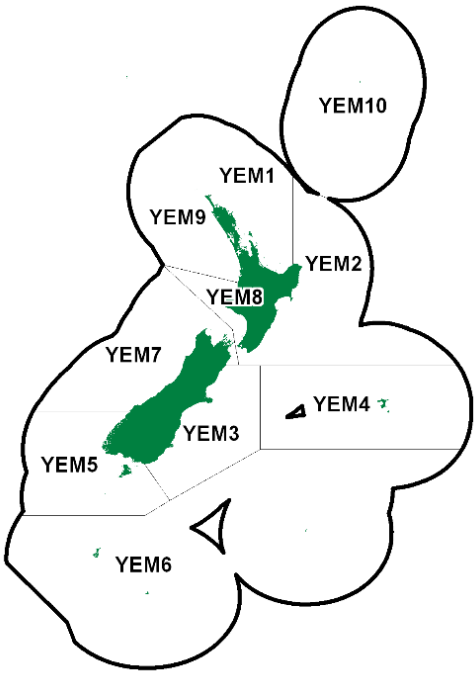
YELLOW-EYED MULLET (YEM)

(*Aldrichetta forsteri*)
Aua



1. FISHERY SUMMARY

1.1 Commercial fisheries

Yellow-eyed mullet entered the Quota Management System (QMS) on 1 October 1998. There is very little published information on the commercial fishery for yellow-eyed mullet apart from brief comments about its use as bait. From 1934 to 1972 information from catch records indicate that yellow-eyed mullet was taken by "other nets", meaning nets other than trawl or Danish seine. Catch by gear-type data from the Fisheries Statistics Unit (FSU) records between 1982–83 and 1988–89 show a predominant use of setnets and gillnets (about 95.5% of total catch) over beach seine and drag net (about 4.5% of total catch).

There is the potential for incorrect assignment of yellow-eyed mullet in landings records because of similarity in the common names of grey mullet and yellow-eyed mullet and the possibility that some fishers refer to both as *mullet*. A second possible classification error may arise from erroneous use of the names *herring* or *sprat*. The level of error in the landings data due to misidentification is not known.

Before 1960 the majority of the recorded landings of yellow-eyed mullet was taken in Northland. Between 1960 and 1968, there was a marked increase in landings from Lake Ellesmere. Regular records are also available for Napier beginning in 1941, and Manukau Harbour. Apart from Lake Ellesmere, records for the South Island are generally incomplete.

Pre-1980, landings of yellow-eyed mullet by QMA were low, perhaps as a result of under-reporting. Landings increased in the early 1980s due to an increase in landings in QMA 9, and to a lesser extent in QMA 1. In the 1990s landings in QMA 1 equaled and often exceeded landings in QMA 9. Landings have remained below 20 t in QMA 9 since the fishing year 1993-94 with the exception of the 1999–00 landings, which was almost triple that of the previous year and more than double the landings recorded in QMA 1. Most recently, in 2013–14 to 2022–23, an average of 16 t of annual landings were recorded in QMA 1, compared to 9 t in QMA 9.

Yellow-eyed mullet landings have fluctuated over time, with a peak of 68 t being recorded in 1986–87. The high landings recorded since the mid 1980s most likely reflect increased fishing in the Auckland area

in response to an increase in market demand for yellow-eyed mullet. An annual average of 37 t of total landings were recorded between 1996–97 and 1999–2000, and an average of 27 t between 2000–01 and 2019–20. Strong seasonal trends are evident in the landings data for each QMA with annual peaks mostly in July–August, indicating a winter fishery.

A breakdown of the current Total Allowable Catch (TAC) is shown in Table 1. Historical estimated and recent reported yellow-eyed mullet landings and TACCs are shown in Tables 2 and 3, while Figure 1 shows the historical landings and TACC values for the main YEM stocks.

Commercial landings of yellow-eyed mullet have been generally been below the TACC in each QMA since this species was introduced into the QMS on 1 October 1998. YEM 8 and YEM 3 landings however exceeded the TACCs slightly in 2005–06 and 2014–15 respectively.

Table 1: Recreational and Customary non-commercial allowances, other mortality, TACCs, and TACs (t) for yellow-eyed mullet by Fishstock.

Fishstock		Recreational allowance	Customary non-commercial allowance	Other sources of mortality	TACC	TAC
YEM 1	Auckland (East)	15	15	–	20	50
YEM 2	Central (East)	8	4	–	2	14
YEM 3	South-east (Coast)	4	2	–	8	14
YEM 4	South-east (Chatham)	0	0	–	0	0
YEM 5	Southland	1	1	0	1	3
YEM 6	Sub-Antarctic	0	0	–	0	0
YEM 7	Challenger	10	5	–	5	20
YEM 8	Central (West)	10	5	–	3	18
YEM 9	Auckland (West)	4	4	1	17	26
YEM 10	Kermadec	0	0	–	0	0

Table 2: Reported landings (t) for the main QMAs from 1931 to 1982.

Year	YEM 1	YEM 9	Year	YEM 1	YEM 9
1931-32	0	0	1957	19	0
1932-33	0	0	1958	22	0
1933-34	0	0	1959	20	0
1934-35	0	0	1960	9	0
1935-36	0	0	1961	20	0
1936-37	0	0	1962	19	1
1937-38	0	0	1963	8	1
1938-39	1	0	1964	9	0
1939-40	0	0	1965	6	3
1940-41	0	0	1966	4	5
1941-42	0	0	1967	23	4
1942-43	0	0	1968	19	2
1943-44	1	0	1969	17	2
1944	0	0	1970	17	1
1945	9	0	1971	14	1
1946	52	0	1972	7	1
1947	65	0	1973	0	0
1948	71	0	1974	0	0
1949	81	0	1975	11	0
1950	31	0	1976	11	0
1951	36	0	1977	2	0
1952	13	0	1978	1	0
1953	13	0	1979	1	0
1954	15	0	1980	2	1
1955	28	0	1981	5	4
1956	28	0	1982	4	2

Notes:
1. The 1931–1943 years are April–March but from 1944 onwards are calendar years.
2. Data up to 1985 are from fishing returns: Data from 1986 to 1990 are from Quota Management Reports.
3. Data for the period 1931 to 1982 are based on reported landings by harbour and are likely to be underestimated as a result of under-reporting and discarding practices. Data includes both foreign and domestic landings.

Table 3: Reported landings (t) of yellow-eyed mullet by fishstock and fishing year, 1983–84 to present. The data in this table has been updated from that published in previous Plenary Reports using the data through to 1996–97 in table 47 on p. 304 of the "Review of Sustainability Measures and Other Management Controls for the 1999–2000 Fishing Year – Final Advice Paper" dated 6 August 1998. There are no landings from FMA 10, which has a TACC of 0. [Continued on next page]

Fishstock	YEM 1		YEM 2		YEM 3		YEM 4		YEM 5	
FMA	1		2		3		4		5	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1982–83	2	-	35	-	3	-	0	-	0	-
1983–84	2	-	28	-	5	-	0	-	0	-
1984–85	12	-	2	-	1	-	0	-	0	-
1985–86	24	-	5	-	7	-	0	-	0	-
1986–87	14	-	10	-	4	-	0	-	0	-
1987–88	11	-	9	-	9	-	0	-	0	-
1988–89	3	-	1	-	4	-	0	-	0	-
1989–90	1	-	9	-	17	-	0	-	0	-
1990–91	21	-	12	-	13	-	0	-	0	-
1991–92	15	-	22	-	23	-	0	-	0	-
1992–93	32	-	13	-	1	-	1	-	0	-
1993–94	53	-	34	-	2	-	0	-	0	-
1994–95	32	-	41	-	1	-	0	-	0	-
1995–96	19	-	68	-	2	-	0	-	0	-
1996–97	32	-	89	-	7	-	< 1	-	0	-
1997–98	10	-	31	-	< 1	-	0	-	0	-
1998–99	16	20	34	1	7	6	0	0	0	0
1999–00	10	20	48	1	7	6	0	0	0	0
2000–01	9	20	21	1	5	6	0	0	0	0
2001–02	6	20	8	2	< 1	8	0	0	0	0
2002–03	9	20	< 1	2	4	8	0	0	0	0
2003–04	4	20	< 1	2	6	8	0	0	0	0
2004–05	4	20	< 1	2	1	8	0	0	< 1	0
2005–06	3	20	1	2	3	8	0	0	0	0
2006–07	5	20	< 1	2	5	8	0	0	< 1	0
2007–08	3	20	< 1	2	3	8	0	0	0	0
2008–09	6	20	< 1	2	< 1	8	0	0	0	0
2009–10	15	20	< 1	2	4	8	0	0	0	0
2010–11	10	20	< 1	2	7	8	0	0	0	0
2011–12	9	20	< 1	2	5	8	0	0	0	0
2012–13	14	20	< 1	2	3	8	0	0	0	0
2013–14	15	20	< 1	2	4	8	0	0	< 1	0
2014–15	19	20	< 1	2	9	8	0	0	< 1	0
2015–16	16	20	< 1	2	6	8	0	0	< 1	0
2016–17	15	20	0	2	3	8	0	0	< 1	0
2017–18	13	20	< 1	2	4	8	0	0	< 1	0
2018–19	16	20	< 1	2	4	8	0	0	< 1	0
2019–20	13	20	< 1	2	5	8	0	0	< 1	0
2020–21	16	20	< 1	2	8	8	0	0	0	1
2021–22	14	20	< 1	2	7	8	0	0	0	1
2022–23	21	20	< 1	2	6	8	0	0	0	1
2023–24	22	20	< 1	2	2	8	0	0	< 1	1

Fishstock	YEM 6		YEM 7		YEM 8		YEM 9			
FMA	6		7		8		9		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1982–83	0	-	0	-	5	-	5	-	17	-
1983–84	0	-	0	-	5	-	26	-	26	-
1984–85	0	-	3	-	3	-	33	-	33	-
1985–86	0	-	4	-	2	-	61	-	61	-
1986–87	0	-	6	-	0	-	68	-	68	-
1987–88	0	-	4	-	0	-	43	-	43	-
1988–89	0	-	5	-	0	-	21	-	21	-
1989–90	0	-	0	-	3	-	11	-	11	-
1990–91	0	-	10	-	0	-	21	-	21	-
1991–92	0	-	14	-	1	-	25	-	25	-
1992–93	0	-	2	-	5	-	31	-	31	-
1993–94	0	-	3	-	4	-	20	-	20	-
1994–95	0	-	8	-	2	-	18	-	18	-
1995–96	0	-	4	-	0	-	10	-	10	-
1996–97	0	-	5	-	2	-	11	-	58	-
1997–98	0	-	0	-	0	-	2	-	12	-
1998–99	0	0	2	4	< 1	2	9	33	34	56
1999–00	0	0	1	4	< 1	2	26	33	44	56
2000–01	0	0	< 1	4	< 1	2	12	33	28	56
2001–02	0	0	3	5	0	3	15	30	24	68
2002–03	0	0	< 1	5	< 1	3	19	30	34	68
2003–04	0	0	1	5	0	3	11	30	22	68
2004–05	0	0	0	5	< 1	3	7	30	13	68
2005–06	0	0	0	5	4	3	4	30	14	68
2006–07	0	0	< 1	5	3	3	9	30	23	68
2007–08	0	0	< 1	5	2	3	9	30	17	68
2008–09	0	0	2	5	2	3	10	30	20	68
2009–10	0	0	2	5	3	3	5	30	30	68
2010–11	0	0	2	5	2	3	17	30	38	68
2011–12	0	0	< 1	5	2	3	13	30	29	68

Table 3 [Continued]:

Fishstock	YEM 6		YEM 7		YEM 8		YEM 9			
FMA	6		7		8		9		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
2012–13	0	0	< 1	5	2	3	5	30	25	68
2013–14	0	0	< 1	5	< 1	3	11	30	31	68
2014–15	0	0	< 1	5	1	3	15	30	45	68
2015–16	0	0	< 1	5	2	3	9	30	39	68
2016–17	0	0	< 1	5	< 1	3	5	30	24	68
2017–18	0	0	< 1	5	< 1	3	7	30	25	68
2018–19	0	0	< 1	5	0	3	13	30	33	68
2019–20	0	0	< 1	5	< 1	3	11	30	29	68
2020–21	0	0	< 1	5	< 1	3	4	30	28	69
2021–22	0	0	< 1	5	< 1	3	9	17	29	56
2022–23	0	0	< 1	5	< 1	3	5	17	31	56
2023–24	0	0	< 1	5	< 1	3	9	17	34	56

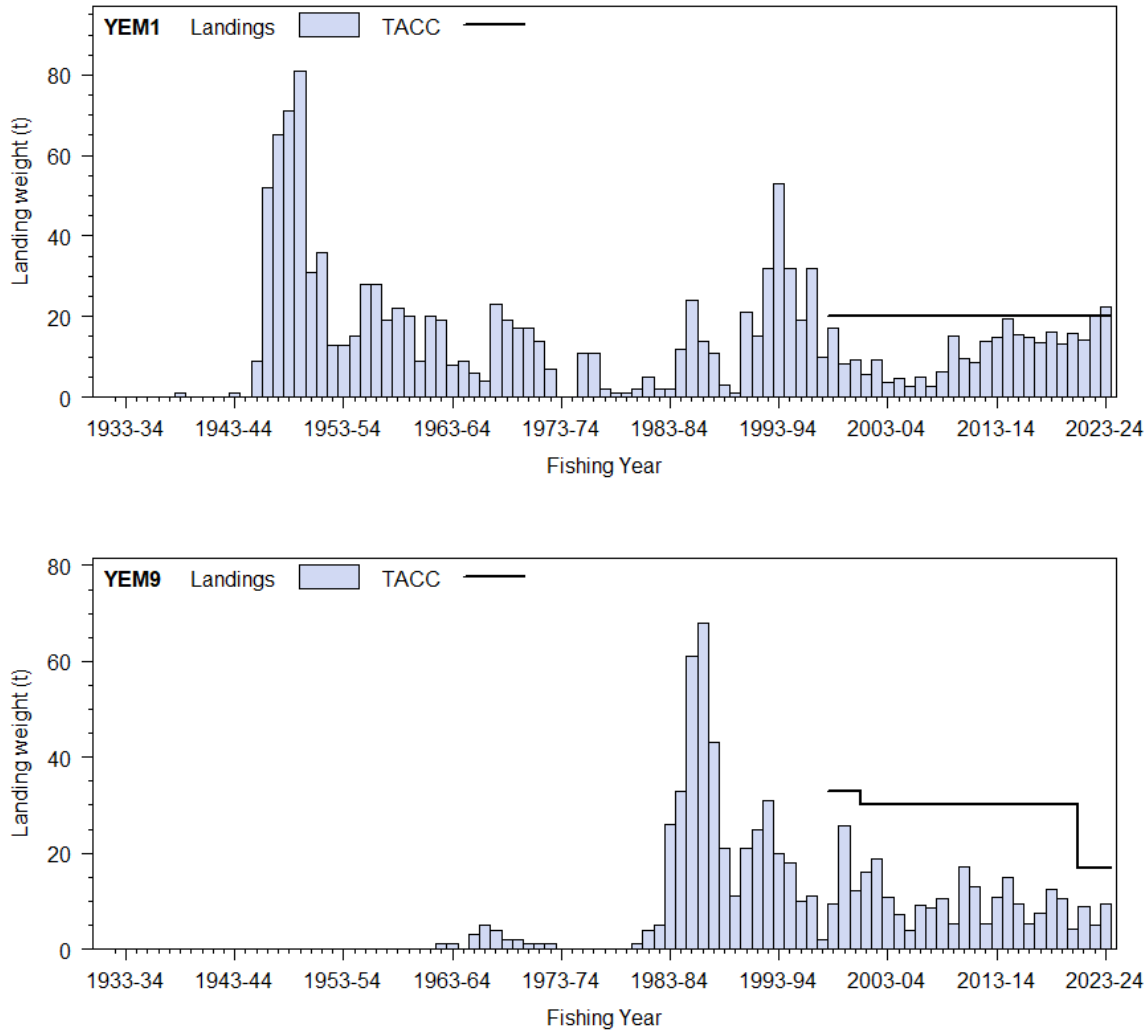


Figure 1: Reported commercial landings and TACCs for the two main YEM stocks. YEM 1 (Auckland East) and YEM 9 (Auckland West).

1.2 Recreational fisheries

Yellow-eyed mullet are a popular recreational species throughout New Zealand, particularly in YEM 1. The first recreational harvest estimates were provided by offsite telephone-diary surveys conducted between 1991 and 2001 (Bradford 1998, Teirney et al. 1997, Boyd & Reilly 2005). The harvest estimates provided by these telephone-diary surveys are no longer considered reliable for various reasons. A Recreational Technical Working Group concluded that these harvest estimates should be used only with the following qualifications: a) they may be very inaccurate; b) the 1996 and earlier surveys contain a methodological error; and c) the 2000 and 2001 estimates are implausibly high for many important

fisheries. In addition, some confusion probably arises between grey and yellow-eyed mullet during surveys, and the incorrect use of names like herring and sprat adds further uncertainty.

In response to these problems and the cost and scale challenges associated with onsite methods, a National Panel Survey was conducted for the first time throughout the 2011–12 fishing year (Wynne-Jones et al 2014). The panel survey used face-to-face interviews of a random sample of 30 390 New Zealand households to recruit a panel of fishers and non-fishers for a full year. The panel members were contacted regularly about their fishing activities and harvest information collected in standardised phone interviews. The national panel survey was repeated during the 2017–18 and 2022–23 fishing years using very similar methods to produce directly comparable results (Wynne-Jones et al 2019; Heinemann & Gray 2024). Recreational catch estimates from the three national panel surveys are given in Table 4. Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals.

Table 4: Recreational harvest estimates for yellow-eyed mullet stocks from national panel surveys (Wynne-Jones et al 2014, 2019, Heinemann & Gray 2024). Mean weights from boat ramp surveys (Hartill & Davey 2015, Davey et al 2019; 2024).

Stock	Year	Method	Number of fish	Total weight (t)	CV
YEM 1	2011–12	Panel survey	57 417	11.5	0.26
	2017–18	Panel survey	38 705	11.3	0.31
	2022–23	Panel survey	8 857	2.9	0.43
YEM 2	2011–12	Panel survey	12 053	2.4	0.38
	2017–18	Panel survey	10 103	2.9	0.63
	2022–23	Panel survey	2 817	0.9	0.68
YEM 3	2011–12	Panel survey	8 326	1.7	0.36
	2017–18	Panel survey	12576	3.7	0.58
	2022–23	Panel survey	273	0.1	0.75
YEM 5	2011–12	Panel survey	-	-	-
	2017–18	Panel survey	251	0.1	1.00
	2022–23	Panel survey	-	-	-
YEM 7	2011–12	Panel survey	15 792	3.2	0.33
	2017–18	Panel survey	10 804	3.2	0.33
	2022–23	Panel survey	300	0.1	1.01
YEM 8	2011–12	Panel survey	11 715	2.3	0.37
	2017–18	Panel survey	19 818	5.8	0.34
	2022–23	Panel survey	4 173	1.4	0.62
YEM 9	2011–12	Panel survey	20 535	4.1	0.34
	2017–18	Panel survey	14 830	4.3	0.49
	2022–23	Panel survey	2 936	1.0	0.60

1.3 Customary non-commercial fisheries

No quantitative information is available on the current level of customary non-commercial take.

1.4 Illegal catch

No quantitative information is available on the level of illegal catch.

1.5 Other sources of mortality

No quantitative estimates are available about the impact of other sources of mortality on yellow-eyed mullet stocks. Yellow-eyed mullet principally occur in sheltered harbour and estuarine ecosystems. Some of these habitats are known to have suffered environmental degradation.

2. BIOLOGY

The yellow-eyed mullet, *Aldrichetta forsteri* (Cuvier & Valenciennes 1836), is a member of the Mugilidae family (mullets). It is found in New Zealand, Norfolk Island and Australia. Its range extends from North Cape to Stewart Island in New Zealand and from the Murchison River in Western Australia, across South Australia and around Tasmania, to the Hawkesbury River in New South Wales. It is typically a schooling species that occurs commonly along coasts, in estuaries and in lower river systems, with juveniles sometimes observed in freshwater where they have been observed feeding on algae. In New Zealand, the species is widely but erroneously known as herring.

Yellow-eyed mullet are omnivorous and feed on a wide range of food types including algae, crustaceans, diatoms, molluscs, insect larvae, fish, polychaetes, coelenterates, fish eggs and detritus.

Egg development begins in July and maturity occurs by late December. Generally, spawning is during summer from late December to mid-March although there is some evidence in females from Canterbury to suggest biennial spawning, with peaks in winter and summer. Yellow-eyed mullet appear to leave their estuarine habitat to spawn in coastal waters, with eggs and larvae being found in surface waters up to 33 km offshore. There is no information available on the age of recruitment into estuarine systems of New Zealand waters.

Within estuaries and river systems, yellow-eyed mullet are separated to some extent by age, with older fish preferring more saline water and juveniles sometimes found in freshwater. The larger fish also prefer deeper water than juveniles.

The Intrinsic Productivity Level is categorised as High for this species. M was estimated from the equation $M = \log_e 100/\text{maximum age}$, where maximum age is the age to which 1% of the population survives in an unexploited stock. Using 7 years for the maximum age results in an estimate of $M = 0.66$. The maximum age used here is for a yellow-eyed mullet taken in Wellington Harbour in 1963.

Biological parameters relevant to stock assessment are shown in Table 6.

Table 6: Estimates of biological parameters of yellow-eyed mullet.

Fishstock	Estimate		Source
1. Natural mortality (M)			
		Both Sexes	NIWA (unpub. Data)
Wellington Harbour		0.66	
2. Weight = a(length)^b (Weight in g, length in cm fork length).			
		Both Sexes	
	a	b	
Lake Ellesmere	0.0068	3.2	Gorman (1962)

3. STOCKS AND AREAS

No information is available to determine the stock structure of yellow-eyed mullet in New Zealand waters. Because catches are generally taken locally within harbours and estuarine systems that are relatively easy to identify, boundaries for Fishstocks take this natural division into account.

4. STOCK ASSESSMENT

4.1 Estimates of fishery parameters and abundance

No estimates of fishery parameters or stock abundance are available for yellow-eyed mullet.

4.2 Biomass estimates

Biomass estimates are not available for any stocks.

4.3 Yield estimates and projections

Estimates of *MCY* are not available.

No estimates of current biomass, fishing mortality, or other information are available which would permit the estimation of *CAY*.

4.4 Other factors

Because of the highly localised nature of the fishery and the relatively high landings taken recently, particularly in the Manukau Harbour, yellow-eyed mullet may be susceptible to localised depletion.

Concern has been expressed by the Working Group about the effects of the small-meshed nets used to fish yellow-eyed mullet on other species within estuarine systems. For example, species such as grey mullet may suffer increased pressure as a consequence of increased target fishing for yellow-eyed mullet.

5. STATUS OF THE STOCKS

For all Fishstocks there is insufficient information to estimate current stock status.

6. FOR FURTHER INFORMATION

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