DIET AND FEEDING BIOLOGY OF ADULT OLIVE RIDLEY (*LEPIDOCHELYS OLIVACEA*) AND LOGGERHEAD (*CARETTA CARETTA*) SEA TURTLES IN FOG BAY, NORTHERN TERRITORY, AUSTRALIA.

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Abstract:

A shark-fin fishery by-catch incident in Fog Bay, Northern Territory killed more than 300 sea turtles of four species over a couple of weeks in 1991. Collecting and macerating approximately 100 beach-washed carcasses resulted in recovering and identifying the stomach contents of 36 Olive Ridley and 3 Loggerhead sea turtles. The gastropods, *Turritella terebra* and *Nassarius crematus*, dominated the stomach contents. Both species of sea turtle selected *T. terebra* as the target species with almost complete niche overlap. A benthic survey of Fog Bay established likely feeding zones based on similarities between dietary and field data. Further support for identifying the feeding locations came from a model comparing the reconstructed crushed shells of *T. terebra* from the stomachs with length-frequency and biomass data for this species from field sites. Speculation of metabolism and feeding dynamics for these species are provided. A model based on energy requirements from the literature, reconstructed stomach contents, and gastropod biomass from field data, suggested the average Olive Ridley digestive tract contained 166.2 Kcal. and that of the average Loggerhead contained 201.1 Kcal with a turnover rate of 1.5 and 1.8 days respectively. Based on this model, a volume of 2.6 m^3 of feeding ground would be needed for each individual to get their daily calorific requirements.

Introduction

Both adult Olive Ridley (*Lepidochelys olivacea*) and Loggerhead (*Caretta caretta*) sea turtles feed on mollusks and crustaceans (Marquez 1990). The foraging areas of both species are poorly known in tropical Australia. Reported diets of Olive Ridley suggest a single species specialist to that of an extremely varied omnivorous generalist (Marquez 1990). Adult Loggerheads are primarily benthic carnivores (Moodie 1979, Marquez 1990). Study specimens comprised the stomach contents of 36 Olive Ridley, 3 Loggerhead and one Flatback Sea Turtle (*Natator depressus*) retrieved from a collection of 70 sea turtles washed ashore after a fishing mishap that killed approximately 300 sea turtles in 1991 in Fog Bay, Northern Territory (Guinea and Chatto 1992).

The aims of this study were to:

- Identify stomach contents of the dead sea turtles,
- Investigate species diversity and abundance of prey items,
- Examine niche overlap between Olive Ridley and Loggerhead sea turtles in Fog Bay,
- Identify likely feeding grounds in Fog Bay,
- Compare the relative biomass of living and dead molluscs from the feeding grounds.

Methods

Dead turtles were retrieved from 60 km of coastline, identified, measured (CCL), placed in individual plastic bags, transported to a field site, placed on their backs and allowed to decompose for six months. Remains were water macerated and bones and stomach contents sorted over a 1 mm mesh sieve. Stomach contents were collected by hand and stored in individually numbered plastic bags for identification.

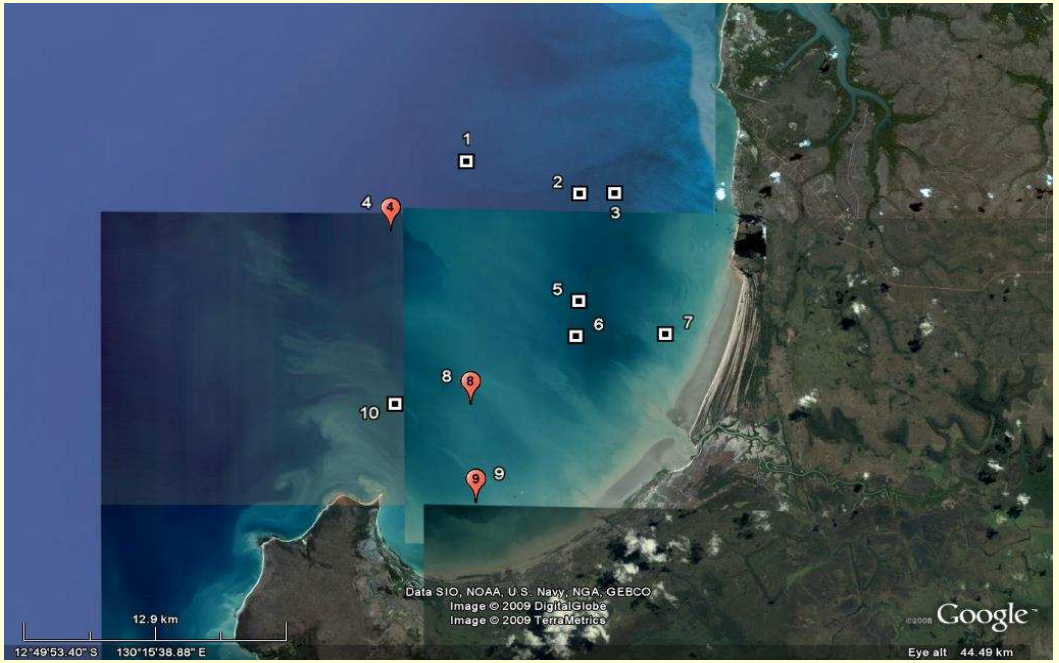
Proportional prey abundance and Simpson's Index of Diversity were calculated. Benthic samples were collected by a Veen grab (0.2m3) from 10 random sites in Fog Bay in water depths of 4 - 14 m. Sorting and analysis of the infaunal molluscs followed that used with the sea turtle stomach contents. Living and dead molluscs were identified.

Results

Species	CCL (cm) Mean ± SD (n)	Prey Species Abundance	Simpson's Index of Diversity Hmax
Olive Ridley	66.0 ± 4.9 (31)	*Turritella terebra* (58.3%) *Nassarius crematus* (16.8%)	0.8 – 1.0
Loggerhead	82.5 ± 7.8 (3)	*Turritella terebra* (74.0%) *Nassarius crematus* (12.5%)	0.8 – 0.9
Flatback	70.0 (1)	Absent (only beach sand present)	_

Near complete overlap between Olive Ridley and Loggerhead sea turtles in Fog Bay (Marisita's Similarity Index = 0.97, Pianka's Symmetrical Index = 0.99, Horn's Similarity Index = 0.96). The density of *Turritella terebra* varied in Fog Bay with three localities having high densities.

Locality	*Turritella terebra* density (m^{-3})
4	1467
8	3550
9	1460



Discussion

The principle prey species utilized by Olive Ridley and Loggerhead sea turtles at Fog Bay were the herbivorous meso-gastropod *Turritella terebra* and the scavenger *Nassarius crematus*. Both species of sea turtles were selective in their diets.

This may have been as a result of flushing unwanted material out of the mouth and crushing the remaining shells before swallowing. The sizes of the shell fragments were smaller in the stomachs from Loggerhead turtles. The stomachs of Olive Ridley turtles contained larger fragments indicating less pulverising or weaker jaw strength in this species. There was a high degree of niche overlap between Olive Ridley and Loggerhead sea turtles in Fog Bay. Three localities in Fog Bay were identified as likely feeding areas because of the abundance of *Turritella terebra* in the benthic samples.

A model based on energy requirements from the literature (Moodie 1979), reconstructed stomach contents, and gastropod biomass from field data, suggested the average Olive Ridley digestive tract contained 166.2 Kcal. and that of the average Loggerhead contained 201.1 Kcal with a turnover rate of 1.5 and 1.8 days respectively. Based on this model, a volume of 2.6 m^3 of feeding ground would be needed for each individual to get their daily calorific requirements. This study shows that identifying feeding grounds from stomach contents is a task comprising multiple steps and repeated validations of assumptions.

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