ORANGE ROUGHY WEST COAST SOUTH ISLAND (ORH 7B)

1. FISHERY SUMMARY

(a) Commercial fisheries

This fishery is centred on an area near the Cook Canyon in statistical areas 033, 034 and 705. Up until 1996–97 approximately 80% of the catch was taken in winter (June-July) when fish form aggregations for spawning. From 1997–98 onwards about 50% of the catch was taken in winter. Reported domestic landings and TACs are shown in Table 1.

Table 1: Reported landings (t) of orange roughy and TACs (t) for ORH 7B from 1983–84 to 2005–06.

Fishing year	Reported landings	TAC
1983–84*	2	–
1984–85*	282	–
1985–86*	1763	1558
1986–87*	1446	1558
1987–88†	1413	1558
1988–89†	1750	1708
1989–90†	1711	1708
1990–91†	1683	1708
1991–92†	1604	1708
1992–93†	1139	1708
1993–94†	701	1708
1994–95†	290	1708
1995–96†	446	430
1996–97†	425	430
1997–98†	330	430
1998–99†	405	430
1999–00†	284	430
2000–01†	161	430
2001–02†	95	110
2002–03†	90	110
2003–04†	119	110
2004–05†	106	110
2005–06†	77	110

* FSU data.
† QMS data.

Catches in the early-mid 1990s (especially 1994–95) were well below the TACC. The TACC was reduced to 430 t for the 1995–96 fishing year, and then was reduced further to 110 t from 1 October 2001.

(b) Recreational fisheries

There is no known recreational fishery for orange roughy in this area.

(c) Maori customary fisheries

There is no known Maori customary fishing for orange roughy in this area.

(d) Illegal catch

There is no quantitative information available on illegal catch.

(e) Other sources of mortality

There is no quantitative information available on other sources of mortality in this fishery.

2. STOCKS AND AREAS

There are no new data which would alter the stock boundaries given in previous assessment documents.

Orange roughy in this fishery are thought to be a single stock. Genetic studies have shown that samples of Cook Canyon orange roughy are significantly different from Challenger Plateau and Puysegur Bank samples. Moreover, the size structure and parasite composition differ from fish on the Challenger Plateau. Spawning occurs at a similar time to fish on the Challenger Plateau and the Puysegur Bank.

3. STOCK ASSESSMENT

The previous assessment for this stock was carried out in 2004 and is summarised in the 2006 Plenary Report. Biomass was estimated to be 17% B_0 (95% confidence interval 14-23%) when CPUE was assumed directly proportional to abundance (beta = 1) or 45% B_0 (95% confidence interval 18-69%) when beta was estimated. The Working Group now prefers to drop the initial 3 CPUE data points from the assessment rather than to estimate the beta parameter within the model.

An updated assessment was attempted in 2007 with the addition of catch data up to 2005-06 and new standardised CPUE indices. The Working Group rejected the assessment on the basis of the poor fit to the CPUE data. The effect was similar to the result from the 2004 assessment; namely a slow rebuild in recent years, which was not supported by the CPUE data.

(a) Estimates of fishery parameters and abundance

Commercial catch and effort data are available from 1985 and were examined using both an unstandardised and a standardised analysis. Unstandardised catch rates have declined substantially over the course of the fishery but have shown no clear trend in recent years (Table 2).

Most recent effort in the fishery has been by small, inshore vessels. Since 2001–02, when the TAC was dropped to 110 t, effort (in vessel days) has decreased except for in 2004–05 when there was an increase. The average distance towed in the last four years is more than twice its initial level.

Table 2: Summary of groomed data from TCEPR and CELR forms.

Fishing year	Number of vessel days	Number of tows	Total estimated catch (t)	Mean daily catch rate (t/tow)	Mean daily catch rate (t/h)
1985–86	138	357	1544	4.5	2.9
1986–87	132	405	1250	4.0	2.7
1987–88	132	420	1250	3.4	2.3
1988–89	133	368	827	2.5	1.6
1989–90	123	356	1282	4.5	5.6
1990–91	208	632	1657	2.8	3.3
1991–92	238	810	1601	2.0	1.4
1992–93	258	784	1128	1.5	2.3
1993–94	298	708	660	1.1	0.9
1994–95	162	361	320	0.9	1.6
1995–96	66	150	275	2.2	1.7
1996–97	90	182	244	1.3	7.5
1997–98	96	228	170	0.7	0.3
1998–99	188	566	359	0.6	0.2
1999–2000	213	647	259	0.4	0.1
2000-2001	149	442	162	0.4	0.1
2001-2002	117	282	76	0.3	0.1
2002-2003	97	292	112	0.4	0.2
2003-2004	90	252	118	0.4	0.2
2004-2005	121	393	102	0.3	0.1
2005-2006	87	257	73	0.3	0.2

Up until 1996–97 approximately 70% of the estimated catch was recorded on TCEPR forms. In 1997–98 this decreased to 20% and now nearly all the catch is recorded on CELR form. Because of this

change in the fleet composition, and associated difficulties with vessel linkage across years, it was decided to split the standardised CPUE analysis into two series: (i) using TCEPR data from 1985–86 through to 1996–97, and (ii) using CELR data from 1990–91 through to 2005–06. In addition, in order to increase vessel linkage across years, it was decided to use all months of data not just that from the winter fishery (June-July) as has been done for previous standardisations.

The standardised analysis for the TCEPR data used catch per tow in a linear regression model. Indices from this model (Table 3, Figure 1) show a steep decline after the first two years, followed by a more gradual decline and a slight increase in catch rates in 1995-96 and 1996-97.

Table 3: **Standardised CPUE indices (relative year effect) based on TCEPR data with number of vessel tows from 1985–86 to 1996–97.**

Year	CPUE index	CV.	Number of tows	Year	CPUE index	CV	Number of tows
1985–86	1.99	0.20	153	1991–92	0.48	0.23	231
1986–87	2.13	0.23	150	1992–93	0.29	0.23	230
1987–88	1.11	0.26	212	1993–94	0.14	0.25	341
1988–89	0.58	0.22	310	1994–95	0.13	0.27	172
1989–90	0.61	0.22	236	1995–96	0.51	0.33	37
1990–91	0.76	0.23	238	1996–97	0.41	0.26	104

The standardised analysis for the CELR data used daily catch in a linear regression model. Indices from this model (Table 4, Figure 1) show a steep decline for the first four years, followed by an increase to a peak in 1995–96, and subsequent low catch rates after then.

Table 4: **Standardised CPUE indices (relative year effect) based on CELR data with number of days from 1990–91 to 2005–06.**

Year	CPUE index	CV	Number of days	Year	CPUE index	CV	Number of days
1990–1991	2.17	0.27	110	1998–1999	0.39	0.28	112
1991–1992	1.11	0.27	108	1999–2000	0.34	0.27	131
1992–1993	0.74	0.27	126	2000–2001	0.34	0.28	88
1993–1994	0.28	0.28	81	2001–2002	0.33	0.28	73
1994–1995	0.53	0.30	46	2002–2003	0.61	0.26	67
1995–1996	1.16	0.33	29	2003–2004	0.59	0.25	75
1996–1997	0.53	0.38	19	2004–2005	0.35	0.24	114
1997–1998	0.36	0.30	52	2005–2006	0.36	0.26	80

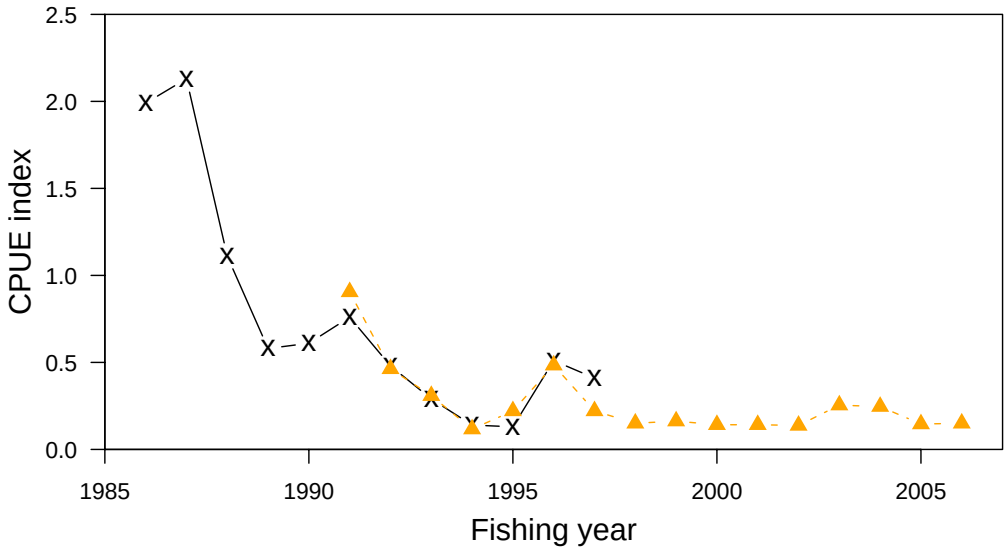

Figure 1: **The CPUE indices based on: (i) TCEPR data (solid line and crosses) covering 1985–6 to 1996–97, and (ii) CELR data (triangles and dashed line) covering 1990–91 to 2005–06. The CELR index has been scaled so that it has the same mean value as the TCEPR index in the years that they overlap.**

(b) Biomass estimates

No estimates of current biomass are available. Based on previous stock assessments using CPUE data the TACC was cut back severely from about 1700 t in 1994-95 to just 110 t since 2000-01. By the late 1990s the stock was believed to be well below B_{MSY} (17% B_0 in the 2004 assessment). Despite the large reduction in annual removals from the stock since 2001-02 recent catch rates have not increased over the last 5 years.

An updated assessment was attempted in 2007 with the addition of catch data up to 2005-06 and new standardised CPUE indices (Figure 1) based on TCEPR data (1986-97) and a separate CELR series (1991-2006). These data were incorporated in a Bayesian stock assessment with deterministic recruitment to estimate stock size. The Working Group rejected the assessment on the basis of the poor fit to the recent CPUE data. The model was insensitive to the recent CPUE data and predicted a rebuild (driven by the recruitment assumptions) that is not supported by any observations in the fishery.

4. STATUS OF THE STOCK

No estimates of current biomass are available. The current stock size is most likely below B_{MSY} as catch rates have not increased over the last 5 years despite a large reduction in annual removals from the stock. The assessment model projected a rebuild since 2000, which was not supported by the data from the fishery. The Working Group rejected the assessment results because of the poor fit to recent CPUE data.

It is not known if catches at the level of the current TACC (110 t) will allow the stock to move towards a size that will support the maximum sustainable yield.

5. FOR FURTHER INFORMATION

Annala, J.H.; Sullivan, K.J.; O'Brien, C.J.; Smith, N.W.McL.; Graying S.M. (Comps.) (2003). Report from the Fishery Assessment Plenary, May 2003: stock assessments and yield estimates. 616 p. (Unpublished report held in NIWA Greta Point library, Wellington.)

Clark, M.R.; Tracey, D.M. (1988). Assessment of the west coast South Island and northern North Island orange roughy fisheries. *N.Z. Fisheries Assessment Research Document* 88/20. 11 p.

Clark, M.R.; Field, K.D. (1995). Assessment of the ORH 7B orange roughy fishery for the 1995–96 fishing year. *N.Z. Fisheries Assessment Research Document* 95/19. 15 p.

O'Driscoll, R.L. (2001). Assessment of the west coast South Island orange roughy fishery (ORH 7B) for the 2001–02 fishing year. *N.Z. Fisheries Assessment Research Document* 2001/31. 29 p.