



Annual distribution of grey mullet lineage

FD0750_1; FD0751_1; FD0752_1; 753_1; FD0754_1

1. Electronic databases were used to generate initial maps of species distribution.
 - a. Commercial fishing returns (smaller vessels): **CELR** database. All records from 1 October 1989 to 30 June 2003 were extracted on 15–17 July 2003. Data were used to estimate mean annual catch in statistical areas. Information from statistical areas 1–10 was down-weighted because of likely mis-recording of Fishstock instead of statistical area. Only the top five species caught are reported on these forms so information on the absence of a species is not available. Records of grey mullet south of Kaikoura and from the Chathams are probable mis-identifications or mis-codings, and were ignored.
 - b. Recreational fishing database: **rec_data**. All records were extracted on 24 July 2003. Data were used to determine the presence of a species in a variety of statistical reporting areas.
 - c. Museum of New Zealand Te Papa records of this species based on voucher specimens held in their collection were searched for distributional information that added to the distributional ranges determined from other databases.
 - d. Databases of offshore and pelagic commercial fishing (**TCEPR**, **TLCER**), observer records (**obs**, **I_line**), and aerial sightings (**aer_sight**) were not used as they contained no records of this species, or the number of records was too small to provide useful additional distributional information. Records from New Zealand and Russian trawl surveys (**fish_comm**, **trawl**) were not used as they contained no useful records.
2. Literature sources were searched for distributional information that added to the distributional ranges determined from databases.
 - a. Unpublished electronic bibliography of New Zealand fishes compiled by L. J. Paul and held on a NIWA computer.
 - b. Aquatic Sciences and Fisheries Abstracts.
 - c. *New Zealand Professional Fisherman* and *Seafood New Zealand* for 1986–2002.
 - d. *New Zealand Fishing News* for 1998–2002.
 - e. Scientific papers, unpublished reports and university theses available to the expert who prepared the distributional layers.
3. Other sources.
 - a. Nil.
4. Summary

- a. Maps generated from the electronic databases were provided to an expert scientist who integrated this information with other information from the literature, and expert opinion, and produced hand-drawn distributional zones on a template map containing depth contours at 250 m, 500 m, and 1000 m. These maps were then digitised and imported into a GIS software package as layers. The areas of the zones were calculated, and the layers were linked to attribute and metadata files.
- b. The primary sources of distributional data for grey mullet were the CELR database and Museum of New Zealand records.
- c. Grey mullet are a widespread cosmopolitan species in coastal waters of the tropical and subtropical zones of all seas, including the eastern Pacific Ocean (California to Chile), western Atlantic Ocean (Nova Scotia, Canada to Brazil), eastern Atlantic (Bay of Biscay to South Africa, including the Mediterranean Sea and Black Sea), Indian Ocean, and western Pacific Ocean. In the New Zealand region, they are known from Norfolk Island, and from North Cape to Cook Strait. They also occur rarely in the South Island, having been reported from Tasman Bay (Paulin 1998) and Kaikoura (Francis 1979), but these may be summer-autumn stragglers. The South Island distribution is poorly known. Grey mullet are most abundant in the estuaries and harbours of the northern North Island. The known depth range is 0–20 m in New Zealand, but grey mullet are reported down to 120 m elsewhere in the world

5. References

The following sources provided useful information on the distribution of this species. This is not an exhaustive list of all references to the species.

Francis, M.P. (1979). Checklist of the marine fishes of Kaikoura, New Zealand. *Mauri Ora* 7: 63-71.

Francis, M.P. (1993). Checklist of the coastal fishes of Lord Howe, Norfolk, and Kermadec Islands, Southwest Pacific Ocean. *Pacific Science* 47: 136-170.

Jones, J.B.; Hadfield, J.D. (1985). Fishes from Porirua and Pauatahanui Inlets: occurrence in gill nets. *New Zealand Journal of Marine and Freshwater Research* 19: 477-484.

McDowall, R.M. (1990). New Zealand freshwater fishes. A natural history and guide. Revised edition. Heinemann Reed, Auckland. 553 p.

Morrison, M.A.; Francis, M.P.; Hartill, B.W.; Parkinson, D.M. (2002). Diurnal and tidal variation in the abundance of the fish fauna of a temperate tidal mudflat. *Estuarine, Coastal and Shelf Science* 54: 793-807.

Paulin, C. (1998). Common New Zealand marine fishes. Canterbury University Press, Christchurch. 80 p.