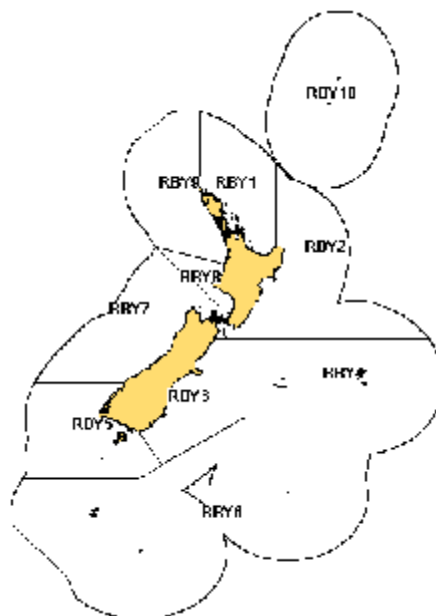


RUBYFISH (RBY)

(*Plagiogeneion rubiginosum*)



1. FISHERY SUMMARY

(a) Commercial fisheries

Rubyfish catches were first reported in 1982–83. In 1990–91, 245 t was landed, mainly as bycatch in the trawl fisheries for alfoncino, 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 where gear usually fished close to the bottom.

The main rubyfish grounds (target species and alfoncino 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 RBY1 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.

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.

	<u>QMA 1</u>	<u>QMA 2</u>	<u>QMA 3</u>	<u>QMA 4</u>	<u>QMA 5</u>	<u>QMA 6</u>	<u>QMA 7</u>	<u>QMA 8</u>	<u>QMA 9</u>	<u>QMA 10</u>	<u>Other</u>	<u>Total</u>
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 from 1998–99 to 2004–05.

Fishstock FMA	RBY 1		RBY 2		RBY 3		RBY 4		RBY 5	
	<u>1</u>		<u>2</u>		<u>3</u>		<u>4</u>		<u>5</u>	
	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

Fishstock FMA	RBY 6		RBY 7		RBY 8		RBY 9		RBY 10	
	<u>6</u>		<u>7</u>		<u>8</u>		<u>9</u>		<u>10</u>	
	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	2	19	0	0

	<u>Total</u>	
	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	438	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 is recorded from southern Australia, South Africa and from banks in the southern Indian and south-east Atlantic oceans. It occurs in the subtropical water around northern and central New Zealand, but is absent from the southern Chatham Rise and the Campbell Plateau. Rubyfish occurs 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. Some small catches by research trawl have 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 species (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 estimate of 0.10 for natural mortality (M), 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 progressing.

There is no information on rubyfish spawning cycles or areas. Observations on gut contents show that rubyfish feed on midwater 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), Paul et al., (2003)	
2. Weight = $a(\text{length})^b$ (Weight in g, length in cm fork length)			
Both sexes			
	a	b	
RBY 2	0.0255	2.9282	
3. von Bertalanffy growth parameters			
Both sexes			
	L_∞	K	t_0
QMA 2	48.68	0.045	-16.53

*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, due mainly 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 109t to 300t under the Adaptive Management Programme (AMP) in October 2002.

Mid-term Review of RBY 1 AMP in 2005

In 2004 the AMP FAWG reviewed the performance of the AMP after 2 years in its current 5-year term (SeaFIC 2005a). The WG noted:

Characterisation

- Despite the 300t TACC, the landed catch of RBY1 declined steadily from 40 t in 2000/01 to 23 t in 2003/04. Apparently those fishers who knew how to target RBY using mid-water trawl gear have left the fishery.

Abundance Indices

- The initial intention was to use CPUE from the anticipated target fishery to develop an abundance index.
- As there is currently no target fishery unstandardized CPUE indices were presented for three fisheries: the combined BOP and East Northland gemfish bottom trawl fishery, the combined BOP and East Northland tarakihi bottom trawl fishery and the combined BOP and the East Northland bottom longline fishery for bluenose and bass. Given the low catch per fishery, these indices are unlikely to track abundance reliably.

RBY 1 Decision Rule

- None proposed. During the exploratory phase, catch spreading and monitoring would be the only requirements of the programme.
- No spatial constraints were proposed for the first year. This would provide the flexibility to enable the target fishery to develop and avoid imposing restrictions on the existing non-target fisheries

Log Book Programme

- Only four tows from one trip in the BOP were sampled.
- Industry attributed this to the fact that there has been no target fishery.
- In the future industry intend to sample RBY 1 whenever they are caught.

Environmental considerations

- Although RBY1 are targeted with mid-water trawls, these often touch the ocean floor at the end of a targeted tow. In areas where there is already substantial bottom trawling, this activity is unlikely to have much additional impact. It could however have an impact on areas of rough ground that are not currently fished.

Conclusion

- Given that RBY 1 was lightly exploited prior to entering the AMP and the small catches over the last four years, this Fishstock probably remains above Bmsy.
- Industry should make a concerted effort to increase logbook coverage, particularly if catches increase.
- Non fish bycatch should be recorded when/if a target fishery develops

Annual Review of RBY 1 in 2006

In 2006 the AMP FAWG reviewed the performance of the logbook monitoring programme (Starr 2006). The WG noted:

- Despite the TACC being increased under the AMP from 109 t to 300 t in 2002/03, reported catch was been very low: 21t in 2002/03, 19t in 2003/04 and 109t in 2004/05.
- During the previous review the AMP FAWG recommended that a concerted effort should be made to improve coverage once catch begins to increase.
- Despite the recent catch of 109t, no logbook data were collected in 2004/05.

6. STATUS OF THE STOCKS

Landings of rubyfish have fluctuated in recent years with more targeted fishing in some areas. Landings in the major Fishstock, QMA 2 (which makes up about 70% of the total landings on average) were below the TACC in 2001–02. Given the short history of the fishery in QMA 2, 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 adaptive management programme on the basis that the stock has been lightly fished and appears to be near its virgin size. Based on the low catches – 21t in 2002/03, 19t in 2003/04 and 109t in 2004/05 - RBY 1 is likely to remain near the unexploited level.

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

Fishstock		FMA	2004-05 Actual TACC	2004-05 Reported landings
RBY 1	Auckland (East)	1	300	109
RBY 2	Central (East)	2	433	217
RBY 3	South-east (Coast)	3	3	<1
RBY 4	South-east (Chatham)	4	3	10
RBY 5	Southland	5	0	1
RBY 6	Sub-antarctic	6	0	<1
RBY 7	Challenger	7	27	99
RBY 8	Central (West)	8	1	<1
RBY 9	Auckland (West)	9	19	2
RBY 10	Kermadec	10	0	0
Total			786	438

7. FOR FURTHER INFORMATION

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