Lineage – Scientific methodology

Spring distribution of kahawai

Spring, for the purposes of NABIS, is defined as being the months of October, November and December. 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).

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

    a. Commercial trawl fishing returns: **TCEPR** and **TCE** forms. All records from 1 October 1989 to 30 September 2008 were extracted on 4 August 2009. Data were used to estimate mean annual catch and catch rate (kilograms per kilometre towed) in 0.25 degree rectangles. Only the top five or eight species respectively are reported on these forms so information on the absence of a species is not available. Records of kahawai from depths greater than 150 m, and on the Snares Shelf and Campbell Plateau, are probable mis-identifications or mis-codings of other species, and were ignored (kahawai has never been recorded from these regions in research trawl tows).
    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 kahawai from depths greater than 150 m, and on the Snares Shelf, Campbell Plateau and Bounty Plateau, are probable mis-identifications or mis-codings of other species, and were ignored (kahawai has never been recorded from these regions in research trawl tows).
    c. Scientific observer records from commercial vessels: **COD** database. All records from 1 April 1986 to 30 September 2008 were extracted on 6 August 2009. 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.

d. Research bottom trawl records: **fish_comm** and **trawl** databases. **fish_comm** is a groomed version of **trawl**. All **fish_comm** records from 2 September 1978 to 30 September 2005 were extracted on 19 May 2006. All **trawl** records from 1 October 2005 to 30 September 2008 were extracted on 7 August 2009. 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.
e. 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.
f. 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.
g. 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.
h. 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 golden and horse 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. 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 kahawai were the TCEPR, CELR, aer_sight, and fish_comm databases.
c. Kahawai are an Australasian species. In Australia, they range from Brisbane to Tasmania. They are also found at Lord Howe, Norfolk and Kermadec islands. In New Zealand they range from the Three Kings Islands to Otago and northern Fiordland, and the Chatham Islands. The known depth range is 0–150 m, though surface schools often occur over deeper water.
d. The spring distribution differed from the annual distribution only in the position of hotspots, with the large west coast hotspot broken up and only existing from North Cape to Manukau Harbour. Hotspots also occur around Cape Egmont, west of Durville Island and Kahurangi, and in the Bay of Plenty.

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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Paulin, C. (1993). Review of the Australasian fish family Arripididae (Percomorpha), with the description of a new species. *Australian Journal of Marine and Freshwater Research 44*: 459-471.

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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.