

Satellite tagging of female hawksbill sea turtles (*Eretmochelys imbricata*) nesting on Groote Eylandt, Northern Territory

Hawksbill turtles are classified Critically Endangered by the IUCN following intense commercial exploitation that decimated global stocks. Despite Australia supporting one of the largest breeding aggregations worldwide, hawksbill turtle biology and ecology remains poorly documented, especially for populations nesting in the Northern Territory. This study focused on the internationally significant hawksbill turtle population breeding in Groote Eylandt in the Gulf of Carpentaria, and aimed at providing high resolution information for managing this critically endangered species. By using multiple state-of-the-art analytical frameworks and combining satellite telemetry, hydrological modelling, and tag recapture data, we (i) assessed habitat utilisation during the inter-nesting and foraging periods, (ii) quantified migratory behaviour for better understanding of navigational strategies, and (iii) simulated post-hatchling dispersal patterns, which we subsequently compared to the location of adult foraging grounds.

This metadata record, represents several different datasets listed hereafter, which can all be accessed through a multi-WFS service.

CTD - Data parameters measured by the instruments include time, temperature, and depth. The data represented by this record are presented in delayed mode.

GPS - Location data parameters measured by the instruments include time, longitude, latitude, location quality, along with other diagnostic information. The Fastloc GPS data represented by this record are presented in delayed mode.

Argos - Location data parameters measured by the instruments include time, longitude, latitude, location quality, along with other diagnostic information provided by Argos (<http://www.argos-system.org/>). The Argos data represented by this record are presented in delayed mode.

Haulout - A haulout begins when the SRDL has been continuously dry for a specified length of time (usually 10 minutes). It ends when continuously wet for another interval (usually 40 seconds). Haulout data parameters measured by the instruments include haulout start and end dates and longitude/latitude, and haulout number. The haulout data represented by this record are presented in delayed mode.

Diving - Diving data parameters measured by the instruments include start and end time and longitude/latitude of each individual dive, post-dive surface duration, dive duration, maximum dive depth, intermediate dive depths and times. The diving data represented by this record are presented in delayed mode.

Summary - As well as sending records of individual events such as dives and haulouts, the SRDL also calculates summary statistics of those events over a specified time period (usually 3, 4 or 6 hours). Summary statistics computed by the instruments include the proportion of time spent diving, at the surface and hauled-out, the number of dives, and the average, standard deviation and maximum dive duration and dive depth during each summary period. These statistics are based on all the data recorded by the SRDL and so are not prone to distortion by variations in the efficiency of transmission via Argos. The summary data represented by this record are presented in delayed mode. Note that it is impossible to subset this particular dataset using a bounding box as there is no latitude, longitude coordinates associated with each entry.

Simple

Identification info

Alternate title	Satellite tracking of nesting hawksbill sea turtles
Date (Creation)	2015-10-12T00:00:00

Principal investigator

Research Institute for the Environment and Livelihoods (RIEL), Charles Darwin University (CDU) - Hoenner, Xavier (PhD Student)

Research Institute for the Environment and Livelihoods

Charles Darwin University

Darwin

Northern Territory

0909

Australia

Credit	Australian Government under the Caring for Country initiative
Credit	Anindilyakwa Land Council

Credit	Northern Territory Government – Marine Biodiversity Group, Department of Natural Resources, Environment, the Arts and Sport
Credit	Charles Darwin University (CDU)
Credit	ANZ Trustees Foundation – Holsworth Wildlife Research Endowment
Status	Completed

Point of contact

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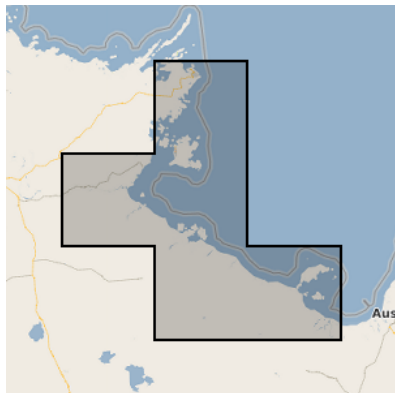
7001

Australia

Topic category

- Oceans

Extent



Temporal extent

Time position	2009-08-06
Time position	2011-03-06

Vertical element

Minimum value	0
Maximum value	70
Identifier	5712
Identifier	6499
Identifier	5711

Maintenance and update frequency	As needed
NASA/Global Change Master Directory Earth Science	<ul style="list-style-type: none"> Oceans Marine Biology Marine Reptiles
Marine Community Profile of ISO19115 v1.4 Collection	<ul style="list-style-type: none"> Tags and Tracking Devices
IMOS Keywords Thesaurus	<ul style="list-style-type: none"> Satellite Tag
AODN Geographic Extents Vocabulary	<ul style="list-style-type: none"> Marine Features (Australia) Gulf of Carpentaria, NT/QLD
AODN Geographic Extents Vocabulary	<ul style="list-style-type: none"> Countries Australia Marine Features (Australia) Groote Eylandt, NT States, Territories (Australia) Northern Territory
AODN Platform Vocabulary	<ul style="list-style-type: none"> organism
AODN Sampling Parameter Vocabulary	<ul style="list-style-type: none"> Latitude north Longitude east
AODN Discovery Parameter Vocabulary	<ul style="list-style-type: none"> Temperature of the water body Pressure (measured variable) in the water body exerted by overlying sea water and any medium above it
AODN Instrument Vocabulary	<ul style="list-style-type: none"> SMRU GPS Satellite Relay Data Logger (Argos)

Resource constraints

Linkage	https://licensebuttons.net/l/by/4.0/88x31.png License Graphic
Title	Creative Commons Attribution 4.0 International License

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Website	http://creativecommons.org/licenses/by/4.0/ License Text
Other constraints	The citation in a list of references is: citation author name/s (year metadata published), metadata title. Citation author organisation/s. File identifier and Data accessed at (add http link).
Language	English
Character encoding	UTF8
Supplemental Information	Publications arising from this research: Hoenner, Xavier, Whiting, Scott D., Hamann, Mark, Limpus, Colin J., Hindell, Mark A., and McMahon, Clive R. (2015). High-resolution movements of critically endangered hawksbill turtles help elucidate conservation requirements in northern Australia. Marine and Freshwater Research , http://dx.doi.org/10.1071/MF15013 Hoenner Xavier, Whiting Scott D., Enever Gavin, Lambert Keith, Hindell Mark A., McMahon Clive R. (2016) Nesting ecology of hawksbill turtles at a rookery of international significance in Australia's Northern Territory. Wildlife Research, http://dx.doi.org/10.1071/WR16047

Content Information

Content type	Physical measurement
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Identifier

Code	Latitude north
Identifier	http://vocab.nerc.ac.uk/collection/P06/current/UAAA
Name	Degrees

Identifier

Code	Longitude east
Identifier	http://vocab.nerc.ac.uk/collection/P06/current/UAAA
Name	Degrees

Identifier

Code	Temperature of the water body
Identifier	http://vocab.nerc.ac.uk/collection/P06/current/UPAA
Name	Degrees Celsius

Identifier

Code	Pressure (measured variable) in the water body exerted by overlying sea water and any medium above it
Identifier	http://vocab.nerc.ac.uk/collection/P06/current/UPDB
Name	Decibars

Distribution Information

Distribution format	
OnLine resource	View and download data though the AODN Portal
OnLine resource	imos:aodn_nt_sattag_hawksbill_profile_map Hawksbill turtle trajectories
OnLine resource	imos:aodn_nt_sattag_hawksbill_profile_data This OGC WFS service returns filtered geographic information. The returned data (CTD profiles) is available in multiple formats including CSV.
OnLine resource	imos:aodn_nt_sattag_hawksbill_gps_location_data This OGC WFS service returns filtered geographic information. The returned data (GPS locations) is available in multiple formats including CSV.
OnLine resource	imos:aodn_nt_sattag_hawksbill_location_data This OGC WFS service returns filtered geographic information. The returned data (Argos locations) is available in multiple formats including CSV.
OnLine resource	imos:aodn_nt_sattag_hawksbill_haulout_data This OGC WFS service returns filtered geographic information. The returned data (Haulouts) is available in multiple formats including CSV.
OnLine resource	imos:aodn_nt_sattag_hawksbill_dive_profile_data This OGC WFS service returns filtered geographic information. The returned data (Dive profiles) is available in multiple formats including CSV.
OnLine resource	imos:aodn_nt_sattag_hawksbill_summary_data This OGC WFS service returns filtered geographic information. The returned data (Summary statistics) is available in multiple formats including CSV.
OnLine resource	OGC WFS help documentation

Resource lineage

Statement	The Aboriginal owned Groote Eylandt (136° 30' E, 14° S) archipelago is located in the western part of the Gulf of Carpentaria (Northern Territory), a large shallow embayment (maximum depth 70 m) situated between northern Australia, Indonesia and Papua New Guinea, connected to the West to the Arafura Sea and to the East to the Coral Sea through Torres Strait (Torgersen et al. 1983, Somers & Long 1994). After oviposition, we equipped seven adult female hawksbill turtles with satellite transmitters on North East Island (13°38.4 S, 136°56.6 E), a 4.4 km ² remote and uninhabited island 30 km off Groote Eylandt, Northern Territory, Australia, where over 100 breeding females nest annually (Limpus et al. 2000). When available, we used an ultrasound scanner (Easi-Scan, BCF Pty Ltd) prior to deployment to confirm the presence of mature follicles and ensure that animals would collect data between nesting events. All turtles were measured and weighed prior to satellite transmitter attachment using standard procedures (i.e. minimum curved carapace length (CCL) and maximum curved carapace width (CCW), measurement error = ± 0.5 cm; weighing error = ± 0.25 kg) and tagged with two numbered titanium tags (Stockbrands®, Australia) applied at a proximal location in each front flipper (Limpus 1992a, Balazs 1999, Bolten 1999). We attached seven satellite relay data loggers (SRDLs, Sea Mammal Research Unit, St. Andrews, U.K.). SRDLs relayed both highly accurate Fastloc GPS locations (95th percentile error < 140 m) (Fedak et al. 2002, Bryant 2007, Hazel 2009a, Shimada et al. 2012) and animal haulout records. To maximise communication efficiency between units and satellites we mounted satellite transmitters onto wedges (SRDL wedges: base = 102 mm, width = 5 mm, height = 30 mm; PTT wedges: base = 73 mm, width = 4 mm, height = 4 mm) (McMahon et al. 2007). We glued units and wedges with quick-setting two-part epoxy resin (Sika AnchorFix®-3+, Sika Australia Pty Ltd) onto the two anterior central scutes of hawksbills' carapace. As the satellite transmitters we used were hydrodynamic and represented less than 1.5 % of hawksbill turtles' weight, we presumed they had minimal effects on marine turtle behaviour (SRDL: 700 g, PTT: 430 g, average weight of adult female hawksbill turtles: 48.7 kg). Temperature-depth profiles were relayed, based on continuous water temperature recordings throughout dives by a CTD instrument, and reconstructed using an 11 point broken-stick algorithm (Fedak et al., 2002, McMahon et al., 2007). For details about the tag: http://www.smru.st-and.ac.uk/Instrumentation/GPSArgosTag/
Hierarchy level	Dataset

Resource lineage

Statement	This dataset collection combines the following datastreams: CTD, GPS, Argos, Haulout, Diving, Summary Statistics. Prior to October 2015, these datastreams were described and served separately but with new developments of the portal 1-2-3, they have been combined in a single collection for ease of discovery and data access.
Hierarchy level	Dataset
Hierarchy level	Dataset

Platform

Identifier

Code	organism
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Instrument

Identifier

Code	SMRU GPS Satellite Relay Data Logger (Argos)
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Metadata

Metadata identifier	9f16351d-eec1-4223-a761-c711ebb9c7d9
Language	English
Character encoding	UTF8

Distributor

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Parent metadata	•
Type of resource	
Resource scope	Dataset
Metadata linkage	https://catalogue-imos.aodn.org.au:443/geonetwork/srv/api/records/9f16351d-eec1-4223-a761-c711ebb9c7d9 Point of truth URL of this metadata record
Date info (Creation)	2017-04-19T04:49:05
Date info (Revision)	2017-04-19T04:49:05
Metadata standard	
Title	ISO 19115-3:2018

Overviews

Provided by

