

Summary for Blue Groper Tagging Project – Bronte Coogee Aquatic Reserve 2009-2011

Introduction

Marine Protected Areas (MPAs) include “any area of intertidal or sub tidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment”.

Aquatic Reserves are one type of MPA, and although usually smaller in size compared to MPAs are established in order to protect biodiversity and representative samples of marine biodiversity and their habitats. In addition, they have a significant role in not only protecting vital habitat and fish nursery areas and their associated threatened and vulnerable species, aquatic reserves also provide valuable research and educational roles.

Currently, NSW has 6 marine protected areas covering a total of 345,000 hectares and 12 aquatic reserves declared under the Fisheries Management Act 1994, covering a total of 1,930 hectares.

Following community concerns about local populations of eastern blue groper – *Achoerodus viridus*, the Blue Groper Tagging Project within Bronte-Coogee Aquatic Reserve (BCAR) was developed in conjunction with Macquarie University, Office of Environment and Heritage (formerly DECCW), Waverley and Randwick Council and supporting marine academic institutions. This research looked at the efficacy of the current state of the BCAR in supporting populations of blue groper within the reserve.

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Figure 1: Bronte-Coogee Aquatic Reserve (BCAR)

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Aims

The development of the tagging project aimed to determine the residency times, habitat use and site fidelity of the tagged blue groper and looked to ascertain the movements of the tagged groper in and out of area within and adjacent to the reserve.

The Blue Groper tagging project began in 2009 and concluded in 2011. The research involved tagging a total of 29 blue groper in which:

- 15 were tagged within the reserve and within the sanctuary zone of BCAR
- 7 were tagged within the reserve but outside of the sanctuary zone
- 5 were tagged completely outside of the BCAR reserve and within the area of Wedding Cake Island.
- 2 tagged at Lurline Bay, south of Coogee beach

Methods

In order to track their movements passive acoustic telemetry technology was used. This involved catching and internally tagging the 29 blue groper (Figure 2) with V13 tags which were 45mm in length and weighed 6g in water (Figure 3a). Once tagged and released (Figure 3b), acoustic receivers were deployed on the seabed with some located within the reserve and others located external to the reserve boundaries (Figure 4). When a blue groper with a V13 tag came within ~200 metres of these acoustic receivers, a signal was recorded containing unique identification code, time and date for that specific tag and therefore specific blue groper.

Tagging occurred between June and August 2009 and 8 males (blue), 9 females (brown/red) and 5 transitional groper (from female to male) were tagged within the boundaries of the BCAR.



Figure 2: PhD researcher Kate Lee tagging a blue groper.

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Figure 3a: Internal V13tag.



Figure 3b: Releasing tagged gropers.



Figure 4: Acoustic receivers deployed on the seabed.

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Summary of Results:

Residency times:

Tagged groper were recorded as 'present' within the study area when the acoustic receivers picked up on signals from the individual V13 tags 2 or more times per day. Analysis showed:

- 3 tagged groper with short detections periods
- Excluding these 3 individuals, tagged groper were 'present' for an average of 97% of the two year study period.
- The total number of signals detected by the acoustic receivers was approximately 448,000 over the study period.

Site Fidelity:

Results showed strong site fidelity levels from the tagged groper. Groper tagged within the reserve were never detected out side the reserve boundaries and those tagged external to the reserve were not detected within the reserve boundaries. Groper detected within the reserve also showed lengthy residency times.

Habitat Use:

Tagged groper showed a dominant preference for rocky reef habitats with both male and females preferring this habitat over combined reef and sand habitats or sand only habitats. Groper showed to avoid sandy habitats and therefore, sandy habitats can act as a barrier for the movement of blue groper populations between rocky reefs.

Home Range:

- Home range is defined as the area an animal uses in its normal activities such as searching for food. In this study, home range is the area to which you have a 95% chance of relocating the animal and the core-range the area in which you have a 50% chance of relocating the animal.
- During the study period, male groper showed to have a larger home-range (i.e. 'territory') than females or transitional groper in general.
- During the breeding season, female groper increased their home-range in order to breed, and decreased their core-range.
- During the breeding season, male groper decreased their home-range, but increased their core-range.
- Groper tagged within the Gordon's Bay area (which has complete protection status including prohibited line fishing for groper) showed no significant differences in their home range compared to those tagged within the waters adjacent to Waverley Cemetery (outside the BCARs sanctuary zone).

Activity Patterns

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Results showed tagged groper to be more active during the hours from 04.00am to about 08.00am, evident through a distinct peak in detections by the acoustic receivers. Movement and activity by the tagged groper displayed a slight decrease during the middle of the day; however increased again from the late afternoon through to about 08.00pm.

Study Conclusions:

Overall, research showed that the tagged groper displayed strong site fidelity with little movement to and from adjacent rocky reefs. Migration of groper to other areas was prevalent in juveniles, with a clear decrease in migration once sexually maturity was reached.

The tagged groper tended to have long residency times once reaching sexual maturity and thereby establishing both their core and home ranges which, in addition, showed to be limited – substantiating findings of minimal migration to other rocky reefs.

Activity was highest throughout early daylight hours and late afternoon, early evening which coincides with their daily feeding patterns. The tagged groper showed a preference for rocky reef habitats and displayed avoidance towards sandy habitats resulting in this type of habitat acting as a natural barrier for the migration of groper populations.

Although small in size, the study has shown that the current boundaries of the Bronte-Coogee Aquatic Reserve have shown to be effective in providing protection and habitat for the local blue groper populations.

Future Directions for the Blue Groper Project:

Following the conclusion of this two-year tagging project, there is potential for ongoing monitoring and further tagging research by Macquarie University for the development of a Bronte-Coogee Aquatic Reserve Management Plan by Office of Environment and Heritage (OEH).

A technical paper authored by PhD student Kate Lee with Macquarie University will be released later this year which will provide more technical data and results from this vital research. Waverley Council will continue to liaise with Macquarie University and ensure that the aforementioned technical paper will be made available to the community once finalised. Council aims to report on any future movements or progression on the Blue Groper Project in order to keep the Waverley community informed and will actively seek community advice and support for all coastal management issues and concerns.

For any enquiries on the Blue Groper Project, please contact New South Wales Department of Primary Industries on [1300 550 474](tel:1300550474).