

Lineage – Scientific methodology

Annual distribution of spawning gemfish 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. No new records outside the previous range were found in both databases and no changes were made to the map of the known distributional range of spawning gemfish.

2. Literature sources were searched for usable biological and distributional information to add to the distributional range of spawning gemfish 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 - c. Unpublished electronic bibliography of New Zealand fishes compiled by L. J. Paul and held on a NIWA computer.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 - g. Scientific papers, unpublished reports and university theses available to the expert who prepared the distributional layers.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 22 May 2009 returned no additional material that would alter the known distribution of spawning gemfish 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 gemfish were the **observer** and **trawl** databases.
- c. Gemfish occur on the continental shelf waters around New Zealand down to a depth of about 700 m. They have also been recorded occasionally from the Challenger Plateau, Chatham Rise and the Auckland Islands. There are no records from the Southern Plateau and Bounty Islands. Records of gemfish from northern New Zealand may possibly include another species (*Rexea antefurcata*).
- d. Spawning gemfish have been recorded from the west coast South Island, off the east coast of Northland, the Wairarapa coast, the Stewart/Snares shelf and off Banks Peninsula.
- e. Hurst (1998) suggested that there were 2 stocks of gemfish, a southern/west coast stock and a northern/east coast stock (Hurst et.al (2000)). The northern stock is thought to migrate to the east coast of the northern North Island in winter for spawning while the western stock appears to spawn off the west coast of the South Island in winter. Running ripe female gemfish have been recorded from depths of between 100-500 m.
- f. The distribution of observer tows and research surveys where gemfish were staged will influence the distribution map and spawning gemfish may occur outside the 100% distribution shown.

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.
- Horn, P.L.; Hurst, R.J. (1999). Age and stock structure of gemfish (*Rexea solandri*) in New Zealand waters. *Marine and Freshwater Research 50(2)*: 103–115.
- Hurst, R.J., and Bagley, N.W. 1998: A summary of biology and commercial landings, and a stock assessment of southern (SKI 3 and SKI 7) gemfish *Rexea solandri* (Gempylidae) in New Zealand waters. *New Zealand Fisheries Assessment Research Document 98/3*. 51 p.
- Hurst, R.J., Coburn, R.P., Hanchet, S.M., Horn, P.L., Langley, A.D., and Bagley, N.W. 1998: Assessment of northern gemfish stocks (SKI 1 and SKI 2) for 1998. *New Zealand Fisheries Assessment Research Document 98/31*. 55
- Hurst, R.J.; Coburn, R.P.; Horn, P.L. 2000: Assessment of northern gemfish stocks (SKI 1 and SKI 2) for 2000. *New Zealand Fisheries Assessment Report 2000/18*. 41 p.
- Hurst, R.J.; Bagley, N.W.; Anderson, O.F.; Francis, M.P.; Griggs, L.H.; Clark, M.R.; Paul, L.J.; Taylor, P.R. (2000a). Atlas of juvenile and adult fish and squid distributions from bottom and midwater trawls and tuna longlines in New Zealand waters. *NIWA Technical Report 84*. 162 p.
- Hurst, R.J.; Stevenson, M.L.; Bagley, N.W.; Griggs, L.H.; Morrison, M.A.; Francis, M.P. (2000b). Areas of importance for spawning, pupping or egg-laying, and juveniles of New Zealand coastal fish. *Final Research Report for Ministry of Fisheries Research Project ENV1999/03, Objective 1*. 302 p.
- O'Driscoll, R.L.; Booth, J.D.; Bagley, N.W.; Anderson, O.F.; Griggs, L.H.; Stevenson, M.L.; Francis, M.P. (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*. 377 p.
- Paul, L.J. (2000). New Zealand fishes: identification, natural history and fisheries. Revised edition. Reed, Auckland. 253 p.