



## Lineage – Scientific methodology

### Annual distribution of Buller's shearwater

1. Literature sources were searched for distribution information.
  - a. Scientific papers, published texts, unpublished reports and university theses available to the expert who prepared the distributional layers.
  - b. Aquatic Sciences and Fisheries Abstracts for 1960-2007.
  - c. *OSNZ News* and *Southern Bird* for 1977–2007.
2. Other sources.
  - a. NZSAS (New Zealand Seabirds at Sea) database maintained by Natural Environment, Museum of New Zealand Te Papa Tongarewa, Wellington.
  - b. A database of daily seabird sightings off Kaikoura, January 1999-October 2007 ([www.oceanwings.co.nz](http://www.oceanwings.co.nz)).
3. Summary
  - a. An expert scientist integrated information from the literature and expert opinion, and produced hand-drawn distributional zones on a template map. 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of distribution data for Buller's shearwater were the NZSAS database, papers published in refereed journals, texts and unpublished reports.
  - c. During the breeding season (September-May inclusive) Buller's shearwaters are among the commonest seabirds over the shelf off NE New Zealand (North Cape to Banks Peninsula), with occasional records as far as 48°S. There are few records of Buller's shearwaters in New Zealand waters during the non-breeding season of June-August inclusive (Bartle 1974, Jenkins 1974, 1988, Marchant & Higgins 1990, NZSAS data).
  - d. A distribution "hotspot" for New Zealand seabirds is defined as "an area of increased abundance of a species, as considered by the expert compiling the species account". Typical examples of hotspots include areas around breeding locations during the breeding season, regardless of the absolute size of the breeding colony, and areas that are consistently and repeatedly favoured as feeding locations.

- e. Buller's shearwater is endemic to New Zealand, where it breeds at the Poor Knights Islands (Harper 1983, Marchant & Higgins 1990, Taylor 2000). Usually, they forage north of the sub-tropical convergence during the breeding season, generally staying over the continental shelf (Taylor 2000). In a study of the distribution and abundance of seabirds off the east coast, from Kairakau Rocks (Hawkes Bay) to Banks Peninsula (Canterbury) during autumn Bartle (1974) reported that Buller's shearwater was the most frequently seen seabird species and that they were evenly distributed throughout this area. The species is also found in the mid-Tasman Sea and off eastern Australia (Jenkins 1974, 1988). The main distribution hotspots are located off N and E Northland, east of the North Island from East Cape to Cook Strait, off Banks Peninsula (autumn) and west of the Challenger Plateau (spring). Most Buller's shearwaters migrate to the North Pacific Ocean in winter and disperse widely from Japan to the western coast of North America (Wahl 1985). A few also are reported annually off the Galapagos (Robertson *et al.* 2003), Peru and Chile (Marchant & Higgins 1990). However, small numbers probably overwinter in New Zealand waters and "significant" numbers continue to visit their breeding grounds in winter (Bartle 1974).

#### 4. 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.

- Bartle, J.A. (1974). Seabirds of eastern Cook Strait, New Zealand, in autumn. *Notornis* 21: 135-166.
- Harper, P.C. (1983). Biology of the Buller's shearwater (*Puffinus bulleri*) at the Poor Knights islands, New Zealand. *Notornis* 30: 299-318.
- Jenkins, J.A.F. (1974). Local distribution and feeding habits of Buller's shearwater (*Puffinus bulleri*). *Notornis* 21: 109-120.
- Jenkins, J.A.F. (1988). The distribution of Buller's shearwater (*Puffinus bulleri*) in New Zealand coastal waters and in the Tasman Sea. *Notornis* 35: 203-215.
- Langlands, P.A. (1991). Buller's shearwaters foraging around fishing vessels. *Notornis* 38: 266.
- Marchant, S.; Higgins, P.J. (1990). Handbook of Australian, New Zealand and Antarctic birds. Volume 1, Part A. Oxford University Press, Melbourne. 735p.
- Robertson, C.J.R.; Bell, E.A.; Sinclair, N.; Bell, B.D. (2003). Distribution of seabirds from New Zealand that overlap with fisheries worldwide. Science for Conservation 233. Department of Conservation, Wellington. 102p.

Taylor, G.A. (2000). Action plan for seabird conservation in New Zealand. Part A: threatened seabirds. Threatened species occasional publication No. 16, Department of Conservation, Wellington. 233p.

Wahl, T.R. (1985). The distribution of Buller's shearwater (*Puffinus bulleri*) in the North Pacific Ocean. *Notornis* 32: 109-117.