the Fishery Assessment Plenary, May 2001: stock assessments and yield estimates. 515 p. (Unpublished report held in NIWA library, Wellington.)
- Coburn, R.P.; Doonan, I.J.; McMillan, P.J. (1999). Black oreo abundance indices from standardised catch per unit of effort data for OEO 3A. *New Zealand Fisheries Assessment Research Document 99/32*. 18 p. (Unpublished report held in NIWA library, Wellington.)
- Coburn, R.P.; Doonan, I.J.; McMillan, P.J. (2001a). Smooth oreo abundance indices from standardised catch per unit of effort data for OEO 4. *New Zealand Fisheries Assessment Report 2001/11*. 39 p.
- Coburn, R.P.; Doonan, I.J.; McMillan, P.J. (2001b). Black oreo abundance indices from standardised catch per unit of effort data for OEO 4. *New Zealand Fisheries Assessment Report 2001/39*. 24 p.

- Doonan, I.J.; McMillan, P.J.; Coburn, R.P.; Hart, A.C.; Cordue, P.L. (1995). Assessment of smooth oreo for 1995. New Zealand Fisheries Assessment Research Document 95/12. 31 p. (Unpublished report held in NIWA library, Wellington.)
- McMillan, P.J.; Doonan, I.J.; Hart, A.C.; Coburn, R.P. (2001). Oreo stock assessment 2000–01. Final Research Report for Ministry of Fisheries, Project OEO2000/02, Objectives 1–3. 74 p. (Unpublished report held by Ministry of Fisheries, Wellington.)

Table 1: Total reported oreo catch for oreo management areas OEO 1 and OEO 6, total oreo catch from the tow-by-tow database, and percentage data captured in tow-by-tow database.

Fishing year	OEO 1 total oreo catch		OEO 6 total oreo catch		% of tow-by-tow data	
	Reported	Tow by tow	Reported	Tow by tow	OEO 1	OEO 6
1978-79*	2 808	2 818	17	3	100	-
1979-80*	143	130	18	20	91	-
1980-81*	467	480	283	0	103	0
1981-82*	21	1	4 380	3 221	-	74
1982-83*	162	15	765	1 929	9	252
1983-83#	39	0	354	436	-	123
1983-84†	3 241	3 424	3 568	3 092	106	87
1984-85†	1 480	1 747	2 044	1 853	118	91
1985-86†	5 390	5 724	126	126	106	100
1986-87†	532	296	0	0	56	-
1987-88†	1 193	1 047	197	249	88	126
1988-89†	432	266	0	0	62	-
1989-90†	2 069	1 628	0	0	79	-
1990-91†	4 563	3 373	288	304	74	106
1991-92†	4 156	3 292	33	17	79	-
1992-93†	5 739	5 404	815	599	94	74
1993-94†	4 910	4 395	983	872	90	89
1994-95†	1 483	1 137	2 528	2 232	77	88
1995-96†	4 783	3 824	4 435	3 823	80	86
1996-97†	5 181	4 168	5 645	5 188	81	92
1997-98†	2 681	2 518	5 222	4 819	94	92
1998-99†	4 102	3 537	5 287	4 726	84	88
1999-00†	3 711	3 215	5 914	5 392	87	91
2000-01†	4 852	3 242	5 932	5 263	67	89

Source: FSU from 1977-78 to 1987-88; QMS/ITD from 1988-89 to 2000-01. *, 1 April to 31 March; #, 1 April to 30 September; †, 1 October to 30 September.

Table 2: Total reported oreo catch for oreo management areas OEO 3A and OEO 4, total oreo catch from tow by-tow-data and percentage data captured in tow-by-tow data.

Fishing year	OEO 3A total oreo catch		OEO 4 total oreo catch		Percentage captured in tow by tow data	
	Reported	Tow by tow	Reported	Tow by tow	OEO 3A	OEO 4
1978-79*	1 366	1 360	8 041	8 150	100	101
1979-80*	10 958	8	680	652	<1	96
1980-81*	14 832	15 076	10 269	5 057	102	49
1981-82*	12 750	21 497	9 296	8 625	169	93
1982-83#	8 576	6 493	3 927	7 217	76	184
1983-83†	4 409	9 162	3 209	6 041	208	188
1983-84†	9 190	9 090	6 104	6 158	99	101
1984-85†	8 284	6 613	6 390	6 420	80	101
1985-86†	5 331	4 721	5 883	5 826	89	99
1986-87†	7 222	7 087	6 830	6 813	98	100
1987-88†	9 049	8 932	8 674	8 539	99	98
1988-89†	10 191	8 587	8 447	7 524	84	89
1989-90†	9 286	7 850	7 348	5 804	85	79
1990-91†	9 827	8 727	6 936	6 114	89	88
1991-92†	10 072	5 021	7 457	6 493	50	87
1992-93†	9 290	7 480	7 976	6 241	81	78
1993-94†	9 106	8 241	8 319	6 869	91	83
1994-95†	6 600	5 626	7 680	6 488	85	85
1995-96†	7 786	7 038	6 806	5 834	90	86
1996-97†	6 991	6 655	6 962	6 135	95	88
1997-98†	6 336	5 459	7 010	6 373	86	91
1998-99†	5 763	5 234	6 931	6 502	91	94
1999-00†	5 859	3 974	7 034	6 522	68	93
2000-01†	4 577	3 691	7 358	6 818	81	93

Source: FSU from 1977-78 to 1987-88; QMS/ITD from 1988-89 to 2000-01. *, 1 April to 31 March; #, 1 April to 30 September; †, 1 October to 30 September.

Table 3: Total reported landings (t) for all oreo species for oreo management areas OEO 1 and OEO 6 from 1978-79 to 2000-01 and TACs (t) from 1982-83 to 2000-01.

Fishing year	OEO 1		OEO 6	
	Landings	TAC	Landings	TAC
1978-79*	2 808	-	17	-
1979-80*	143	-	18	-
1980-81*	467	-	283	-
1981-82*	21	-	4 380	-
1982-83*	162	-	765	-
1983-83#	39	-	354	-
1983-84†	3 241	-	3 568	-
1984-85†	1 480	-	2 044	-
1985-86†	5 390	-	126	-
1986-87†	532	4 000	0	3 000
1987-88†	1 193	4 000	197	3 000
1988-89†	432	4 233	7	3 000
1989-90†	2 069	5 033	0	3 000
1990-91†	4 563	5 033	288	3 000
1991-92†	4 156	5 033	33	3 000
1992-93†	5 739	6 044	815	3 000
1993-94†	4 910	6 044	983	3 000
1994-95†	1 483	6 044	2 528	3 000
1995-96†	4 783	6 044	4 435	3 000
1996-97†	5 181	6 044	5 645	6 000
1997-98†	2 681	6 044	5 222	6 000
1998-99†	4 102	5 033	5 287	6 000
1999-00†	3 711	5 033	5 914	6 000
2000-01†	4 852	5 033	5 932	6 000

Source: FSU from 1977-78 to 1987-88; QMS/ITD from 1988-89 to 2000-01. *, 1 April to 31 March; #, 1 April to 30 September; †, 1 October to 30 September.

Table 4: Total reported landings (t) for all oreo species for OEO 3A and OEO 4 from 1978-79 to 2000-01 and TACs (t) from 1982-83 to 2000-01.

Fishing year	OEO 3A		OEO 4	
	Landings	TAC	Landings	TAC
1978-79*	1 366	-	8 041	-
1979-80*	10 958	-	680	-
1980-81*	14 832	-	10 269	-
1981-82*	12 750	-	9 296	-
1982-83*	8 576	10 000	3 927	6 750
1983-83#	4 409	#	3 209	#
1983-84†	9 190	10 000	6 104	6 750
1984-85†	8 284	10 000	6 390	6 750
1985-86†	5 331	10 000	5 883	6 750
1986-87†	7 222	10 000	6 830	6 750
1987-88†	9 049	10 000	8 674	7 000
1988-89†	10 191	10 000	8 447	7 000
1989-90†	9 286	10 106	7 348	7 000
1990-91†	9 827	10 106	6 936	7 000
1991-92†	10 072	10 106	7 457	7 000
1992-93†	9 290	10 106	7 976	7 000
1993-94†	9 106	10 106	8 319	7 000
1994-95†	6 600	10 106	7 680	7 000
1995-96†	7 786	10 106	6 806	7 000
1996-97†	6 991	6 600	6 962	7 000
1997-98†	6 336	6 600	7 010	7 000
1998-99†	5 763	6 600	6 931	7 000
1999-00†	5 859	5 900	7 034	7 000
2000-01†	4 577	4 400	7 358	7 000

Source: FSU from 1977-78 to 1987-88; QMS/ITD from 1988-89 to 2000-01. *, 1 April to 31 March; #, 1 April to 30 September; †, 1 October to 30 September.

Table 5: Southland. Percentage of oreo catch (combined) by nation and fishing year. NA, unknown nationality; DOM, New Zealand; JAP, Japanese; KOR, Korean; NOR, Norwegian; RUS, Soviet/Russian; PAN, Panamanian; BZE, Belizean; POL, Polish.

	NA	DOM	JAP	KOR	NOR	RUS
1977-78	31	0	0	0	0	69
1978-79	0	0	0	0	0	100
1979-80	0	0	0	0	0	100
1980-81	0	0	0	0	0	100
1981-82	0	0	100	0	0	0
1982-83	0	0	0	0	0	0
1983-84	0	0	0	5	0	95
1984-85	0	0	6	47	0	47
1985-86	0	0	4	22	0	74
1986-87	0	17	0	35	0	48
1987-88	0	36	19	4	0	41
1988-89	0	81	0	19	0	0
1989-90	0	42	0	10	49	0
1990-91	0	58	0	7	35	0
1991-92	0	100	0	0	0	0
1992-93	0	100	0	0	0	0
1993-94	0	100	0	0	0	0
1994-95	0	84	0	16	0	0
1995-96	0	77	0	22	0	0
1996-97	0	84	0	16	0	0
1997-98	0	88	0	12	0	0
1998-99	0	100	0	0	0	0
1999-00	0	75	0	25	0	0
2000-01	0	99	0	1	0	0

Table 6: Southland. Percentage of oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. - data from fewer than four vessels or where combined catch was less than 1 t.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1977-78	7	0	0	93	8
1978-79	0	0	0	100	-
1979-80	0	0	0	100	-
1980-81	0	100	0	0	-
1981-82	0	0	0	100	-
1982-83	0	0	0	0	-
1983-84	0	5	0	95	8
1984-85	0	47	6	47	9
1985-86	0	22	4	74	11
1986-87	0	52	0	48	7
1987-88	0	14	26	60	6
1988-89	0	74	26	0	5
1989-90	0	98	2	0	7
1990-91	0	55	45	0	6
1991-92	0	94	5	0	13
1992-93	0	84	15	0	14
1993-94	0	51	49	0	9
1994-95	0	79	21	0	6
1995-96	0	64	36	0	15
1996-97	0	94	6	0	12
1997-98	0	84	16	0	13
1998-99	0	83	15	2	12
1999-00	0	55	45	0	8
2000-01	0	8	92	0	7

Table 7: Southland. Number of tows where oreos were caught (n.total), the number of oreo target tows (n.target) and percentage of tows by target species for all tows catching oreos, by fishing year. OEO, unspecified oreo; SSO, smooth oreo; BOE, black oreo; ORH, orange roughy; Other, other species.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1977-78	406	314	77	0	0	0	23
1978-79	29	28	0	0	97	0	3
1979-80	86	85	84	3	12	0	1
1980-81	1	0	0	0	0	0	100
1981-82	1	0	0	0	0	0	100
1982-83	1	1	0	0	100	0	0
1983-84	502	498	0	55	45	0	1
1984-85	244	241	0	36	62	0	1
1985-86	800	797	6	71	23	0	0
1986-87	101	101	0	43	57	0	0
1987-88	226	220	0	85	12	0	3
1988-89	31	27	10	55	23	13	0
1989-90	164	161	6	92	0	0	2
1990-91	156	150	16	79	1	0	4
1991-92	474	466	34	61	3	1	0
1992-93	356	336	29	64	1	5	0
1993-94	226	209	61	23	9	6	1
1994-95	172	163	85	7	3	4	1
1995-96	341	317	64	14	14	7	0
1996-97	535	531	51	39	10	0	1
1997-98	263	249	59	34	1	5	1
1998-99	410	404	60	31	7	0	1
1999-00	496	460	31	58	3	0	7
2000-01	394	388	72	19	7	1	1

Table 8: Southland. Catch of unspecified oreo (OEO), smooth oreo (SSO), and black oreo (BOE) by fishing year.

	Catch (t)		
	OEO	SSO	BOE
1977-78	2 747	0	0
1978-79	0	13	113
1979-80	410	1	67
1980-81	0	0	0
1981-82	0	0	0
1982-83	0	0	0
1983-84	0	1 268	2 106
1984-85	0	883	1 004
1985-86	0	4 244	1 058
1986-87	0	156	148
1987-88	0	915	138
1988-89	0	196	69
1989-90	0	586	187
1990-91	1	661	389
1991-92	150	3 454	1 182
1992-93	234	860	238
1993-94	43	632	228
1994-95	5	456	389
1995-96	113	1 087	744
1996-97	23	610	1 625
1997-98	10	663	251
1998-99	1	1 050	404
1999-00	0	978	440
2000-01	0	1 759	151

Table 9: Southland. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1977-78	6.59	314	0	0	0	0
1978-79	0	0	0	0	3.91	28
1979-80	6.59	72	0.19	3	0.20	10
1980-81	0	0	0	0	0	0
1981-82	0	0	0	0	0	0
1982-83	0	0	0	0	0	1
1983-84	0	0	3.37	274	5.69	224
1984-85	0	0	6.71	89	5.47	152
1985-86	3.68	51	6.83	566	3.48	180
1986-87	0	0	1.74	43	2.26	58
1987-88	0	0	4.57	192	2.39	28
1988-89	0.12	3	7.51	17	7.09	7
1989-90	8.61	10	3.85	151	0	0
1990-91	10.02	25	4.98	124	0	1
1991-92	9.27	163	8.97	291	4.27	12
1992-93	4.69	105	2.69	229	4.28	2
1993-94	4.94	138	2.07	51	1.69	20
1994-95	5.54	146	1.22	12	1.40	5
1995-96	6.57	219	2.13	49	5.36	49
1996-97	4.25	273	1.61	206	4.24	52
1997-98	3.32	156	2.59	90	4.67	3
1998-99	3.59	248	2.57	129	1.20	27
1999-00	2.84	155	2.36	289	1.08	16
2000-01	5.80	285	1.71	76	2.25	27

Table 10: Puysegur. Percentage oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	DOM	JAP
1983-84	0	100
1984-85	0	0
1985-86	0	100
1986-87	0	100
1987-88	0	0
1988-89	0	0
1989-90	100	0
1990-91	100	0
1991-92	100	0
1992-93	100	0
1993-94	100	0
1994-95	100	0
1995-96	100	0
1996-97	100	0
1997-98	100	0
1998-99	100	0
1999-00	100	0
2000-01	100	0

Table 11: Puysegur. Percentage oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. – data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1983–84	0	0	0	100	–
1984–85	0	0	0	0	0
1985–86	0	0	100	0	–
1986–87	100	0	0	0	–
1987–88	0	0	0	0	0
1988–89	0	0	0	0	0
1989–90	0	0	100	0	–
1990–91	0	1	99	0	–
1991–92	0	45	55	0	12
1992–93	0	67	16	18	12
1993–94	0	14	61	25	6
1994–95	0	13	87	0	–
1995–96	0	53	47	0	6
1996–97	0	19	81	0	5
1997–98	0	100	0	0	–
1998–99	0	99	0	1	–
1999–00	0	100	0	0	–
2000–01	0	99	1	0	–

Table 12: Puysegur. Number of tows where oreos were caught, number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1983–84	3	0	0	0	0	0	100
1984–85	0	0	0	0	0	0	0
1985–86	1	0	0	0	0	0	100
1986–87	4	0	0	0	0	0	100
1987–88	0	0	0	0	0	0	0
1988–89	0	0	0	0	0	0	0
1989–90	70	6	0	9	0	91	0
1990–91	231	159	24	10	35	31	0
1991–92	535	54	0	8	1	90	0
1992–93	464	143	15	9	7	69	0
1993–94	472	20	4	1	0	96	0
1994–95	123	48	39	0	0	61	0
1995–96	209	51	21	4	0	75	0
1996–97	132	43	33	0	0	67	0
1997–98	4	4	100	0	0	0	0
1998–99	12	11	92	0	0	0	8
1999–00	84	84	30	70	0	0	0
2000–01	33	32	0	97	0	0	3

Table 13: Puysegur. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1983-84	0	0	0
1984-85	0	0	0
1985-86	0	0	0
1986-87	0	0	0
1987-88	0	0	0
1988-89	0	0	0
1989-90	0	178	660
1990-91	15	403	1 687
1991-92	147	477	1 806
1992-93	271	417	1 214
1993-94	18	1 022	884
1994-95	0	459	69
1995-96	0	445	165
1996-97	3	244	126
1997-98	19	0	0
1998-99	6	190	0
1999-00	0	168	154
2000-01	0	246	2

Table 14: Puysegur. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	OEO		SSO		BOE	
		n		n		n
1983-84	0	0	0	0	0	0
1984-85	0	0	0	0	0	0
1985-86	0	0	0	0	0	0
1986-87	0	0	0	0	0	0
1987-88	0	0	0	0	0	0
1988-89	0	0	0	0	0	0
1989-90	0	0	0.50	6	0	0
1990-91	13.5	56	0.53	22	8.35	81
1991-92	0	2	0.86	44	4.81	8
1992-93	2.98	69	1.95	42	7.29	32
1993-94	5.41	17	0.50	3	0	0
1994-95	4.57	48	0	0	0	0
1995-96	7.75	43	0.28	8	0	0
1996-97	6.60	43	0	0	0	0
1997-98	4.63	4	0	0	0	0
1998-99	17.74	11	0	0	0	0
1999-00	7.58	25	1.61	59	0	0
2000-01	0	0	7.64	32	0	0

Table 15: Snares. Percentage of oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	DOM
1990-91	100
1991-92	100
1992-93	100
1993-94	100
1994-95	100
1995-96	100
1996-97	100
1997-98	100
1998-99	100
1999-00	100
2000-01	100

Table 16: Snares. Percentage of oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. - data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n	
1990-91		0	0	100	0	-
1991-92		0	43	57	0	-
1992-93		0	30	62	8	5
1993-94		0	9	46	45	6
1994-95		0	22	76	2	5
1995-96		0	46	54	0	4
1996-97		0	18	82	0	-
1997-98		0	66	34	0	4
1998-99		0	64	36	0	5
1999-00		0	10	90	0	-
2000-01		0	0	100	0	-

Table 17: Snares. The number of tows where oreos were caught, number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1990-91	20	10	40	10	0	50	0
1991-92	21	9	0	43	0	57	0
1992-93	387	244	37	10	16	37	0
1993-94	343	68	15	3	1	80	0
1994-95	61	36	54	0	5	41	0
1995-96	127	63	37	9	3	49	2
1996-97	92	68	66	7	1	25	1
1997-98	68	61	69	16	4	10	0
1998-99	87	85	67	22	9	2	0
1999-00	119	118	45	50	4	1	0
2000-01	64	64	95	0	5	0	0

Table 18: Snares. Catch of unspecified oreo, smooth oreo, and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1990-91	0	38	189
1991-92	0	99	274
1992-93	0	720	2 298
1993-94	10	656	1 687
1994-95	5	114	181
1995-96	0	237	561
1996-97	12	251	455
1997-98	60	76	83
1998-99	0	324	105
1999-00	0	279	266
2000-01	0	69	79

Table 19: Snares. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	OEO		SSO		BOE	
	t per tow	n	t per tow	n	t per tow	n
1990-91	19.5	8	0.09	2	0	0
1991-92	0	0	8.80	9	0	0
1992-93	6.98	143	1.55	38	7.52	63
1993-94	10.32	53	3.96	10	2.90	5
1994-95	5.33	33	0	0	1.26	3
1995-96	9.17	47	0.91	12	2.93	4
1996-97	9.78	61	0.17	6	3.00	1
1997-98	2.76	47	2.02	11	2.00	3
1998-99	5.24	58	4.37	19	1.64	8
1999-00	3.36	53	3.46	60	2.00	5
2000-01	2.24	61	0	0	3.15	3

Table 20: Wairarapa. Percentage oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	DOM	JAP	RUS
1980-81	0	0	100
1981-82	0	11	89
1982-83	89	11	0
1983-84	100	0	0
1984-85	100	0	0
1985-86	100	0	0
1986-87	100	0	0
1987-88	100	0	0
1988-89	100	0	0
1989-90	100	0	0
1990-91	100	0	0
1991-92	100	0	0
1992-93	100	0	0
1993-94	100	0	0
1994-95	100	0	0
1995-96	100	0	0
1996-97	100	0	0
1997-98	100	0	0
1998-99	100	0	0
1999-00	100	0	0
2000-01	100	0	0

Table 21: Wairarapa. Percentage oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. - data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1980-81	0	100	0	0	-
1981-82	0	0	0	100	-
1982-83	0	19	71	11	7
1983-84	0	100	0	0	6
1984-85	0	100	0	0	7
1985-86	0	100	0	0	6
1986-87	0	100	0	0	5
1987-88	0	100	0	0	4
1988-89	0	100	0	0	5
1989-90	0	99	1	0	6
1990-91	0	100	0	0	7
1991-92	0	100	0	0	7
1992-93	0	100	0	0	6
1993-94	0	100	0	0	11
1994-95	0	100	0	0	9
1995-96	0	100	0	0	7
1996-97	0	99	1	0	9
1997-98	0	100	0	0	6
1998-99	0	100	0	0	7
1999-00	0	100	0	0	5
2000-01	0	100	0	0	4

Table 22: Wairarapa. The number of tows where oreos were caught, the number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1980-81	1	0	0	0	0	0	100
1981-82	48	0	0	0	0	100	0
1982-83	137	1	1	0	0	79	20
1983-84	956	0	0	0	0	93	7
1984-85	472	6	0	1	0	95	4
1985-86	75	20	0	27	0	64	9
1986-87	165	1	1	0	0	68	31
1987-88	76	0	0	0	0	86	14
1988-89	80	2	0	3	0	94	4
1989-90	122	58	0	48	0	48	5
1990-91	193	33	5	12	0	78	5
1991-92	320	22	1	6	0	89	4
1992-93	308	43	0	14	0	84	2
1993-94	288	10	0	3	0	77	19
1994-95	250	14	0	5	0	90	4
1995-96	181	62	22	12	0	58	8
1996-97	155	78	39	12	0	25	25
1997-98	160	101	51	13	0	31	6
1998-99	136	50	23	14	0	51	12
1999-00	163	68	17	25	0	49	9
2000-01	236	168	28	43	0	25	4

Table 23: Wairarapa. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1980-81	0	1	0
1981-82	0	24	0
1982-83	151	28	1
1983-84	158	51	0
1984-85	13	62	4
1985-86	0	45	0
1986-87	0	74	2
1987-88	0	27	1
1988-89	0	25	1
1989-90	0	180	0
1990-91	2	138	9
1991-92	2	112	15
1992-93	2	138	1
1993-94	13	85	11
1994-95	8	88	2
1995-96	9	59	1
1996-97	9	34	5
1997-98	3	82	1
1998-99	0	70	3
1999-00	2	129	6
2000-01	15	813	42

Table 24: Wairarapa. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	OEO		SSO		BOE	
	t per tow	n	t per tow	n	t per tow	n
1980-81	0	0	0	0	0	0
1981-82	0	0	0	0	0	0
1982-83	1.08	1	0	0	0	0
1983-84	0	0	0	0	0	0
1984-85	0	0	1.32	6	0	0
1985-86	0	0	1.38	20	0	0
1986-87	0.03	1	0	0	0	0
1987-88	0	0	0	0	0	0
1988-89	0	0	0.45	2	0	0
1989-90	0	0	1.68	58	0	0
1990-91	0.45	9	1.93	24	0	0
1991-92	0.20	2	0.90	20	0	0
1992-93	0	0	0.86	43	0	0
1993-94	0	0	0.34	10	0	0
1994-95	0.10	1	0.56	13	0	0
1995-96	0.49	40	0.47	22	0	0
1996-97	0.26	60	0.70	18	0	0
1997-98	0.37	81	1.51	20	0	0
1998-99	0.82	31	0.56	19	0	0
1999-00	1.12	28	2.11	40	0	0
2000-01	8.09	66	3.16	102	0	0

Table 25: OEO 1 north of 45° S excluding Wairarapa. Percentage of oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	NA	DOM	JAP	KOR	NOR	PAN	RUS
1977-78	0	0	0	100	0	0	0
1978-79	58	0	40	1	0	0	0
1979-80	0	0	99	1	0	0	0
1980-81	0	0	88	12	0	0	0
1981-82	0	0	18	1	0	0	80
1982-83	0	99	0	1	0	0	0
1983-84	0	10	3	0	0	0	87
1984-85	0	80	20	0	0	0	0
1985-86	0	100	0	0	0	0	0
1986-87	0	98	1	1	0	0	0
1987-88	0	53	47	0	0	0	0
1988-89	0	98	1	0	0	0	0
1989-90	0	94	0	6	0	0	0
1990-91	0	88	1	0	11	0	0
1991-92	0	100	0	0	0	0	0
1992-93	0	98	0	0	2	0	0
1993-94	0	100	0	0	0	0	0
1994-95	0	100	0	0	0	0	0
1995-96	0	100	0	0	0	0	0
1996-97	0	100	0	0	0	0	0
1997-98	0	100	0	0	0	0	0
1998-99	0	99	0	0	0	1	0
1999-00	0	100	0	0	0	0	0
2000-01	0	100	0	0	0	0	0

Table 26: OEO 1 north of 45° S excluding Wairarapa. Percentage of oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. -- data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1977-78	0	100	0	0	-
1978-79	58	1	40	0	5
1979-80	0	1	99	0	-
1980-81	0	12	70	18	-
1981-82	0	1	17	82	-
1982-83	0	100	0	0	-
1983-84	0	10	0	90	4
1984-85	0	80	0	20	13
1985-86	0	97	3	0	8
1986-87	0	99	0	1	10
1987-88	0	99	1	0	10
1988-89	0	58	41	1	13
1989-90	0	46	54	0	9
1990-91	0	53	47	1	12
1991-92	0	77	23	0	7
1992-93	0	97	3	0	13
1993-94	0	85	0	14	14
1994-95	0	97	3	0	13
1995-96	0	95	5	0	9
1996-97	0	83	17	0	10
1997-98	0	94	6	0	9
1998-99	0	86	14	1	10
1999-00	0	100	0	0	9
2000-01	0	70	30	0	5

Table 27: OEO 1 north of 45° S excluding Wairarapa. The number of tows where oreos were caught, the number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1977-78	11	0	0	0	0	0	100
1978-79	189	0	0	0	0	0	100
1979-80	186	0	0	0	0	0	100
1980-81	9	0	0	0	0	0	100
1981-82	95	0	0	0	0	6	94
1982-83	20	0	0	0	0	30	70
1983-84	230	2	0	1	0	71	28
1984-85	368	0	0	0	0	55	45
1985-86	293	11	0	3	0	83	13
1986-87	255	0	0	0	0	84	16
1987-88	304	2	0	1	0	83	16
1988-89	103	11	1	7	3	69	20
1989-90	63	8	3	10	0	84	3
1990-91	93	5	1	4	0	88	6
1991-92	108	1	1	0	0	94	5
1992-93	156	3	1	1	0	94	4
1993-94	256	3	1	0	0	89	9
1994-95	224	1	0	0	0	77	22
1995-96	179	62	34	1	0	47	18
1996-97	333	190	39	18	0	32	11
1997-98	183	76	36	6	0	49	9
1998-99	160	37	6	17	1	66	11
1999-00	252	33	3	10	0	75	12
2000-01	317	38	0	9	3	82	6

Table 28: OEO 1 north of 45° S excluding Wairarapa. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1977-78	1	0	0
1978-79	0	0	11
1979-80	0	0	5
1980-81	0	0	0
1981-82	0	7	6
1982-83	7	0	0
1983-84	6	28	23
1984-85	8	14	8
1985-86	4	55	6
1986-87	0	38	3
1987-88	1	21	3
1988-89	7	32	16
1989-90	0	66	6
1990-91	1	41	27
1991-92	1	113	40
1992-93	8	89	17
1993-94	13	94	11
1994-95	11	7	45
1995-96	9	119	1
1996-97	54	693	3
1997-98	4	121	2
1998-99	2	165	15
1999-00	10	164	12
2000-01	0	344	5

Table 29: OEO 1 north of 45° S excluding Wairarapa. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1977-78	0	0	0	0	0	0
1978-79	0	0	0	0	0	0
1979-80	0	0	0	0	0	0
1980-81	0	0	0	0	0	0
1981-82	0	0	0	0	0	0
1982-83	0	0	0	0	0	0
1983-84	0	0	12.04	2	0	0
1984-85	0	0	0	0	0	0
1985-86	0	0	0.27	10	0.38	1
1986-87	0	0	0	0	0	0
1987-88	0	0	0.69	2	0	0
1988-89	9.30	1	1.35	7	2.79	3
1989-90	5.07	2	1.50	6	0	0
1990-91	8.00	1	1.45	4	0	0
1991-92	0.30	1	0	0	0	0
1992-93	6.00	2	0.72	1	0	0
1993-94	2.30	2	0	1	0	0
1994-95	1.00	1	0	0	0	0
1995-96	1.06	61	22.00	1	0	0
1996-97	1.11	131	9.73	59	0	0
1997-98	0.49	65	7.23	11	0	0
1998-99	2.25	9	4.55	27	10.00	1
1999-00	0.68	7	5.64	26	0	0
2000-01	30.00	1	6.71	29	0.44	8

Table 30: Auckland Islands. Percentage oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	<u>BZE</u>	<u>DOM</u>	<u>RUS</u>
1981-82	0	0	100
1982-83	0	0	0
1983-84	0	0	0
1984-85	0	0	0
1985-86	0	0	100
1986-87	0	0	0
1987-88	0	0	0
1988-89	0	0	0
1989-90	0	0	0
1990-91	0	100	0
1991-92	0	0	0
1992-93	0	100	0
1993-94	0	100	0
1994-95	0	100	0
1995-96	0	100	0
1996-97	0	100	0
1997-98	0	100	0
1998-99	1	99	0
1999-00	0	100	0
2000-01	0	100	0

Table 31: Auckland Islands. Percentage oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. – data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1981–82	0	0	0	100	–
1982–83	0	0	0	0	0
1983–84	0	0	0	0	0
1984–85	0	0	0	0	0
1985–86	0	0	0	100	–
1986–87	0	0	0	0	0
1987–88	0	0	0	0	0
1988–89	0	0	0	0	0
1989–90	0	0	0	0	0
1990–91	0	0	100	0	–
1991–92	0	0	0	0	0
1992–93	0	15	0	85	–
1993–94	0	11	0	88	–
1994–95	0	56	44	0	4
1995–96	0	100	0	0	4
1996–97	0	74	4	22	6
1997–98	0	68	31	0	4
1998–99	0	22	78	0	5
1999–00	0	2	98	1	–
2000–01	0	0	100	0	–

Table 32: Auckland Islands. The number of tows where oreos were caught, the number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1981–82	6	5	0	50	33	0	17
1982–83	0	0	0	0	0	0	0
1983–84	0	0	0	0	0	0	0
1984–85	0	0	0	0	0	0	0
1985–86	3	2	0	0	67	0	33
1986–87	0	0	0	0	0	0	0
1987–88	0	0	0	0	0	0	0
1988–89	0	0	0	0	0	0	0
1989–90	0	0	0	0	0	0	0
1990–91	2	0	0	0	0	100	0
1991–92	0	0	0	0	0	0	0
1992–93	68	54	0	79	0	18	3
1993–94	103	9	0	9	0	91	0
1994–95	260	166	33	31	0	36	0
1995–96	177	29	5	11	0	84	0
1996–97	109	24	11	11	0	78	0
1997–98	153	23	15	0	0	85	0
1998–99	218	77	29	6	0	64	0
1999–00	168	90	45	8	0	44	2
2000–01	81	34	27	15	0	58	0

Table 33: Auckland Islands. Catch of unspecified oreo, smooth oreo, and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1981-82	0	10	35
1982-83	0	0	0
1983-84	0	0	0
1984-85	0	0	0
1985-86	0	30	2
1986-87	0	0	0
1987-88	0	0	0
1988-89	0	0	0
1989-90	0	0	0
1990-91	0	0	0
1991-92	0	0	0
1992-93	0	315	0
1993-94	28	274	1
1994-95	0	555	4
1995-96	0	508	1
1996-97	10	267	0
1997-98	5	318	3
1998-99	0	658	1
1999-00	0	552	0
2000-01	0	200	0

Table 34: Auckland Islands. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	OEO		SSO		BOE	
		n		n		n
1981-82	0	0	3.33	3	15.00	2
1982-83	0	0	0	0	0	0
1983-84	0	0	0	0	0	0
1984-85	0	0	0	0	0	0
1985-86	0	0	0	0	0.37	2
1986-87	0	0	0	0	0	0
1987-88	0	0	0	0	0	0
1988-89	0	0	0	0	0	0
1989-90	0	0	0	0	0	0
1990-91	0	0	0	0	0	0
1991-92	0	0	0	0	0	0
1992-93	0	0	4.56	54	0	0
1993-94	0	0	4.03	9	0	0
1994-95	1.58	85	1.04	81	0	0
1995-96	2.28	9	2.88	20	0	0
1996-97	0.80	12	6.34	12	0	0
1997-98	2.14	23	0	0	0	0
1998-99	3.41	64	1.06	13	0	0
1999-00	3.31	76	2.34	14	0	0
2000-01	5.02	22	0.85	12	0	0

Table 35: Bounty Plateau. Percentage oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	NA	BZE	DOM	JAP	RUS
1980-81	13	0	0	0	87
1981-82	0	0	0	0	0
1982-83	0	0	0	0	0
1983-84	0	0	0	0	100
1984-85	0	0	0	0	0
1985-86	0	0	0	0	0
1986-87	0	0	0	0	0
1987-88	0	0	0	100	0
1988-89	0	0	0	0	0
1989-90	0	0	0	0	0
1990-91	0	0	100	0	0
1991-92	0	0	0	0	0
1992-93	0	0	100	0	0
1993-94	0	0	100	0	0
1994-95	0	0	100	0	0
1995-96	0	0	100	0	0
1996-97	0	0	100	0	0
1997-98	0	0	100	0	0
1998-99	0	18	82	0	0
1999-00	0	0	100	0	0
2000-01	0	0	100	0	0

Table 36: Bounty Plateau. Percentage oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. - data from fewer than four vessels or where combined catch was less than 1 t.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1980-81	0	0	0	100	-
1981-82	0	0	0	0	0
1982-83	0	0	0	0	-
1983-84	0	0	0	100	-
1984-85	0	0	0	0	0
1985-86	0	0	0	0	-
1986-87	0	0	0	0	0
1987-88	0	0	0	100	0
1988-89	0	0	0	0	0
1989-90	0	0	0	0	0
1990-91	0	0	100	0	0
1991-92	0	0	0	0	0
1992-93	0	0	100	0	0
1993-94	0	13	0	87	-
1994-95	0	23	77	0	5
1995-96	0	77	23	0	-
1996-97	0	64	36	0	-
1997-98	0	49	30	21	6
1998-99	0	41	59	0	8
1999-00	0	42	58	0	5
2000-01	0	26	74	0	5

Table 37: Bounty Plateau. The number of tows where oreos were caught, the number of oreo target tows (OEO, SSO, BOE) and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1981-82	0	0	0	0	0	0	0
1982-83	1	1	0	0	100	0	0
1983-84	59	58	0	42	56	0	2
1984-85	0	0	0	0	0	0	0
1985-86	2	2	0	50	50	0	0
1986-87	0	0	0	0	0	0	0
1987-88	2	2	0	100	0	0	0
1988-89	0	0	0	0	0	0	0
1989-90	0	0	0	0	0	0	0
1990-91	6	6	0	100	0	0	0
1991-92	0	0	0	0	0	0	0
1992-93	10	10	100	0	0	0	0
1993-94	24	24	4	96	0	0	0
1994-95	162	155	42	54	0	4	0
1995-96	154	127	77	5	0	17	1
1996-97	170	160	94	0	0	6	0
1997-98	203	122	38	22	0	40	0
1998-99	338	250	20	54	0	26	0
1999-00	139	101	39	34	0	27	0
2000-01	135	94	33	36	0	30	0

Table 38: Bounty Plateau. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1981-82	0	0	0
1982-83	0	0	0
1983-84	0	525	628
1984-85	0	0	0
1985-86	0	0	0
1986-87	0	0	0
1987-88	0	18	0
1988-89	0	0	0
1989-90	0	0	0
1990-91	0	20	78
1991-92	0	0	0
1992-93	0	81	0
1993-94	0	434	3
1994-95	30	1 252	0
1995-96	48	732	2
1996-97	464	98	0
1997-98	51	544	8
1998-99	0	1 059	9
1999-00	0	765	1
2000-01	0	491	2

Table 39: Bounty Plateau. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1981-82	0	0	0	0	0	0
1982-83	0	0	0	0	0	1
1983-84	0	0	15.37	25	15.63	33
1984-85	0	0	0	0	0	0
1985-86	0	0	0	1	0	1
1986-87	0	0	0	0	0	0
1987-88	0	0	8.84	2	0	0
1988-89	0	0	0	0	0	0
1989-90	0	0	0	0	0	0
1990-91	0	0	3.33	6	0	0
1991-92	0	0	0	0	0	0
1992-93	8.10	10	0	0	0	0
1993-94	55.00	1	16.61	23	0	0
1994-95	11.19	68	5.67	87	0	0
1995-96	5.28	119	14.11	8	0	0
1996-97	3.49	160	0	0	0	0
1997-98	1.66	77	2.56	45	0	0
1998-99	6.73	69	2.18	181	0	0
1999-00	5.85	54	8.11	47	0	0
2000-01	3.51	45	3.92	49	0	0

Table 40: Pukaki Rise (east). Percentage of oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	NA	DOM	JAP	RUS
1978-79	0	0	0	100
1979-80	0	0	0	0
1980-81	69	0	0	27
1981-82	18	0	0	82
1982-83	0	0	0	100
1983-84	0	0	0	100
1984-85	0	0	3	97
1985-86	0	0	0	100
1986-87	0	0	0	0
1987-88	0	0	100	0
1988-89	0	0	0	0
1989-90	0	100	0	0
1990-91	0	100	0	0
1991-92	0	0	0	0
1992-93	0	100	0	0
1993-94	0	0	0	0
1994-95	0	100	0	0
1995-96	19	81	0	0
1996-97	0	100	0	0
1997-98	1	99	0	0
1998-99	0	100	0	0
1999-00	0	100	0	0
2000-01	0	100	0	0

Table 41: Pukaki Rise (east). Percentage of oreo catch (combined) by vessel tonnage class by fishing year. NA, unknown tonnage class. – data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1978–79	0	0	0	100	–
1979–80	0	0	0	0	0
1980–81	0	1	0	99	8
1981–82	0	0	0	100	5
1982–83	0	0	0	100	6
1983–84	0	0	0	100	5
1984–85	0	0	0	100	4
1985–86	0	0	0	100	–
1986–87	0	0	0	0	0
1987–88	0	0	0	100	–
1988–89	0	0	0	0	0
1989–90	0	0	100	0	–
1990–91	0	100	0	0	–
1991–92	0	0	0	0	0
1992–93	0	0	100	0	–
1993–94	0	0	0	0	0
1994–95	0	0	100	0	–
1995–96	0	7	74	19	–
1996–97	0	23	66	11	6
1997–98	0	13	79	8	5
1998–99	0	28	72	0	7
1999–00	0	63	37	0	5
2000–01	0	41	59	0	6

Table 42: Pukaki Rise (east). The number of tows where oreos were caught, the number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1978–79	4	0	0	0	0	0	100
1979–80	0	0	0	0	0	0	0
1980–81	576	564	4	1	93	0	2
1981–82	476	476	12	3	85	0	0
1982–83	106	106	0	0	100	0	0
1983–84	85	84	8	41	49	0	1
1984–85	169	169	0	4	96	0	0
1985–86	9	9	0	22	78	0	0
1986–87	0	0	0	0	0	0	0
1987–88	1	1	0	100	0	0	0
1988–89	0	0	0	0	0	0	0
1989–90	1	0	0	0	0	0	100
1990–91	1	1	0	100	0	0	0
1991–92	0	0	0	0	0	0	0
1992–93	1	0	0	0	0	100	0
1993–94	0	0	0	0	0	0	0
1994–95	29	29	100	0	0	0	0
1995–96	333	88	22	5	0	69	5
1996–97	606	97	14	2	0	84	0
1997–98	584	404	57	6	7	30	0
1998–99	429	380	71	8	10	11	0
1999–00	597	569	46	32	17	5	0
2000–01	625	606	40	48	8	2	1

Table 43: Pukaki Rise (east). Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1978-79	0	0	5
1979-80	0	0	0
1980-81	62	1	3 118
1981-82	0	41	1 830
1982-83	0	0	402
1983-84	0	229	212
1984-85	0	58	364
1985-86	0	1	19
1986-87	0	0	0
1987-88	0	2	0
1988-89	0	0	0
1989-90	0	0	0
1990-91	0	1	5
1991-92	0	0	0
1992-93	0	1	1
1993-94	0	0	0
1994-95	0	119	210
1995-96	0	1 167	1 146
1996-97	53	1 465	1 898
1997-98	102	1 079	1 916
1998-99	0	956	1 052
1999-00	4	1 610	955
2000-01	3	1 492	1 040

Table 44: Pukaki Rise (east). Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	OEO	n	SSO	n	BOE	n
1978-79	0	0	0	0	0	0
1979-80	0	0	0	0	0	0
1980-81	2.83	22	0.32	4	5.70	538
1981-82	2.40	59	1.34	13	4.14	404
1982-83	0	0	0	0	3.79	106
1983-84	1.84	7	6.29	35	1.68	42
1984-85	0	0	1.57	6	2.21	163
1985-86	0	0	0.39	2	2.68	7
1986-87	0	0	0	0	0	0
1987-88	0	0	1.60	1	0	0
1988-89	0	0	0	0	0	0
1989-90	0	0	0	0	0	0
1990-91	0	0	0.50	1	0	0
1991-92	0	0	0	0	0	0
1992-93	0	0	0	0	0	0
1993-94	0	0	0	0	0	0
1994-95	11.34	29	0	0	0	0
1995-96	9.77	72	6.06	16	0	0
1996-97	7.20	82	4.35	15	0	0
1997-98	6.54	332	1.35	34	2.25	38
1998-99	5.25	303	0.64	36	6.40	41
1999-00	5.26	275	3.39	193	3.15	101
2000-01	5.01	252	2.69	302	3.26	52

Table 45: Pukaki Rise (west). Percentage oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	NA	DOM	JAP	KOR	NOR	PAN	RUS
1977-78	100	0	0	0	0	0	0
1978-79	36	0	5	0	0	0	58
1979-80	96	0	4	0	0	0	0
1980-81	0	0	0	0	0	0	100
1981-82	60	0	0	0	0	0	40
1982-83	0	0	0	0	0	0	100
1983-84	0	0	0	51	0	0	49
1984-85	0	0	0	100	0	0	0
1985-86	0	0	0	100	0	0	0
1986-87	0	0	0	0	0	0	0
1987-88	0	0	100	0	0	0	0
1988-89	0	0	0	0	0	0	0
1989-90	0	8	0	0	92	0	0
1990-91	0	84	0	0	16	0	0
1991-92	0	0	0	0	100	0	0
1992-93	0	94	0	0	6	0	0
1993-94	0	0	0	0	100	0	0
1994-95	0	45	0	0	55	0	0
1995-96	0	90	0	0	10	0	0
1996-97	0	77	0	0	20	0	4
1997-98	0	62	0	0	20	18	0
1998-99	0	98	0	0	0	2	0
1999-00	0	69	0	13	0	18	0
2000-01	0	99	0	0	0	1	0

Table 46: Pukaki Rise (west). Percentage oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. - data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1977-78	100	0	0	0	0
1978-79	4	0	1	95	4
1979-80	96	0	4	0	-
1980-81	0	0	0	100	-
1981-82	0	5	0	95	-
1982-83	0	0	0	100	0
1983-84	0	51	0	49	4
1984-85	0	100	0	0	-
1985-86	0	100	0	0	0
1986-87	0	0	0	0	0
1987-88	0	0	0	100	0
1988-89	0	0	0	0	0
1989-90	0	8	74	18	-
1990-91	0	0	100	0	-
1991-92	0	3	55	42	-
1992-93	0	41	57	2	-
1993-94	0	55	45	0	-
1994-95	0	53	10	38	6
1995-96	0	16	61	23	4
1996-97	0	81	19	0	5
1997-98	0	15	29	56	7
1998-99	0	42	25	33	6
1999-00	0	68	14	18	7
2000-01	0	0	98	2	-

Table 47: Pukaki Rise (west). The number of tows where oreos were caught, the number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1977-78	1	0	0	0	0	0	100
1978-79	17	8	24	0	24	0	53
1979-80	4	0	0	0	0	0	100
1980-81	7	5	0	14	57	0	29
1981-82	6	4	0	17	50	0	33
1982-83	3	3	0	0	100	0	0
1983-84	87	80	0	28	64	1	7
1984-85	125	43	0	1	34	0	66
1985-86	30	30	0	10	90	0	0
1986-87	0	0	0	0	0	0	0
1987-88	12	12	0	100	0	0	0
1988-89	0	0	0	0	0	0	0
1989-90	3	1	0	33	0	0	67
1990-91	24	0	0	0	0	0	100
1991-92	13	0	0	0	0	0	100
1992-93	21	2	10	0	0	43	48
1993-94	5	0	0	0	0	0	100
1994-95	22	1	5	0	0	5	91
1995-96	15	2	13	0	0	20	67
1996-97	20	1	5	0	0	0	95
1997-98	26	1	0	0	4	0	96
1998-99	11	5	36	9	0	0	55
1999-00	37	10	16	11	0	0	73
2000-01	42	21	50	0	0	0	50

Table 48: Pukaki Rise (west). Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1977-78	3	0	0
1978-79	6	0	11
1979-80	0	3	0
1980-81	0	0	5
1981-82	0	0	12
1982-83	0	0	21
1983-84	0	321	800
1984-85	0	252	1 196
1985-86	0	29	51
1986-87	0	0	0
1987-88	0	230	0
1988-89	0	0	0
1989-90	0	0	0
1990-91	0	1	2
1991-92	1	2	1
1992-93	1	28	18
1993-94	0	0	0
1994-95	0	2	2
1995-96	0	7	7
1996-97	1	9	1
1997-98	0	2	4
1998-99	0	2	2
1999-00	0	14	18
2000-01	0	229	6

Table 49: Pukaki Rise (west). Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1977-78	0	0	0	0	0	0
1978-79	1.34	4	0	0	0	4
1979-80	0	0	0	0	0	0
1980-81	0	0	0	1	0.43	4
1981-82	0	0	0	1	2.84	3
1982-83	0	0	0	0	6.84	3
1983-84	0	0	3.10	24	10.61	56
1984-85	0	0	0.48	1	9.23	42
1985-86	0	0	0.89	3	1.85	27
1986-87	0	0	0	0	0	0
1987-88	0	0	19.16	12	0	0
1988-89	0	0	0	0	0	0
1989-90	0	0	0.02	1	0	0
1990-91	0	0	0	0	0	0
1991-92	0	0	0	0	0	0
1992-93	12.5	2	0	0	0	0
1993-94	0	0	0	0	0	0
1994-95	0.60	1	0	0	0	0
1995-96	3.50	2	0	0	0	0
1996-97	7.45	1	0	0	0	0
1997-98	0	0	0	0	0.20	1
1998-99	0.61	4	0	1	0	0
1999-00	2.94	6	1.15	4	0	0
2000-01	10.81	21	0	0	0	0

Table 50: Macquarie Ridge. Percentage oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	<u>BZE</u>	<u>DOM</u>
1990-91	0	100
1991-92	0	0
1992-93	0	100
1993-94	0	100
1994-95	0	100
1995-96	0	100
1996-97	0	100
1997-98	0	100
1998-99	11	89
1999-00	0	100
2000-01	0	100

Table 51: Macquarie Ridge. Percentage oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class. - data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1990-91	0	0	100	0	-
1991-92	0	0	0	0	0
1992-93	0	76	24	4	-
1993-94	0	7	89	0	-
1994-95	0	0	100	0	-
1995-96	0	100	0	0	4
1996-97	0	100	0	0	-
1997-98	0	89	11	0	-
1998-99	0	49	51	0	6
1999-00	0	5	95	0	-
2000-01	0	0	100	0	-

Table 52: Macquarie Ridge. The number of tows where oreos were caught, the number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1990-91	19	18	95	0	0	5	0
1991-92	0	0	0	0	0	0	0
1992-93	24	8	21	13	0	67	0
1993-94	12	0	0	0	0	100	0
1994-95	16	15	88	6	0	6	0
1995-96	32	29	13	78	0	9	0
1996-97	183	145	37	43	0	21	0
1997-98	182	159	64	23	0	13	0
1998-99	206	178	54	31	1	14	0
1999-00	256	234	64	28	0	9	0
2000-01	404	337	50	33	0	16	0

Table 53: Macquarie Ridge. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1990-91	0	46	128
1991-92	0	0	0
1992-93	0	80	49
1993-94	0	98	23
1994-95	0	38	15
1995-96	0	122	17
1996-97	220	615	45
1997-98	189	442	24
1998-99	0	531	158
1999-00	0	1 007	53
2000-01	0	1 294	75

Table 54: Macquarie Ridge. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1990-91	8.81	18	0	0	0	0
1991-92	0	0	0	0	0	0
1992-93	6.20	5	0.20	3	0	0
1993-94	0	0	0	0	0	0
1994-95	3.18	14	0	1	0	0
1995-96	6.48	4	3.43	25	0	0
1996-97	3.67	67	6.31	78	0	0
1997-98	3.48	117	4.55	42	0	0
1998-99	3.00	112	3.47	64	1.35	2
1999-00	5.29	163	1.99	71	0	0
2000-01	3.30	203	3.87	134	0	0

Table 55: OEO 3A, excluding data from the Southland fishery. Percentage of oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	NA	DOM	JAP	KOR	NOR	PAN	RUS
1977-78	3	0	0	0	0	0	97
1978-79	99	0	1	0	0	0	0
1979-80	2	0	1	0	0	0	97
1980-81	4	0	0	0	0	0	96
1981-82	0	0	1	0	0	0	99
1982-83	0	1	1	1	0	0	98
1983-84	0	2	6	6	0	0	86
1984-85	0	6	16	4	0	0	73
1985-86	0	17	16	16	0	0	51
1986-87	0	26	5	14	0	0	55
1987-88	0	48	17	9	0	0	26
1988-89	0	67	11	9	0	0	13
1989-90	0	91	2	7	0	0	0
1990-91	0	96	0	1	3	0	1
1991-92	0	97	0	3	0	0	0
1992-93	0	100	0	0	0	0	0
1993-94	0	96	0	4	0	0	0
1994-95	0	96	0	4	0	0	0
1995-96	3	93	0	3	0	0	0
1996-97	0	96	0	4	0	0	0
1997-98	0	98	0	2	0	0	0
1998-99	0	86	0	14	0	1	0
1999-00	0	99	0	1	0	0	0
2000-01	0	100	0	0	0	0	0

Table 56: OEO 4. Percentage of oreo catch (combined) by nation and fishing year. See Table 5 for abbreviations.

	NA	DOM	JAP	KOR	NOR	POL	RUS
1977-78	41	0	0	0	0	0	59
1978-79	2	0	2	0	0	0	96
1979-80	0	0	1	0	0	0	99
1980-81	0	0	1	0	0	2	97
1981-82	0	0	1	0	0	0	99
1982-83	0	17	9	0	0	0	74
1983-84	0	25	23	4	0	0	48
1984-85	0	31	29	5	0	0	34
1985-86	0	42	32	5	0	0	21
1986-87	0	59	25	0	0	0	16
1987-88	0	76	15	6	0	0	4
1988-89	0	84	11	2	0	0	4
1989-90	0	95	5	0	0	0	0
1990-91	0	98	0	2	0	0	0
1991-92	0	99	0	0	1	0	0
1992-93	0	100	0	0	0	0	0
1993-94	0	100	0	0	0	0	0
1994-95	0	97	0	0	3	0	0
1995-96	0	99	0	0	1	0	0
1996-97	0	100	0	0	0	0	0
1997-98	0	98	0	0	2	0	0
1998-99	0	99	0	0	1	0	0
1999-00	0	96	0	3	0	0	0
2000-01	0	100	0	0	0	0	0

Table 57: OEO 3A, excluding data from the Southland fishery. Percentage of oreo catch (combined) by vessel tonnage class by fishing year. NA, unknown tonnage class, n is the number of vessels. – data from fewer than four vessels.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1977-78	0	0	0	100	4
1978-79	0	1	0	99	–
1979-80	1	11	0	88	16
1980-81	4	21	0	75	21
1981-82	0	19	0	81	10
1982-83	0	27	1	72	12
1983-84	0	27	15	59	19
1984-85	0	24	15	60	22
1985-86	0	38	15	48	26
1986-87	0	25	16	59	22
1987-88	0	29	29	41	22
1988-89	0	26	50	24	25
1989-90	0	36	62	2	19
1990-91	0	55	44	1	18
1991-92	0	47	52	0	16
1992-93	0	50	35	14	17
1993-94	0	61	35	4	18
1994-95	0	45	55	0	17
1995-96	0	66	31	3	22
1996-97	0	83	17	0	19
1997-98	0	93	5	1	21
1998-99	0	78	19	3	18
1999-00	0	63	36	1	16
2000-01	0	56	43	0	13

Table 58: OEO 4. Percentage of oreo catch (combined) by vessel tonnage class and number of vessels (n), by fishing year. NA, unknown tonnage class.

	NA	< 1 000 t	< 2 000 t	> 2 000 t	n
1977-78	34	0	0	66	9
1978-79	2	0	0	98	8
1979-80	0	1	0	99	7
1980-81	0	3	0	97	12
1981-82	0	5	1	94	11
1982-83	0	6	22	72	17
1983-84	0	6	39	55	15
1984-85	0	12	49	39	20
1985-86	0	22	43	35	20
1986-87	0	24	46	30	19
1987-88	0	22	64	15	18
1988-89	0	23	62	15	15
1989-90	1	32	63	5	10
1990-91	0	57	42	0	11
1991-92	0	52	47	1	6
1992-93	0	56	44	0	6
1993-94	0	48	46	6	8
1994-95	0	54	35	10	11
1995-96	0	53	43	4	8
1996-97	0	63	19	18	7
1997-98	0	64	19	17	10
1998-99	0	70	16	13	17
1999-00	0	45	46	8	12
2000-01	0	35	61	3	12

Table 59: OEO 3A, excluding data from the Southland fishery. Number of tows where oreos were caught, number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1977-78	179	168	94	0	0	0	6
1978-79	4	1	25	0	0	0	75
1979-80	1 786	1 336	19	9	46	0	25
1980-81	3 152	2 655	21	2	61	1	15
1981-82	1 033	973	4	6	84	3	3
1982-83	1 811	1 551	0	8	78	10	4
1983-84	2 343	1 863	0	19	61	9	12
1984-85	1 496	1 029	1	24	44	22	9
1985-86	1 430	728	1	27	23	43	6
1986-87	1 768	1 315	0	28	46	22	3
1987-88	2 004	1 561	1	39	38	19	3
1988-89	1 677	1 270	19	36	21	22	2
1989-90	1 740	1 297	7	61	6	23	3
1990-91	2 231	1 685	8	63	4	16	9
1991-92	1 046	482	13	19	14	47	7
1992-93	1 455	986	34	28	6	31	2
1993-94	1 968	1 214	40	10	12	34	4
1994-95	1 435	1 026	55	12	4	23	6
1995-96	2 171	1 832	69	9	6	9	7
1996-97	2 173	1 759	64	10	6	11	8
1997-98	1 983	1 407	47	24	0	11	18
1998-99	1 442	1 015	33	9	29	16	14
1999-00	1 310	783	34	3	22	16	24
2000-01	1 079	768	42	9	20	10	19

Table 60: OEO 4. Number of tows where oreos were caught, number of oreo target tows and percentage of tows by target species for all tows catching oreos, by fishing year. See Table 7 for abbreviations.

	n.total	n.target	Target species (%)				
			OEO	SSO	BOE	ORH	Other
1977-78	872	856	98	0	0	0	2
1978-79	297	149	11	0	39	14	36
1979-80	567	345	49	8	5	5	34
1980-81	2 144	1 065	34	2	14	25	25
1981-82	1 442	1 255	16	22	49	9	4
1982-83	1 738	674	0	23	16	60	1
1983-84	1 420	844	0	39	20	36	5
1984-85	2 088	868	0	29	13	55	3
1985-86	1 918	721	0	27	10	59	3
1986-87	2 254	996	0	31	13	52	3
1987-88	2 546	922	0	30	6	55	9
1988-89	2 949	484	3	11	3	83	1
1989-90	2 119	585	1	26	0	68	4
1990-91	1 756	456	4	21	0	69	6
1991-92	1 709	249	2	13	0	76	9
1992-93	1 472	177	4	8	0	87	1
1993-94	2 216	67	1	2	0	96	1
1994-95	2 032	140	3	4	0	88	5
1995-96	1 361	238	6	11	0	80	3
1996-97	1 521	454	11	19	0	65	5
1997-98	2 042	399	13	6	0	71	10
1998-99	2 236	596	11	15	1	59	14
1999-00	1 901	473	4	21	0	67	8
2000-01	1 903	389	3	18	0	73	6

Table 61: OEO 3A, excluding data from the Southland fishery. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1977-78	1 360	0	0
1978-79	8	0	0
1979-80	511	5 882	8 683
1980-81	4 065	1 998	15 434
1981-82	0	795	5 698
1982-83	7	2 293	6 862
1983-84	103	3 524	5 463
1984-85	53	3 812	2 748
1985-86	0	2 639	2 082
1986-87	0	3 105	3 982
1987-88	0	5 894	3 038
1988-89	1	5 871	2 715
1989-90	25	5 462	2 363
1990-91	13	4 554	4 160
1991-92	24	2 808	2 189
1992-93	661	2 963	3 856
1993-94	206	4 253	3 782
1994-95	173	3 404	2 049
1995-96	797	3 089	3 152
1996-97	502	2 730	3 423
1997-98	43	3 887	1 529
1998-99	8	2 183	3 043
1999-00	3	1 209	2 762
2000-01	19	1 278	2 394

Table 62: OEO 4. Catch of unspecified oreo, smooth oreo and black oreo by fishing year. See Table 7 for abbreviations.

	Catch (t)		
	OEO	SSO	BOE
1977-78	8 150	0	0
1978-79	0	106	546
1979-80	1 549	626	2 882
1980-81	2 710	898	5 017
1981-82	0	3 623	3 594
1982-83	60	3 864	2 117
1983-84	15	4 863	1 280
1984-85	8	4 758	1 654
1985-86	0	4 846	980
1986-87	0	5 659	1 154
1987-88	0	7 644	895
1988-89	0	6 430	1 094
1989-90	26	5 339	439
1990-91	65	5 256	793
1991-92	7	4 790	1 696
1992-93	1 053	3 844	1 344
1993-94	548	4 765	1 556
1994-95	109	5 760	619
1995-96	42	5 428	364
1996-97	1	5 603	531
1997-98	3	5 677	693
1998-99	7	5 650	845
1999-00	19	5 877	626
2000-01	43	5 972	803

Table 63: OEO 3A, excluding data from the Southland fishery. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1977-78	7.87	168	0	0	0	0
1978-79	7.53	1	0	0	0	0
1979-80	7.62	346	15.53	166	5.07	824
1980-81	8.95	666	4.70	75	6.43	1 914
1981-82	7.18	44	2.50	58	6.30	871
1982-83	0	0	8.16	147	4.58	1 404
1983-84	13.39	2	3.69	434	3.25	1 427
1984-85	1.30	13	7.43	353	2.91	663
1985-86	3.93	9	4.43	389	3.27	330
1986-87	0	0	3.97	503	3.38	812
1987-88	5.43	17	5.61	776	2.29	768
1988-89	4.26	319	6.78	600	2.92	351
1989-90	6.29	125	3.35	1 067	4.27	105
1990-91	8.13	181	2.54	1 413	4.78	91
1991-92	8.11	138	7.72	194	4.93	150
1992-93	7.58	501	2.52	403	2.95	82
1993-94	6.50	794	2.38	188	5.54	232
1994-95	5.53	789	1.91	178	4.63	59
1995-96	3.66	1 506	1.92	186	3.36	140
1996-97	3.42	1 400	1.86	220	6.02	139
1997-98	3.16	931	3.56	467	6.00	9
1998-99	5.22	475	2.43	128	3.75	412
1999-00	4.10	447	4.03	43	3.73	293
2000-01	3.78	455	3.13	102	4.57	211

Table 64: OEO 4. Target catch per tow (t per tow) by species and number of target tows (n) by fishing year. See Table 7 for abbreviations.

	<u>OEO</u>	<u>n</u>	<u>SSO</u>	<u>n</u>	<u>BOE</u>	<u>n</u>
1977-78	9.32	856	0	0	0	0
1978-79	3.49	33	0	0	2.88	116
1979-80	10.62	275	14.21	44	7.66	26
1980-81	6.33	724	8.84	37	4.96	304
1981-82	5.74	235	5.57	316	4.23	704
1982-83	0	0	3.95	397	3.72	277
1983-84	0	0	4.81	558	2.89	286
1984-85	0	0	3.75	607	1.82	261
1985-86	14.84	5	4.32	525	2.53	191
1986-87	2.58	3	4.15	708	2.27	285
1987-88	1.60	2	4.70	765	2.30	155
1988-89	3.33	91	4.62	318	7.13	75
1989-90	3.65	28	3.49	557	0	0
1990-91	8.76	79	3.80	375	5.68	2
1991-92	11.77	26	5.27	219	4.00	4
1992-93	6.77	56	7.10	120	0	1
1993-94	4.35	26	2.55	38	2.67	3
1994-95	5.00	64	10.21	76	0	0
1995-96	7.11	83	9.16	154	0	1
1996-97	6.84	161	5.80	292	13.55	1
1997-98	5.68	269	8.90	130	0	0
1998-99	5.36	252	6.80	328	6.05	16
1999-00	5.74	71	8.06	400	0	2
2000-01	10.58	50	9.45	336	13.67	3

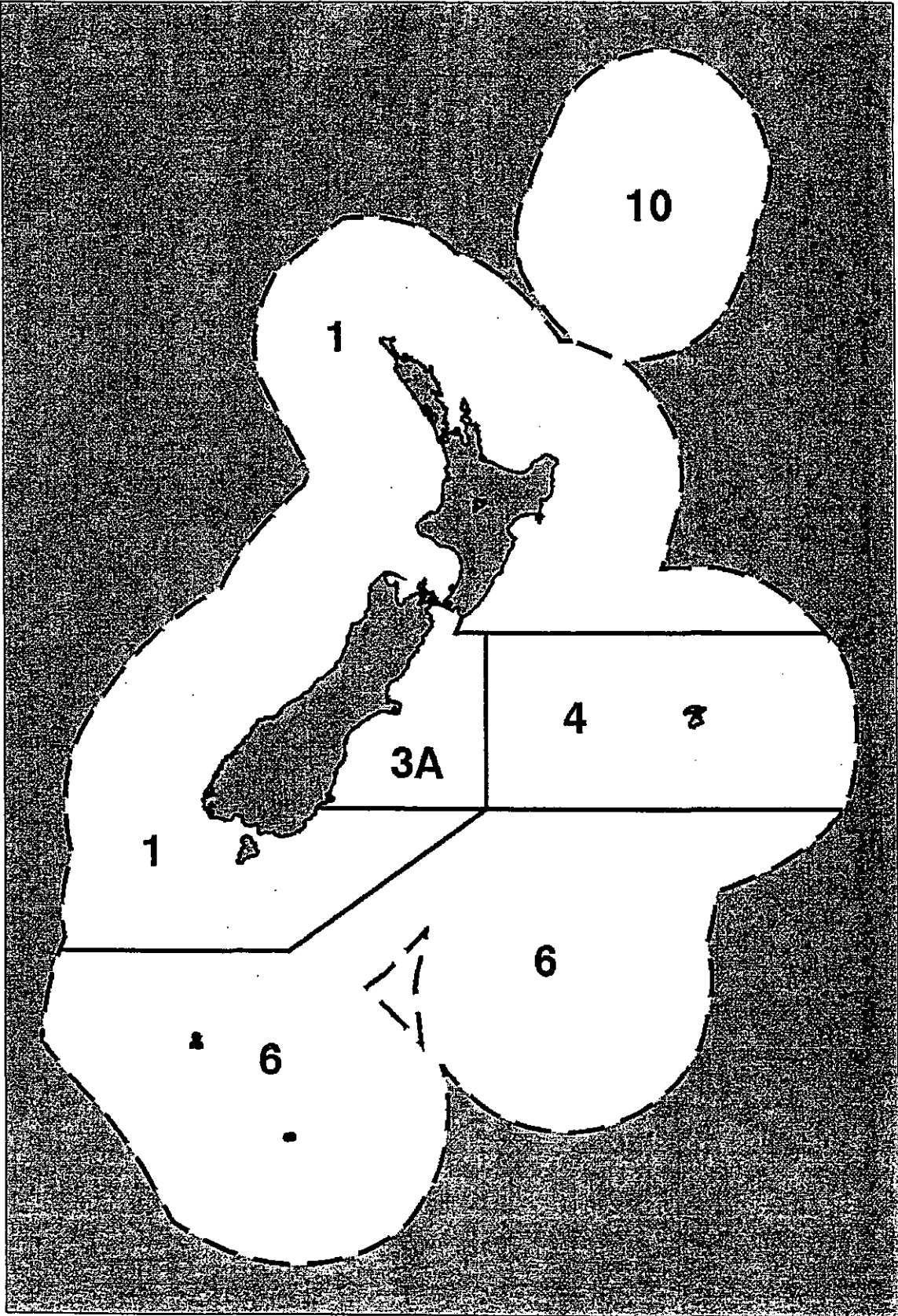


Figure 1: Oreo management areas.

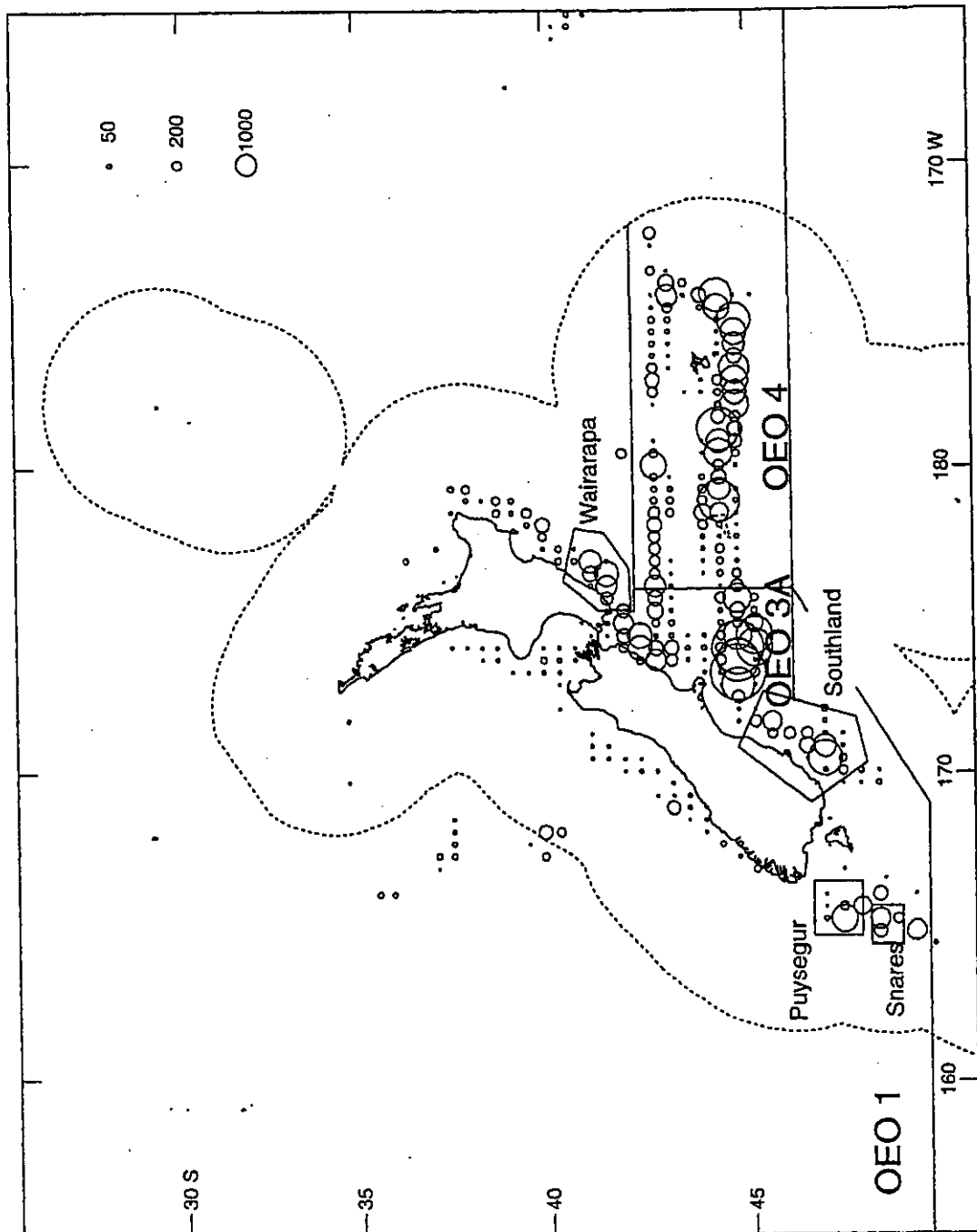


Figure 2: Boundaries of OEO 1, OEO 3A, OEO 4, and fisheries (rectangles and polygons) defined in the text. The number of trawls that caught or targeted oreos from 1977-78 to 2000-01 were summed for each 0.4 x 0.4 degree bin (for 10 or more tows per bin) and plotted as a circle at the centre of each bin. Circle area (see inset) is proportional to the number of tows per bin.

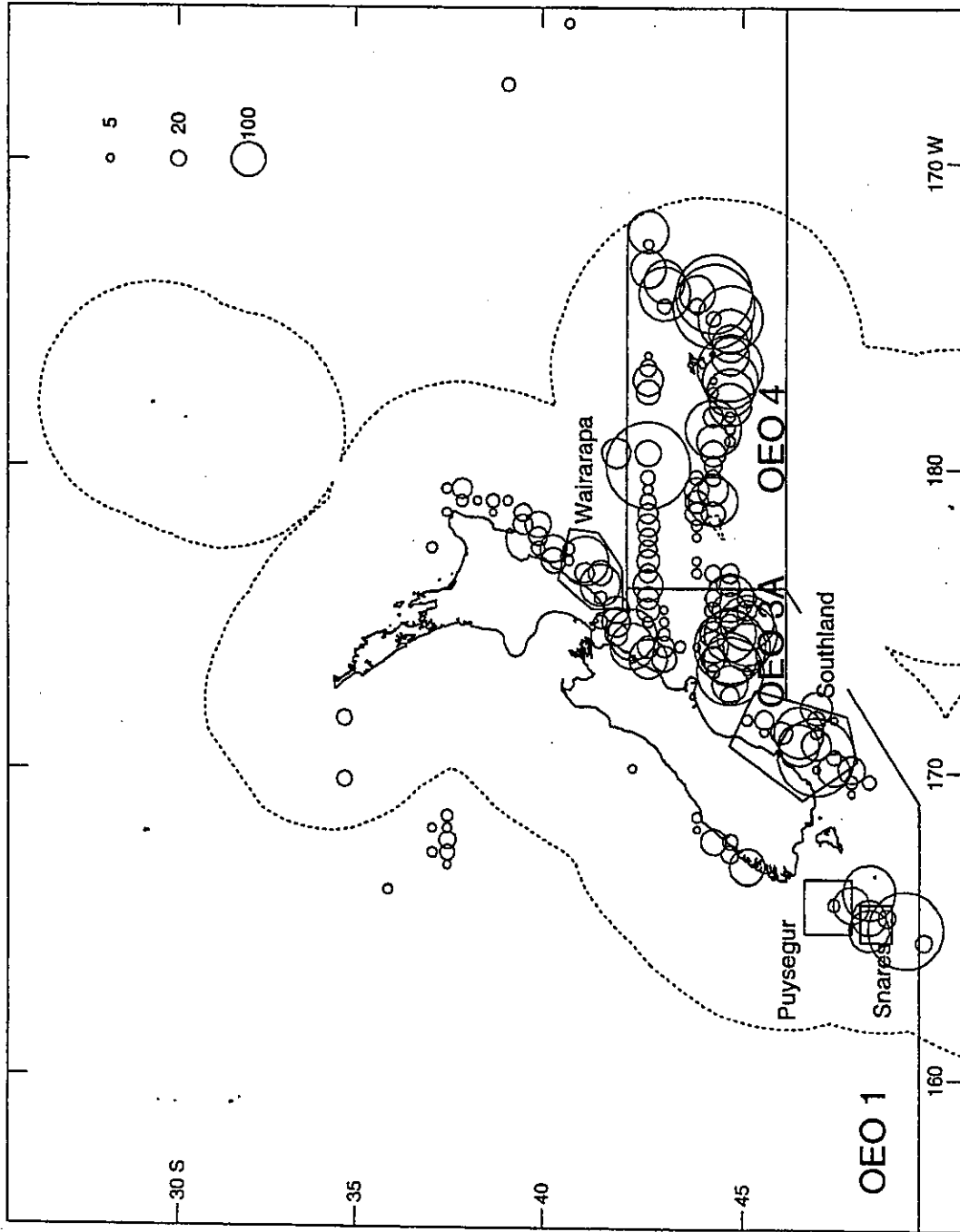


Figure 3: Boundaries of OEO 1, OEO 3A, OEO 4, and fisheries (rectangles and polygons) defined in the text. The number of tows that caught or targeted oreos from 1998-99 to 2000-01 were summed for each 0.4 x 0.4 degree bin (for 5 or more tows per bin) and plotted as a circle at the centre of each bin. Circle area (see inset) is proportional to the number of tows per bin.

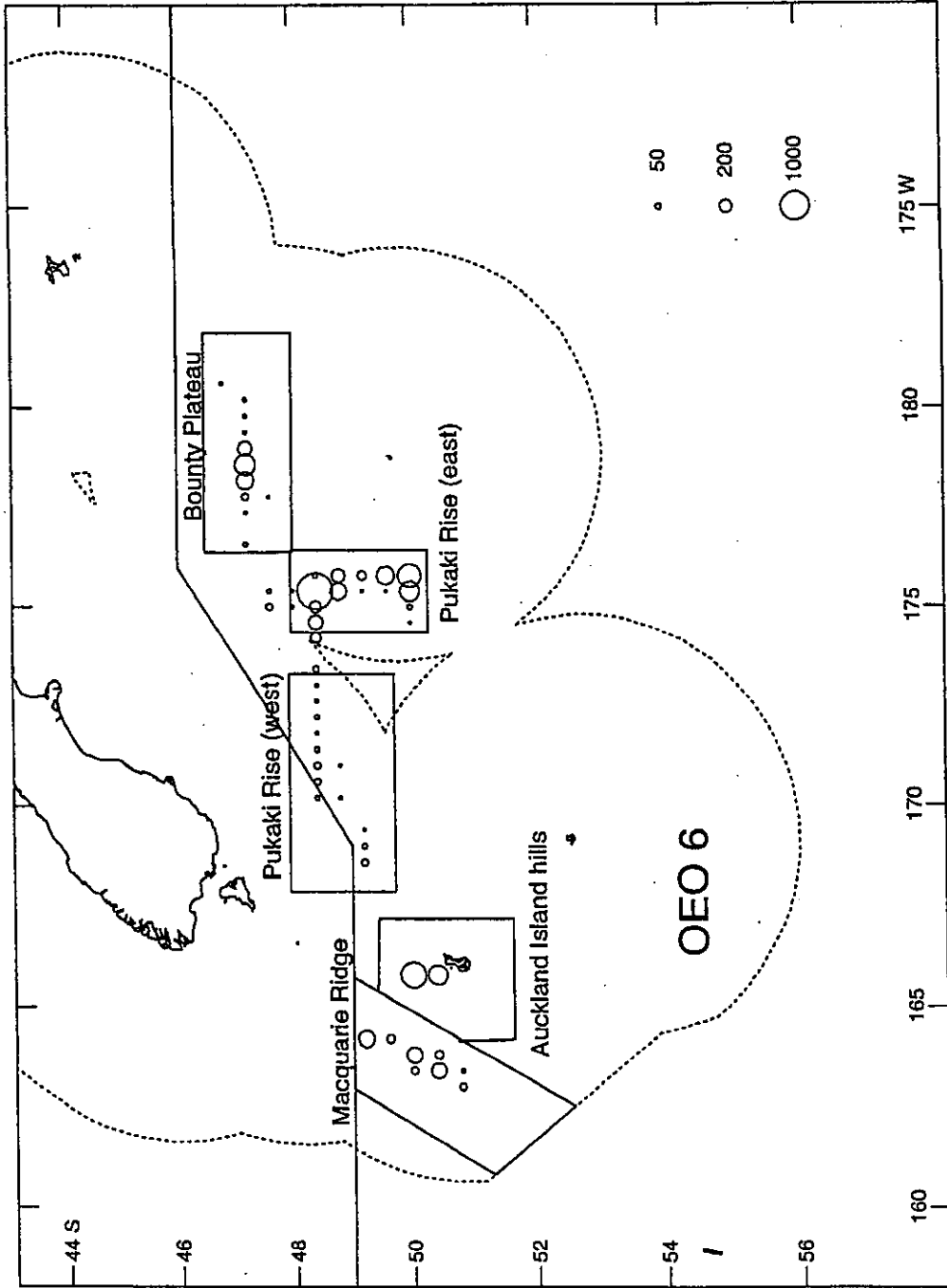


Figure 4: Boundaries of OEO 6 and fisheries (rectangles) defined in the text. The number of tows that caught or targeted oreos from 1977-78 to 2000-01 were summed for each 0.4 x 0.4 degree bin (for 10 or more tows per bin) and plotted as a circle at the centre of each bin. Circle area (see inset) is proportional to the number of tows per bin.

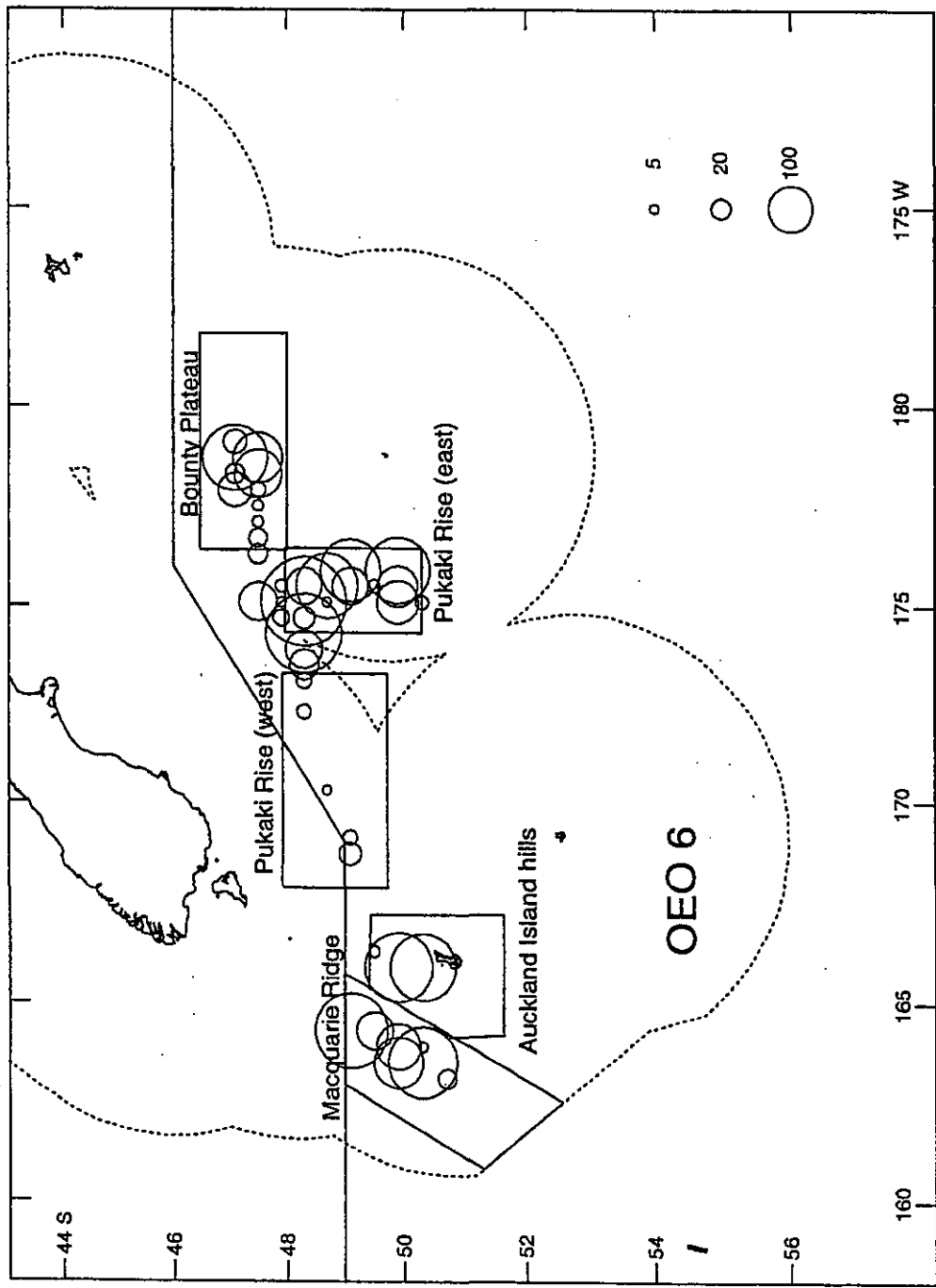


Figure 5: Boundaries of OEO 6 and fisheries (rectangles) defined in the text. The number of trawls that caught or targeted oreos from 1998-99 to 2000-01 were summed for each 0.4 x 0.4 degree bin (for 5 or more tows per bin) and plotted as a circle at the centre of each bin. Circle area (see inset) is proportional to the number of tows per bin.

OEO 1 - Southland

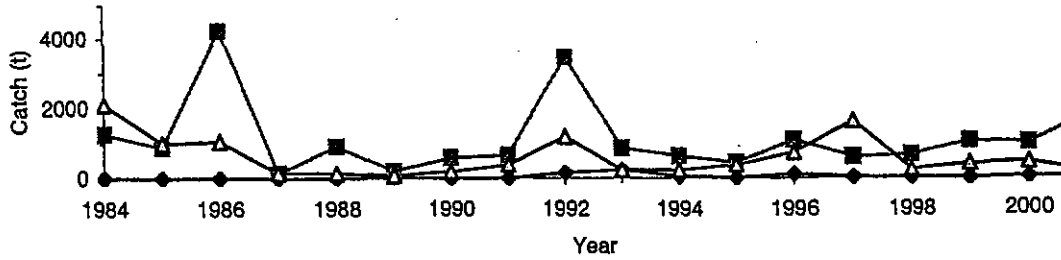


Figure 6: Southland. Estimated catch (t) of OEO (diamonds), SSO (squares) and BOE (triangles) from 1983-84 to 2000-01.

Southland - SSO target tows

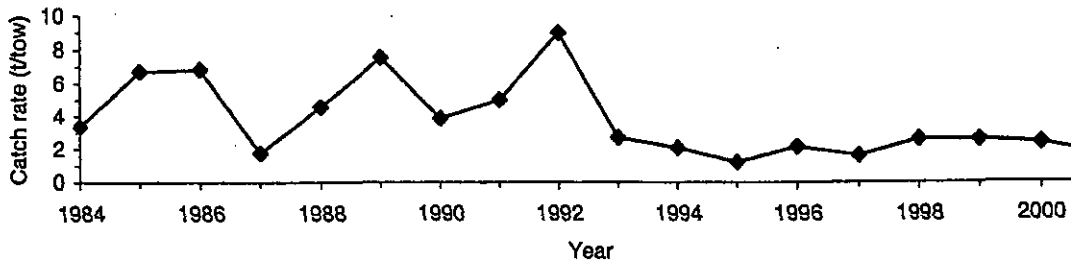


Figure 7: Southland. SSO estimated catch rate (tonnes per tow) for tows that listed SSO as the target species.

OEO 1 - Puysegur

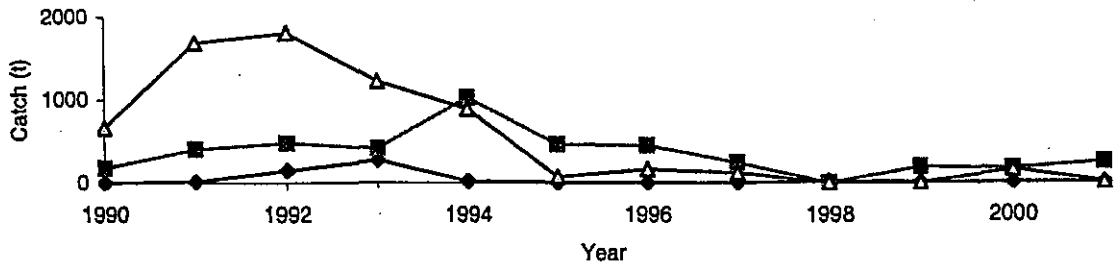


Figure 8: Puysegur. Estimated catch (t) of OEO (diamonds), SSO (squares) and BOE (triangles) from 1989-90 to 2000-01.

OEO 1 - Snares

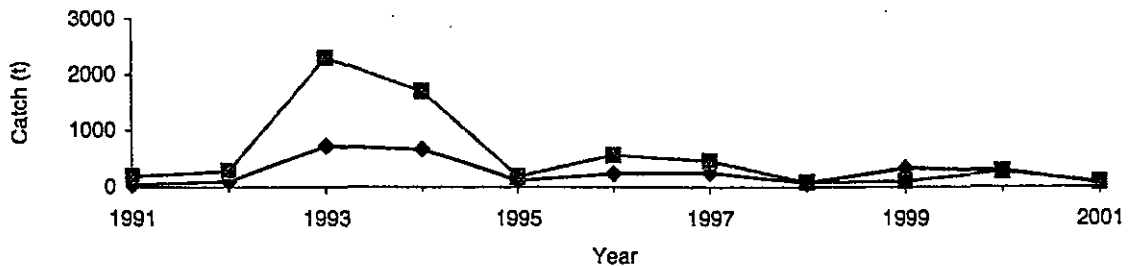


Figure 9: Snares. Estimated catch (t) of BOE (squares) and SSO (diamonds) from 1990-91 to 2000-01.

OEO 1 - Wairarapa

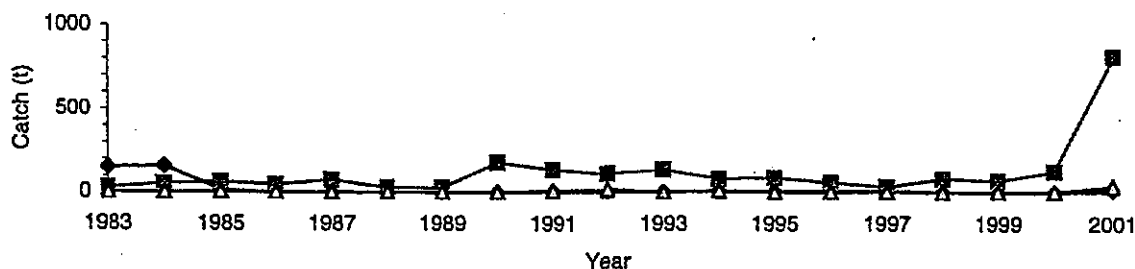


Figure 10: Wairarapa. Estimated catch (t) of OEO (diamonds), SSO (squares), and BOE (triangles) from 1982-83 to 2000-01.

OEO 6 - Auckland Island

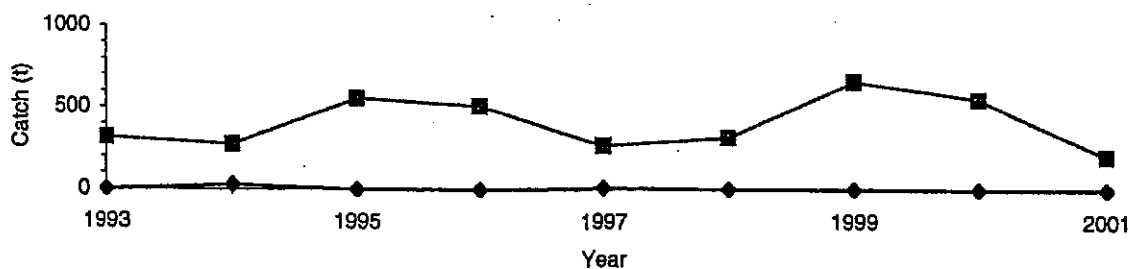


Figure 11: Auckland Island hills. Estimated catch of OEO (diamonds) and SSO (squares) from 1992-93 to 2000-01.

OEO 6 - Bounty Plateau

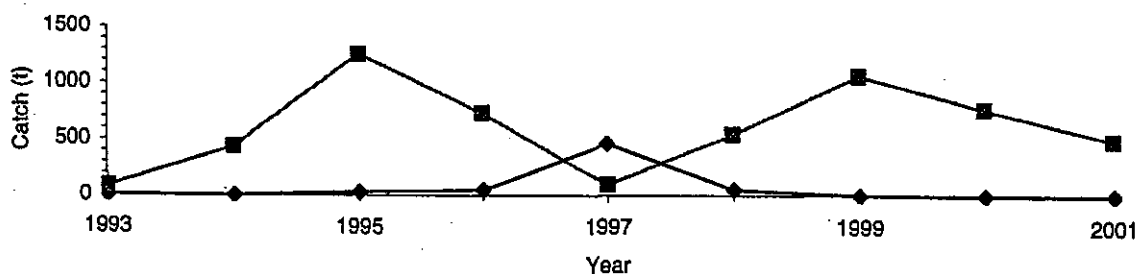


Figure 12: Bounty Plateau. Estimated catch of OEO (diamonds) and SSO (squares) from 1992-93 to 2000-01

OEO 6 - Pukaki (East)

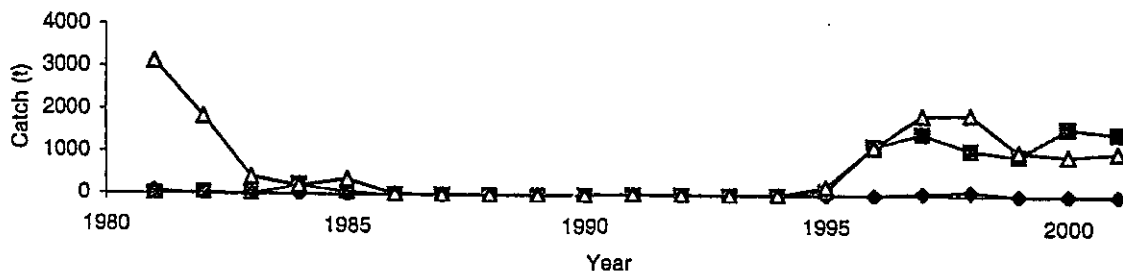


Figure 13: Pukaki Rise (East). Estimated catch (t) of OEO (diamonds), SSO (squares) and BOE (triangles) from 1980-81 to 2000-01.

Pukaki (East) - SSO target tows

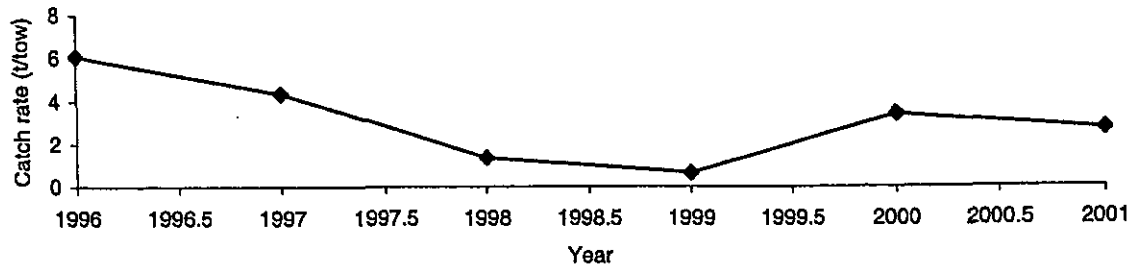


Figure 14: Pukaki Rise (East). SSO estimated catch rate (tonnes per tow) for tows that listed SSO as the target species.

OEO 6 - Maquarie

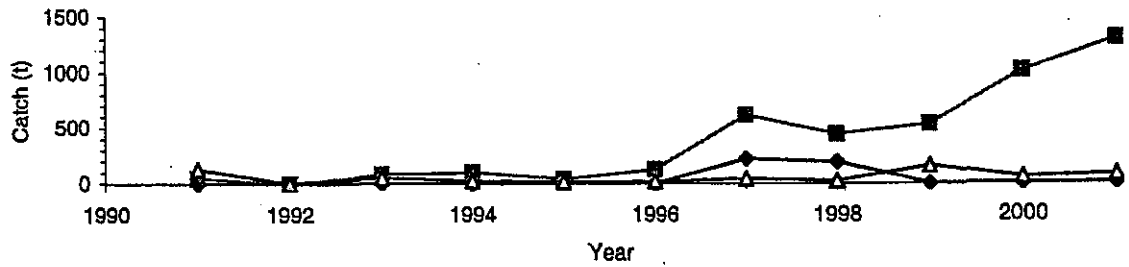


Figure 15: Macquarie. Estimated catch of OEO (diamonds), SSO (squares) and BOE (triangles) from 1990-91 to 2000-01.

OEO 3A

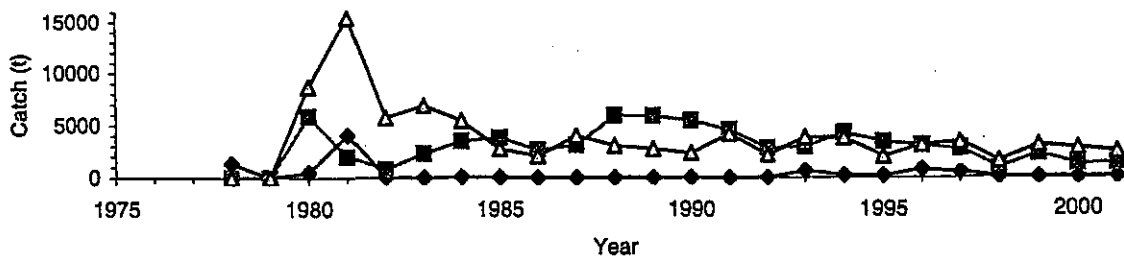


Figure 16: OEO 3A. Estimated catch (t) of OEO (diamonds), SSO (squares) and BOE (triangles) from 1977-78 to 2000-01.

OEO 4

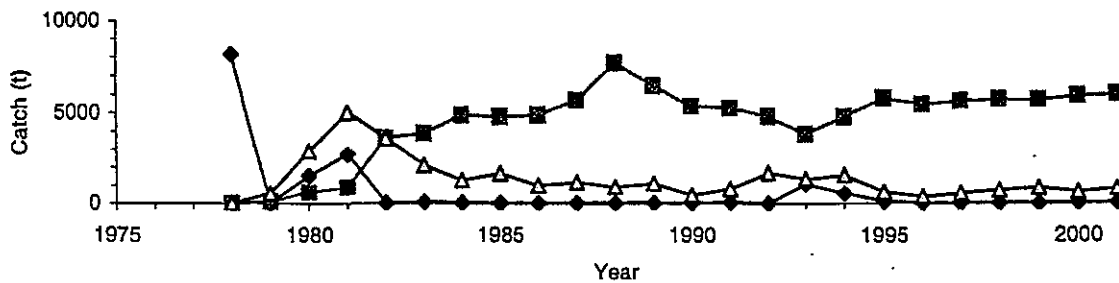


Figure 17: OEO 4. Estimated catch (t) of OEO (diamonds), SSO (squares) and BOE (triangles) from 1977-78 to 2000-01.

OEO 3A - BOE target tows

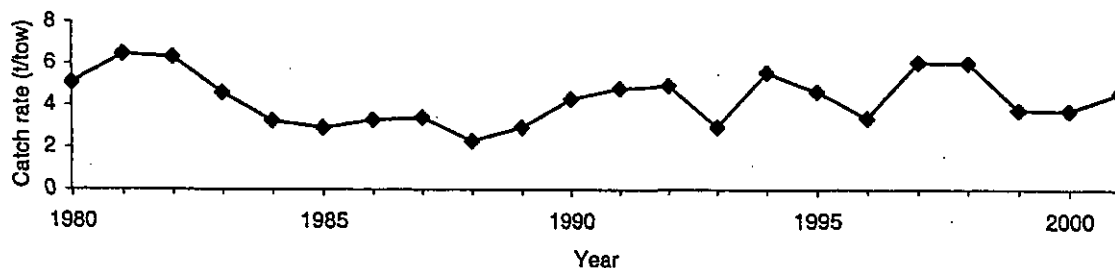


Figure 18: OEO 3A. BOE estimated catch rate (tonnes per tow) for tows that listed BOE as the target species.

OEO 3A - SSO target tows

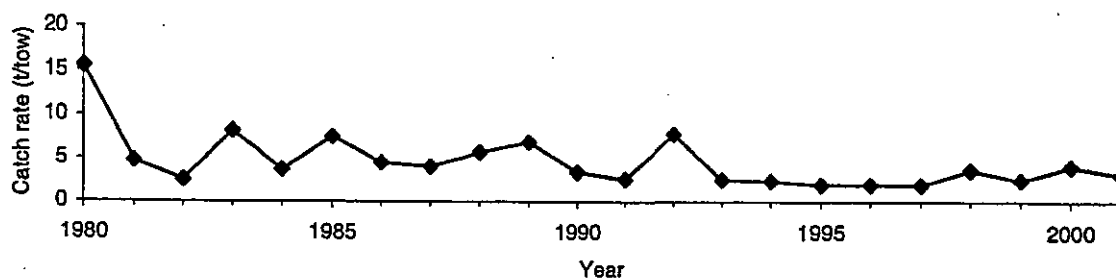


Figure 19: OEO 3A. SSO estimated catch rate (tonnes per tow) for tows that listed SSO as the target species.

OEO 4 - SSO target tows

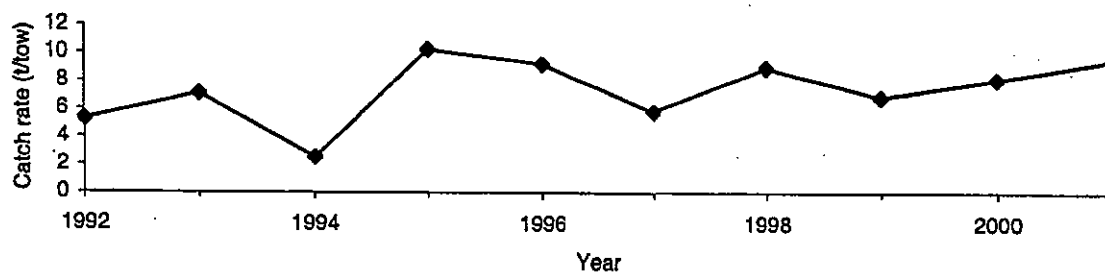


Figure 20: OEO 4. SSO estimated catch rate (tonnes per tow) for tows that listed SSO as the target species.