Lineage

Annual distribution of Bronze whaler shark

1. Electronic databases were used to generate initial maps and summary tables of species distributions.

    a. Commercial fishing returns: **Catch-effort data**. All records from 01 Oct 1989 to 07 November 2006 were extracted on 9 November 2006. A summary of estimated catches by statistical area was created from these data. Many of these records did not have position information, but those that did were used to create draft maps of species distributions. Information from statistical areas 1–10 was down-weighted because of likely mis-recording of FMA or QMA 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.
    b. Commercial fishing returns: **Landings data**. All records from 01 Oct 1989 to 07 November 2006 were extracted on 9 November 2006. From this extract a summary of landings by species, year, and fishstock (either the species QMAs or the generic FMAs numbered 1–10) was created.
    c. Scientific observer records from larger trawlers: **obs** database. All records from 24 August 1989 to 3 October 2006 and stored in the new data format were extracted on 13 November 2006. Data were used to create draft maps of the species distribution, showing also the positions of trawls not catching the species. This database provides an important check against how well observed vessel data matches the larger commercial catch-effort data.
    d. Scientific observer records from bottom long-liners: **obs_lfs** database. All records from 30 March 1993 to 16 August 2006 were extracted on 13 November 2006. Data were used to create draft maps of the species distribution.
    e. Scientific observer records from tuna long-liners: **l_line** database. All records from 30 March 1993 to 16 August 2006 were extracted on 13 November 2006. Data were used to create draft maps of the species distribution. However, the latitudes and longitudes used were for the set start position, and because longline length is often greater than 140 km, the resolution of the data is about 1 degree square.
    f. Recreational fishing dairy and boatramp surveys: **rec_data** database. Data were extracted on 15 November 2006 for all records available for the species since these surveys began in 1991. Records of the locations of catches of the species by recreational fishers were summarised in a spreadsheet.

2009 update: Catch-effort and landings data, the observer database (**cod**), and the **trawl** database were re-examined for the period 31 August 2006 to 13 May 2009. Numerous new records of bronze whaler sharks were available from catch effort records and **cod**, but all were from within the previously recorded range for the species.

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 1986–2006.
    d. *New Zealand Fishing News* for 1998–2006.
    e. Scientific papers, unpublished reports, species monographs, and university theses available to the expert who prepared the distributional layers.
    f. Other online sources such as OBIS, Fishbase, Google, and the ISI Web of knowledge.

3. Other sources.
    a. Nil.

4. Summary
    a. Maps and summary tables 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 bronze whaler sharks were catch-effort, obs and l_line databases.
    c. Bronze whaler sharks occur in most warm temperate and some tropical waters of the Indo-Pacific and Atlantic oceans, and the Mediterranean Sea (Last & Stevens 1994; Compagno et al. 2005).
    d. In the New Zealand region, bronze whalers are found around the North Island and the northern coast of South Island. Occasional commercial catch records from the east and west coasts of South Island, the Snares Shelf, the Campbell Plateau and the Chatham Islands cannot be substantiated from observer reports, and require confirmation. The same applies to records from the Wanganella Bank, the southern Norfolk Ridge and the Lord Howe Rise. Bronze whaler sharks are very similar in appearance to several other whaler sharks that occasionally occur in northern New Zealand waters, and some northern records may represent these other species. Bronze whalers are most often seen during summer and it

is possible they make seasonal migrations, but there are insufficient data to confirm this.

e. Bronze whaler sharks are most abundant north of Cape Egmont (especially in the large west coast harbours) and on the northeast coast from the Bay of Plenty to the Bay of Islands.
f. The depth range of bronze whaler sharks is poorly known. They occur mainly in coastal waters, and have been recorded to depths of at least 100 m (Last & Stevens 1994; Compagno et al. 2005). New Zealand observer records go as deep as 500 m, and some beyond that, but these depths require confirmation; they may reflect seabed depth rather than depth of capture, or may have been misidentified or miscoded records.

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.

Bagley, N.W.; Anderson, O.F.; Hurst, R.J.; Francis, M.P.; Taylor, P.R.; Clark, M.R.; Paul, L.J. (2000). Atlas of New Zealand fish and squid distributions from midwater trawls, tuna longline sets, and aerial sightings. *NIWA Technical Report* 72. 171 p.

Compagno, L.; Dando, M.; Fowler, S. (2005). Sharks of the world. Princeton University Press, Princeton. 368 p.

Last, P.R.; Stevens, J.D. (1994). Sharks and rays of Australia. CSIRO, Hobart. 513 p.