

Worlds apart? Connectivity between marine predator communities

MR Heupel¹, CA Simpfendorfer², A Tobin², M Cappo¹, M Espinoza²

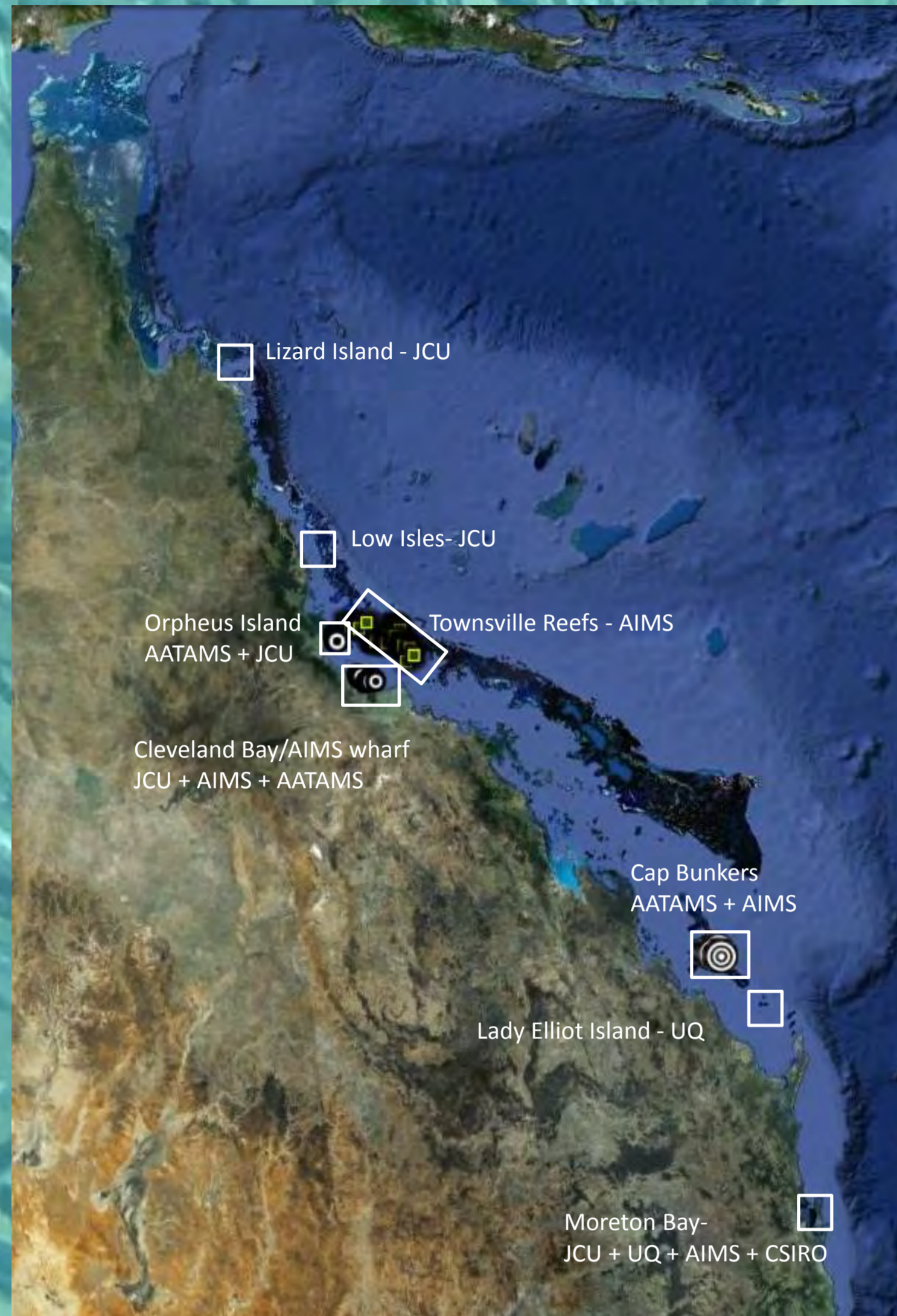
¹Australian Institute of Marine Science

²James Cook University

Many coastal, and especially reef based species are considered to be highly site attached with limited movement from home locations. This is also true for predatory marine fish, including sharks, despite research to indicate the potentially broad movements of some species. Here we consider the connectivity of several marine predators and the efficacy of acoustic telemetry systems in monitoring the presence and movements of these individuals.

Aims

1. Examine acoustic monitoring data to define the residency and presence patterns of marine predators
2. Consider the efficacy of widely spaced acoustic receivers in defining connectivity between habitats and regions



Map indicating the location of acoustic receiver arrays along the coast of Qld. Arrays range from inshore (Cleveland Bay, Moreton Bay) to mid-shelf and offshore reefs.

Reef shark connectivity



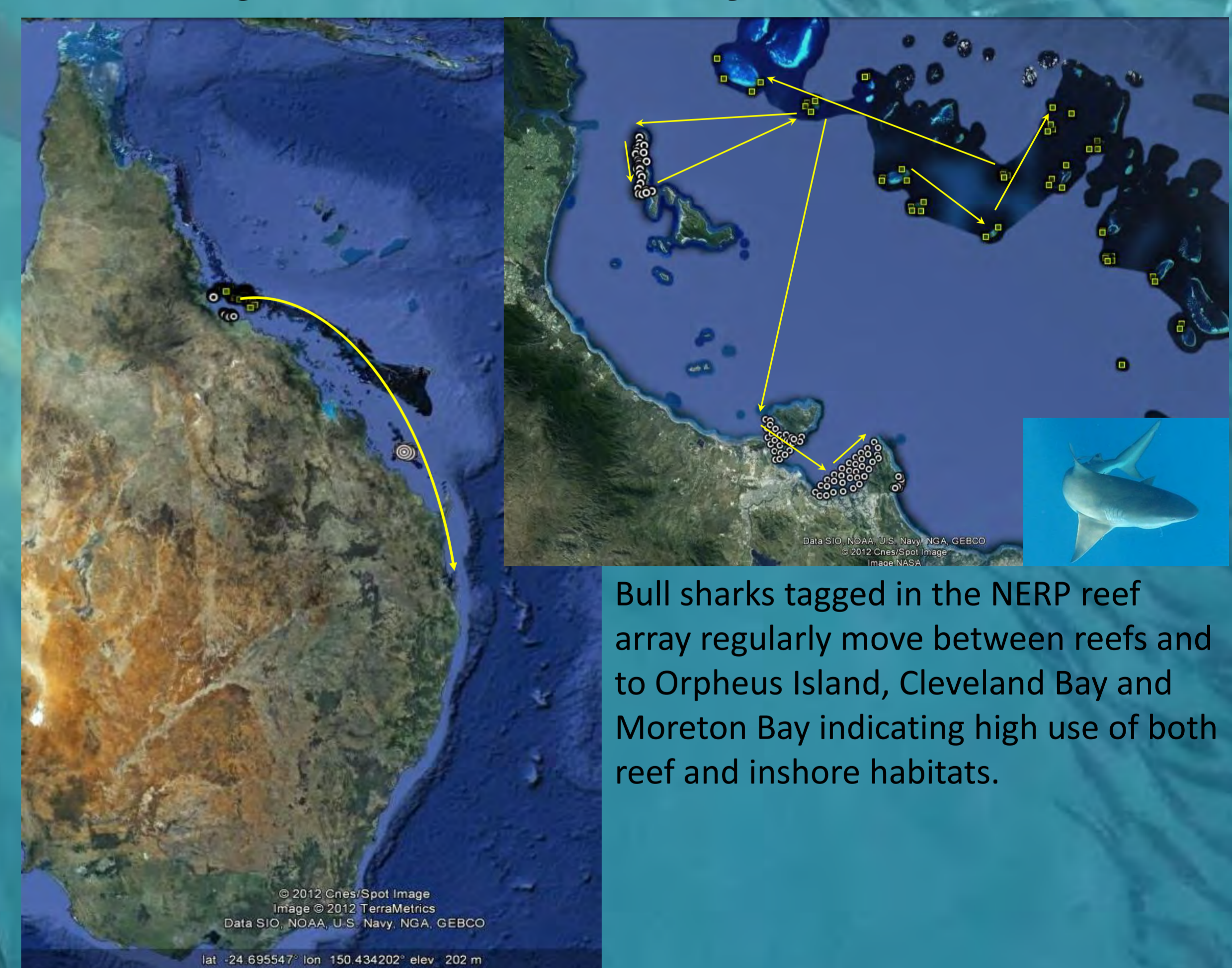
Map indicating the movement of blacktip reef sharks released near Magnetic Island (white arrows) and an individual released at Orpheus Island (orange arrows). Individuals were detected moving between study sites including detection on multiple reefs in the NERP acoustic array over several months.

Inshore-offshore connectivity



Mangrove jack released at the AIMS wharf made synchronous offshore movements as they shifted from inshore habitat use to reef residence.

Non-reef shark connectivity



Bull sharks tagged in the NERP reef array regularly move between reefs and to Orpheus Island, Cleveland Bay and Moreton Bay indicating high use of both reef and inshore habitats.

Broader connectivity



Data from the east coast of Australia have revealed broad scale movement by multiple species including:

- Manta rays moving 100 km from Lady Elliot Island to Heron Island
- Juvenile white sharks moving 1500 km from Port Stephens to Heron Island
- Bull sharks moving 2200 km from Sydney Harbour to the Townsville reefs, and later returning to Sydney Harbour

Conclusions

- Acoustic arrays can be useful in defining both reef-scale and broader scale movement of marine predators
- Despite assumptions that reef sharks are site attached, permanent residents of reef systems, intra-reef movement is not uncommon
- Long-term maintenance of acoustic monitoring systems has the potential to reveal complex and unknown movement patterns and habitat linkages

Pathway to impact

- Strong linkages exist between inshore/offshore systems, but alongshore linkages are also present and of high importance given cross-jurisdictional implications of movements
- These data will be increasingly informative and valuable to stakeholders such as GBRMPA, QDAFF, NSW Fisheries, AFMA and SEWPaC in implementing management and conservation plans for marine predators
- Given the extensive movements already observed, individual reef-scale marine protected areas provide limited shelter to mobile predators