



Lineage

Summer Distribution of Horse Mackerel

1. Electronic databases were used to generate initial maps of species distribution.
 - a. Scientific observer records from larger vessels: **obs** database. All records from 1 March 1990 to 30 June 2003 and stored in the new data format were extracted on 28 July 2003. 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 horse mackerel were mainly from the west coast (approximately Raglan to Hokitika), the Puysegur–Snares shelf, off Banks Peninsula to 500 m depth, and Mernoo Bank, with small numbers around the Chatham Islands and on the Chatham Rise, and shallower than 300 m near the Auckland Islands. There was no observer coverage of the purse-seine fleet, which is responsible for most horse mackerel catch on the east coast of the North Island. Thus, the **obs** database only provides partial information on distribution for this species.
 - b. Research bottom trawl records: **fish_comm** database. This database is a groomed version of the research trawl database **trawl**. All records from 2 September 1978 to 3 September 1997 were extracted on 15–16 July 2003. Further surveys have been added to **trawl** and **fish_comm** since 1997. 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. Because of the paucity of information from other sources, these data provided most of the information for this species. Their greatest coverage was on the west coast south of Raglan Harbour, on the east coast in the Hauraki Gulf and south of East Cape, and on the Puysegur–Snares shelf. However there were gaps in research trawl effort in key areas (e.g., the northeast coast of the North Island from North Cape to the Bay of Plenty, excluding the Hauraki Gulf).
 - c. 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.
 - d. Databases of commercial trawl and purse-seine catches (**TCEPR** and **CELR**) were not used because catches of horse mackerel are recorded under the combined code JMA for all three species of jack mackerel. Recreational fishing databases (**rec_data**) were not used because fishers do not reliably distinguish the three species, and other data sources cover the same geographic range. Similarly, the aerial sightings database (**aer_sight**) does not separate golden and horse mackerel. Databases of commercial tuna longline catches

(**TLCER**) and observer records from tuna longlines (**L_line**) 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 (i.e., separation of horse and golden mackerels) is considered 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. Anecdotal information from a senior fish-spotting pilot who has worked in the purse-seine industry since 1976 was summarised to determine the position of any hotspots of this species in northern waters. These hotspots apply to both golden and horse mackerel, and were included in annual, spring, and summer distribution maps.
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 their expert opinion to produce 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 horse mackerel were the obs and fish_comm databases.
 - c. Horse mackerel occur in New Zealand, the Kermadec Islands, the Wanganella Bank on the West Norfolk Ridge, and from Western Australia to New South Wales.
 - d. In New Zealand, horse mackerel occur throughout mainland waters from the Three Kings Islands to the Puysegur–Snares shelf, and shallower than 500 m around the Auckland Islands, although there was no information to support its presence in Fiordland. There were a few records from the Chatham Rise, and at the Chatham Islands, with a good representation from the Mernoo Bank in the observer data. The known depth range is 0–300 m (but fish may be caught in midwater over bottom depths up to 500 m).
 - e. The summer distribution of horse mackerel differed from the annual distribution in the presence of a single hotspot off the west coast

that was continuous between the North and South Taranaki bights. A second small hotspot was evident on the Snares–Stewart Shelf, and another south of East Cape.

- f. Summer, for the purposes of NABIS, is defined as being the months of January, February and March. This definition is based on research regarding the spatial and temporal variability of sea surface temperature in the New Zealand region (Uddstrom and Oien 1999).

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.

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Roberts, C.D. (1991). Fishes of the Chatham Islands, New Zealand: a trawl survey and summary of the ichthyofauna. *New Zealand Journal of Marine and Freshwater Research 25*: 1-19.

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