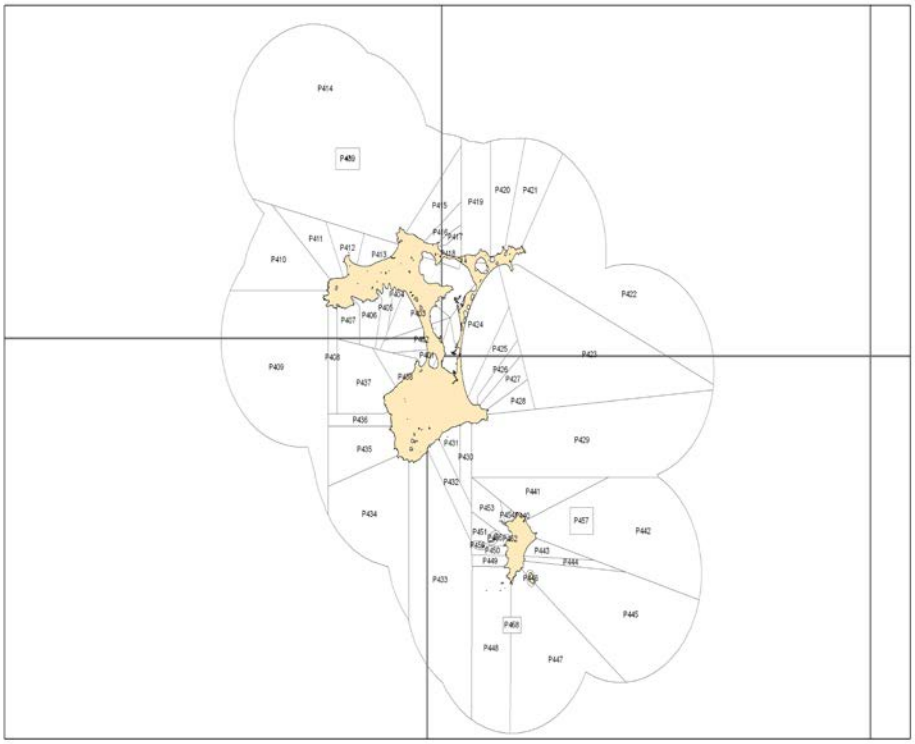
PAUA (PAU 4) – Chatham Islands

(Haliotis iris)
Paua



1. FISHERY SUMMARY

PAU 4 was introduced to the Quota Management System in 1986-87 with a TACC of 261 t. As a result of appeals to the Quota Appeal Authority, the TACC was increased in 1995-96 to 326 t 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 4 since introduction to the QMS.

Year	TAC	Customary	Recreational	Other mortality	TACC
1986 - 1995	-	-	-	-	261
1995- present	-	-	-	-	326

1.1 Commercial fisheries

The fishing year runs from 1 October through 30 September. 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 (see figure above). These reporting areas were subsequently adopted on MFish PCELRs.

At the beginning of the 2009-10 fishing year, reporting of catch in PAU 4 was changed from reporting in green weight to reporting in meat weight. The TACC is still reported in green weight but fishers are now required to report green weight catch based on the meat weight measured by the licensed fish receiver (LFR). The meat weight to green weight conversion factor is 2.50 (equivalent to 40% meat weight recovery). The change was made to curb the practice of converting meat weight to landed green weight after shucking to obtain artificially high recovery rates. It was also made to encourage catch spreading by making it commercially viable for fishers to harvest areas where shells are heavily fouled and meat

weight recovery is low. Heavy fouling on shells is a problem that occurs in a number of areas around the Chatham Islands. Landings for PAU 4 are shown in Table 2.

Table 2: TACC and reported landings (t) of paua in PAU 4 from 1983-84 to present.

Fishstock	Landings	TACC
1983-84*	409	-
1984-85*	278	-
1985-86*	221	-
1986-87*	267.37	261
1987-88*	279.57	269.08
1988-89*	284.73	270.69
1989-90	287.38	287.25
1990-91	253.61	287.25
1991-92	281.59	287.25
1992-93	266.38	287.25
1993-94	297.76	287.25
1994-95	282.10	287.25
1995-96	220.17	326.54
1996-97	251.71	326.54
1997-98	301.69	326.54
1998-99	281.76	326.54
1999-00	321.56	326.54
2000-01	326.89	326.54
2001-02	321.64	326.54
2002-03	325.62	326.54
2003-04	325.85	326.54
2004-05	319.24	326.54
2005-06	322.53	326.54
2006-07	322.76	326.54
2007-08	323.98	326.54
2008-09	324.18	326.54
2009-10	323.57	326.54
2010-11	262.15	326.54
2011-12	262.07	326.54

* FSU data.

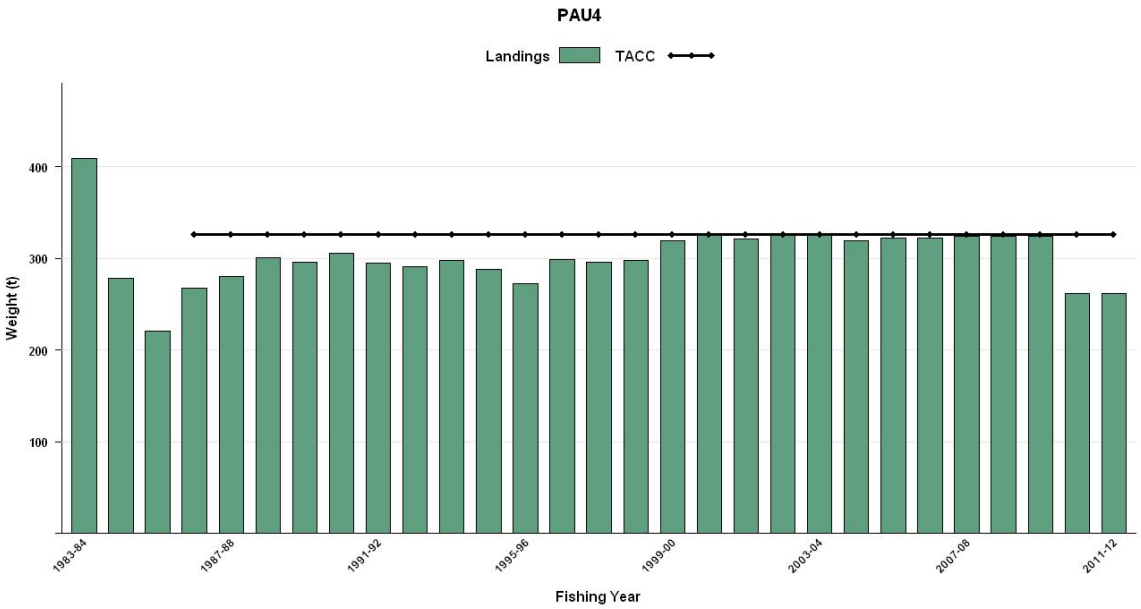


Figure 2: Historical landings and TACC for PAU4 from 1983-84 to present. QMS data from 1986 to present.

1.2 Recreational fisheries

There are no estimates of recreational catch for PAU 4. The 1996, 1999-2000 and 2000-01 national marine recreational fishing surveys did not include PAU 4.

1.3 Customary fisheries

There are no estimates of customary catch for PAU 4. For the 2004 stock assessment this catch was assumed to be zero. For further information on customary fisheries refer to the introductory PAU Working Group Report.

1.4 Illegal catch

There are no estimates of illegal catch for PAU 4. For the 2004 stock assessment this catch was assumed to be zero. 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.

3. STOCKS AND AREAS

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

4. STOCK ASSESSMENT

4.1 Estimates of fishery parameters and abundance

A standardised CPUE analysis for PAU 4 (Fu 2010) from 1989-90 to 2007-08 was completed in February 2010.

The Shellfish Working Group (SFWG) agreed that, because of extensive misreporting of catch in PAU 4, catch and effort data from the Fisheries Statistical Unit and from the CELR and PCELR forms might be misleading in CPUE analyses and therefore, CPUE cannot be used as an index of abundance in this fishery.

4.2 Stock assessment 2004

The last stock assessment for PAU 4 was completed in 2004 (Breen & Kim 2004). A Bayesian length-based stock assessment model was applied to PAU 4 data to estimate stock status and yield. A reference period from 1991-93 was chosen: this was a period after which exploitation rates increased and then leveled off, and after which biomass declined somewhat and then stabilised. It was not intended as a target. Assessment results suggested that then-current recruited biomass was just above $B_{AV,}$ but with high uncertainty (83% to 125%). and current spawning biomass appeared higher than S_{AV}, (130%), but with cautions related to maturity ogives. Projections suggested that 2007 recruited and spawning biomasses could be above B_{AV}, but this was uncertain.

The SFWG advised that major uncertainties in the assessment required the results to be treated with great caution. The major uncertainties included very sparse research diver survey data, misreported CELR and PCELR data, growth and length frequency data most likely not being representative of the whole population and the assumption that CPUE was an index of abundance.

In February 2010 the SFWG agreed that, because of the lack of adequate data as input into the Bayesian length-based model, a stock assessment for PAU 4 using this model was not appropriate.

4.3 Biomass estimates

There are no current biomass estimates for PAU 4.

4.4 Yield estimates and projections

There are no estimates of PAU 4

5. STATUS OF THE STOCKS

Stock Structure Assumptions
H. iris individuals collected from the Chatham Islands were found to be genetically distinct from those collected from costal sites around the North and South Islands (Will & Gemmell 2008).

- **PAU 4 - *Haliotis iris***

Stock Status	
Year of Most Recent Assessment	2010
Assessment Runs Presented	None
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	Soft Limit: Unknown Hard Limit: Unknown
Historical Stock Status Trajectory and Current Status In 2010 the SFWG rejected CPUE as an index of abundance, therefore the 2004 stock assessment (Breen & Kim 2004) is no longer considered reliable.	
Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	-
Recent Trend in Fishing Mortality or Proxy	-
Other Abundance Indices	-
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis		
Stock Projections or Prognosis	The 2004 stock assessment is no longer considered reliable	
Probability of Current Catch or TACC causing decline below Limits	Soft Limit: Unknown Hard Limit: Unknown	
Assessment Methodology		
Assessment Type	Full Quantitative Stock Assessment, but subsequently rejected	
Assessment Method	-	
Main data inputs	-	
Period of Assessment	Latest assessment: 2004	Next assessment: Unknown
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	- Potential bias in RDSI - CPUE as a reliable index of abundance - Data are unreliable - Model is homogeneous - Model assumptions may be violated	

Qualifying Comments
The 2004 full quantitative stock assessment is no longer considered reliable; i.e. the previous assessment has been rejected and there is currently no valid assessment for this stock.

Fishery Interactions
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6. FOR FURTHER INFORMATION

Breen P.A., Kim S.W. 2004. The 2004 stock assessment of paua (*Haliotis iris*) in PAU 4. New Zealand Fisheries Assessment Report 2004/55. 79p.

Fu D. 2010. Summary of catch and effort data and standardised CPUE analyses for paua (*Haliotis iris*) in PAU 4, 1989-90 to 2007-08. Fisheries Research Report 2008/01. 50p

Naylor J.R., Andrew NL., Kim SW. 2003. Fishery independent surveys of the relative abundance, size-structure, and growth of paua (*Haliotis iris*) in PAU 4. New Zealand Fisheries Assessment Report 2003/08. 16p.

Pirker J.G. 1992. Growth, shell-ring deposition and mortality of paua (*Haliotis iris* Martyn) in the Kaikoura region. MSc thesis, University of Canterbury. 165p.

Sainsbury K.J. 1982. Population dynamics and fishery management of the paua, *Haliotis iris.* 1. Population structure, growth, reproduction and mortality. New Zealand Journal of Marine and Freshwater Research 16: 147-161.

Schiel D.R. 1992. The paua (abalone) fishery of New Zealand. In: Shepherd SA., Tegner MJ., Guzman del Proo S. eds., Abalone of the World: Biology, fisheries, and culture. Blackwell Scientific, Oxford.

Schiel D.R., Breen P.A. 1991. Population structure, ageing and fishing mortality of the New Zealand abalone Haliotis iris. Fishery Bulletin 89: 681-691.

Will M.C., Gemmell N.J. 2008. Genetic Population Structure of Black Foot paua. New Zealand Fisheries Research Report. GEN2007A: 37p