

## Lineage – Scientific methodology

### Spring distribution of juvenile 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 mean annual catch of juveniles, proportion of juveniles in the catch of the species, and proportion of tows that caught juveniles 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 mean annual catch of juveniles, proportion of juveniles in the catch of the species, and proportion of tows that caught juveniles 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 either database and no changes were made to the map of the known spring distributional range of juvenile gemfish.
2. Literature sources were searched for usable biological and distributional information to add to the distributional range of juvenile 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  - c. Unpublished electronic bibliography of New Zealand fishes compiled by L. J. Paul and held on a NIWA computer.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  - g. Scientific papers, unpublished reports and university theses available to the expert who prepared the distributional layers.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 spring distribution of juvenile gemfish in New Zealand waters.

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 juvenile gemfish was the **obs\_ifs 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 small gemfish from northern New Zealand may possibly include another species (*Rexea antefurcata*).
- d. Juvenile gemfish in spring have been recorded from coastal waters around New Zealand and the Stewart/Snares shelf including Puysegur Bank. *Rexea antefurcata* only grows to a small size and it is probable that this may have been mis-identified as juvenile gemfish in Northern New Zealand waters and the Challenger Plateau. The depth range juvenile gemfish have been recorded in spring is between 50-700 m
- e. Suggested hotspots of higher abundance in spring occur off the west coast of the South Island and north of Farewell Spit .
- 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.
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- 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.