

Ecography

ECOG-01450

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Supplementary material

Appendix 1

Table A1. Summary of allowed uses in zones, defined by IUCN categories (Roman numerals) and sub-categories (letters), of the Coral Sea Commonwealth Marine Reserve. Activities not allowed are marked 'x' in shaded cells. Only activities that have differing management between the zones are shown. A full list of activities managed within the zones can be found in the Coral Sea Commonwealth Marine Reserve Management Plan 2014-24 (<http://www.comlaw.gov.au/Details/F2013L00425>).

| Activity | Marine National Park Zone (IUCN II) | Conservation Park Zone (IUCN IV; IVa) | Habitat Protection Zone (Coral Sea) (IUCN IV; IVb) | Habitat Protection Zone (Seamounts) (IUCN IV; IVc) | Multiple Use Zone (IUCN VI; VIa) | General Use Zone (IUCN VI; VIb) |
|--|-------------------------------------|---------------------------------------|--|--|----------------------------------|---------------------------------|
| Commercial fishing (except as indicated below) | x | | | | | |
| Handline / rod and reel | x | | | | | |
| Minor line / poling | x | x | | | | |
| Dropline | x | x | | | | |
| Dive and hand collection | x | | | | | |
| Crab and fish trap/pot | x | x | | x | | |
| Purse seine | x | x | x | | | |
| Pelagic longline | x | x | x | | | |
| Demersal trawl | x | x | x | x | x | |
| Commercial tourism-fishing related activities | x | | | | | |
| Recreational use - fishing | x | | | | | |

Appendix 2 Preparation of study area for analysis

Table A2. Exclusion of pixels from study area.

| | Number of pixels excluded | Number of pixels remaining in analysis |
|---|---------------------------|--|
| Marine section of study area | 0 | 48,953 |
| Great Barrier Reef Marine Park | 4253 | 44,700 |
| Torres Strait Protected Zone Joint Authority | 323 | 44,377 |
| 30 nm buffer around land | 5278 | 39,099 |
| Gulf of Papua | 312 | 38,787 |
| Pixels missing values in 6 or more images within the same month | 234 | 38,553 |

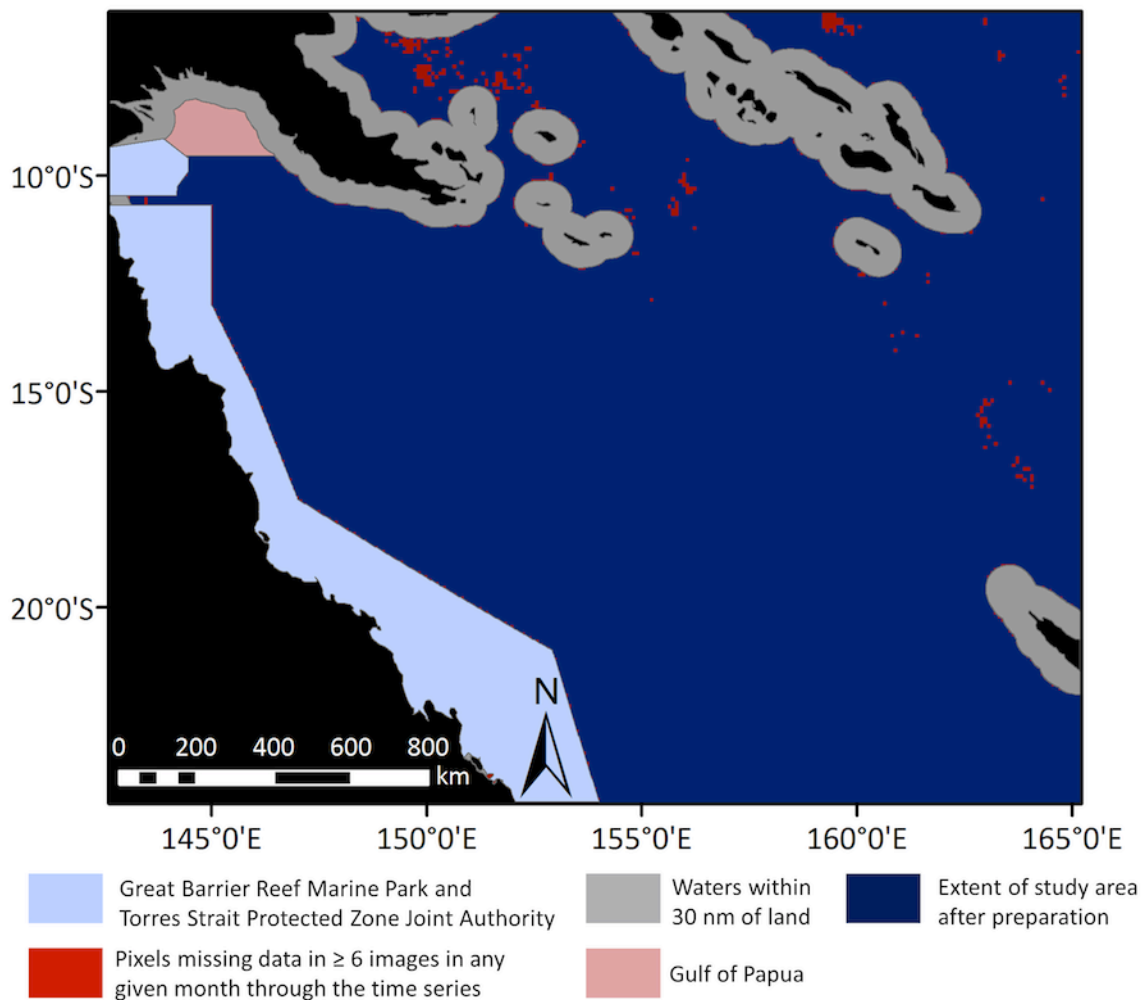


Figure A1. Preparing the study area for analyses. Map shows the final extent of the study area (dark blue) after the removal of near-shore pixels, and pixels with significant missing data. Pixels within the Great Barrier Reef Marine Park and the Torres Strait Protected Zone Joint Authority were not considered in this study. Table 2 lists numbers of removed pixels in each group.

Appendix 3

Table A3. Publications containing information on species distributions within the Coral Sea.

| Publication | Study species | Data type | Data source | Length of dataset |
|----------------------------|---------------------------------------|------------------|-------------------------------|--------------------------|
| Allain et al. 2008 | Bigeye tuna | Primary | Archival tag | 47 - 1441 days |
| Bannister et al. 1996 | Multiple cetaceans | Secondary | Synopsis of current knowledge | N/A |
| Benson et al. 2011 | Leatherback turtle | Primary | Telemetry | 4 - 946 days |
| Block et al. 2011 | Multiple apex predators | Primary | Multiple tag types | 2000 - 2009 |
| Borsa et al. 2012 | Bottlenose dolphin | Primary | Opportunistic observation | 1993 - 2009 |
| Campbell 2011 | Multiple tuna species | Secondary | Synopsis of current knowledge | N/A |
| Campbell and Hobday 2003 | Broadbill swordfish | Primary | Fishery | 1996 - 2001 |
| Campbell et al. 2008 | Broadbill swordfish | Primary | Fishery | 1985 - 2007 |
| Cato et al. 2010 | Multiple whale species | Primary | Passive acoustic survey | 6 weeks |
| Domeier and Speare 2012 | Black marlin | Primary | Pop-up satellite archival tag | 0 - 211 days |
| Evans 2010 | Broadbill swordfish | Primary | Pop-up satellite archival tag | 2 - 364 days |
| Evans et al. 2011 | Yellowfin tuna | Primary | Pop-up satellite archival tag | 2 - 168 days |
| Flynn and Paxton 2012 | Lanternfish and multiple tuna species | Primary | Biological sampling | December 2010 |
| Fowler et al. 2008 | Multiple tuna species | Primary | Biological sampling | 12 days |
| Garrigue et al. 2010 | Humpback whale | Primary | ARGOS satellite tag | 1 - 52 days |
| Hanamoto 1977a | Striped marlin | Primary | Fishery | 1966 - 1970 |
| Hanamoto 1977b | Striped marlin | Primary | Fishery | 1966 - 1975 |
| Hanamoto 1978 | Striped marlin | Primary | Fishery | 1972 - 1975 |
| Harley et al. 2011 | Multiple tuna species | Primary | Fishery | 38+ years |
| Harvey et al. 2005 | Green turtle | Secondary | Monitoring | 9 nesting seasons |
| Hoyle and Langley 2007 | Yellowfin tuna | Primary | Fishery | 1960 - 1986 |
| Kirby et al. 2009 | Multiple Procellariiform seabirds | Primary | Fishery | 2002 - 2007 |
| Lawson 2011 | Multiple shark species | Primary | Fishery | 1991 - 2011 |
| Leis et al. 1987 | Multiple billfish species | Primary | Biological sampling | 1980 - 1985 |
| McPherson 1988 | Lanternfish and multiple tuna species | Primary | Biological sampling | 2 months |
| Miller et al. 2001 | Green and Hawksbill turtles | Primary | Monitoring | 7 years |
| Morato et al. 2010 | Pelagic biodiversity | Primary | Fishery | 1980 - 2007 |
| Nishikawa et al. 1985 | Pelagic biodiversity | Primary | Fishery | 1956 - 1981 |
| Oremus and Garrigue 2013 | Humpback whale | Primary | Monitoring | 11 days |
| Rock et al. 2006 | Humpback whale | Combination | Opportunistic observation | 11+ years |
| Vang 2002 | Humpback whale | Secondary | Synopsis of current knowledge | N/A |
| Werry et al. 2010 | Tiger and bull shark | Primary | Multiple tag types | 2009 - 2010 |
| Williams and Terawasi 2012 | Multiple tuna and billfish species | Primary | Fishery | 2005 - 2011 |
| Worm et al. 2003 | Multiple predatory species | Primary | Fishery | 1991 - 2000 |
| Young et al. 2006 | Broadbill swordfish | Primary | Biological sampling | 1997 - 2005 |

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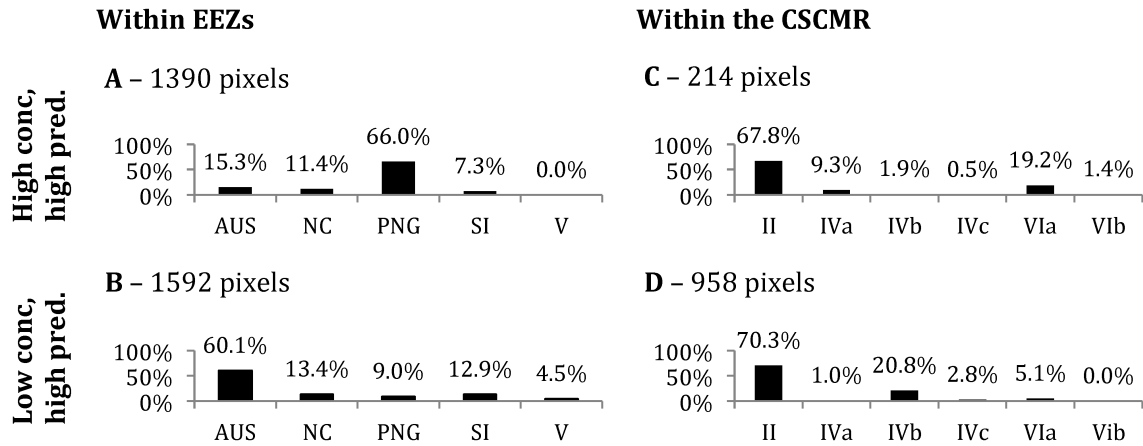


Figure A2. Distribution of distinct parts of regime 2 between different management boundaries. A. Percentages of the total extent of persistent high-concentration, high-predictability pixels and B. persistent low-concentration, high-predictability pixels within each of the five EEZs: Australia (AUS), New Caledonia (NC), Papua New Guinea (PNG), Solomon Islands (SI), and Vanuatu (V). C. Percentages of the extent in Australia’s Coral Sea Commonwealth Marine Reserve of persistent high-concentration, high-predictability pixels and D. Persistent low-concentration, high-predictability pixels within each of the Reserve’s IUCN zones.