

The logo for NABIS (New Zealand Aquatic Biodiversity Information System) features the word "NABIS" in a bold, blue, sans-serif font. To the right of the text is a stylized map of New Zealand with a magnifying glass icon overlaid on it, symbolizing search and discovery.

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Lineage – Scientific methodology

Annual distribution of rubyfish

1. Electronic databases were used to generate initial maps of species distribution.
 - a. Commercial trawl fishing returns: **TCEPR** and **TCE** forms. All records from 1 October 1989 to 30 September 2008 were extracted on 4 August 2009. Data were used to estimate mean annual catch and catch rate (kilograms per kilometre towed) in 0.25 degree rectangles. Only the top five or eight species respectively are reported on these forms so information on the absence of a species is not available. Records of rubyfish from seamounts on the south-western Lord Howe Rise are plausible but unconfirmed. Records of rubyfish from the Snares Shelf are supported by observer data (obs), but by no other information.
 - b. 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 rubyfish catches support other information sources.
 - c. Scientific observer records from commercial vessels: **COD** database. All records from 1 April 1986 to 30 September 2008 were extracted on 6 August 2009. Data were used to estimate mean annual catch and catch rate (kilograms per kilometre towed), and proportion of tows that caught the species, in 0.25 degree rectangles. Records of rubyfish from the Snares Shelf match those from the TCEPR database, but – given the preference of rubyfish for warmer subtropical water – require confirmation.
 - d. Research bottom trawl records: **fish_comm** and **trawl** databases. **fish_comm** is a groomed version of **trawl**. All **fish_comm** records from 2 September 1978 to 30 September 2005 were extracted on 19 May 2006. All **trawl** records from 1 October 2005 to 30 September 2008 were extracted on 7 August 2009. Data were used to estimate total catch, proportion of tows that caught the species,

and catch rate (kilograms per kilometre towed) in 0.25 degree rectangles. Records for rubyfish generally matched those from other databases, but were much sparser, and absent for the entire region south of Banks Peninsula and Westland. This might be a consequence of research tows avoiding the rough bottom areas favoured by this species.

- e. 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.
 - f. NORFANZ voyage: **biods** database. Records from a research trawling and dredging survey of the Norfolk Ridge and Lord Howe Rise carried out in May–June 2003 were extracted on 9 January 2006.
 - g. Databases of recreational fishing catches (**rec_data**), commercial tuna longline catches (**TLCER**), observer records from tuna longlines (**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 Russian trawl surveys (**trawl**) were not used because they were historic (pre 1987), and species identification is regarded as unreliable.
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 rubyfish were TCEPR, CELR, and fish_comm databases.

- c. Rubyfish occur at the shelf edge and on the upper continental slope from the Three Kings Ridge to at least South Canterbury, and probably less commonly and perhaps intermittently to the Snares Shelf (the southern limit to their distribution is uncertain). They appear to have an association with seamounts. They occur across the Chatham Rise, on at least part of the Challenger Plateau (where there is a hotspot), have been plausibly reported from seamounts on the Lord Howe Rise, and West Norfolk Ridge, and probably occur where there is suitable seafloor habitat in the mid-Tasman.
- d. Rubyfish also occur in south-eastern Australia and at southern Indian Ocean islands in similar latitudes. The known depth range of rubyfish is 0–1000 m, and they probably extend deeper. Commercial catches are reported (probably from midwater) over seabed depths up to 2000 m.

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.

Anderson, O.F.; Bagley, N.W.; Hurst, R.J.; Francis, M.P.; Clark, M.R.; McMillan, P.J. (1998). Atlas of New Zealand fish and squid distributions from research bottom trawls. *NIWA Technical Report 42*. 303 p.

Heemstra, P.C.; Randall, J.E. (1977). A revision of the Emmelichthyidae (Pisces: Perciformes). *Australian Journal of Marine and Freshwater Research* 28: 361-396

Paul, L.J. (1997). A summary of biology and commercial landings, and a stock assessment of rubyfish, *Plagiogeneion rubiginosum* (Hutton, 1875) (Percoidei: Emmelichthyidae). *New Zealand Fisheries Assessment Research Document 97/27*. 22 p.

Paulin, C. (1999). Bonnetmouths: rubyfish & redbait. *Seafood New Zealand* 7(8): 74-76.