Annual distribution of *Carpophyllum maschalocarpum* lineage

The brown seaweed *Carpophyllum maschalocarpum* (Turner) Grev. is endemic to New Zealand and is found on the North, South, and Chatham Islands (Adams 1994, Neale & Nelson 1998, Nelson et al. 2002). It has not been recorded from the subantarctic islands.

1. Literature sources

   The literature was searched for distributional information for the brown kelp *C. maschalocarpum*.

   a. A search was carried out of the following databases: Te Puna using the keywords "*Carpophyllum maschalocarpum* + Zealand +geograph? (+distribut?" Keyword Relevance Search = "*Carpophyllum maschalocarpum"* +thesis (16/09/2005); Aquatic Sciences and Fisheries Abstracts "*Carpophyllum maschalocarpum* and zealand and (geograph* or distribut*)" (16/09/2005); Web of Science "TS=(*Carpophyllum maschalocarpum* and zealand and (geograph* or distribut*))" (15/09/2005); Scopus "title-abs-key ("*Carpophyllum maschalocarpum"* and zealand and (geograph* or distribut*))" (16/09/2005); Google Scholar "zealand geographic or distributed or distribution "*Carpophyllum maschalocarpum"* (19/09/2005). From all these sources 1 thesis, a number of paper citations were located (ASFA = 1; Scopus = 1; Google scholar = 39).
   b. Using subject indices, *Seafood New Zealand* was checked for articles dealing with *Carpophyllum maschalocarpum* and research.
   c. A search of NIWACAT in September 2005 produced no records that contributed additional distribution information for this species.

2. Ministry of Fisheries electronic databases

   There are no data held for *Carpophyllum maschalocarpum*.

3. Museum holdings

   Holdings of *C. maschalocarpum* were examined at WELT, the herbarium of the Museum of New Zealand Te Papa Tongarewa, CHR (Landcare Research herbarium), AK (Auckland Museum herbarium, including the herbarium of Auckland University), and in the algal research collections at NIWA. Data were used to help estimate presence/absence.

4. Summary

Carpophyllum maschalocarpum is geographically widespread, and a common or abundant brown alga found in the low intertidal and down to about 3 m depth (about 0.5–6.5 m depth relative to MHWS, depending on location). It grows in a wide array of environments in the upper subtidal zone, from sheltered bays and harbours to reefs on open coasts. The ecology of this species has been examined in the North Auckland area (Schiel & Choat 1980, Schiel 1985, 1988, Hurd et al. 2004) in relation to growth, longevity, and recruitment, intraspecific competition, and with respect to the recruitment of juvenile reef fishes.

The 90% distribution has been overlaid on the 100% distribution and has been extended to link headlands or subtidal reef areas where this species has been recorded and/or where equivalent habitats occur.

The above information on the distribution of *C. maschalocarpum*, derived primarily from herbarium collections, was reviewed by Dr Murray Parsons, former Keeper Landcare Herbarium, and then integrated by hand onto a large-scale map of New Zealand. The shoreline distributions were then digitised and imported into a GIS software package as layers. The areas of each distribution class were calculated and the layers were linked to attribute and metadata files. The map, because of its scale, cannot be taken to accurately define the local distribution of this species.

5. References

The following publications were the key references and/or the ones most useful in describing the annual distribution of *C. maschalocarpum*. The list is not intended to be an exhaustive bibliography of publications about this species.

Adams, N.M. (1994). Seaweeds of New Zealand. Canterbury University Press. 360 p.

Byrch, C. (1990). An investigation of the potential of the brown alga *Carpophyllum maschalocarpum* as a bioindicator of heavy metal pollution of seawater. MSc Thesis (Environmental Science/Botany), University of Auckland. 114 p.

Hurd, C.L.; Nelson, W.A.; Falshaw, R.; Neill, K. (2004). History, current status and future of marine macroalgae research in New Zealand: taxonomy, ecology, physiology and human uses. *Phycological Research 52*: 80–106.

Neale, D.; Nelson, W.A. (1998). Marine algae of the West Coast, South Island, New Zealand. *Tuhinga 10*: 87–118.

Nelson, W.A.; Villouta, E.; Neill, K.; Williams, G.C.; Adams, N.M.; Slivsgaard, R. (2002). Marine macroalgae of Fiordland. *Tuhinga 13*: 117–152.

Schiel, D.R. (1985). Growth, survival and reproduction of two species of marine algae at different densities in natural stands. *Journal of Ecology 73*: 199–217.

Schiel, D.R. (1988). Algal interactions on shallow subtidal reefs in northern New Zealand: a review. *New Zealand Journal of Marine and Freshwater Research 22*: 481–489.

Schiel, D.R.; Choat, J.H. (1980). Effects of density on monospecific stands of marine algae. *Nature 285*: 324–326.