



## Annual distribution of blue mackerel lineage

**FD0330\_2; FD0331\_1; FD0332\_1; FD0333\_2; FD0334\_1**

1. Electronic databases were used to generate initial maps of species distribution.
  - a. Commercial fishing returns (larger vessels): **TCEPR** database. All records from 1 October 1989 to 30 September 2005 were extracted on 17 October 2005. Data were used to estimate mean annual catch and catch rate (kilograms per kilometre towed) in 0.25 degree rectangles. Only the top five species caught are reported on these forms so information on the absence of a species is not available. Records of blue mackerel were almost exclusively shallower than 500 m, which is consistent with research trawl and observer records; some **TCEPR** records outside 500 m were not supported by other databases and were ignored.
  - b. Commercial fishing returns (smaller vessels): **CELR** database. All records from 1 October 1989 to 30 June 2003 were extracted on 15–17 July 2003. Data were used to estimate mean annual catch in statistical areas. Information from statistical areas 1–10 was down-weighted because of likely mis-recording of Fishstock instead of statistical area. Only the top five species caught are reported on these forms so information on the absence of a species is not available. Records of blue mackerel largely reflected distributions from the other data sources, but because data were by statistical area, little fine scale information could be derived from them.
  - c. Scientific observer records from larger vessels: **obs** database. All records from 1 March 1990 to 30 September 2005 and stored in the new data format were extracted on 20 October 2005. 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 blue mackerel were mainly from the west coast (approximately Raglan to Hokitika) and the Chatham Rise. There is no observer coverage of the purse-seine fleet, which is responsible for most blue mackerel catch on the east coast of the North Island.
  - d. 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 30 September 2005 were extracted on 19 May 2006. 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. This database provided the most extensive coverage of blue mackerel distribution, though there were gaps off east Northland and northeast South Island.

- e. Russian research bottom trawl records: **trawl** database. These data are a subset of the research trawl database **trawl**. All records were extracted on 9 August 2003. Data were used to determine the presence of this species north of 37 °S. Because the data are old (the most recent record was 1987), and there are problems with species identifications, these data were given low weighting.
  - f. Recreational fishing database: **rec\_data**. All records were extracted on 24 July 2003. Data were used to determine the presence of a species in a variety of statistical reporting areas.
  - g. Aerial sightings database: **aer\_sight**. On 31 August 2005, data were extracted for 1976 onwards (for 0.5 degree squares) and for 1 January 1986 onwards (for actual positions). Data were used to estimate total tonnage, number of schools, and tonnes per hour of flying. This database provided good distributional information for blue mackerel, particularly in areas where the other sources were lacking (e.g., east Northland).
  - h. 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.
  - i. Databases of commercial tuna longline catches (**TLCER**) and observer records from tuna longlines (**I\_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.
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. 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 blue mackerel were TCEPR, CELR, fish\_comm, and aer\_sight databases.

- c. Blue mackerel (*Scomber australasicus*) occur in the Indo-Pacific and eastern Pacific oceans. The Indo-Pacific distribution covers the Red Sea and northern Indian Ocean, Australia and New Zealand, north to China and Japan and east to the Hawaiian Islands but the species is relatively rare in tropical waters. The eastern Pacific distribution is Socorro and Revillagigedo Islands, Mexico (Collette 1995).
- d. In the New Zealand region, blue mackerel occurs at Lord Howe Island (Francis 1993), and throughout mainland waters from the Three Kings Islands to the southern edge of the Snares Shelf and on the Chatham Rise. There are many records from Mernoo Bank at the western end of the Chatham Rise, and some from the Chatham Islands. Other hotspots occur in east Northland, Bay of Plenty, from the Hokianga south around Cape Egmont and the northwestern coast of the South Island. Records from several areas require confirmation, and are regarded as unknown (outer continental shelf off northern New Zealand and the west coast of the South Island). Blue mackerel have not been recorded from Norfolk and Kermadec islands, but may occur there, given their presence at Lord Howe Island in a similar latitude. The known depth range is 0–150 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.

- 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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squid distributions from bottom and midwater trawls and tuna longlines in New Zealand waters. *NIWA Technical Report 84*. 162 p.

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