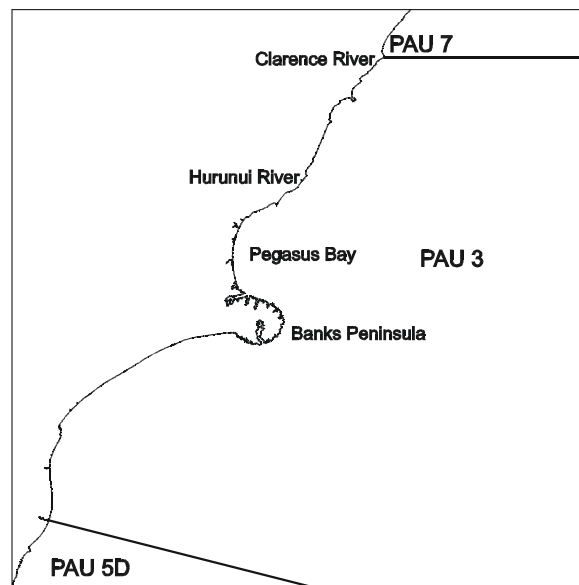


PAUA (PAU 3) – Canterbury / Kaikoura

(Haliotis iris)
Paua



1. FISHERY SUMMARY

1.1 Commercial fisheries

PAU 3 was introduced into the Quota Management System in 1986-87 with a TACC of 57 t. As a result of appeals to the Quota Appeal Authority, the TACC was increased to 91.62 t in 1995 and has remained unchanged to the current fishing year (Table 1). There is no TAC for this QMA: before the Fisheries Act (1996) a TAC was not required. When changes have been made to a TACC after 1996, stocks have been assigned a TAC.

Table 1: Total allowable catches (TAC, t) allowances for customary fishing, recreational fishing, and other sources of mortality (t) and Total Allowable Commercial Catches (TACC, t) declared for PAU 3 since introduction to the QMS.

Year	TAC	Customary	Recreational	Other mortality	TACC
1986 - 1995	-	-	-	-	57
1995 - present	-	-	-	-	91.62

The fishing year runs from 1 October through 30 September. Most of the commercial catch comes from the northern part of the QMA between the northern end of Pegasus Bay and the Clarence River, and from the southern side of Banks Peninsula.

On 1 October 2001 it became mandatory to report catch and effort using fine-scale reporting areas developed by the New Zealand Paua Management Company for their voluntary logbook program (Figure 1). These reporting areas were subsequently adopted on MFish PCELRs.

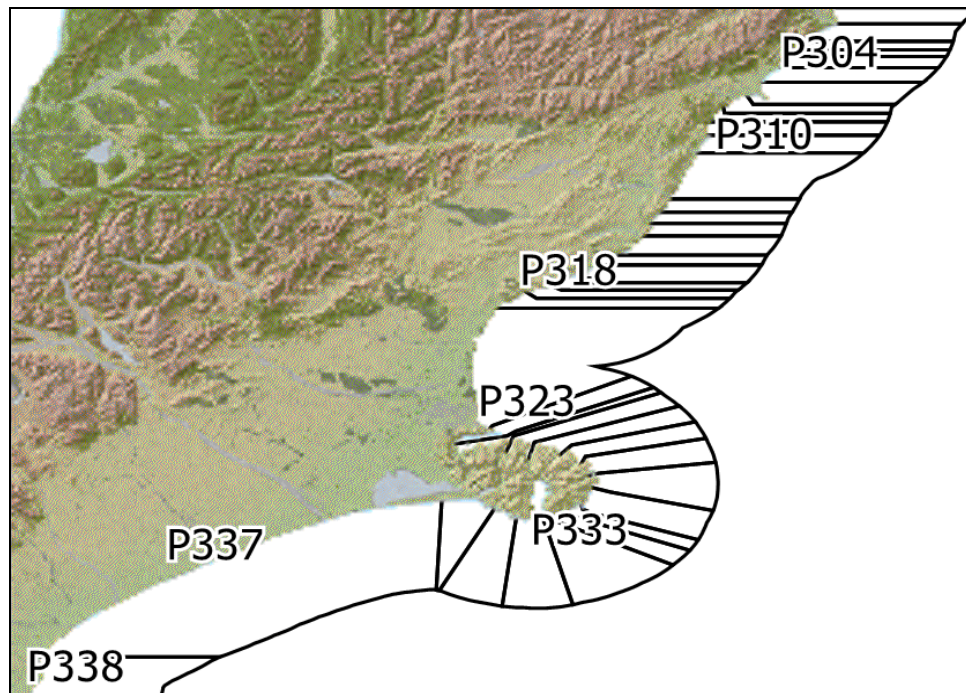


Figure 1: Map of fine scale statistical reporting areas for PAU 3.

Landings for PAU 3 are shown in Table 2.

Table 2: TACC and reported landings (t) of puaa in PAU 3 from 1983-84 to present.

Year	Landings	TACC
1983-84*	114	-
1984-85*	92	-
1985-86*	51	-
1986-87*	54.02	57
1987-88*	62.99	60.49
1988-89*	57.55	66.48
1989-90	73.46	69.43
1990-91	90.68	77.24
1991-92	90.25	91.5
1992-93	94.52	91.5
1993-94	85.09	91.5
1994-95	93.26	91.5
1995-96	92.89	91.62
1996-97	89.65	91.62
1997-98	93.88	91.62
1998-99	92.54	91.62
1999-00	90.3	91.62
2000-01	93.19	91.62
2001-02	89.66	91.62
2002-03	90.92	91.62
2003-04	91.58	91.62
2004-05	91.43	91.62
2005-06	91.6	91.62
2006-07	91.61	91.62
2007-08	91.67	91.62
2008-09	90.84	91.62
2009-10	91.61	91.62
2010-11	90.4	91.62
2011-12	91.14	91.62

* FSU data.

PAUA (PAU 3)

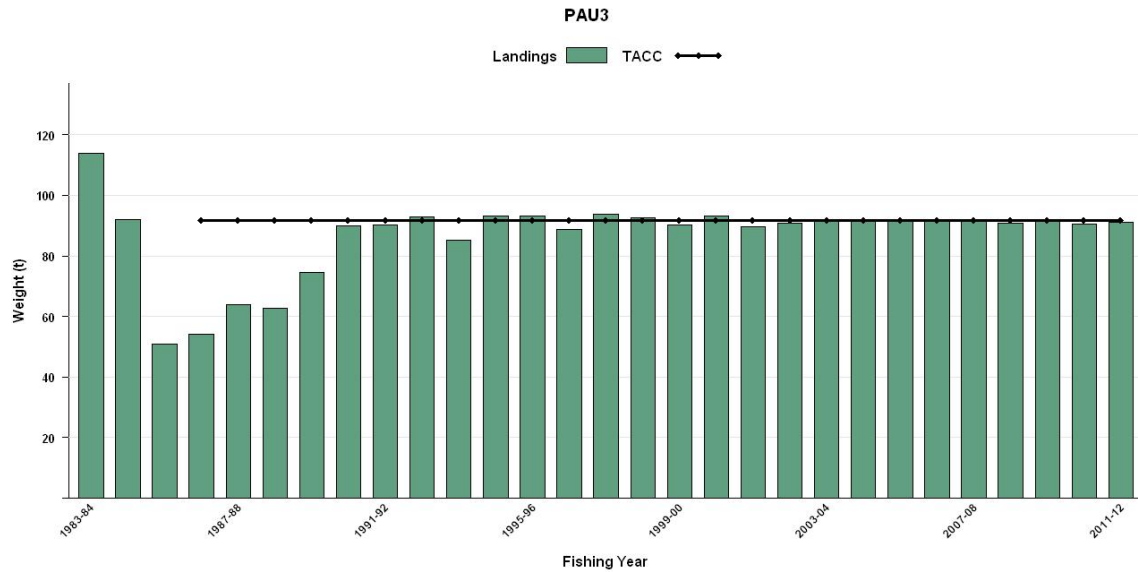


Figure 2: Historical landings and TACC for PAU3 from 1983-84 to present. QMS data from 1986-present.

1.2 Recreational fisheries

For further information on recreational fisheries refer to the introductory PAU Working Group Report.

1.3 Customary fisheries

Estimates of customary catch for PAU 3 over the period of their reliable availability are shown in Table 3. Landings do not include the area between the Hurunui River and the South Shore (just north of Banks Peninsula), as Tangata Tiaki have not yet been appointed there. Many tangata whenua also harvest paua under their recreational allowance and these are not included in records of customary catch.

Table 3: Reported customary landings (t) of paua in PAU 3 from 2000-01 to 2008-09. Landings data exclude the area between the Hurunui and Pegasus Bay.

Year	Landings (t)
2000-01	1.64
2001-02	4.88
2002-03	3.84
2005-06	1.89
2006-07	4.56
2007-08	5.79
2008-09	8.13

1.4 Illegal catch

For further information on illegal catch refer to the introductory PAU Working Group Report.

1.5 Other sources of mortality

For further information on other sources of mortality refer to the introductory PAU Working Group Report.

2. BIOLOGY

For further information on paua biology refer to the introductory PAU Working Group Report. A summary of published estimates of biological parameters for PAU 3 is presented in Table 3.

Table 3: Estimates of biological parameters (*H. iris*) in PAU 3.

Fishstock		Estimate	Source
<u>1. Natural mortality (<i>M</i>)</u>			
Peraki Bay		0.02-0.25	Sainsbury (1982)
<u>2. von Bertalanffy Growth parameters</u>			
Peraki Bay	$L_{\infty} = 131.9$	$K = 0.164$	Sainsbury (1982)
Kaikoura	$L_{\infty} = 146.2$	$K = 0.31$	Poore (1972)
<u>3. Size at maturity (shell length)</u>			
50% mature (Banks Peninsula)		75.5 mm	Naylor & Andrew (2000)
<u>4. Fecundity = a (length)^b (eggs, shell length in mm)</u>			
Banks Peninsula	$a = 7.75 \times 10^{-4}$	$b = 4.64$	Naylor & Andrew (2000)
Fecundity = 0.17 (weight) - 1.528 (eggs x 10 ⁻⁶ , gms)			

3. STOCKS AND AREAS

For further information on stocks and areas refer to the introductory PAU Working Group Report.

4. STOCK ASSESSMENT

A standardised CPUE index based on commercial catch was constructed covering the 1990 to 2007 fishing years (McKenzie *et al.* 2009). The index was based on CELR data for 1990 to 2001, and PCELR data collapsed into CELR format for 2002 to 2007, with units of kg per diver day. The index shows a decline from 1990 to 1992, but has remained fairly stable since (Table 4, Figure 3).

There is a large literature for abalone suggesting that CPUE is difficult to use to estimate abundance because of serial depletion, which happens when fishers deplete unfished or lightly fished beds and maintain their catch rates: CPUE stays high while the biomass is actually decreasing. CPUE should be treated with caution as an index of abundance.

Table 4: The standardised CPUE for PAU 3 1990-2007.

Fishing year	Number of records	Standardised CPUE	CV
1990	227	153	0.14
1991	252	111	0.12
1992	263	97	0.11
1993	238	120	0.11
1994	260	105	0.11
1995	293	100	0.11
1996	225	104	0.11
1997	219	113	0.11
1998	235	112	0.11
1999	187	127	0.11
2000	210	116	0.10
2001	294	107	0.10
2002	283	113	0.10
2003	276	102	0.10
2004	266	115	0.10
2005	267	105	0.10
2006	242	127	0.10
2007	244	108	0.10

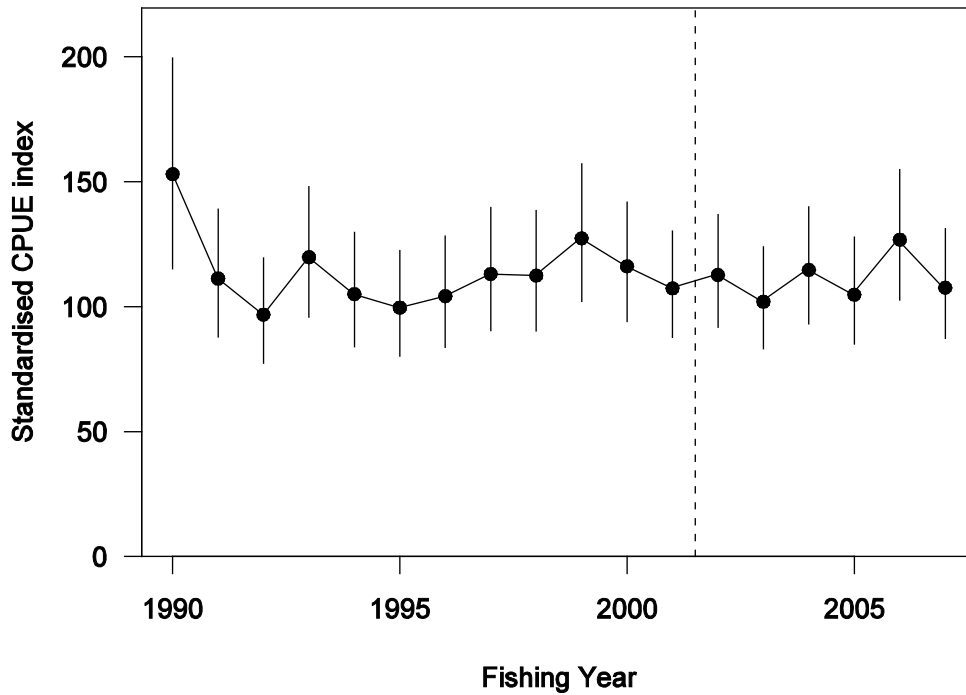


Figure 3: Standardised CPUE index for PAU 3 1990-2007 with 95% confidence intervals. The vertical line delineates between CELR and PCELR data.

5. STATUS OF THE STOCKS

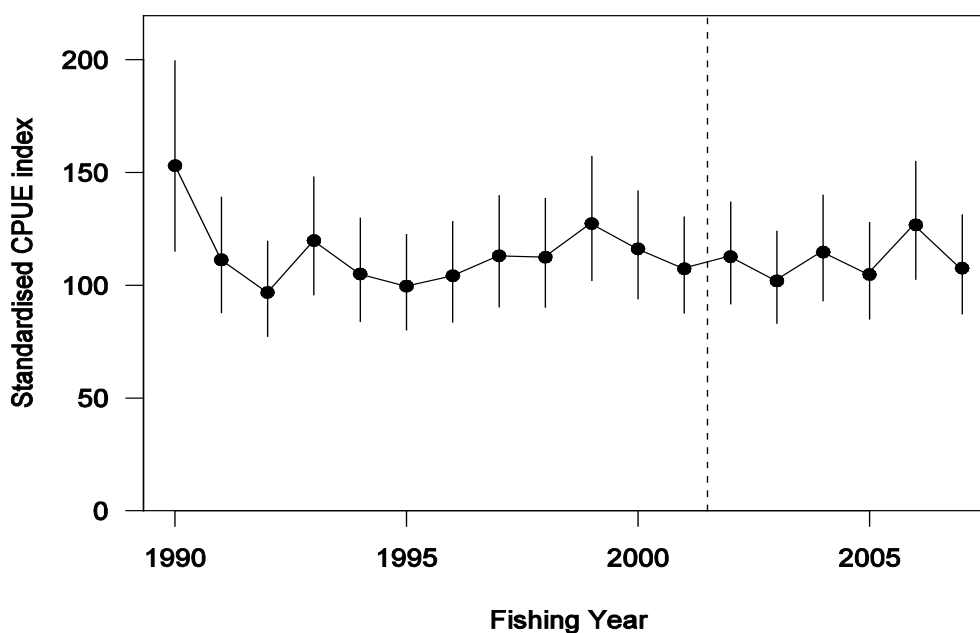
Stock Structure Assumptions

A genetic discontinuity between North Island and South Island paua populations was found approximately around the area of Cook Strait (Will & Gemmell 2008).

- **PAU 3 - *Haliotis iris***

Stock Status	
Year of Most Recent Assessment	No stock assessment has been undertaken for this stock
Assessment Runs Presented	Standardised CPUE index
Reference Points	Target: 40% B_0 (Default as per HSS) Soft Limit: 20% B_0 (Default as per HSS) Hard Limit: 10% B_0 (Default as per HSS)
Status in relation to Target	Unknown
Status in relation to Limits	Unlikely (< 40 %) to be below the Hard Limit

Historical Stock Status Trajectory and Current Status



Standardised CPUE index for PAU 3 1990-2007 with 95% confidence intervals. The vertical line delineates between CELR and PCELR data.

Fishery and Stock Trends

Recent Trend in Biomass or Proxy	-
Recent Trend in Fishing Mortality or proxy	-
Other Abundance Indices	Standardised CPUE decreased between 1990 and 1992 and has since remained fairly stable up to 2007.
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis

Stock Projections or Prognosis	No stock assessment has been undertaken for this stock.
Probability of Current Catch or TACC causing decline below Limits	Soft Limit: Unknown Hard Limit: Unknown

Assessment Methodology

Assessment Type	-	
Assessment Method	-	
Main data inputs	-	
Period of Assessment	Latest assessment: -	Next assessment: -
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-	

Qualifying Comments

-

Fishery Interactions

-

6. FOR FURTHER INFORMATION

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