Citation

1. Dataset title

Benthic cover and fish density on fringing reefs of inshore island groups of the GBR, 1999 – 2014 (NERP 8.2, JCU)

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Dataset documentation

3. Summary of what this dataset describes and where it is relevant?

This dataset consists of site and zone means of the percent cover of major benthic categories and the density of fish functional groups on fringing coral reefs of the Keppel, Whitsunday and Palm Island groups, as a result of monitoring surveys carried out between 1999 and 2014.

4. Background information, purpose and lineage

This data extract summarises the results of a long-term monitoring project that assesses the effects of no-take marine reserve zoning in the Great Barrier Reef Marine Park.

Spatial zoning for multiple-use is the cornerstone of management for the Great Barrier Reef Marine Park (GBRMP). Multiple-use zoning was first implemented widely in the GBRMP in the late 1980's and this original zoning plan was in place until 2004, when the marine park was completely rezoned under the Representative Areas Program (RAP). The overall proportion of the marine park area assigned into NTRs was increased from around 5% (~ 25% of the coral reefs) to 33.4%. The need to objectively assess the ecological consequences of zoning management has attracted an increasing amount of research effort in recent years. Critical knowledge gaps still remain however, and research is required to determine how and to what extent NTR networks may help to protect biodiversity, sustain stocks of fished species and increase ecosystem resilience.

This project was established in 1999 and expanded in 2004, with the primary objective of providing a robust assessment of the ecological effects of multiple-use zoning on inshore coral reefs of the GBRMP. The project uses underwater visual census (UVC) to provide a spatially and temporally replicated assessment of fish and benthic communities and will include concurrent surveys of coral health within no-take (Green) and fished (Blue) zones on high-use inshore reefs. It is one of the few long-term monitoring projects specifically assessing the effects of zoning management within the GBRMP and the only one with a solid baseline data set that was established prior to the implementation of the 2004 zoning management plan.

5. Methods

Underwater visual census (UVC) was used to survey reef fish and benthic communities on fringing coral reefs of the Palm, Magnetic, Whitsunday and Keppel Island groups. Within each island group, sites are evenly distributed between zones that have remained open to fishing (General Use and Conservation Park zones), NTRs that were closed to fishing in 1987, and NTRs that were established in 2004 (Marine National Park zones) (Figure 1).

Within each site UVC surveys were conducted using 5 replicate transects (50m x 6m, 300m^2 survey area). Transects were deployed on the reef slope between approximately 4 and 12 metres depth. Using SCUBA, two observers recorded approximately 190 species of fish from 15 Families (Acanthuridae, Balistidae, Chaetodontidae, Haemulidae, Labridae, Lethrinidae, Lutjanidae, Mullidae, Nemipteridae, Pomacanthidae, Pomacentridae, Scaridae, Serranidae, Siganidae and Zanclidae). A third diver (observer 3) swam directly behind observers one and two, deploying the transect tapes. This UVC technique reduces diver avoidance or attraction behaviour of the surveyed fish species. To increase accuracy of the fish counts, the species list was divided between the two fish observers. Observer one surveyed the fish families Haemulidae, Lethrinidae, Lutjanidae, Mullidae, Nemipteridae, Serranidae and the larger species of Labridae targeted by fishers. Observer two surveyed the families Acanthuridae, Balistidae, Chaetodontidae, Pomacanthidae, Pomacentridae, Scaridae, Siganidae, Zanclidae and small 'non-targeted' species of Labridae. Pomacentrids and small labrids were recorded by observer two during return transect swims within a 2m band (1m either side of the tape, 100m^2 survey area).

Broad-scale structural complexity of the reef habitat was estimated by observer one using a simple method that applied a rank (1-5) to both the angle of the reef slope and the rugosity for each ten-metre section of each transect. Observer three utilised a line intercept survey method to record a benthic point sample every metre along each transect tape (50 samples per transect).Benthos sampled in the benthic survey was live and dead hard coral within morphological categories (branching, plate, solitary, tabular, massive, foliose, encrusting) live soft coral, sponges, clams (*Tridacna* spp.), other invertebrates (such as ascidians and anemones), macro-algae, coral reef pavement, rock, rubble and sand.

Limitations of the data

Not all island groups could be surveyed in each year, usually due to funding limitations and unpredictable weather events.

6. Format of the data

The data are contained within two worksheets of an Excel file (215kb). All benthic data is in % cover, and fish data are in density (individuals per 1000m^2). The first worksheet shows the data averaged for each site, and the second worksheet has average values for each zone (Fished, NTR 1987 and NTR 2004).

Names in rounded brackets () are the matching names in the shapefile. This was done to meet the 10 character limitation of this format.

- SE - Standard Error
- mean - Mean over the transects at a site.
- Total Fish Densit_mean (TFishDenMn)
- Total Fish Densit_SE (TFishDenSE)
- Fish Species richness_mean (FishRichMn)
- Fish Species richness_SE (FishRichSE)

- Fishery Target Spp_mean (FishTargMn) - Pooled group of fish species designated as 'Primary target' in the species list file.

- Fishery Target Spp_SE (FishTargSE)

- Grazers_mean (GrazersMn) - Pooled group of fish species listed as ‘grazers’ in the species list

- Grazers_SE (GrazersSE)

- Corallivores_mean (CorallivMn)

- Coraliivores_SE (CorallivSE)

- Planktivores_mean (PlanktivMn)

- Planktivores_SE (PlanktivSE)

- Territorial Pomacentrids_mean (TerrPomaMn)

- Territorial Pomacentrids_SE (TerrPomaSE)

- Plectropomus spp_mean (PlectSppMn)

- Plectropomus spp_SE (PlectSppSE)

- SCI_mean - Structural complexity Index.. An index (1-25) calculated by multiplying our visual estimates of reef slope angle (1-5) by reef slope rugosity (Complexity 1-5). These values are estimated for each 10m section of each 50m transect. 5 transects per site = 25 SCI estimates per site. The e-atlas data we have provided is site means… i.e.. the mean of those 25 values.

- LCC - Live coral cover (percent cover), live hard and soft coral pooled.

- LHC - Live hard coral cover (%), live hard coral only.

- MAC - Macro Algae Cover % (fleshy algas only, does not include turf algae)

- Fish Line_SUM - is the pooled number of lines recorded on the 5 transects surveyed at each site. = total number of lines/1500m2.

- Line Accumulation Rate - number of lines accumulated per month.

7. References

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8. Declaration

I certify that I am the owner or creator of the submitted dataset and understand that the submitted dataset will be released publically under a creative commons attribution 3.0 Australian license (contingent on restrictions applied in Question 10).

Example:

Project: NERP TE Project 3.4 - Monitoring of key vertebrate species

Submitted: David Westcott, Date: 28/01/2013

Project:	NERP TE Project 8.2 – Assessing the ecological effects of zoning management on inshore reefs of the Great Barrier Reef Marine Park.		
Submitted by:	David H. Williamson	Date:	19/11/2014

Advanced options: Hosting, Publication and Licensing

This section contains questions that most projects do not need to consider. Please complete these if relevant.

9. Dataset hosting *(optional)*

Most projects can skip this question as there data will be made publically available via the e-Atlas.

Some projects already have existing institutional dataset repository, where the dataset already has an existing established database or where the datasets are very large (>100 GB). These datasets should be hosted in an enduring institutional data repository that provides public access to the data. If this is not possible then an extract of the data covering at least the period covered by NERP TE funding (June 2011 - Dec 2014) should be provided to the e-Atlas for public availability. If the dataset is too large to be made publically available then a set of summary datasets should be developed to act as a preview for the full dataset.

These projects still need to supply details of these dataset so that the e-Atlas is aware of all NERP TE datasets.

Is this dataset already hosted in an institutional repository?		No
If yes:	What is the name of the repository and a URL to where the data is available from?	
	Has a preview dataset or extract been supplied to the e-Atlas?	

10. Restrictions on raw data *(optional)*

Describe any restrictions on the supply of the raw data. Are there any privacy reasons or sensitive environmental reasons why the original raw data cannot be published? Is the dataset very complex where there is a good chance of misinterpretation of the data? If so please describe the reason for the restriction. In these cases a public form of the data should be developed and made available, such as a spatial summary of the data, or a rounding of the spatial coordinates (introduced error) to protect the exact location of sites. This description should make it clear what aggregation or protection measure has been added to the public form of the data.

If the dataset cannot be made available for download, but can be made available as a visualisation then outline under what conditions the data will be available and what steps should be taken should someone wish to obtain the data.

None

11. Delayed data publication *(optional)*

Is this dataset currently under an embargo due to a pending publication as part of a journal article? If so please indicate when this dataset can be made public. Embargoed datasets will have their metadata published as soon as they are ready but access to the data will be restricted until the embargo date. The embargo can only be active for up to 12 months. Under the NERP TE data management guidelines all datasets must be made publically available, ideally prior to Dec 2014.

Is there a reason for delayed publication of this dataset?	No
If so why and what date can it be published?	

12. Additional licensing information *(optional)*

Data submitted to the e-Atlas is made available publically under a creative commons open access license. This allows others to freely use the data and create derivative works, but they must attribute the original data source.

If this dataset has been created from other datasets that need additional attribution to be included in the data documentation then please provide that here.

Example:

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> *You must also include meta-data with the product(s) and include as a minimum the metadata provided with this supplied data.*

None