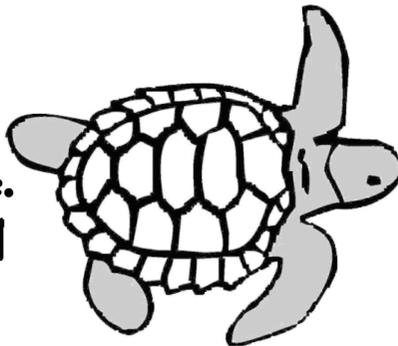


BLOOD CHEMISTRY OF NESTING FLATBACK TURTLES (*NATATOR DEPRESSUS*): BASELINE RESULTS PRIOR TO OFFSHORE OIL AND GAS DEVELOPMENT

Michael L. Guinea, Nirmala W. Nath, Dean J. Wright, Andrew M. Raith

AusTurtle
Inc.
SEA TURTLE RESEARCH
AND CONSERVATION



**PO Box 34u
Charles Darwin University 0815
Northern Territory
Australia
austurtle@austurtle.org.au**

**School of Environment
Research Institute for the Environment
and Livelihoods
Darwin 0909
Northern Territory
Australia
michael.guinea@cdu.edu.au**

Introduction

Flatback Sea Turtles, *Natator depressus*, forage for molluscs and other invertebrates over the continental shelf of northern Australia. At least four discrete meta-populations use separated nesting sites on mainland and coastal islands (Fig 1). Satellite tracking suggest the meta-populations mix on the feeding grounds. The more southern populations nest during the austral summer, November to February, while the northern populations nest either in the winter months, June to August, or throughout the year. Few reports address the physiology of Flatback Sea Turtle blood and none address biochemistry.

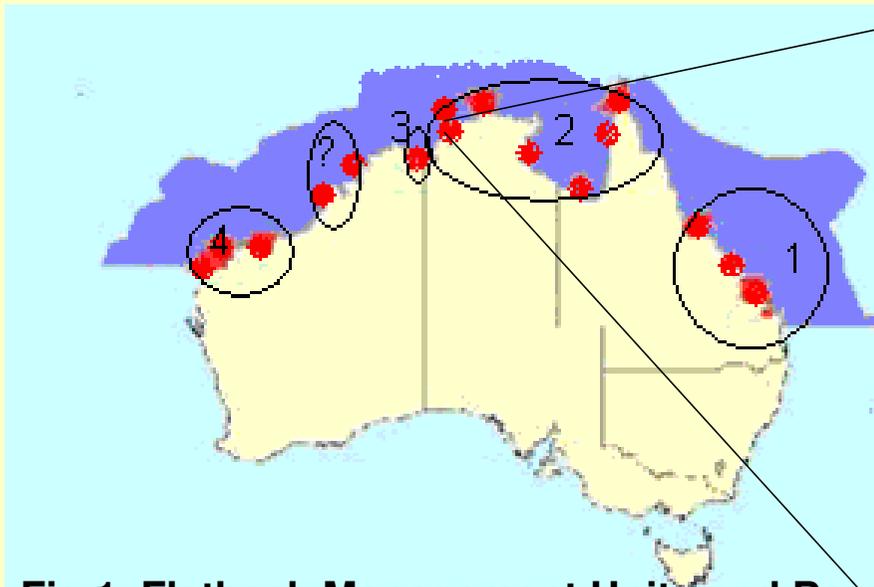
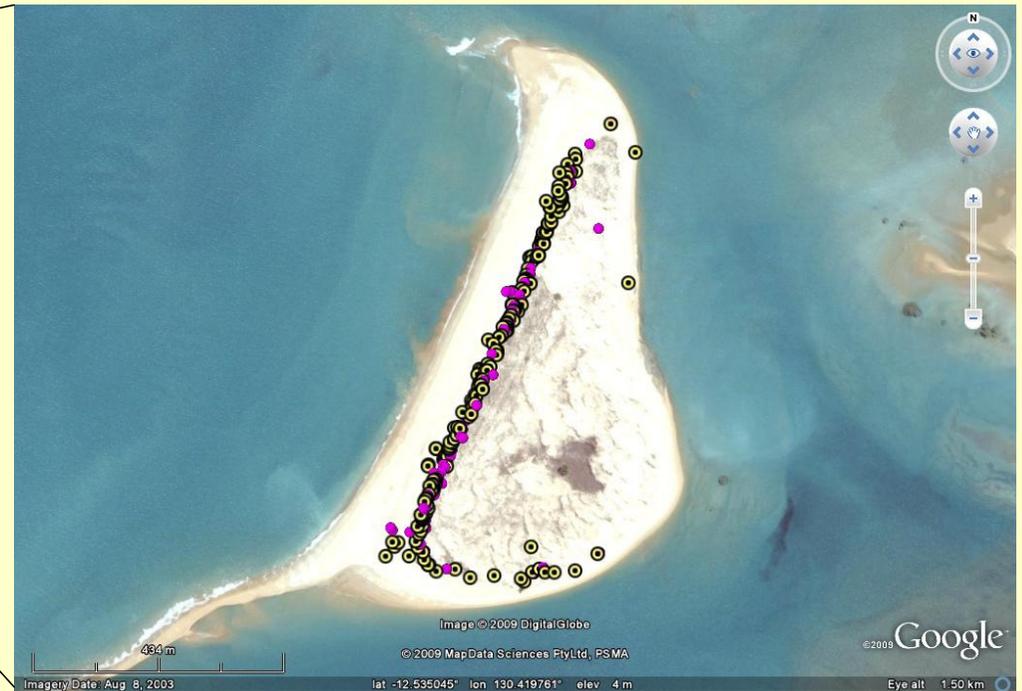


Fig 1. Flatback Management Units and Bare Sand Island locality and nests (courtesy of AusTurte Inc).



Methods

In the 2013 breeding season, blood samples were collected from the lateral cervical sinus of ten female Flatback Sea Turtles after nesting on Bare Sand Island (Fig 2). The turtles ranged in curved carapace length from 77.8 to 87.7 cm (mean = 85.0 cm; sd = 2.7).

The blood was divided into Lithium Heparin and EDTA blood tubes, chilled and transported by boat to Darwin, 50 km away.

EDTA tubes provided Packed Cell Volume within 24 hours.

Plasma from the heparinized samples was analysed for proteins, enzymes, electrolytes and other compounds.



Fig 2. Bare Sand Island Flatback female (left) and hatchling (right) (courtesy AusTurtle Inc).

Results

The results as means and standard deviations are given below:

Packed Cell Volume (0.31 ± 0.04),

Glucose (3.78 ± 0.62 mmol/L),

Total Bilirubin (17.40 ± 8.11 μ mol/L),

Liver and cardiac enzymes; Alanine Aminotransferase (31.80 ± 5.88 units/L), Aspartate Aminotransferase (124.3 ± 18.12 units/L), Alkaline Phosphatase (90.00 ± 56.76 units/L), Gamma Glutamyl Transferase (4.3 ± 1.16 units/L) and Creatine Phosphokinase (511.90 ± 504.13 units/L),

Proteins; Total Protein (44.60 ± 9.89 g/L), Albumin (18.60 ± 4.72 g/L), Globulin (25.90 ± 5.63 g/L), Albumin/Globulin ratio (0.75 ± 0.07),

Kidney function compounds; Creatinine (28.10 ± 9.55 μ mol/L), Urea (1.30 ± 0.73 mmol/L) and Uric Acid (75.18 ± 15.82 μ mol/L),

Electrolytes; Sodium (144.90 ± 2.51 mmol/L), Potassium (4.91 ± 0.33 mmol/L), Chloride (105.40 ± 2.72 mmol/L), Calcium (5.19 ± 2.56 mmol/L), Phosphorus (3.90 ± 1.37 mmol/L) and Magnesium (2.70 ± 0.21 mmol/L).

Discussion

- **These concentrations differ, in part, from published values for juvenile (Whiting et al 2007) and adult Green Sea Turtles (*Chelonia mydas*) Hamann et. al. 2006, Flint et al 2010) and Hawksbill (*Eretmochelys imbricata*) from northern Australia.**
- **This study addresses a select subset of adult Flatback Sea Turtles that have common parameters such as time of day, fasting regime, season, genetics, reproductive and body condition.**
- **Although the sample size is small, the results form the initial part of the base line survey of nesting Flatback Sea Turtles that forage widely across the northern Australian continental shelf.**
- **Trawl, net and trap fisheries have been the major maritime industries of northern Australia for more than 50 years.**
- **Within the last decade many oil and gas prospecting and production leases and licences have been issued as Australia strives to supply the World's demand for cleaner energy (Fig 3).**
- **Bare Sand Island with 20 years of nesting data has been a reference beach for trends in the annual nesting population of Flatback Sea Turtles.**
- **Blood chemistry of the nesting population now acts as a sentinel to habitat degradation and pollution (Fig 4).**

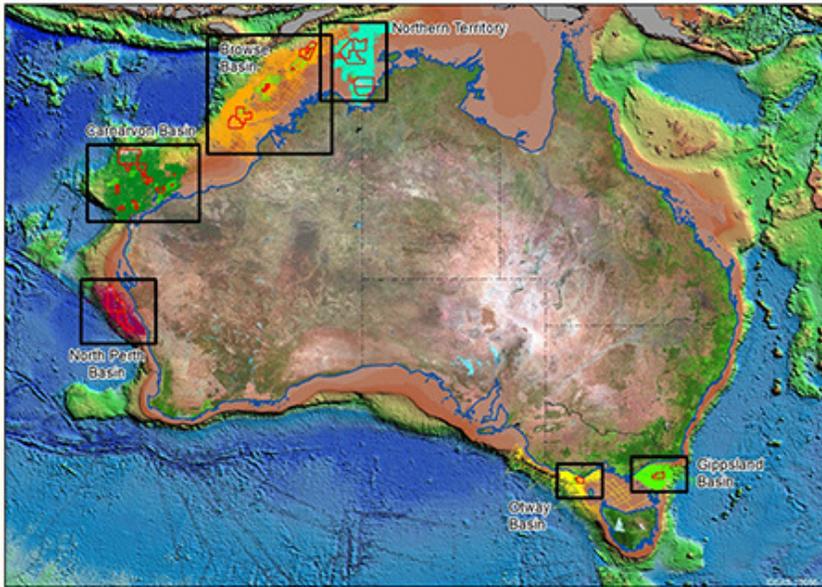


Fig 3 Map of Australia showing 2013 offshore acreage release areas and seismic coverage (<http://www.ga.gov.au/energy/projects/acreage-release-and-promotion/2013.html>)



Fig 4 Gas and vapor escaping from the Montara H1-ST1 Well (Courtesy of NOPSEMA and Asia-Pacific Applied Science Association <http://www.nopsema.gov.au/assets/images/imagegallery/Image%20A149247.jpg>)

Acknowledgement

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References

- Flint M. *et. al.* 2010 Development and application of biochemical and haematological reference intervals to identify unhealthy green sea turtles (*Chelonia mydas*). *The Veterinary Journal* 185: 299-304.
- Hamann M. *et. al.* 2006 Demographic and health parameters of green sea turtles *Chelonia mydas* foraging in the Gulf of Carpentaria, Australia. *Endang. Spec. Res.* 2:81-88.
- Whiting S.D. *et. al.* 2007 Blood chemistry reference values for two ecologically distinct populations of foraging green turtles, eastern Indian Ocean. *Comp. Clin. Pathol.* 16:109-118.
- Whiting S.D. *et. al.* 2014 Plasma biochemical and PCV ranges for healthy, wild immature hawksbill *Eretmochelys imbricata* sea turtles. *Veterinary Record* doi 10.1136/vr101396.