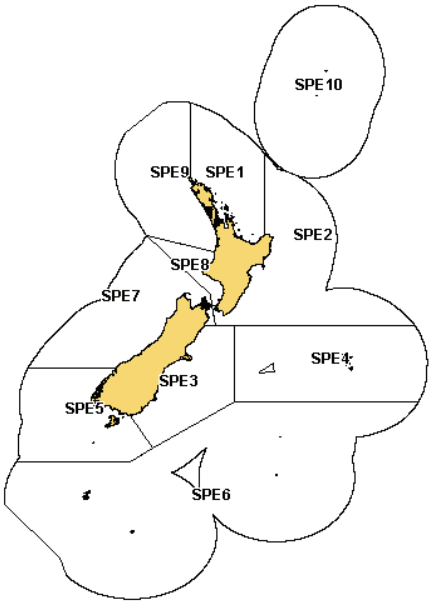
SEA PERCH (SPE)

(*Helicolenus percoides*)
Pohuiakaroa



1. FISHERY SUMMARY

1.1 Commercial fisheries

Sea perch was introduced into the QMS from 1 October 1998. From 1 October 2000 the TACC for SPE 3 was increased to 1000 t under the Adaptive Management Programme (AMP). The TACC for SPE 4 was increased from 533 t to 910 t from 1 October 2004 under the low knowledge bycatch framework, and from 1st October 2006 the TACC for SPE 1 was increased from 18 to 33 t. In SPE 1 landings were above the TACC for a number of years and the TACC has been increased to the average of the previous 7 years plus an additional 10%. Current TACCs and allowances for non-commercial fishers are displayed in Table 1, while the historical landings and TACC values for the four major SPE stocks are depicted in Figure 1.

Very small quantities of sea perch have been landed for local sale for many years, but are largely unreported. Catches have been made by foreign vessels since the 1960s, but were also not recorded (they were most probably included within a "mixed" or "other finfish" category), and most were probably discarded. Despite poor reporting rates, estimated landings are thought to have increased from 400 t in the early 1980s to approximately 2000 t in recent years; an unknown quantity has been discarded over this period.

Table 1: Recreational and customary non-commercial allowances and Current TACCs, by Fishstock, for sea perch.

	Recreational	Customary non-commercial	Other sources	
SPE 1	1	1	0	33
SPE 2	9	5	0	79
SPE 3	11	11	0	1 000
SPE 4	0	0	46	910
SPE 5	1	1	0	36
SPE 6	0	0	0	9
SPE 7	8	2	0	82
SPE 8	4	1	0	15
SPE 9	0	0	0	6
SPE 10	0	0	0	0
Total	34	21	46	2 155

About 75% of New Zealand's landed sea perch is taken as a bycatch in trawl fisheries off the east coast of the South Island, including the Chatham Rise. A small catch is made in some central and southern line fisheries, e.g., for groper.

Recent reported landings of sea perch by QMAs are shown in Table 2. The most important QMAs in most years are QMA 3 (east coast South Island) and QMA 4 (Chatham Rise).

The catch from SPE 3 is spread throughout the fishing year. There is a variable seasonal distribution between years. A higher proportion of the catch is taken during April, May and September and catches are lower from December to February, and in July. Most of the SPE 3 catch is taken as a bycatch from the red cod (~30 %) and hoki fisheries (15%) and from the sea perch target fishery (21%). The remainder is taken as a bycatch from the target barracouta, flatfish, ling, squid and tarakihi fisheries. Virtually all the SPE 3 catch is taken by bottom trawling, with a small proportion taken by bottom longline. SPE 3 catch rates are highest between 150–400 m depth.

The trawl fisheries operating in SPE 4 catch sea perch along the northern and southern edge of the Chatham Rise between 200 and 700 m depth. The majority of the SPE 4 catch is taken as a bycatch of the hoki target fishery (~ 59%), with the ling and hake fisheries accounting for around 25% and 10% of the total SPE 4 catch, respectively.

Table 2: Reported landings (t) of sea perch by fishstock and fishing year, 1983–84 to 2007–08. The data in this table have been updated from that published in previous Plenary Reports by using the data through 1996–97 in table 38 on p. 278 of the "Review of Sustainability Measures and Other Management Controls for the 1998–99 fishing year – Final Advice Paper" dated 6 August 1998.

Fishstock	SPE 1		SPE 2		SPE 3		SPE 4		SPE 5 & 6	
FMA	1		2		3		4		5 &6	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1983–84	14	-	2	-	150	-	58		36	-
1984–85	10	-	2	-	290	-	70		26	-
1985–86	14	-	2	-	213	-	218		28	-
1986–87	19	-	2	-	507	-	71		19	-
1987–88	20	-	1	-	544	-	63		18	-
1988–89	14	-	1	-	262*	-	36		18	-
1989–90	2	-	6	-	287*	-	177		9	-
1990–91	5	-	9	-	559*	-	68		33	-
1991–92	12	-	8	-	791*	-	222		36	-
1992–93	15	-	15	-	783*	-	317		55	-
1993–94	16	-	26	-	690*	-	223		28	-
1994–95	25	-	66	-	626*	-	415		18	-
1995–96	23	-	50	-	1 047*	-	404		62	-
1996–97	19	-	77	-	655*	-	435		45	-
1997–98	24	-	54	-	913	-	656		29	-
1998–99	21	18	79	79	903	738	872	533	27	45
1999–00	27	18	82	79	862	738	821	533	28	45
2000–01	25	18	81	79	798	738	840	533	19	45
2001–02	41	18	89	79	720	1 000	910	533	22	45
2002–03	19	18	78	79	696	1 000	1 685	533	25	45
2003–04	30	18	80	79	440	1 000	1 287	533	28	45
2004–05	27	18	104	79	372	1 000	894	910	24	45
2005–06	40	18	73	79	436	1 000	502	910	24	45
2006–07	30	33	98	79	519	1 000	588	910	31	45
2007–08	38	33	92	79	422	1 000	568	910	20	45

Fishstock	SPE 7		SPE 8		SPE 9		SPE 10			
FMA	7		8		9		10		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1983–84	16	-	2	-	55	-	0	-	0	-
1984–85	14	-	1	-	2	-	0	-	0	-
1985–86	12	-	2	-	4	-	0	-	0	-
1986–87	11	-	3	-	1	-	0	-	0	-
1987–88	8	-	6	-	0	-	0	-	0	-
1988–89	5	-	2	-	1	-	0	-	0	-
1989–90	14	-	1	-	0	-	0	-	0	-
1990–91	28	-	1	-	0	-	0	-	0	-
1991–92	20	-	2	-	0	-	0	-	0	-

Table 2 continued:

Fishstock	SPE 7		SPE 8		SPE 9		SPE10			
FMA	7		8		9		10		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1992–93	71	-	18	-	0	-	2	-	2	-
1993–94	52	-	10	-	0	-	0	-	0	-
1994–95	67	-	7	-	0	-	0	-	0	-
1995–96	78	-	7	-	1	-	0	-	0	-
1996–97	64	-	7	-	1	-	<1	-	1 310	-
1997–98	118	-	5	-	7	-	<1	-	1 808	-
1998–99	109	82	<1	15	2	6	0	0	2 014	1 516
1999–00	80	82	2	15	5	6	0	0	1 907	1 516
2000–01	80	82	4	15	3	6	0	0	1 853	1 778
2001–02	95	82	6	15	3	6	0	0	1 888	1 778
2002–03	103	82	4	15	4	6	0	0	2 619	1 778
2003–04	95	82	6	15	3	6	0	0	1 972	1 778
2004–05	47	82	5	15	2	6	0	0	1 475	2 155
2005–06	75	82	5	15	2	6	0	0	1 157	2 155
2006–07	67	82	2	15	2	6	0	0	1 338	2 170
2007–08	103	82	2	15	2	6	0	0	1 247	2 170

*These numbers may contain erroneous landings data, the situation is currently under investigation and the data will be amended if an error is identified during the course of that investigation.

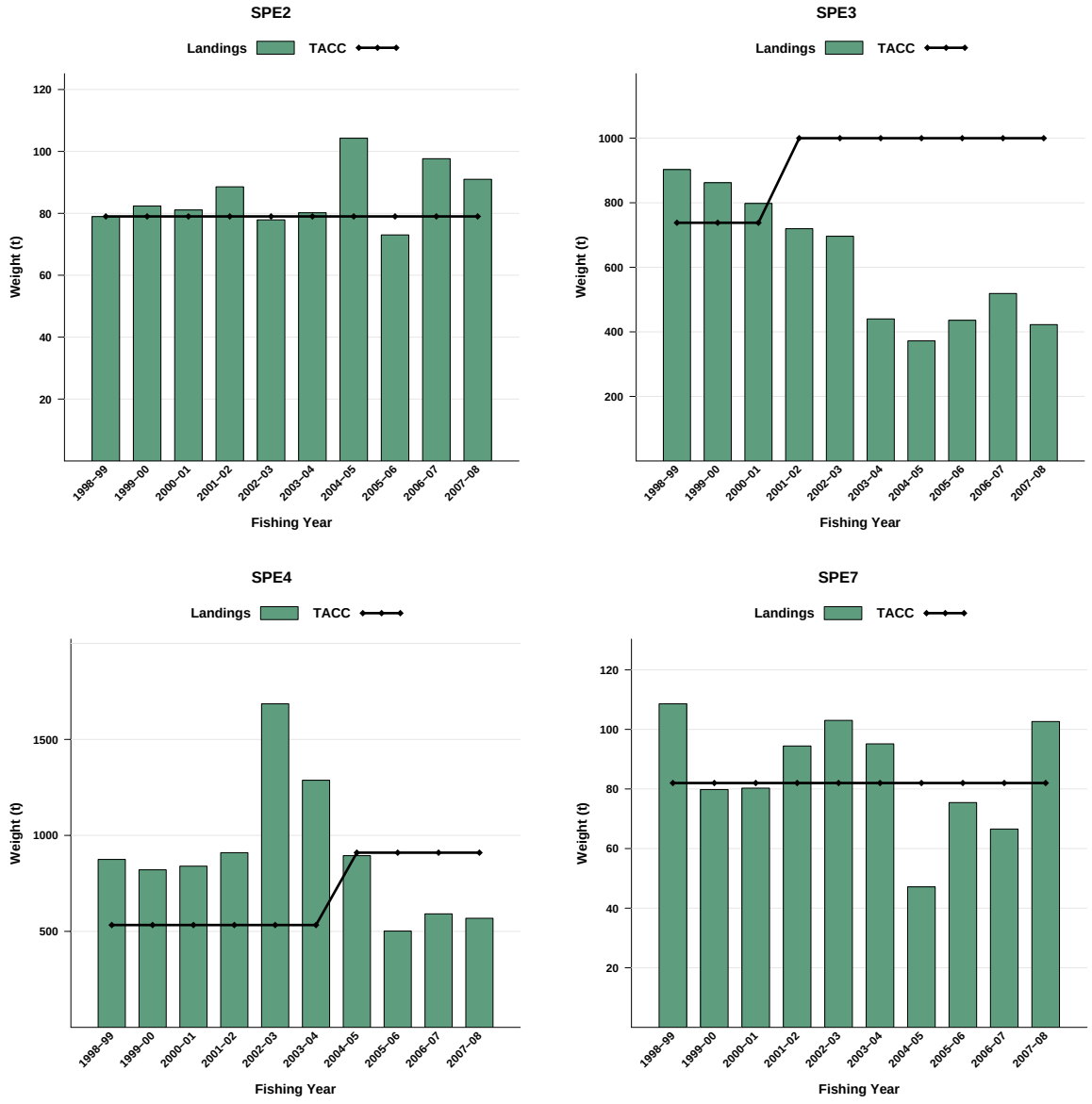


Figure 1: Historical landings and TACC for the four main SPE stocks. From top left to bottom right: SPE2 (Central East), SPE3 (South East Coast), SPE4 (South East Chatham Rise), and SPE7 (Challenger). Note that these figures do not show data prior to entry into the QMS.

1.2 Recreational fisheries

Sea perch are seldom targeted by recreational fishers, but are caught in large numbers. Some are used for bait, but most are probably discarded.

Three recreational fishing surveys were carried out by the Ministry of Fisheries in the 1990s (Table 3). However, because of identification problems and incomplete records, recreational fishing surveys probably do not provide good estimates of the recreational sea perch catch. The highest reported recreational catch of sea perch during these surveys was from QMAs 2, 3 and 7.

A key component of estimating recreational harvest from diary surveys is determining the proportion of the population that fish. The Recreational Technical Working Group concluded that the harvest estimates from the diary surveys should be used only with the following qualifications: a) they may be very inaccurate; b) the 1996 and earlier surveys contain a methodological error; and, c) the 2000 and 2001 estimates are implausibly high for many important fisheries. The 1999–2000 Harvest estimates for each Fishstock should be evaluated with reference to the coefficient of variation.

Table 3: Estimated number and weight of sea perch harvested by recreational fishers by Fishstock and survey. Surveys were carried out in different years in the Ministry of Fisheries regions: South in 1991–92, Central in 1992–93, North in 1993–94 (Teirney *et al.* 1997) and nationally in 1996 (Bradford, 1998) and 1999–00 (Boyd & Reilly 2005).

Fishstock	Survey	Number	C. V.%
1991–92			
SPE 3	South	110 000	25
SPE 5	South	18 000	35
SPE 7	South	16 000	–
1992–93			
SPE 2	Central	27 000	–
SPE 3	Central	<500	–
SPE 5	Central	<500	–
SPE 7	Central	65 000	40
SPE 8	Central	11 000	–
1993–94			
SPE 1 + 9	North	<500	–
SPE 2	North	<500	–
SPE 8	North	<500	–
1996			
SPE 1 + 9	National	2000	37
SPE 2	National	23 000	–
SPE 3	National	28 000	17
SPE 5	National	3000	–
SPE 7	National	20 000	17
SPE 8	National	11 000	–
1999–00			
SPE 2	National	10 000	94
SPE 2	National	16 000	64
SPE 3	National	154 000	38
SPE 5	National	10 000	58
SPE 7	National	63 000	46
SPE 8	National	<500	101

1.3 Customary non-commercial fisheries

The customary non-commercial take has not been quantified.

1.4 Illegal catch

There is no quantitative information on illegal fishing activity or catch, and given the low commercial value of sea perch, such activity is unlikely.

1.5 Other sources of mortality

No quantitative estimates are available about the impact of other sources of mortality on sea perch stocks. However, they are commonly caught as bycatch and a moderate quantity, particularly of small fish, is undoubtedly discarded.

2. BIOLOGY

Sea perch are widely distributed around most of New Zealand, but are rare on the Campbell Plateau. They inhabit waters ranging from the shoreline to 1200 m and are most common between 150 and 500 m. Previously it was believed that there were two species of sea perch, *H. percoides* and *H. barathri* in New Zealand waters. However, genetics research determined that there is probably only one species of sea perch in New Zealand waters, *H. percoides* (Smith 1998). Because of confusion between *H. percoides* and *H. barathri* until recent years, there is limited information on sea perch biology. Trawl surveys from about 1990 show sea perch size to vary with depth and locality without an obvious pattern, possibly representing population differences as well as life history characteristics.

Sea perch are viviparous, extruding small larvae in floating jelly-masses during an extended spawning season. Sex ratios observed in trawl survey samples show more males, generally in the ratio 1:0.7 to 1:0.8. Sea perch are opportunistic feeders and prey on a variety of animals on or close to the seafloor.

Growth is relatively slow throughout life. After about age 5 years, males appear to grow faster than females (there is some uncertainty due to small sample sizes). Males mature at 19-25 cm, about 5–7 years, whereas females mature at between 15 and 20 cm, around 5 years (Paul & Francis 2002). Maximum observed ages estimated for sea perch from the east coast South Island and Chatham Rise were 32 and 43 years. The natural mortality estimates derived from these are 0.13 and 0.10 (using the Hoenig method) and 0.07–0.09 (using the Chapman-Robson estimator) (Paul & Francis 2002). Ageing studies have not identified the species involved, but the maximum age of Australian fish listed as *H. percoides* by Withell & Wankowski (1988), is about 40 years. The maximum size for sea perch is about 56 cm.

Biological parameters relevant to stock assessment are shown in Table 4.

Table 4: Estimates of biological parameters for sea perch.

Fishstock	Estimate	Source
1. Natural mortality (*M*)		
SPE 3	0.10-0.13 (Hoenig method)	Paul & Francis (2002)
SPE 3	0.07-0.09 (Chapman Robson estimator)	Paul & Francis (2002)

2. Weight = a (length)^b (Weight in g, length in cm fork length)

	Both sexes		
	a	b	
SPE 3	0.007767	3.219132	Schofield & Livingston (1996)

3. von Bertalanffy growth parameters

	Females			Males			
	K	t_0	L_∞	K	t_0	L_∞	
ECSI 1996	0.128	-0.725	40.7	0.117	-0.64	43.6	Paul & Francis (2002)
ECSI 2000	0.13	-0.895	37.9	0.116	-0.956	42.4	Paul & Francis (2002)

3. STOCKS AND AREAS

There are no data relevant to stock boundaries. However, regional variation in colouration suggests that separate populations could exist.

4. STOCK ASSESSMENT

4.1 Estimates of fishery parameters and abundance

Estimates of relative abundance from trawl surveys are presented in Table 5. Annual biomass estimates from the winter and summer east coast South Island and Southland surveys have been variable between years, and were determined with only moderate precision (generally CVs around 30%).

Table 5: Relative biomass indices (t) and coefficients of variation (CV) for west coast South Island, Stewart-Snares Island, east coast South Island (ECSI) – summer and winter, and Chatham Rise trawl surveys. Note, because trawl survey biomass estimates are indices, comparisons between different seasons (e.g., summer and winter ECSI) are not strictly valid.

Region	Survey	Date	Biomass (t)	CV *(%)*
West coast,	KAH9204	Mar-Apr 1992	293	24
South Island	KAH9404	Mar-Apr 1994	510	18
	KAH9504	Mar-Apr 1995	667	23
	KAH9701	Mar-Apr 1997	338	14
	KAH0004	Mar-Apr 2000	302	22
	KAH0304	Mar-Apr 2003	76	25
	KAH0503	Mar-Apr 2005	150	20
	KAH0704	Mar-Apr 2007	163	19
Southland	TAN9301	Feb-Mar 1993	469	33
(Stewart-Snares	TAN9402	Feb-Mar 1994	443	26
shelf)	TAN9502	Feb-Mar 1995	450	27
	TAN9604	Feb-Mar 1996	480	29
East coast.	KAH9105	May-Jun 1991	1 802	30
South Island	KAH9205	May-Jun 1992	2 288	27
(Winter)	KAH9306	May-Jun 1993	3 348	30
	KAH9406	May-Jun 1994	2 327	29
	KAH9606	May-Jun 1996	1 671	26
	KAH0705	May-Jun 2007	1 954	22
		May-Jun 2008	1944	23
East coast.	KAH9618	Dec-Jan 1996–97	4 041	47
South Island	KAH9704	Dec-Jan 1997–98	1 638	25
(Summer)	KAH9809	Dec-Jan 1998–99	3 889	41
	KAH9917	Dec-Jan 1999–00	2 203	27
	KAH0014	Dec-Jan 2000–01	1 792	20
Chatham Rise	TAN9106	Dec-Jan 1991–92	3 050	12
	TAN9212	Dec-Jan 1992–93	3 110	9
	TAN9401	Jan 1994	3 914	11
	TAN9501	Jan 1995	1 490	9
	TAN9601	Jan 1996	3 006	10
	TAN9701	Jan 1997	2 713	14
	TAN9801	Jan 1998	3 448	14
	TAN9901	Jan 1999	4 842	9
	TAN0001	Jan 2000	4 776	8
	TAN0101	Jan 2001	6 310	10
	TAN0201	Jan 2002	8 417	8
	TAN0301	Jan 2003	6 904	8
	TAN0401	Jan 2004	5 786	13
	TAN0501	Jan 2005	4 615	11
	TAN0601	Jan 2006	5 752	10
	TAN0701	Jan 2007	4 737	10
	TAN0801	Jan 2008	3 081	14
	TAN0901	Jan 2009	5 149	13

The time series of biomass estimates from the West Coast South Island surveys increased between 1992 and 1995 and declined substantially from 667 t in the subsequent surveys. The 2005 estimate of relative biomass was 150 t. Annual trawl survey biomass estimates from the Chatham Rise have a low associated coefficient of variation (8–15%). The time series of indices is relatively constant between 1992 and 1994, drops significantly in 1995, and recovers in 1996. Biomass estimates increased dramatically from 2713 t in 1997 to 8417 t in 2002, but have declined since then (Figure 2). The 2008 estimate was 3081 t (Table 5).

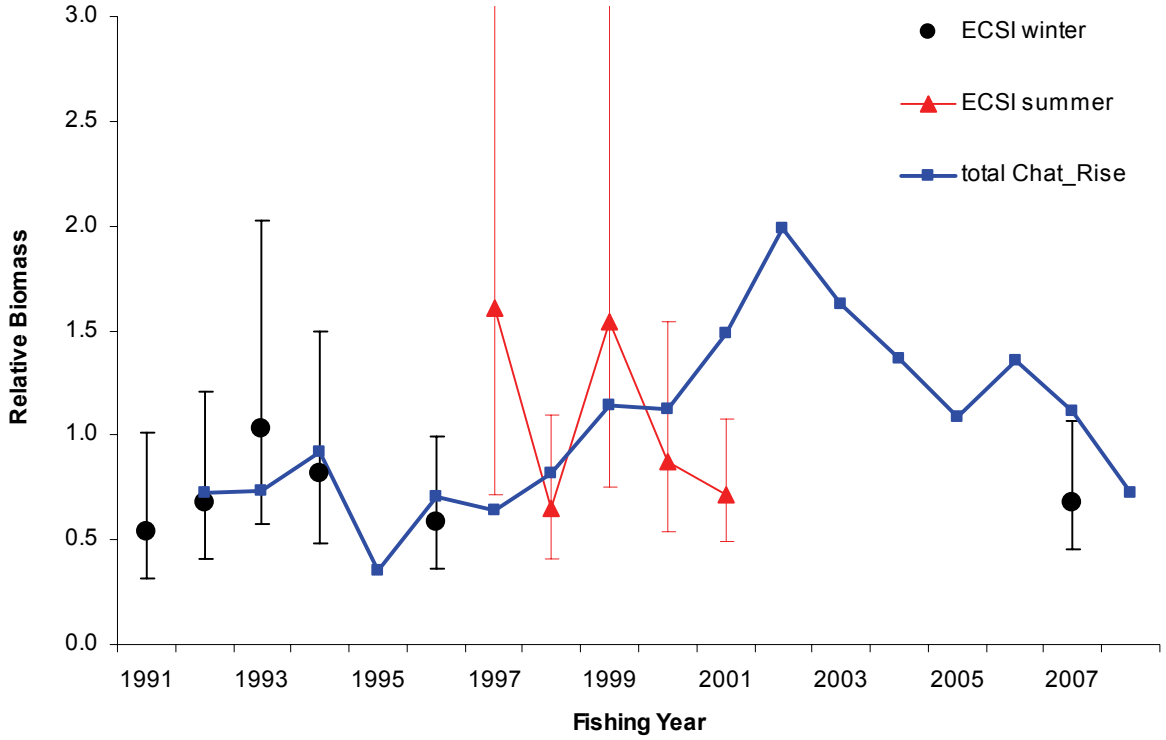


Figure 2: Biomass estimates ±95% CI from the East Coast South Island (ECSI) trawl surveys and the Chatham Rise survey.

4.2 Biomass estimates

Estimates of current and reference absolute biomass are not available.

4.3 Estimation of Maximum Constant Yield (MCY)

No estimate of MCY can be made. The method MCY = cY_{AV} (Method 4) requires a longer period of relatively stable, or at least known, catches (in view of a potential longevity of 40 years) than is available.

4.4 Estimation of Current Annual Yield (CAY)

No estimates of current biomass, fishing mortality, or other information are available which would permit the estimation of CAY.

4.5 Other Factors

Factors influencing yield estimates (species identification, catch history, biomass estimates, longevity/mortality, and natural fluctuations in population size) are poorly known for sea perch and preclude any reliable yield estimates at present.

5. ANALYSIS OF ADAPTIVE MANAGEMENT PROGRAMMES

The Ministry of Fisheries revised the AMP framework in December 2000. The AMP framework is intended to apply to all proposals for a TAC or TACC increase, with the exception of fisheries for which there is a robust stock assessment. In March 2002, the first meeting of the new AMP Working Group was held.

Two changes to the AMP were adopted:

- a new checklist was implemented with more attention being made to the environmental impacts of any new proposal,
- the annual review process was replaced with an annual review of the monitoring requirements only. Full analysis of information is required a minimum of twice during the 5 year AMP.

2008 AMP Review of SPE 3

SPE 3 entered the QMS in 1998–99, and subsequently was put in the AMP in October 2001 with a TACC increase from 738 t to 1000 t. The TACC has since remained at that level. Prior to entry into the QMS, catches of SPE 3 increased steadily from approximately 100 t/year in 1982–83 to a peak of 903 t in 1998–99. After the TACC increase to 1000 t, catches declined to 372 t by 2004–05, then increased to 519 t in 2006–07, around the level of catch in the mid-1990s. Since entry into the AMP, SPE 3 annual catches have averaged about half of the TACC.

In 2008 the AMP FAWG reviewed the performance of the AMP (Starr *et al*. 2008). The Working Group noted:

Fishery Characterization

- Most (94%) SPE 3 have been caught by bottom trawl (BT) since 1998–99, with the remaining 6% divided between bottom longline, mid-water trawl, setnet and Dahn line fisheries. 48 t of SPE is reported as being caught in cod and rock lobster pots, but this may the result of misreporting species such as Mäori chief and Jock Stewart.
- Most bottom trawl effort landing SPE occurs in Area 020: Pegasus Bay and Area 022: Canterbury Bight. Significant SPE-directed effort also occurred in Area 018: Kaikoura, although this fishery almost ceased since 2001–02. Bottom longline (BLL) SPE 3 effort occurs mainly off Pegasus Bay, with some effort in Areas 018 022.
- BT and BLL SPE 3 landings occur throughout the year, with somewhat higher BT catches in late autumn or early winter in some years. Setnet landings mainly occur from December to May, and have also been diminishing in recent years. A Dahn line fishery for sea perch has developed since 2004–05, primarily from October to February.
- Landings of SPE 3 by statistical area show changes over time. Most notable is the disappearance of the Area 018 target SPE fishery after 2001–02. Area 022 has higher landings in many years from February to May, coinciding with the peak of the red cod fishery. Area 020 tends to have higher landings in October and September, whereas Areas 020 or 022 show no strong seasonal patterns.
- SPE is caught by BT targeting barracouta, tarakihi and flounder. BLL effort catching sea perch mainly target ling, with some targeting of bluenose and hapuku/bass. Setnet SPE 3 catches are taken by fisheries targeting tarakihi, ling, spiny dogfish, bluenose and rig. The recently developed Dahn line fishery is almost entirely targeted at sea perch.
- Depth information on TCEPR forms show that sea perch are mainly taken between 90 m and 580 m of depth (median 323 m, mean 369 m), depending on target species, shallower for red cod and barracouta targeting, and deeper for hoki, scampi or hake tows.

CPUE Analysis

- Two CPUE analyses were performed on the SPE 3 catch and effort for sea perch catches in a range of east coast South Island bottom trawl fisheries, updating similar analyses presented to the AMP FAWG in 2006:
  - BT(MIX): a mixed target trawl fishery targeting red cod, barracouta, tarakihi and sea perch in statistical areas valid for SPE 3.
  - BT(HOK): a target hoki trawl fishery operating at the deeper end of the sea perch depth distribution fishing in statistical areas valid for SPE 3.
- The target SPE 3 bottom trawl fishery, under which the original SPE 3 AMP was granted, largely ceased when the main participant withdrew from the fishery in 2002–03. The total number of target SPE tows has since declined and it appears that new participants are fishing in different areas from the previous fishery that was centred around Kaikoura. The SPE-targeted BT CPUE series presented in 2004 is therefore no longer considered to be representative of SPE abundance, and has not been updated.
- Unstandardised CPUE indices for the BT(HOK) analysis show high variability and no clear trends. Sea perch are not well reported from this fishery, resulting in an unreliable index, and the Working Group also did not accept the BT(HOK) analysis.

- The preferred lognormal BT(MIX) model shows a gradual declining trend since the start of the series in 1998/99, with some suggestion that the decline may have levelled off since 2005–06 (Figure 3). Unstandardised series are similar to the standardised series, although with a somewhat steeper decline to a slightly lower level in recent years.
- The decline in the BT(MIX) series occurred over a period when catches were decreasing, partially as a result of departure of the main participant in this fishery. Changes in participation and spatial fishing patterns are probably contributing both to the observed CPUE decline as well as possible changes in abundance.

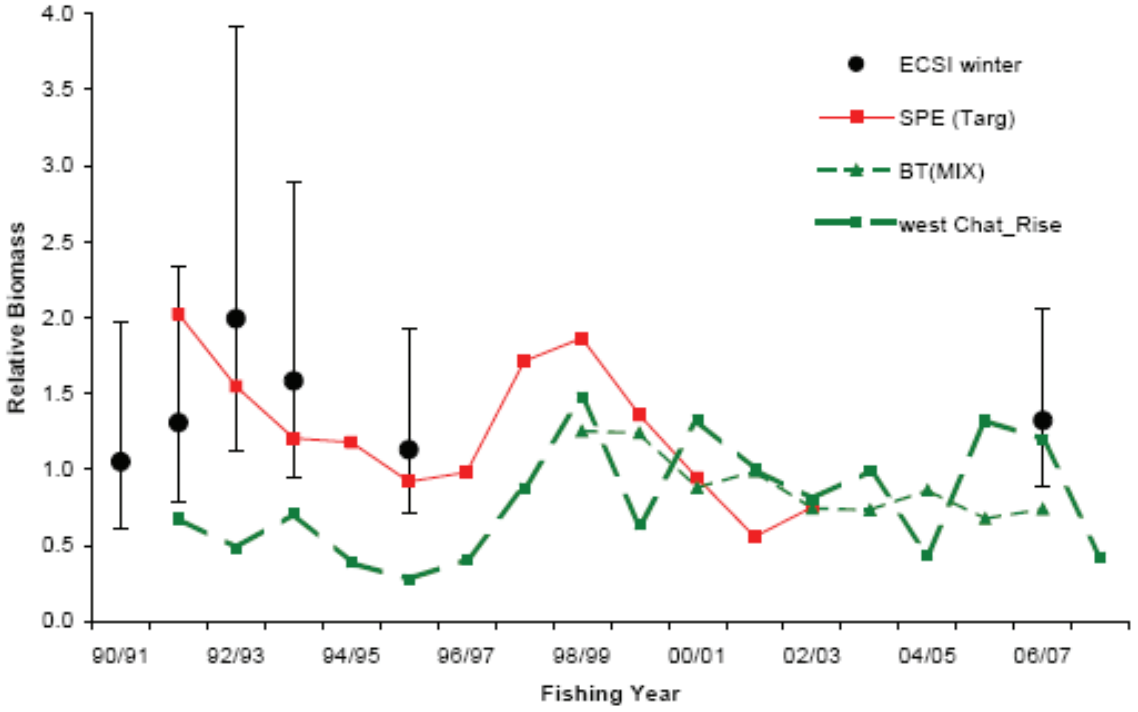


Figure 3: Comparison plot of the winter ECSI and western Chatham Rise SPE survey biomass indices with the SPE(Targ) CPUE series and the BT(MIX) CPUE series. The survey series were assumed to relate to the final year of the fishing year pair. The two CPUE series and the western Chatham Rise series have been standardised to a common geometric mean from 1998– 99 to 2002–03 and the ECSI series has been standardised to the common geometric mean with the SPE(Targ) series from 1991–92 to 1993–94 and 1995–96.

Trawl Survey Abundance Indices

- Data from three trawl surveys in SPE 3 and 4 have been summarised to examine trends in SPE relative abundance and length composition: east coast South Island (ECSI) winter surveys from 1991–1996 (5 surveys) and 2007 (1 survey); ECSI summer surveys from 1997–2001 (5 surveys) and Chatham Rise summer surveys (restricted to the strata west of 176°E) from 1992–2008 (17 surveys).
- Catches of sea perch from the ECSI trawl surveys were low in depths < 80 m in the Canterbury Bight and Pegasus Bay. Highest catch rates were achieved in the 100 m to 180 m depth along the edge of the continental shelf, and catches were low in depths exceeding 200m. SPE were only caught in small quantities in the Chatham Rise survey, with highest catches in the shallower areas of the northern central Chatham Rise.
- Biomass estimates from the ECSI winter survey show no trend among the first five survey indices, increasing between 1991 and 1993 and then declining in 1994 and 1996 (Figure 2 and 3). The ECSI winter series was reinstated in 2007, with a biomass estimate near the median of the earlier five surveys and likely indicative of no overall trend in the 11 year gap between survey periods. ECSI summer survey results are not considered to be reliable indices of SPE abundance.
- Biomass estimates from the western Chatham Rise show no overall trend, with a steady increase from the lowest estimate in 1995 to a peak in 2002, followed by a decline at a similar

rate to a level in 2008 similar to the 1996-1998 levels (Figure 3). It is not known how the sea perch population on the Chatham Rise relates to the population being fished in SPE 3.

- Length compositions from the winter ECSI surveys were dominated by a strong 20-25 cm length mode. There was no significant difference in the length composition for male and female fish and no indication of substantial changes in the length composition over the study period.
- Length compositions from the Chatham Rise surveys were slightly larger, mostly 20 cm – 30 cm and attaining 50 cm, but with high variability between surveys. Strong modal peaks are evident, with some suggestion from modal progression that these may represent year classes. It may be feasible to assess recruitment variation from these data once information on SPE age and growth is available. However, most of this survey falls into SPE 4.

Logbook Programme

- A bottom trawl logbook programme which only sampled the target SPE 3 fishery was introduced in 2001–02. This programme collected data for about one year before the primary participant left the fishery, after which the programme was discontinued. A general programme to sample the east coast South Island trawl fishery started in 2003–04, initially to sample elephantfish, but was gradually extended to sample other AMP species, including sea perch.
- The SPE 3 bottom trawl logbook programme obtained possibly adequate coverage of the SPE 3 target bottom trawl fishery for sea perch in 2001–02 and 2004–05. The coverage of the by-catch of sea perch was poor in all years due to the diversity of the mixed BT fishery and the scarcity of SPE in individual tows. The number of reported tows in the programme has ranged from 144 to 905 per year, over all sampled tows. However, the amount of sea perch catch sampled was only 200 kg to 11 t of estimated catch. Coverage levels of SPE by catch weight have ranged from 0 to 2.5% and only 153 tows, out of the total of 2 526 reported tows, recorded sampled SPE catch.
- Coverage of the target sea perch fishery was over 10% in 2001–02 when the principal operator was participating, and coverage of the smaller target SPE fishery in 2004–05 was about 16%. Coverage of the bycatch fishery was 0.3% in 2006–07.
- There are indications in length-frequency data from logbooks of a decrease in the proportion of large (> 35cm) fish from catches between 2001–02 and 2006–07, and a resultant decrease in modal size from around 32 cm in 2001–02 to 25 cm in 2006–07. However, these conclusions need to be considered against the general lack of representative and consistent sampling from this programme.

Effects of Fishing

- Incidental mortality of Hectors dolphin from trawling appears to be rare. One capture of a Hectors dolphin was observed in the red cod trawl fishery in QMA 3 in 1997 -1998 (Starr & Langley 2000). In particular, the majority of trawls which catch SPE 3 occur between 90 m and 600 m (median 330 m), outside the known distribution of Hectors dolphin, which is within 4 nautical miles of the coast, particularly in the summer months.
- Low observer coverage and lack of fine scale catch reporting has made it difficult to objectively evaluate the environmental effects of fishing under the STA 3 AMP. The rates of non-fish bycatch are unknown, monitoring is not adequate. Since the last review of STA 3 in 2006:
    - The Non-fish/Protected Species Catch Return to be implemented from 1 October 2008 should provide information on the level of non-fish/protected species bycatch for the next review of STA 3. However, adequate observer coverage will still be required to validate reporting rates.
    - The draft Hector's and Maui's Dolphin Threat Management Plan (TMP) released for consultation (MFish and DOC 2007) proposes an extension to the existing Banks Peninsula marine mammal sanctuary.

- Under the seabird sustainability measures that begin on 1 June 2008, trawlers can not discharge offal or fish on more than one occasion per tow or during shooting or hauling or within 20 minutes before shooting.

Conclusions

- A direct comparison of the indices considered most reliable for SPE 3 (the historic SPE(Targ) CPUE, the BT(MIX) CPUE and the ECSI and West Chatham Rise surveys) indicates that the indices from the ECSI survey agree reasonably well with the historic SPE(Targ) CPUE series but lie above the two current CPUE series. The two survey series (western Chatham Rise and ECSI) show similar trends (Figure 2). The western Chatham Rise survey series lies below the ECSI series and the SPE(Targ) series in the early 1990s, but agrees reasonably well with the two CPUE series in the early to mid-2000s.
- Interpretation of these results depends on the relative weight given to the various indices. The ECSI survey series, and particularly the 2007 survey estimate, suggests stable catch rates with no trend across the series. However, the SPE(Targ) index, the BT(MIX) index and the western Chatham Rise survey index from 1999–2005 all indicate a decline in abundance since 1998–99, perhaps levelling off in the last two years. The 2007 ECSI survey estimate requires confirmation from repeat surveys in 2008 and 2009.

AMP Review Checklist

1. The East Coast South Island winter trawl survey is likely to be the best index of abundance for the SPE 3 stock, although there are concerns that this may not be indexing the full population (SPE occur deeper than the survey), and that SPE 3 may be linked to the Chatham Rise SPE population. Of the CPUE indices, the BT(MIX) index may be providing a reasonable index of the currently fished component of SPE 3.

2. With the drop in interest in the targeted SPE bottom trawl fishery and the departure of the main, logbook coverage of remaining SPE 3 bycatch fishery has been negligible.

3. Additional analyses recommended by the Working Group included:

    - For the next review, CPUE standardisation should be conducted for the full time series in the BT(MIX) SPE bycatch fishery, and not just from 1998–99 onwards, to evaluate the degree of correspondence with the historic SPE(Targ) index. In extending this analysis back in time, target should be used as a categorical explanatory variable to evaluate the possible effect of change in reporting practices before and after entry of SPE 3 into the QMS in 1998–99.

4. The combination of optimistic recent trawl surveys estimates and levelling off in the BT(MIX) CPUE index indicate that current harvest levels should be sustainable. However, most indices indicate a decline over the period of the targeted SPE 3 fishery from 1998–99 to 2002–03, when catches were about double current levels. There are therefore indications that the current TACC may not be sustainable.

5. The status of the SPE 3 stock in relation to B_{MSY} has not been estimated. Further ECSI winter trawl survey results may further inform this view over the next two years.

6. Observer coverage levels of the inshore trawl fisheries are low, and the effects of fishing are not currently adequately monitored. Introduction of the '*Non-fish/Protected Species Catch Return*' into the suite of regulated MFish forms from 1st October 2008 may provide a credible source of information on the level of protected species bycatch. However, observer coverage will still be required to validate fisher reporting rates.

7. Given the low observer coverage in this fishery, rates of non-fish bycatch are not known with any confidence, and it is not known whether rates of bycatch are acceptable.

8. The Working Group concluded that this stock does not need to be referred to the Plenary for review. However, catches should be monitored and consideration given to bringing forward the next SPE 3 review if catches increase substantially.

6. STATUS OF THE STOCKS

No estimates of current and reference biomass are available.

For all SPE Fishstocks it is not known if recent catch levels are sustainable.

TACCs and reported landings of sea perch in the 2007–08 fishing year are summarised in Table 6.

Table 6: Summary of TACCs (t), and reported landings (t) of sea perch for the most recent fishing year.

Fishstock		QMA	2007–08 Actual TACC	2007–08 Reported landings
SPE 1	Auckland (East)	1	33	38
SPE 2	Central (East)	2	79	92
SPE 3	South-east (coast)	3	1 000	422
SPE 4	South-east (Chatham)	4	910	568
SPE 5	Southland	5	36	15
SPE 6	Sub-Antarctic	6	9	5
SPE 7	Challenger	7	82	103
SPE 8	Central (West)	8	15	2
SPE 9	Auckland (West)	9	6	2
SPE 10	Kermadec	10	0	0
Total			2 170	1 247

7. FOR FURTHER INFORMATION

Beentjes MP., Horn PL., Bagley NW. 2007. Characterisation of the Chatham Rise sea perch fishery. New Zealand Fisheries Assessment Report 2007/16. 84p.

Bradford E. 1998. Harvest estimates from the 1996 national recreational fishing surveys. New Zealand. Fisheries Assessment Research Document 1998/16. 27p.

Boyd RO., Reilly JL. 2005. 1999/2000 national marine recreational fishing survey: harvest estimates. Draft New Zealand Fisheries Assessment Report.

CFMC 2001. (Challenger Finfish Management Company.) Performance of the SPO 7 Adaptive Management Programme dated 7 May 2001. Copies held by The Ministry of Fisheries.

Hart AM., Walker NA. 2004. Monitoring the recreational blue cod and sea perch fishery in the Kaikoura – North Canterbury area. New Zealand Fisheries Assessment Report 2004/45. 88p.

Park TJ. 1994. Ocean perch, *Helicolenus* sp. *In* Tilzey, R.D.J. (Ed.), The South East Fishery. A scientific review with particular reference to quota management. pp. 237–246. Bureau of Resource Sciences, Canberra. 360p.

Paul LJ. 1998. A summary of biology and commercial landings, and a stock assessment of the sea perches, *Helicolenus* spp. (Scorpaenidae) in New Zealand waters. New Zealand Fisheries Assessment Research Document 1998/29. 30p.

Paulin CD. 1982. Scorpion fishes of New Zealand. New Zealand Journal of Zoology 9(4): 437–450.

Paulin CD. 1989. Redescription of *Helicolenus percoides* (Richardson) and *H. barathri* (Hector) from New Zealand (Pisces, Scorpaenidae). Journal of the Royal Society of New Zealand 19(3): 319–325.

Schofield KA., Livingston ME. 1996. Trawl survey of hoki and middle depth species on the Chatham Rise, January 1996 (TAN9601). NZ Fisheries Data Report No. 71. 50p.

Seafood Industry Council (SeaFIC). 2003. 2003 performance report SPE 3 Adaptive Management Programme. AMP-WG-2003/05 11p. Copies held at The Ministry of Fisheries.

Seafood Industry Council (SeaFIC). 2004. Report to the Adaptive Management Fishery Assessment Working Group: Performance of the SPE 3 Adaptive Management Programme. AMP-WG-2004/07 53 p. Copies held by The Ministry of Fisheries.

Seafood Industry Council (SeaFIC). 2004 performance report SPE 3 Adaptive Management Programme. AMP-WG-2003/05 11p. Copies held at The Ministry of Fisheries.

Southeast Finfish Management Company (SEFMC) 2001. SPE 3 Adaptive Management Programme Proposal – 2001 dated 7 May 2001.

Smith P. 1998. Molecular identification of sea perch species. Final Report to the Ministry of Fisheries for Project MOF706. 17p.

Starr PJ., Kendrick TH., Lydon GJ. 2006. Full Term Review of the SPE 3 Adaptive Management Programme. 71p. (Unpublished manuscript available from the NZ Seafood Industry Council, Wellington).

Starr PJ., Kendrick TH., Bently, N, and Lydon GJ. 2008. Review of the SPE 3 Adaptive Management Programme. 82p. (Unpublished manuscript available from the NZ Seafood Industry Council, Wellington).

Stewart P. (Comp.) 1993. Ocean perch. *In* Kailola PJ., Williams MJ., Stewart PC., Reichelt RE., McNee A., Grieve C.. (Ed), Australian Fisheries Resources. 241–242 pp. Bureau of Resource Sciences, Canberra. 422p.

Teirney LD., Kilner AR., Millar RE., Bradford E., Bell JD. 1997. Estimation of recreational catch from 1991/92 to 1993/94 New Zealand. Fisheries Assessment Research Document 1997/15. 43p.

Withell AF., Wankowski JW. 1988. Estimates of age and growth of ocean perch. *Helicolenus percoides* Richardson, in south-eastern Australian waters. Australian Journal of Marine and Freshwater Research 39(4): 441–457.