



Lineage – Scientific methodology

Annual distribution of spawning red gurnard lineage

1. Electronic databases were used to generate initial maps of species distribution.
 - a. Scientific observer records from larger vessels: **obs_ifs** database. All records from 1 October 1989 to 31 March 2005 and stored in the new data format were extracted on 3 August 2005. Data were used to estimate the mean annual catch (number of fish) of running ripe females, the proportion of running ripe females in the catch of the species, and proportion of tows that caught running ripe females of the species, in 0.25 degree rectangles.
 - b. Research bottom trawl records: **trawl** database. All records from 1 October 1961 to 5 July 2005 were extracted on 25 August 2005. Data were used to estimate the mean annual catch (number of fish) of running ripe females, the proportion of running ripe females in the catch of the species, and proportion of tows that caught running ripe females of the species, in 0.25 degree rectangles.

2009 update: An examination of the observer (**cod**) and research (**trawl**) databases was repeated for the period 31 Mar 2005 to 1 May 2009. Several new records were found in both databases but all were within the known distributional range of spawning red gurnard.

2. Literature sources were searched for usable biological and distributional information to add to the distributional range of spawning red cod determined from databases.
 - a. O'Driscoll et al. (2003). Areas of importance for spawning, pupping or egg-laying, and juveniles of new Zealand deepwater fish, pelagic fish, and invertebrates. *NIWA Technical Report 119*.
 - b. Hurst et al. (2000b). Areas of importance for spawning, pupping or egg-laying, and juveniles of New Zealand coastal fish. Final Research Report for MFish Project ENV199903.
 - c. Unpublished electronic bibliography of New Zealand fishes compiled by L. J. Paul and held on a NIWA computer.
 - d. Aquatic Sciences and Fisheries Abstracts.
 - e. *New Zealand Professional Fisherman and Seafood New Zealand* for 1986–2005.
 - f. *New Zealand Fishing News* for 1998–2005.

- g. Scientific papers, unpublished reports and university theses available to the expert who prepared the distributional layers.
- h. Other online sources such as Fishbase, Google, and the ISI Web of knowledge.

2009 update: Searches of ASFA, Fishbase, and Google Scholar on 18 May 2009 returned no additional material that would alter the known distribution of spawning red gurnard in New Zealand waters.

3. Other sources.

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 spawning red gurnard were the **trawl** databases. There were few tows in the **observer** database that were shallow enough to catch red gurnard.
- c. Red gurnard is found in New Zealand, Australia (Queensland, New South Wales, southern coast, and Western Australia), Norfolk Island, Lord Howe Island, South Africa, Japan, Korea, and China (Last et al. 1983, Ayling & Cox 1984, May & Maxwell 1986, Francis 1993).
- d. In New Zealand red gurnard are distributed from south of Stewart Island to Northland, including Mernoo Bank, the Chathams Islands, and Kermadec Islands. Depth range is 1–300 m although it is most commonly found between 10 and 100 m over muddy or sandy bottoms.
- e. Red gurnard spawn in shallow to midshelf areas throughout New Zealand and there do not appear to be any major geographical spawning aggregations or areas. Spawning period is variable but generally extends from spring to late summer depending on the region. Research surveys suggest that some important areas or spawning hotspots include southland, South Otago, west coast, Bay of Plenty, Raglan coast, and south of Hawke Bay. There are, however, likely to be many other spawning hotspots throughout New Zealand. It is also likely that spawning occurs in the Chatham Islands, Mernoo Bank, Norfolk Island, and Kermadec Islands, but we have no information to support this.

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.

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