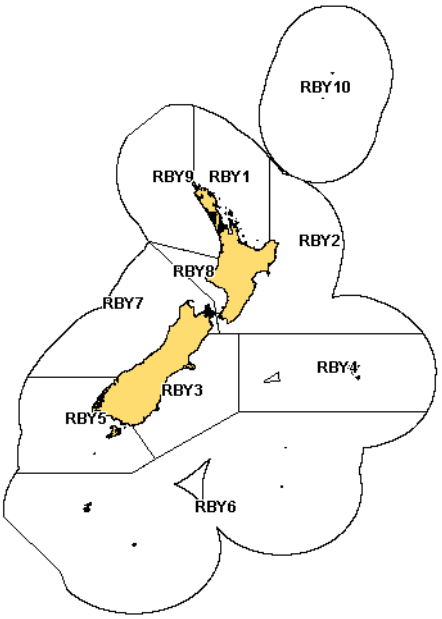
RUBYFISH (RBY)

(*Plagiogeneion rubiginosum*)



1. FISHERY SUMMARY

(a) Commercial fisheries

Rubyfish catches were first reported in 1982–83. In 1990–91, 245 t were landed, mainly as bycatch in the trawl fisheries for alfonsino, gemfish, barracouta, hoki, and jack mackerel. In the following year landings doubled, and from 1992–93 to 1994–95 landings were about 600 t. In 1995–96, landings peaked at 735 t and in subsequent years catches fluctuated between 200 t and 500 t (Tables 1 & 2). The level of direct targeting on rubyfish has increased over the history of the fishery. At least one third of recent annual catches were taken by targeted mid-water trawling with gear usually fished close to the bottom.

The main rubyfish grounds (target species and alfonsino bycatch) are the banks or "hills" off the east coast of the North Island in QMA 2. Rubyfish is also targeted in the Bay of Plenty. The areas where rubyfish is predominantly taken as bycatch (with the target fisheries) are: Westland (hoki, gemfish, barracouta); north-western South Island (jack mackerel); North Taranaki Bight (jack mackerel). Rubyfish have also been reported as an intermittent bycatch with bluenose, black cardinalfish, orange roughy, silver warehou, tarakihi, trevally and scampi. Commercial concentrations of rubyfish probably also exist in areas that have not been fished in appropriate depths, especially in the northern half of New Zealand. Since 1990–91, on average about 70% of total landings are from QMA 2, and 20% are from QMA 1.

Rubyfish was introduced into the QMS on 1 October 1998. Allowances were not made for non commercial catch.

In the 2002–03 fishing year, the TACC for RBY 1 was increased under the adaptive management programme (AMP) to 300 t. At the same time a customary allowance of 1 t, a recreational allowance of 2 t and an allowance of 15 t for fishing-related mortality took the TAC to 318 t.

In these stocks landings were above the TACC for a number of years and the TACCs have been increased to the average of the previous 7 years plus an additional 10%. From the 1st October 2006 the TACCs for RBY 4, 7 and 8 were increased to 6, 33 and 5 t respectively.

Table 1: Reported landings (t) of rubyfish by QMA and fishing year, 1983–84 to 1997–98. The data in this table has been updated from that published in previous Plenary Reports by using the data through 1996–97 in table 35 on p. 270 of the "Review of Sustainability Measures and Other Management Controls for the 1999–00 Fishing Year – Final Advice Paper" dated 6 August 1998.

	QMA 1	QMA 2	QMA 3	QMA 4	QMA 5	QMA 6	QMA 7	QMA 8	QMA 9	QMA 10	Other	Total
1990–91	66	159	5	3	0	0	9	0	3	0		245
1991–92	147	390	0	0	0	0	20	1	6	0		564
1992–93	90	491	0	0	0	0	31	0	0	0		612
1993–94	116	379	3	0	0	0	72	0	5	0		575
1994–95	43	500	3	12	0	0	13	0	10	0		581
1995–96	106	595	2	0	0	0	9	0	23	0		735
1996–97	128	297	2	1	<1	0	14	<1	21	<1	1	463
1997–98	50	308	<1	1	0	0	6	<1	13	<1	<1	380

† QMS data.

Table 2: Reported landings (t) of rubyfish by Fishstock and TACCs from 1998-99 to 2005–06.

Fishstock	RBY 1		RBY 2		RBY 3		RBY 4		RBY 5	
FMA	1		2		3		4		5	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1998–99	55	104	180	433	<1	2	<1	2	0	0
1999–00	138	104	321	433	6	2	<1	2	0	0
2000–01	39	109	433	433	<1	3	2	3	0	0
2001–02	36	109	414	433	1	3	8	3	1	0
2002–03	21	300	233	433	<1	3	11	3	1	0
2003–04	19	300	343	433	<1	3	2	3	<1	0
2004–05	109	300	217	433	<1	3	10	3	1	0
2005–06	135	300	303	433	<1	3	33	3	0	0

Fishstock	RBY 6		RBY 7		RBY 8		RBY 9		RBY 10	
FMA	6		7		8		9		10	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1998–99	0	0	4	27	<1	0	7	9	<1	0
1999–00	0	0	13	27	<1	0	15	9	0	0
2000–01	<1	0	7	27	0	1	16	19	0	0
2001–02	0	0	35	27	<1	1	3	19	0	0
2002–03	<1	0	32	27	2	1	2	19	0	0
2003–04	<1	0	9	27	8	1	1	19	0	0
2004–05	<1	0	99	27	<1	1	3	19	0	0
2005–06	<1	0	8	27	8	1	20	19	0	0

	Total	
	Landings	TACC
1998–99	247	577
1999–00	493	577
2000–01	358	595
2001–02	498	595
2002–03	302	595
2003–04	382	595
2004–05	439	595
2005–06	507	595

(b) Recreational fisheries

There is no reported recreational catch.

(c) Maori customary fisheries

There is no quantitative information on the current level of Maori customary take.

(d) Illegal catch

There is no quantitative information on the level of illegal catch.

(e) Other sources of mortality

There is no quantitative information on the level of other sources of mortality.

2. BIOLOGY

Rubyfish are recorded from southern Australia, South Africa and from banks in the southern Indian and south-east Atlantic oceans. They occur in the subtropical water around northern and central New Zealand, but are absent from the southern Chatham Rise and Campbell Plateau. Rubyfish occur at depths ranging from 50 to at least 800 m. Commercial catch data suggests the species is most abundant between 200 and 400 m.

Rubyfish have been recorded up to 58 cm in length. Small catches by research trawling have all been of similar-sized fish, suggesting schooling by size. Ageing research based on simple counts of otolith structures appeared to indicate that rubyfish are a slow-growing and long-lived (Paul et al., 2002). Paul et al. (2003) used radiocarbon dating techniques on otoliths from 10 rubyfish to determine whether the sudden 1960s increase in atmospheric/oceanic radiocarbon (^{14}C) levels, resulting from nuclear testing, could be detected in these otoliths. Based on the low levels of radioactive ^{14}C measured in the core of these otoliths, they concluded that the oldest fish in this sample were born prior to the beginning of the period of atmospheric testing and therefore were at least 45 years old (calculated from the date of otolith collection).

A maximum age of 45 years (Paul, 2003) in a lightly exploited population implies an estimated natural mortality (M) of 0.10, using the method of Hoenig (1983). This is higher than the estimate for rubyfish reported in previous Plenary documents e.g. 0.03 (Paul et al., 2002). However, these estimates of M should be considered preliminary as work on rubyfish age and growth is still underway.

There is no information on rubyfish spawning cycles or areas. Observations on gut contents show that rubyfish feed on mid-water crustaceans, salps and myctophid fishes.

Table 3: Estimates of biological parameters for rubyfish.

Fishstock	Estimate			Source
1. Natural mortality (M)				
All	M = 0.03 - 0.1*			Paul et al. (2002, 2003)
2. Weight = a (length)^b (Weight in g, length in cm fork length)				
	Both sexes			
	a		**b**	
RBY 2	0.0255		2.9282	NIWA (unpub. Data)
3. von Bertalanffy growth parameters				
	Both sexes			
	L_∞	**K**	**t_0**	
QMA 2	48.68	0.045	-16.53	Paul et al. (2002)

*revised range from 2002; see text.

3. STOCKS AND AREAS

It is not known whether different regional stocks of rubyfish occur in New Zealand waters.

Although landings are reported by Fishstocks which equal the standard QMAs, for stock assessment purposes it may be more appropriate to consider Fishstocks RBY 1 and RBY 9 as one (northern) unit, Fishstock RBY 2 (the main fishery) as an eastern unit, Fishstocks RBY 3–5 as a minor southern unit, and Fishstocks RBY 7 and RBY 8 as a western unit.

4. STOCK ASSESSMENT

(a) Estimates of fishery parameters and abundance

A biomass index derived from a standardised CPUE (log linear, kg/day) analysis of the target trawl fishery represented by 10 main vessels (Blackwell, 2000) was calculated for RBY 2. However, the results were highly uncertain, mainly due to the limited amount of data available, and were not accepted by the Inshore Working Group.

(b) Biomass estimates

No information is available.

(c) Estimation of Maximum Constant Yield (MCY)

MCY cannot be determined.

(d) Estimation of Current Annual Yield (CAY)

CAY cannot be determined.

(e) Other yield estimates and stock assessment results

No information is available.

(f) Other factors

A substantial catch of rubyfish has been taken in conjunction with alfonsino by the trawl fishery off the North Island east coast. Future quotas and catch restraints imposed on rubyfish could, in turn, constrain the alfonsino fishery. Rubyfish is taken in smaller, irregular quantities in other target trawl fisheries and these fisheries could also be affected by future rubyfish management policy.

5. ANALYSIS OF ADAPTIVE MANAGEMENT PROGRAMMES (AMP)

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 Adaptive Management Programme 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.

RBY 1
The TACC for RBY 1 was increased from 109 t to 300 t under the Adaptive Management Programme (AMP) in October 2002.

Full-term Review of RBY 1 AMP in 2007

In 2007 the AMP FAWG reviewed the performance of the AMP (Starr et al., 2007). The WG noted:

Fishery Characterisation

- Fish are landed as green weight, so there are no conversion factor issues.
- Historical landings have been primarily taken as a bycatch of the bottom trawl fishery targeted at gemfish in the Bay of Plenty. These landings have nearly disappeared as a result of the decline in that fishery.

- The main target fishery has been a mid-water trawl fishery associated with features in the Bay of Plenty which has operated in 2004/05 and 2005/06.
- It was noted that there may be some merit in considering management options like feature limits in this fishery.

CPUE Analysis

- There are insufficient data to use for a standardised analysis so four unstandardised analyses were presented, three from bycatch trawl fisheries for gemfish, tarakihi and hoki and one from a bycatch bottom longline fishery directed at hapuku and bluenose. No series was constructed from the target rubyfish fishery as there were sufficient data in only three years. The CPUE trends in the four bycatch fisheries showed variable trends which appeared to reflect effort trends in the respective fisheries rather than RBY biomass trends.

Logbook Programme

- There are no logbook data in the database, except 1 trip and 4 tows. There is a problem in obtaining samples as it is difficult to sample the fish, as they are directly dumped into sea water tanks on the ship.
- Recommend a shed sampling programme, or a similar approach to obtain biological data, but the programme will endeavour to collect data that will allow the fish to be linked to a tow.

Environmental Effects

- Catch has never exceeded the TACC over the term of the. The target gemfish fishery, the primary bycatch fishery for this species, has diminished considerably in recent years.
- No code of practice in RBY fishery.

Conclusion

- If the AMP continues, there is a need to improve the collection of information. There is a need for more biological data, such as otoliths and lengths from every large landing of this species.
- There is also a need for improved fine-scale catch and effort information for smaller areas.
- The Working Group indicated that a catch curve analysis approach is likely to be the most effective way to monitor this Fishstock.

6. STATUS OF THE STOCKS

Landings of rubyfish have fluctuated in recent years. Landings have never exceeded the total TACC but the RBY 4 TACC was substantially overcaught in 2005/2006. 70% of the RBY catch is landed in QMA 2, and given the short history of this fishery, it is not known whether the level of recent commercial catches in this QMA is sustainable in the short-term, and whether the decline in landings represents regional or localised depletion, or a decline in directed fishing effort. It is not known whether the recent commercial catches from QMA 2 are sustainable in the long-term, or at a level that will allow the stock to move towards a size that will support the maximum sustainable yield.

For most other areas it is not known if recent catches are sustainable or will allow the stocks to move towards the size that will support the maximum sustainable yield. Commercial concentrations of rubyfish probably also exist in areas that have not been fished. In 2002, RBY 1 was included in the AMP on the basis that the stock has been lightly fished it seems likely that the stock is above B_{MSY}. Based on the low catches – 21 t in 2002/03, 19 t in 2003/04 and 109 t in 2004/05 - RBY 1 is likely to remain near the unexploited level.

Yield estimates, TACCs and reported landings are summarised in Table 4.

Table 4: Summary of TACCs (t) and reported landings (t) of rubyfish for the most recent fishing year.

Fishstock		FMA	2005-06 Actual TACC	2005-06 Reported Landings
RBY 1	Auckland (East)	1	300	135
RBY 2	Central (East)	2	433	303
RBY 3	South-east (Coast)	3	3	<1
RBY 4	South-east (Chatham)	4	3	33
RBY 5	Southland	5	0	0
RBY 6	Sub-Antarctic	6	0	<1
RBY 7	Challenger	7	27	8
RBY 8	Central (West)	8	1	8
RBY 9	Auckland (West)	9	19	20
RBY 10	Kermadec	10	0	0
Total			786	507

7. FOR FURTHER INFORMATION

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