



Lineage

Summer distribution of Murphy's 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 Murphy's mackerel were mainly from the west coast (approximately Raglan to Hokitika), the Puysegur–Snares shelf, shallower than 500 m depth near the Auckland Islands, off Banks Peninsula to 500 m depth, Mernoo Bank, and the Chatham Islands, with small numbers on the Chatham Rise. There was no observer coverage of the purse-seine fleet, which is responsible for most Murphy's 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 Island, on the east coast south of East Cape, and on the Puysegur–Snares shelf. However there were gaps in research trawl effort (e.g., the northeast coast of the North Island from North Cape to the Bay of Plenty, excluding the Hauraki Gulf).
 - c. Aerial sightings database: **aer_sight**. On 5 August 2003, 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. Murphy's mackerel can be distinguished in aerial observations from horse and golden mackerel by colour and swimming patterns.
 - d. 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.
 - e. Databases of commercial trawl and purse-seine catches (**TCEPR** and **CELR**) were not used because catches of Murphy's 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. 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. Records from Russian trawl surveys (**trawl**) were not used because they were historic (pre 1987).

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 Murphy's mackerel were the obs, aer_sight, and fish_comm databases.
 - c. Murphy's mackerel was first identified in New Zealand waters by Kawahara (1988) as *Trachurus murphyi*, then known as Chilean or Peruvian jack mackerel. Recent work by Stepien and Rosenblatt (1996) has shown that Murphy's mackerel is identical with the North Pacific species *T. symmetricus*, though it is usually referred to in New Zealand as *T. symmetricus murphyi*.
 - d. Murphy's mackerel ranges from southeastern Alaska to southern Baja California, Mexico and the Gulf of California, with reports from Acapulco in Mexico and the Galapagos Islands. As *T. murphyi* it is known from Peru and Chile (Nakamura et al. 1986), Ecuador (Smith-Vaniz 1995), New Zealand, and southern Argentina (Nakamura et al. 1986).
 - e. In New Zealand, Murphy's mackerel occurs throughout mainland waters from the Three Kings Islands to the Puysegur–Snares shelf.

It is also known from depths shallower than 500 m around the Auckland Islands, and on the Chatham Rise to east of the Chatham Islands. The known depth range for this species is 0–500 m.

- f. The summer distribution of Murphy's mackerel differed from the annual distribution in the absence of hotspots at Cape Foulwind, outside Cloudy and Clifford Bays, north of Pegasus Bay, and their positions on the Stewart–Snares shelf.
- g. 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.

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- Uddstrom, M.J.; Oien, N.A. (1999). On the use of high-resolution satellite data to describe the spatial and temporal variability of sea surface temperatures in the New Zealand region. *Journal of Geophysical Research. Oceans* 104 C9: 20729-20751.