Lineage – Scientific methodology

Annual distribution of spawning southern blue whiting lineage

1. Electronic databases were used to generate initial maps of species distribution.

    a. Scientific observer records from larger vessels: **obs_lfs** 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. Numerous new records were found in the observer database and resulted in slight extentions of the known distributional range of spawning southern blue whiting.

2. Literature sources were searched for usable biological and distributional information to add to the distributional range of spawning southern blue whiting 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c. Unpublished electronic bibliography of New Zealand fishes compiled by L. J. Paul and held on a NIWA computer.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g. Scientific papers, unpublished reports and university theses available to the expert who prepared the distributional layers.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 19 May 2009 returned no additional material that would alter the known distribution of spawning southern blue whiting 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 southern blue whiting were the **observer** and **trawl** databases.
   c. Southern blue whiting is found around South America, New Zealand, and in the Bellingshausen Sea. They extend north from Cape Horn to about 46 °S off the coast of Chile and to about 37 °S off the coast of Argentina, and east across the Patagonian shelf to the Falkland Islands. The fish aggregate for spawning during the winter at 46–48 °S off the coast of Chile and at 48–52 °S around the Falkland Islands. During summer both populations migrate south and the fish have been reported as far south as the South Shetland, South Orkney Islands, and Bellingshausen Sea at 60–65 °S. They have been caught in this area feeding on krill in surface waters over bottom depths exceeding 4000 m. They have also been reported from the South Pacific mid-ocean ridge at about 130 °E and 55 °S.
   d. Within New Zealand southern blue whiting are found almost exclusively in subantarctic waters. Their main centres of distribution are on the Campbell Island Rise, Bounty Plateau, Pukaki Rise, and Auckland Islands Shelf in 200–600 m depth. They extend in low numbers north along the edge of the Stewart–Snares Shelf, and are occasionally caught on the Chatham Rise. Their depth range is from 180 m to 800 m. It is not known whether they occur on the

Macquarie Ridge, or pelagically south of the Campbell Plateau and Bounty Plateau over deep water.

e. There are four clearly defined southern blue whiting spawning areas, i.e., the north and east Campbell Island Rise, the Bounty Plateau surrounding Bounty Island, the Pukaki Rise, and the eastern Auckland Islands Shelf. The entire spawning areas can be classified as hotspots. Spawning hotspots are seasonal, relating to spawning months only (spring).
f. Most spawning southern blue whiting are found between depths of 250 and 600 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.

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Merrett, N.R. (1963). Pelagic gadoid fish in the Antarctic. *Norsk Hvalfangst-Tidende 9*: 245–247.

Shpak, V.M. (1975). Morphometric description of the "southern putassu" *Micromesistius australis* Norman from the area of the New Zealand Plateau with notes on the diagnostics of the genus *Micromesistius* Gill. *Journal of Ichthyology 66*: 175–181.