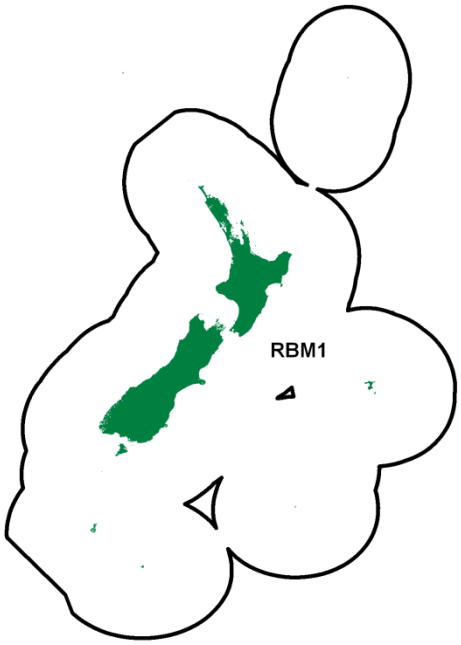
RAY'S BREAM (RBM)

(Brama brama)



1. FISHERY SUMMARY

Ray's bream (*Brama brama*) was introduced into the QMS on 1 October 2004 under a single QMA, RBM 1, with allowances, TACC and TAC in Table 1.

Table 1: Recreational and Customary non-commercial allowances, TACC and TAC (all in tonnes) for Ray's bream.

Fishstock	Recreational Allowance	Customary non-commercial Allowance	Other mortality	TACC	TAC
RBM 1	10	5	50	980	1045

At least two closely related species (*Brama brama* and *Brama australis*) are thought to be caught in New Zealand fisheries. Southern Ray's bream (*Brama australis*), which is difficult to distinguish using external features from *B. brama*, has been reported in both catch statistics and research surveys but the actual proportions of the two species in the catch is unknown. A third closely related species, bronze bream (*Xenobrama microlepis*), is more easily distinguished from the other two, but is also likely to have been recorded as Ray's bream in catch statistics.

1.1 Commercial fisheries

Ray's bream is a highly migratory species and has a wide distribution, being found throughout the subtropical to sub-Antarctic waters across the whole South Pacific between New Zealand and Chile. The catch of Ray's bream, while fluctuating, appeared to be have been declining within New Zealand fisheries waters, from a high of 1001 t in 2000–01 to 143 t in 2011–12, followed by a larger catch of 627 t in 2012–13 (Tables 2 and 3). Licensed Fish Receiver Returns indicate that between 119 and 815 t were processed for the same period.

Based on records since 2003–04, most (46%) Ray's bream is caught by mid-water trawl. Bottom trawling accounts for 27% of the total, surface longlining 18%, trolling 5% and bottom longlining 3%. Ray's bream is caught by mid-water trawlers in all FMAs around the South Island, with the largest amount in mid-water trawls being taken from Stewart-Snares shelf (FMA 5) and the

Chatham Rise (FMA 3). The major catches by bottom trawling have occurred on the Chatham Rise (FMA 3). Ray's bream is taken on surface tuna longlines on the east coast of the North Island, especially in the Bay of Plenty-East Cape (FMA 1). Most of the South Island longline catch comes from the west coast in FMAs 5 and 7. It is also taken by tuna trolling, especially on the west coast of the South Island (FMA 7). While observer coverage of the troll fleet is limited (0.5% of fishing days), observer records for the troll vessels have identified 100% of the Ray's bream in the troll catch as *B. brama.* Figure 1 shows historical landings and longline fishing effort for the two Ray's bream fisheries.

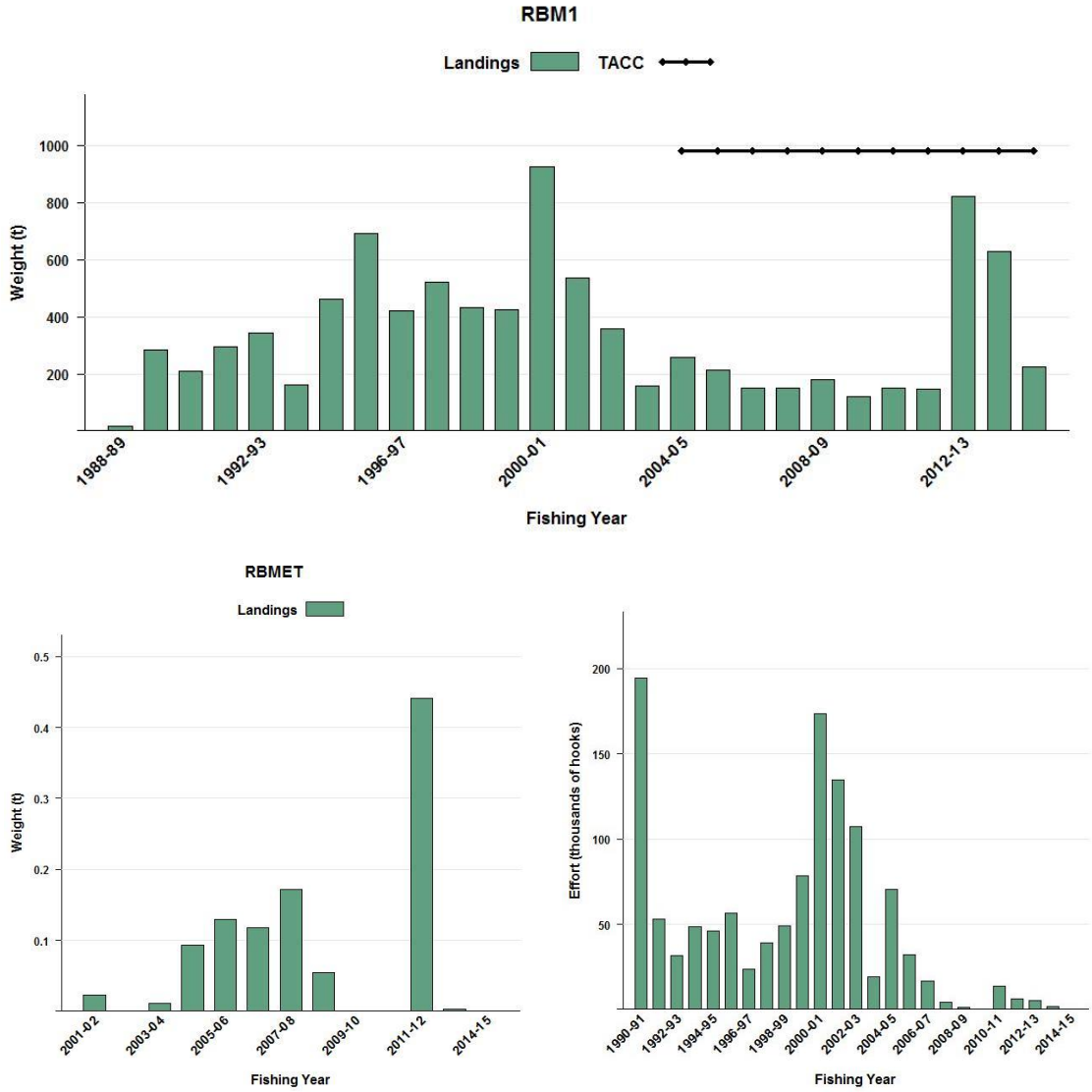


Figure 1: [Top] Ray's Bream catch from 1988–89 to 2013–14 within New Zealand waters (RBM 1) and 2001-02 to 2014-15 on the high seas (RBM ET). [Bottom] Fishing effort (number of hooks set) for high seas New Zealand flagged surface longline vessels from 1990–91 to 2014–15 [Continued on next page].

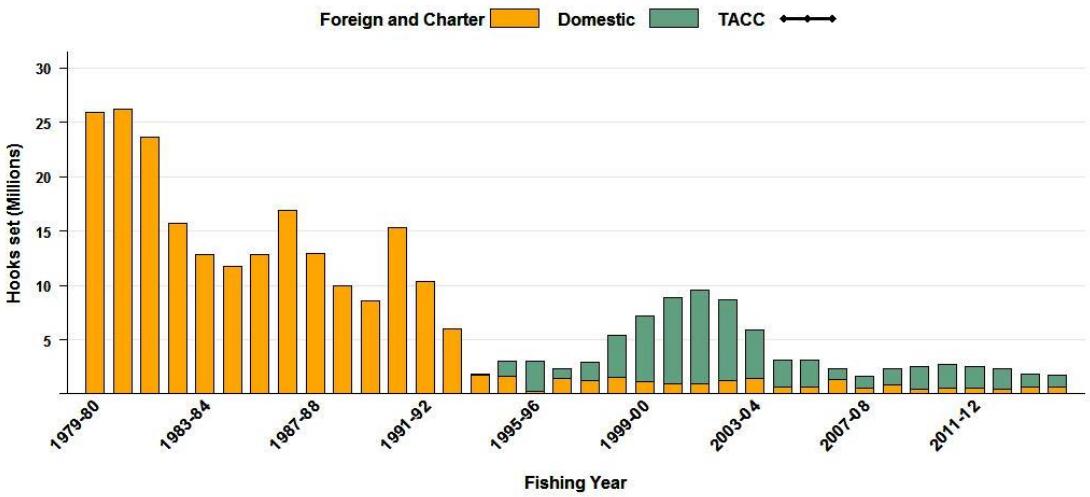


Figure 1 [continued]: Fishing effort (number of hooks set) for all domestic vessels (including effort by foreign vessels chartered by New Zealand fishing companies) from 1979–80 to 2014–15.

Table 2: Reported commercial landings and discards (t) of Ray's bream from CELRs and CLRs, and LFRRs (processor records) by fishing year.

	Reported by fishers			
		CELR and CLR	Total	Processed
Year	Landed	Discarded	reported	LFRR
1988–89	9	0	9	16
1989–90	328	< 1	328	284
1990–91	239	< 1	239	211
1991–92	297	< 1	297	295
1992–93	340	1	341	342
1993–94	151	3	154	160
1994–95	462	8	470	460
1995–96	717	3	720	693
1996–97	356	7	362	421
1997–98	546	8	554	520
1998–99	425	10	435	431
1999–00	444	23	467	423
2000–01	941	60	1 001	926

Table 3: LFRR and MHR data on Ray's bream catches by fishing year.

Year	LFRR Data	MHR Data
2001–02	541	536
2002–03	347	357
2003–04	154	157
2004–05	257	259
2005–06	212	215
2006–07	149	149
2007–08	149	152
2008–09	176	179
2009–10	119	119
2010–11	137	150
2011–12	143	147
2012–13	815	823
2013–14	622	627
2014–15	218	224

The majority of Ray's bream are caught in the New Zealand squid, hoki and Jack mackerel mid-water trawl fisheries with 11% of the Ray's bream landings coming from the Southern bluefin target surface longline fishery with small amounts coming from a range of other fisheries (Figure 2). Ray's bream make up less than 1% of the surface longline catch by weight (Figure 3). Most of the New Zealand Ray's bream catch is landed on the west coast of the South Island and sub-Antarctic islands (Figure 4).

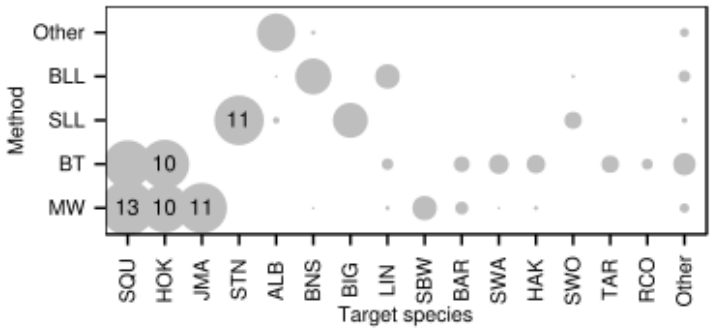


Figure 2: A summary of the proportion of landings of Ray's bream taken by each target fishery and fishing method. The area of each circle is proportional to the percentage of landings taken using each combination of fishing method and target species. The number in the circle is the percentage. SLL = surface longline MW = mid-water trawl, BLL = bottom longline, BT = bottom trawl (Bentley et al 2013).

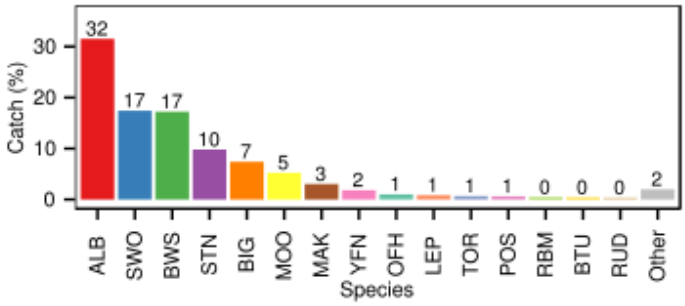


Figure 3: A summary of species composition of the reported surface longline catch. The percentage by weight of each species is calculated for all surface longline trips (Bentley et al 2013).

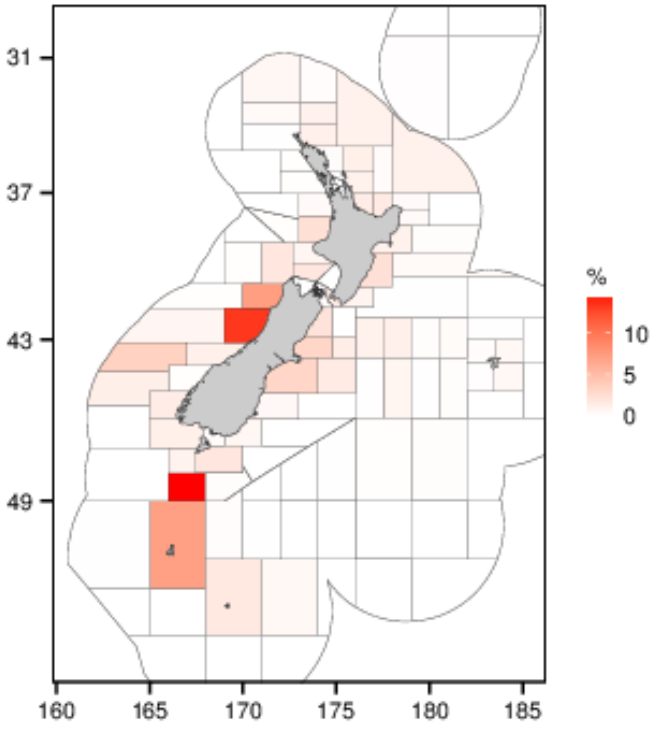


Figure 4: Distribution of catch of Ray's bream by statistical area for all years and all fishing gears. (Bentley et al 2013).

Across all fleets of the longline fishery, most of the Ray's bream were alive when brought to the side of the vessel (95%) (Table 4). The domestic fleets retain around 95–99% of their Ray's bream catch, while the foreign charter fleet retained 97–99% of their Ray's bream catch (Table 5).

Table 4: Percentage of Ray's bream (including discards) that were alive or dead when arriving at the longline vessel and observed during 2006–07 to 2009–10, by fishing year, fleet and region. Small sample sizes (number observed < 20) were omitted (Griggs & Baird 2013).

Year	Fleet	Area	% alive	% dead	Number
2006–07	Charter	North	87.0	13.0	215
		South	96.0	4.0	10 350
	Domestic	North	65.8	34.2	442
	Total		**94.6**	**5.4**	**11 019**
2007–08	Charter	South	95.7	4.3	3 680
	Domestic	North	70.2	29.8	151
	Total		**94.6**	**5.4**	**3 831**
2008–09	Charter	North	90.1	9.9	313
		South	97.9	2.1	4 277
	Domestic	North	78.8	21.2	551
		South	94.1	5.9	34
	Total		**95.4**	**4.6**	**5 175**
2009–10	Charter	South	96.3	3.7	3 259
	Domestic	North	85.6	14.4	264
		South	92.0	8.0	88
	Total		**95.5**	**4.5**	**3 611**
Total all strata			**94.9**	**5.1**	**23 636**

Table 5: Percentage of Ray's bream that were retained, or discarded or lost, when observed on a longline vessel during 2006–07 to 2009–10, by fishing year and fleet. Small sample sizes (number observed < 20) omitted (Griggs & Baird 2013).

Year	Fleet	% retained	% discarded or lost	Number
2006–07	Charter	96.8	3.2	11 744
	Domestic	95.7	4.3	442
	Total	**96.8**	**3.2**	**12 198**
2007–08	Charter	96.8	3.2	3 714
	Domestic	98.7	1.3	152
	Total	**96.9**	**3.1**	**3 866**
2008–09	Charter	98.7	1.3	4 646
	Domestic	98.3	1.7	585
	Total	**98.7**	**1.3**	**5 231**
2009–10	Charter	98.8	1.2	3 291
	Domestic	95.3	4.7	361
	Total	**98.4**	**1.6**	**3 652**
Total all strata		**97.4**	**2.6**	**24 947**

1.3 Recreational fisheries

Recreational fishers take Ray's bream infrequently, generally as bycatch when targeting bluenose, hapuku and bass over deep reefs. The recreational harvest is assumed to be low, and is likely to be insignificant in the context of the total landings.

1.4 Customary non-commercial fisheries

There is no quantitative information available to allow the estimation of the harvest of Ray's bream by customary fishers, however, the harvest is assumed to be insignificant in the context of the commercial landings.

1.5 Illegal catch

There is no known illegal catch of Ray's bream.

1.6 Other sources of mortality

Ray's bream is a desirable species, and only a small percentage (about 1–5% annually) has been reported or observed as having been discarded. Most of the trawl catch of Ray's bream that is reported on CELR and CLR forms is retained. Most of the discarding appears to occur in the tuna fisheries, but these fisheries only take a small proportion of the total catch of Ray's bream. There may be some unobserved shark and cetacean depredation of longline caught Ray's bream.

2. BIOLOGY

Until recently, little was known about the biology of Ray's bream in New Zealand waters. A 2004 study examined growth rates, natural mortality and maturity for Ray's bream. Unfortunately, the actual species examined in this study could not be determined. It is possible that more than one species was involved, and the species (one or more) may not have been representative of the New Zealand catch recorded as Ray's bream. Until further samples are collected, the identification cannot be confirmed, but it is likely that the study was based wholly or partly on Southern Ray's bream (*Brama australis*).

It is expected that the main biological characteristics of Ray's bream will be similar to Southern Ray's bream, so the general findings of the recent study are reported here (Table 6). The small otoliths proved to be extremely difficult to age; notwithstanding this, Southern Ray's bream appear to have rapid initial growth, reaching 40–50 cm in 3–5 years, with little increase in length after this time. The maximum age observed was 25 years.

Table 6: Estimates of biological parameters.

Parameter		Estimate	Source
1. Weight = $a \cdot (\text{length})^b$ (Weight in t, length in cm)			
Both sexes	$a = 5.31 \times 10^{-9}$	b = 3.320	Livingston et al 2004

3. STOCKS AND AREAS

Ray's bream probably come from a wide-ranging single stock found throughout the South Pacific Ocean and southern Tasman Sea. The catch of Ray's bream elsewhere in the South Pacific needs to be considered when assessing the status of Ray's bream within New Zealand's fisheries waters.

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

This summary is from the perspective of Ray's bream but there is no directed fishery for them.

4.1 Role in the ecosystem

Ray's bream (*Brama brama*) is found in mid-water depths down to 1000 m. Ray's bream undertakes daily vertical migrations (Lobo & Erzini 2001) and is thought to feed opportunistically on small fish and cephalopods. It is known to be predated on by deepwater sharks such as the deepwater dogfish species *Centrophorus squamosus* and *Centroscymnus owstonii*, and the school shark *Galeorhinus galeus* (Dunn et al 2010).

4.2 Incidental fish bycatch

Observer records indicate that a wide range of species are landed by the longline fleets in New Zealand fishery waters. Blue sharks are the most commonly landed species (by number), followed by Ray's bream (Table 7).

Table 7: Total estimated catch (numbers of fish) of common bycatch species in the New Zealand longline fishery as estimated from observer data from 2011 to 2015. Also provided is the percentage of these species retained (2015 data only) and the percentage of fish that were alive when discarded, N/A (none discarded).

Species	2012	2013	2014	2015	% retained (2015)	discards % alive (2015)
Blue shark	132 925	158 736	80 118	72 480	0.3	87.0
Rays bream	19 918	13 568	4 591	17 555	95.3	13.7
Lancetfish	7 866	19 172	21 002	12 962	0.2	44.6
Porbeagle shark	7 019	9 805	5 061	4 058	5.1	64.0
Moonfish	2 363	2 470	1 655	3 060	95.6	45.5
Mako shark	3 902	3 981	4 506	2 667	16.1	72.2
Butterfly tuna	713	1 030	699	1 309	86.9	11.1
Pelagic stingray	712	1 199	684	979	0.0	97.2
Dealfish	372	237	910	842	0.4	22.9
Sunfish	3 265	1 937	1 981	770	0.0	100.0
Escolar	2 181	2 088	656	653	82.5	71.4
Oilfish	509	386	518	584	46.7	83.3
Deepwater dogfish	647	743	600	545	2.3	88.3
Rudderfish	491	362	327	373	26.9	78.9
Thresher shark	246	256	261	177	0.0	53.3
Skipjack tuna	123	240	90	150	10.0	n/a
Striped marlin	124	182	151	120	10.0	55.6
School shark	477	21	119	88	43.5	76.9
Big scale pomfret	108	67	164	59	32.5	96.3

4.3 Benthic interactions

N/A

5. STOCK ASSESSMENT

No assessments are available for Ray's bream; therefore estimates of biomass and yield are not available.

5.1 Estimates of fishery parameters and abundance

A time series of relative abundance estimates is available from the Chatham Rise trawl survey, but these estimates may not be a reliable index of relative abundance because Ray's bream are thought to reside in the mid-water and their vulnerability to the trawl survey gear is unknown, and could be extremely low. Similarly, a time series of unstandardised CPUE from the tuna longline fishery is highly variable and may not reflect relative abundance.

CPUE estimates were calculated for the longline fishery by each fleet and area stratum in which eight or more sets were observed and at least 2% of the hooks were observed (Griggs & Baird 2013). CPUE estimates were calculated for Ray's bream for each fleet and area in 2006–07 to 2009–10 and added to the time series for 1988–89 to 2005–06 and these are shown in Figure 5 (Griggs & Baird 2013). The CPUE results from the Domestic fleet should be interpreted with caution due to the lower observer coverage of this fleet. CPUE estimates for the Charter fleet can be considered reliable from 1992–93 onwards. CPUE of Ray's bream, was highest in the South and for the Charter fleet. CPUE of Ray's bream increased to a peak in 2004–05, and remained high but has since decreased in the most recent years. However, as the surface longline catch of Ray's bream accounts for only a small proportion of the catch the longline CPUE (Figure 5) is unlikely to be sufficient to represent stock status and trends in abundance for the stock as a whole.

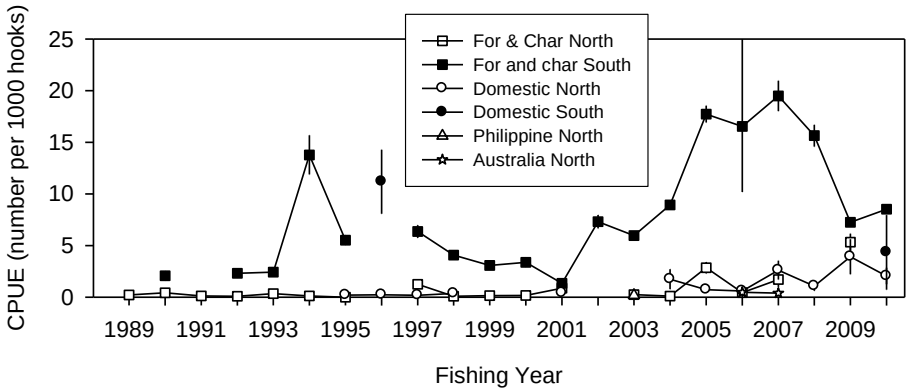


Figure 5: Annual variation in Ray's bream CPUE by fleet and area. Plotted values are the mean estimates with 95% confidence limits. Fishing year 1989 = October 1988 to September 1989 (Griggs & Baird 2013).

5.2 Biomass estimates

No biomass estimates are available for Ray's bream.

5.3 Other yield estimates and stock assessment results

There are no other yield estimates or stock assessment results available for Ray's bream.

5.4 Other factors

At least three closely related species are thought to be caught in New Zealand fisheries. Two species from the genus *Brama*, Ray's bream (*Brama brama*) and southern Ray's bream (*Brama australis*), are difficult to distinguish from external features and have been reported together in both catch statistics and research survey data in unknown ratios. A third closely related species, bronze bream (*Xenobrama microlepis*), is more easily distinguished from the other two, but is also likely to have been recorded as Ray's bream in catch statistics.

As none of the reported catch is from target fishing, the quota allocated under the QMS system will cover bycatch of mid-water trawl fisheries for squid, hoki, and jack mackerels, and target tuna longline fisheries.

The length distributions of Ray's bream for each year in the North and South regions are shown in Figure 6. Ray's bream are usually kept whole and not sexed, but in 2006–07 and 2009–10 fish were further processed and the fish were sexed, and distributions are shown for 2006–07 and 2009–10 by region and sex. There are differences in the North/South distributions, with fish from the South being larger, but the distributions for males and females are similar (Figure 6). Female Ray's bream mature at about 43 cm (Francis et al 2004), and most females were probably mature (78.7% over the four year period).

It is not known if observers are distinguishing Ray's bream from Southern Ray's bream (*Brama australis*) and it is possible that there are two species with different distributions. However observer training and fish identification guides now used by the observers should allow for correct identification and as a result the incidents of misidentification in recent years is likely to be low.

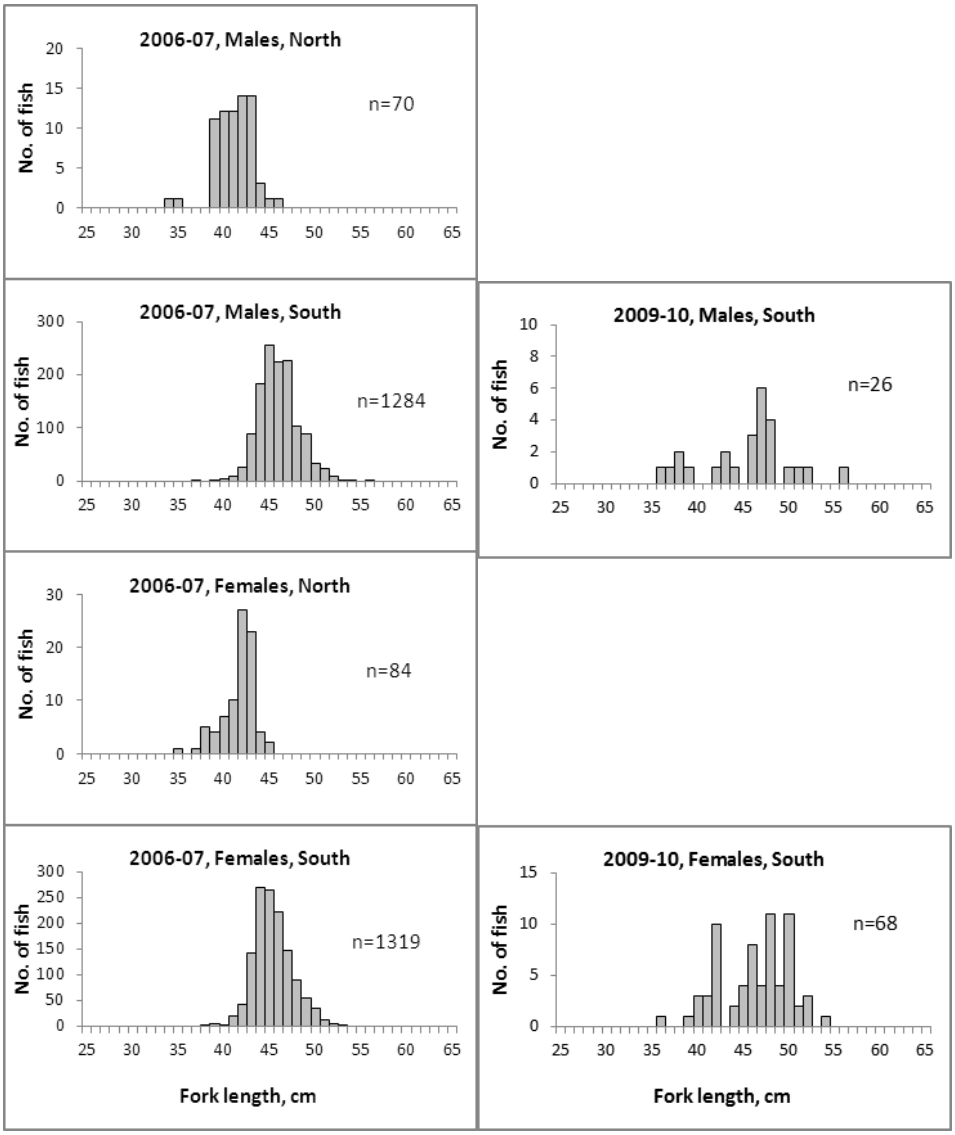


Figure 6: Length-frequency distributions of Ray's bream by fishing year, sex, and region. Sample sizes of less than 20 fish not shown (Griggs & Baird 2013). [Continued on next page]

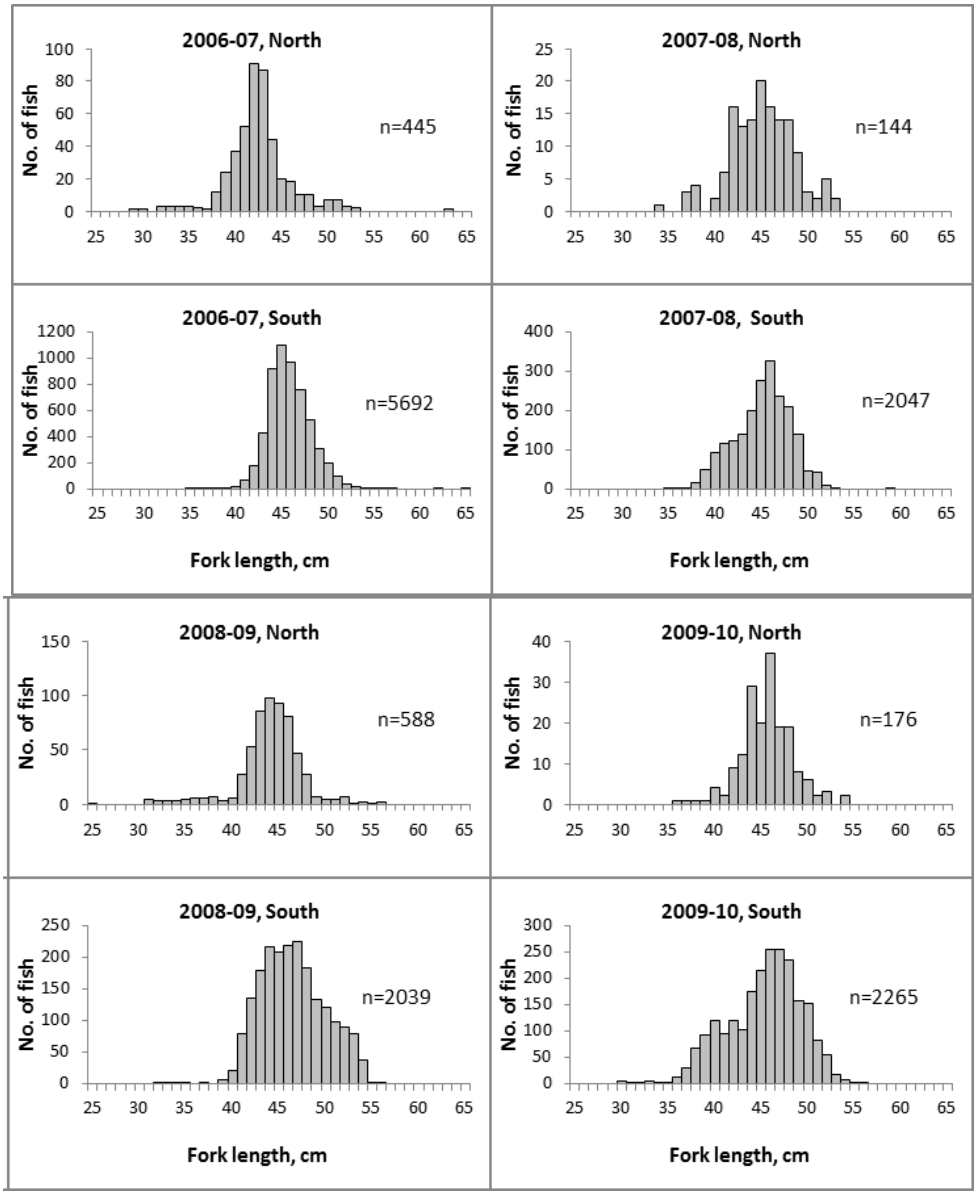


Figure 6 [continued]:

STATUS OF THE STOCKS

Stock structure assumptions

RBM 1 is assumed to be part of the wider South Western Pacific Ocean stock but the assessment below relates only to the New Zealand component of that stock.

Stock Status	
Year of Most Recent Assessment	No assessment
Assessment Runs Presented	-
Reference Points	Target: Not established Soft Limit: Not established but HSS default of 20% SB_0 assumed Hard Limit: Not established but HSS default of 10% SB_0 assumed Overfishing threshold: Not established
Status in relation to Target	Unknown
Status in relation to Limits	Unknown

Status in relation to Overfishing	Unknown

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Unknown
Recent Trend in Fishing Intensity or Proxy	Unknown
Other Abundance Indices	Catches in New Zealand increased from the late 1980s to 2000 but have declined from highs of 1001 t in the early 2000s to 150 t in 2010–11.
Trends in Other Relevant Indicator or Variables	Unknown

Projections and Prognosis		
Stock Projections or Prognosis	Unknown	
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Soft Limit: Unknown Hard Limit: Unknown	
Probability of Current Catch or TACC causing Overfishing to remain or to commence	Unknown	
Assessment Methodology and Evaluation		
Assessment Type	Level 4: Low information evaluation - There are only data on catch and TACC, with no other fishery indicators.	
Assessment Method	-	
Assessment Dates	Latest assessment: none	Next assessment: Unknown
Overall assessment quality rank	N/A	
Main data inputs (rank)	-	
Data not used (rank)	-	
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-	

Qualifying Comments
There is no target fishery for Ray's bream but it is a bycatch in mid-water trawl, bottom trawl, surface longlining, trolling and bottom longlining.

Fishery Interactions
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7. FOR FURTHER INFORMATION

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