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Assessment of the Chatham Rise orange roughy fishery for 1987/88

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This series documents the scientific basis for stock assessments and fisheries management advice in New Zealand. It addresses the issues of the day in the current legislative context and in the time frames required. The documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

ASSESSMENT OF THE CHATHAM RISE ORANGE ROUGHY FISHERY FOR
1987/88

Introduction

a) Overview:

This document will provide only a brief update of the situation concerning the Chatham Rise (Management Area 3B).

The Chatham Rise orange roughy fishery was reviewed on 2 March 1988, as a culmination of ongoing analyses throughout 1987/88. No additional data are available since the acceptance of these papers, (see below) and it is not intended to submit to the April 1988 meetings any new data, or TAC recommendations for the 1987/88 fishing year or for the 1988/89 year. However if a successful biomass survey is completed this winter, there will be a paper available for review around November.

b) Description of the fishery:

Orange roughy are trawled below 750m along the northern, eastern and south eastern slopes of the Chatham Rise. Most fish are taken between mid June and mid August immediately before, during and after the spawning aggregations appear at depths of 800 - 1000m, in an area about 70 miles north of the Chatham Islands.

Of the current (87/88) TAC of 34,000 tonnes, 32,537 tonnes are held by 28 quota holders and 1,463 tonnes by MAFFish. (The gazetted TAC is in fact 38,000 tonnes, but only 34,000 tonnes of this was allocated after the recommendation late in 1986 to reduce the recommended TAC was received and agreed on too late to stop the Gazette notice). The current TAC was revised during 1987 after a survey in July, and the MAFFish Board are presently acting on recommendations from the Orange Roughy Standing Committee to adjust the TAC for the 1988 season (the 1987/88 fishing year).

c) Literature:

Available material on the Chatham Rise orange roughy fishery includes a description of the fishery between 1978 and 1983 (Robertson and Grimes, 1983), and the results of a trawl survey in 1982 with biological information on fish from the northern and eastern Chatham Rise (Robertson et al, 1984). Annual measurements of biomass indices and yield recommendations are presented in the stock assessment papers (Robertson, 1985, 1986; and Robertson et al 1987). Additional information can be found in Catch articles; (Robertson 1982a, 1982b, 1983, 1986), and in Pankhurst, (1988) Fincham et al (1987), Gauldie (1987), Fenaughty et al (1988), and Mace, Fenaughty & Doonan (in prep).

A detailed assessment of Chatham Rise data (Mace and Doonan, 1987) was prepared for the consideration of the Orange Roughy Standing Committee in December 1987. This paper included analyses of survey design, biomass estimation, fishing mortality, natural mortality and recruitment (including length frequency data). It formed the basis for a summary document which included a recommendation for reduction of the Chatham Rise TAC to 17,430 tonnes for the 1987/88 season. These papers were formally reviewed as a part of the 1987 stock assessments on 2 March 1988. No new data or analyses are available for the Chatham Rise fishery.

Review of the fishery

The history of annual reported catches for the Chatham Rise orange roughy fishery is as follows:

	year	reported catch (tonnes)
up to	78/79	negligible
	79/80	11,800
	80/81	31,100
	81/82	28,200
	82/83*	32,605
	83/84*	32,525
	84/85	29,340
	85/86	23,420?
	86/87	(34,000 quota?)

(* Catch for 1982/83 & 83/84 are 15 month totals to accommodate the change over from an April - March fishing year to an October - September fishing year.)

These historical catch estimates are currently being reviewed.

a) Catch and effort:

No complete collation or assessment of catch-effort data has been prepared for the Chatham Rise orange roughy fishery. Work is currently underway to extract the appropriate data from the FSU records, and also to transfer them to a data base on the Pyramid. This will probably not be completed in time for consideration at this current round of fishery assessment meetings.

b) Other Information:

No age and very little size information exists from the commercial catches on the Chatham Rise.

c) Maori and Recreational Fishing:

There is no known Maori or recreational catch of orange roughy.

Research

a) Stock Structure:

The Chatham Rise orange roughy population has been considered as a single separate stock since 1983. However recent data (Fenaughty, 1987) suggest that orange roughy on the south Chatham Rise may be spawning at the same time as those on the north Rise and may

therefore be a separate spawning stock. This question will be addressed by P. Smith in his mitochondrial DNA project currently starting. No information exists on the relationship between the Chatham Rise populations and those treated as separate fisheries on the Ritchie Bank, Wairarapa or Kaikoura areas.

The present management system treats the Chatham Rise orange roughy fishery as a single separate stock .

b) Resource surveys and Recruitment studies:

The following resource surveys have been conducted on the Chatham Rise orange roughy population(s):

Date	Area km ²	Vessel	Species
August/Sept. 1982	25,000	Kaltan	Orange roughy
July 1984	5,000	Otago Buccaneer	Orange roughy
July 1985	5,000	Otago Buccaneer	Orange roughy
July 1986	5,000	Otago Buccaneer	Orange roughy
November 1986	47,100	Arrow	Oreos/O.Rough
July 1987	5,000	Otago Buccaneer	Orange roughy
November 1987	47,500	Amaltal Explorer	Oreos/O.Rough
February 1988	na	James Cook	Orange roughy

The most recent of these was a survey designed to locate and study small juveniles (prerecruits). It is the first of a series of surveys to sample prerecruits to determine age and growth rates. Preliminary results suggest that orange roughy may grow even more slowly than is currently assumed. Length-frequency data showed a pronounced mode at 4cm, seven months after the spawning season.

c) Other Studies:

Research proposals to test stock structure hypotheses have recently been submitted by B.Jones for measurement of parasite loading, and by P.Smith using measurements of mitochondrial DNA.

d,e & f) Estimates of Biomass and yield, and Modelling:

The general conclusion is that since the 1986, biomass indices have been declining rapidly a reduction of TAC is required. Concern has also been expressed that fishing, processing and reporting practices are leading to understatement of the true levels of fishing mortality (Robertson,1986).

The most recent analysis and review of Chatham Rise surveys is Mace & Doonan (1987). No new data or analyses are available since the Stock Assessment review on 2 March 1988. The review group agreed that calculations based on virgin biomass (B_0) are no longer appropriate since stocks appear to be well below the optimal level ($1/2B_0$). An alternative reference point was recommended; (i.e. a fishing mortality level of $F_{0.1}$). Under certain conditions $F_{0.1}$ can be considered as the proportion of a fish stock that can be removed each year without seriously reducing the size of the spawning stock (i.e. $Yield = F_{0.1} * B_{current}$). It has been adopted as

a conservative biological reference point by numerous stock assessment agencies around the world. (e.g. ICES, CAFSAC, NAFO, and CCAMLR). Our preliminary estimate of $F_{0.1}$, based on a yield-per-recruit analysis is $f=0.18$ (Mace & Doonan 1987).

The most recent estimate of orange roughy biomass on the south Chatham Rise (from the "Amaltal Explorer" survey in Nov/Dec 1987) is 10,360 tonnes. Adding this to the 1987 north Chatham Rise estimate (86,440 t) gives a total biomass of 96,800t. Using $F_{0.1}=0.18$ implies that the current yield should be about 17,430 t.

Management Implications:

Management options and implications were discussed within MAF and with industry during March 1988 and approved by the Minister. No additional material is available for these stock assessment meetings.

In summary, the present TAC of 34,000 is not sustainable. The recommended TAC of 17,430 tonnes does not guarantee recovery, particularly since no evidence exists of strong year classes about to recruit to the spawning population. However, the reduction of TAC should reduce the risks of imminent stock collapse.

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