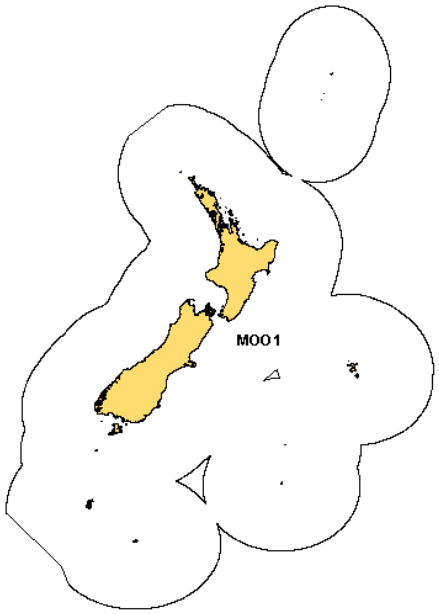
MOONFISH (MOO)

(Lampris guttatus)



1. FISHERY SUMMARY

Moonfish were introduced into the QMS on 1 October 2004 under a single QMA, MOO 1, with the TAC equal to the TACC (Table 1).

Table 1: Recreational and Maori allowances, TACCs and TACs of moonfish.

Fishstock	Recreational Allowance (t)	Maori customary Allowance (t)	Other mortality (t)	TACC (t)	TAC (t)
MOO 1	0	0	0	527	527

Moonfish were added to the Third Schedule of the 1996 Fisheries Act with a TAC set under s14.

1.1 Commercial fisheries

Most moonfish (70%) are caught as a bycatch of fisheries using surface longlines (the 7th most common bycatch species in the surface longline fishery). The main target fisheries catching moonfish by surface longlining are bigeye tuna (*Thunnus obesus*) and, to a lesser extent, southern bluefin tuna (*T. maccoyii*), albacore (*T. alalunga*) and yellowfin tuna (*T. albacares*). Mid-water trawling accounts for 18%, bottom trawling 8% and bottom longlining 1%. The main target fisheries using mid-water trawling are for southern blue whiting (*Micromesistius australis*) and hoki (*Macruronus novaezelandiae*), and bottom trawling for hoki and gemfish (*Rexea solandri*).

When caught on tuna longlines most moonfish are alive (72.4%). Most moonfish catch is kept and landed, as there is a market demand. It is likely that landing data for moonfish reasonably represents actual catches, although it may include small amounts of the less common (< 1% of *Lampris* spp.) and more southerly occurring opah (*Lampris immaculatus*), because of misidentification. Most of the catch taken by the tuna longline fishery was aged 2 to 14 years, and most (71%) of the commercial catch appears to be of adult fish.

Between 1989/90 and 1998/99, reported landings in New Zealand increased each year from 2 to a maximum of 351 t in 2000/01, but have declined since then as a result of decreasing effort in the surface longline fishery (Table 2). Over the last three fishing years, landings have averaged around 115 t. New Zealand landings of moonfish appear to represent about 70% of the reported catch of

moonfish in the wider South Pacific area based on Food and Agriculture Organisation of the United Nations statistics. Alternately, this may reflect non-reporting of bycatch by others.

Table 2. Reported landings (t) of moonfish (CELR, CLR and LFRR data from 1989/90 through 2000/01, MHR data from 2001/02 onwards).

Fishing year	MOO 1 (all FMAs)
1989/90	3
1990/91	18
1991/92	26
1992/93	46
1993/94	97
1994/95	112
1995/96	112
1996/97	130
1997/98	234
1998/99	278
1999/00	311
2000/01	351
2001/02	342
2002/03	239
2003/04	156
2004/05	111
2005/06	79
2006/07	84

1.2 Recreational fisheries

There is no information on recreational catch levels of moonfish. Moonfish has not been recorded from recreational surveys conducted by MFish.

1.3 Maori customary fisheries

There is no information on customary catch, although customary fishers consider moonfish good eating and may have used moonfish in the past.

1.4 Illegal catch

There is no known illegal catch of moonfish.

1.5 Other sources of mortality

There is no information on other sources of mortality although moonfish are occasional prey of blue and mako sharks in New Zealand waters, suggesting there may be some unobserved shark predation of longline caught moonfish.

2. BIOLOGY

Until recently, little was known about the biology of moonfish in New Zealand waters. Recent studies have examined growth rates, natural mortality, and maturity for moonfish.

Age and growth of moonfish (*Lampris guttatus*) in New Zealand waters was studied from counts of growth bands on cross sections of the second ray of the dorsal fin. Ministry of Fisheries observers working on tuna longline vessels collected fin samples. Observers also collected maturity data, and length-frequency data were obtained from the longline observer database.

Thin sections were cut from fin rays 3.5–4 times the condyle width above the fin base. Sections were read blind (without knowing the fish length) by two readers. Readability scores were poor and the four readers who examined the fin rays came to two different interpretations.

Length-at-age data did not show any marked differences between males and females. Von Bertalanffy growth curves were fitted to the age estimates of both readers individually, and also to the mean ages of the two readers. The mean age provides the best available age estimate for moonfish samples.

However, because of differences between readers, and the un-validated nature of our estimates, the growth curves must be interpreted with caution, especially for younger fish.
The growth curves suggest rapid early growth. The greatest age estimated in this study was 13 or 14 years depending on the reader, but this is probably an underestimate of true longevity. Using a maximum age of 14 years, Hoenig's method provides an M estimate of 0.30. If moonfish live to 20 years, this would reduce to 0.21. The Chapman-Robson estimate of Z is 0.13–0.14 for ages at recruitment of 2–4 years. However, our sample was not randomly selected and so this is probably unreliable. The best estimate of M may be around 0.20–0.25.

Length and age at maturity could not be accurately determined due to insufficient data, but it appears that fish longer than about 80 cm fork length are mature. The corresponding age at maturity would be 4.3 years. Sexual maturity may therefore be attained at about 4–5 years. A few spawning females were collected in the Kermadec region, and at East Cape, suggesting that moonfish spawn in northern New Zealand. Identification of the location and timing of spawning are important areas of further research and are a pre-requisite for obtaining good estimates of length and age at maturity.

3. STOCKS AND AREAS

There is no information on the stock structure of moonfish.

4. STOCK ASSESSMENT

There is insufficient information on which to do a stock assessment of moonfish.

4.1 Estimates of fishery parameters and abundance
There are no estimates of relevant fisheries parameters or abundance indices for moonfish.

4.2 Biomass estimates
There are no biomass estimates for moonfish.

4.3 Estimation of Maximum Constant Yield (MCY)
There are no estimates of biomass on which to base an estimate of MCY. Similarly most of the moonfish caught is a bycatch in the tuna longline fishery targeting bigeye tuna. This fishery is relatively new and has not undergone a stable period where the average catch of moonfish can be used as a proxy for abundance or standing stock. It is therefore not appropriate to estimate MCY.

4.4 Estimation of Current Annual Yield (CAY)
There is insufficient information to estimate CAY.

4.5 Other yield estimates and stock assessment results
There are no other yield estimates or stock assessment results.

4.6 Other factors
While there is no information on stock status, available data suggests that moonfish are moderately productive and that most (71%) of New Zealand's catches are of mature fish. Provided that juvenile moonfish are not experiencing high fishing mortality elsewhere in their range, it is unlikely that there are any sustainability concerns for moonfish at this time.

5. STATUS OF THE STOCKS

While moonfish appear to have moderately productive life history characteristics, the stock status is unknown. It is not known if recent catch levels are sustainable or whether they are at levels that will allow the stock(s) to move towards a size that will support the maximum sustainable yield.

6. FOR FURTHER INFORMATION

Anon. 2003. Information summaries and indicative areas for species proposed to be introduced to the QMS in October 2004. NIWA Report on MFish Project MOF2002/03F.

Anon. 2004. Setting of Sustainability and Other Management Controls for Stocks to be introduced into the QMS on 1 October 2004: Final Advice Paper. Ministry of Fisheries.

Anon. 2004. www.fishbase.org.

Ayers, D.; Francis, M.P.; Griggs, L.H.; Baird, S.J. (2004). Fish bycatch in New Zealand tuna longline fisheries, 2000-01 and 2001-02. *New Zealand Fisheries Assessment Report 2004/46*. 47 p.

Francis, M.P.; Griggs, L.H.; Baird, S.J. 2004. Fish bycatch in New Zealand tuna longline fisheries, 1998–99 to 1999–2000. New Zealand Fisheries Assessment Report 2004/22.

Francis, M. P., Griggs, L., Ó Maolagáin, C.. 2005. Growth rate, age at maturity, longevity and natural mortality rate of moonfish (*Lampris guttatus*). Final Research Report for Ministry of Fisheries Research Project TUN2003-01, Objective 1.