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HOWICK GROUP FIELD RESEARCH

UPDATE #6

The Rivers to Reef to Turtles Project



We embarked on our second *Rivers to Reef to Turtles Project* (RRT) Field Trip to the offshore, very remote and isolated part of the Far Northern section of the Great Barrier Reef (GBR) – the Howick Group of Islands. This trip marks the start of our second year of the four year collaborative project to investigate whether exposure to land-based pollutants is adversely affecting coastal green turtle populations of the GBR. Pollution is one of the major threats to this icon and our marine turtles are not immune – as a consequence, turtles can be used as a proxy indicator of ecosystem health.

The RRT will help us better understand the links between water quality and green turtle health and will be used to develop baselines for pollutant exposure in green turtles. The project will also provide the scientific understanding that will allow targeted investment actions to improve water quality on the Great Barrier Reef.

See our webpage for more information –

http://www.wwf.org.au/about_us/working_with_business/project_sponsorships/rivers_to_reef_to_turtles/

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The Field Trip – 23 July to 18 August 2015

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The first step in the RRT project is to identify, characterise and quantify the environmental (water, sediment and seagrass) and bio-accumulated (turtle blood and carapace) pollutant exposure of green turtle populations at the study sites. These data will be used to determine if identified pollutant exposure can be correlated to turtle health at both the individual and population levels.

Study site #1 – the ‘control’ or ‘clean’ site at the Howick Group of Islands (the Howicks).

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We completed a longer survey period this year with two teams working consecutively. Team 1 departed from Cairns on 23 July 2015 for an overnight journey courtesy of Tim North's *Gulf Explorer*. Having travelled from all parts of Queensland (and one member from the United States of America), Team 1 arrived safely on Ingram Island on 24 July 2015. While Team 2 was gathering in Cairns on 4 August 2015, Team 1 were already back in civilization, arriving in Cairns late on 2 August 2015.

With members of Team 2 having travelled from the far stretches of Queensland from Brisbane to the Torres Strait, they arrived on Ingram Island on 5 August 2015 raring to get started.

The weather was ‘challenging’ with spurts of spectacular calm mixed with strong wind warnings, but what could be better than to work on an offshore coral cay in the far northern section of the Great Barrier Reef? But there was *much* work to be done.

The trip focus was to undertake turtle toxicological and health sampling, tag, weigh and measure turtles for mark recapture population studies, assess genetic composition, and undertake toxicological environmental sampling. The opportunity to collect data for complimentary or other projects was also available to the researchers participating in the field trip, including toxicodynamics (effects of pollutants), turtle photo identification, and hawksbill turtle population and toxicology studies.

The research team consisted of volunteers and scientists from all over the world, including turtle biologists, geneticists, toxicologists, statisticians, Traditional Owners, government representatives and WWF – and we all hit the ground running!

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Typically the weather was a bit 'hit and miss', but that did not deter our ambition to deliver on the project priorities and catch more than 1,000 turtles.

We worked three foraging sites within the Howicks - Ingram, Coombe and two unnamed 'outer reefs' (which we would like to now name Bell and Hof). These were chosen based on many factors including accessibility, weather protection, the influence of anthropogenic effects, and turtle 'catchability'.

Dr Ian Bell and Chris Hof started each team trip with inductions on safety, daily life in the field, the project's objectives and training on turtle rodeo and data collection.

It was go, go, go! Each day we hit the water and rodeoed turtles – we caught, tagged, weighed, measured and took lavage (diet samples), blood, tissue, and scute samples. We deployed and retrieved passive water quality samplers, and worked in teams to collect grab samples of benthic habitat over the duration of the trip.

At night, we were still catching turtles, processing turtles, spinning blood samples and entering data.

After 17 days of field work, challenged by the wind, waxing and waning energy levels, and some uncooperative turtles, we slowly worked towards collecting the required data.

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The Science:

While in this day and age we can't guarantee any site along the Great Barrier Reef is 'clean' or pristine, the remoteness of the site, limited anthropogenic impacts and existing tagging dataset, the Howicks is proving to be a good control site based on the data analysed from this project to date.

The turtle size class 'sub-adult-pubescent' (65-85cm curved carapace length) is the target of this project. It is believed this size class will give the most unbiased, representative result of pollutant accumulation in turtles because once they recruit from their oceanic phase to a feeding ground they show strong site fidelity (i.e. stay in the one place) until they breed (approximately 15-20 years). When turtles make a reproductive (breeding) migration they may occasionally feed, and adult females can transfer certain contaminants to their eggs and offspring. Choosing a smaller size class (sub-adults) will provide additional certainty that the turtles are not accumulating or offloading pollutants from elsewhere (nesting, inter-nesting or breeding ground). Both blood and scute samples taken will show the short and longer term pollutant accumulation levels respectively.

The mark-recapture studies were previously conducted in the Howicks between 1997 and 2008 and restarted last year in 2014. These studies are important for determining recruitment, growth and survival rates of the population, and if the population is increasing or decreasing in numbers. Combining the new three year study with the previous dataset will improve the understanding of the local green turtle population.

The Howicks are also home to both the southern and northern GBR green turtle genetic populations which primarily nest at either the Capricorn Bunker Group in the southern GBR or the far northern GBR (with Raine Island a principal site), respectively. The haplotype (genetic) diversity within the Howicks was previously investigated by Dr Michael Jensen in 2008, where approximately 80% of the adults were determined to be from the northern stock and 20% from southern. The juveniles were approximately 50/50. This differs from the stock composition in the other study sites in Upstart and Cleveland Bays and will be re-assessed at the Howicks for any change.

Both passive and grab environmental samples were collected during this trip for comparison to turtle bio-monitoring results and eventual correlation to determine any adverse effects on turtles.

Because limited data and information exists for both turtle bio-monitoring and environmental sampling at all the study sites, the first year of this project was a non-targeted 'screening' phase (meaning we are not assuming to find any pollutant in particular). The results of Year 1 are guiding the future monitoring program and enabling us to refine our sampling including for this 2015 Howick trip.

Finer scale sampling was conducted at each of the three foraging grounds. The environmental samples were collected along a transect between the three areas at each of the three foraging grounds, and the water collected was filtered through a solid phase extraction cartridge to concentrate the chemicals found.

Turtles that had been bled and scuted last year were the focus of toxicological re-sampling with additional blood and scute samples taken primarily from sub-adults.

Turtle Stats:

A total of **1,007** green and hawksbill turtles were caught, tagged and measured.

For the purposes of this study:

- 969 green turtles were caught, tagged and measured
- 705 primary (first time) turtles caught
- The recapture rate for the 2015 trip was 27%; comprised of 93 within season recaptures (turtles caught on the same trip) and 171 inter-season recaptures (turtles caught between trips)
- Smallest was 41cm and longest 130cm
- 14 females caught had previously bred in the Capricorn Bunker Group dating from as far back as 1984
- 3 females caught had previously bred on Raine Island dating from as far back as 1992
- 1 turtle was previously tagged from Fog Bay (Northern Territory), possibly making its development migration to Howicks as its chosen feeding ground
- 52 blood and scute turtle samples from all age classes taken for toxicological (metal and organic) and health analysis
- 22 turtles of all age classes lavaged (to determine diet composition and for toxicological analysis)
- 255 tissue samples taken to determine haplotype diversity (green turtle genetic stocks).

Environment Stats:

- 3 DGT (diffusive gradient thin-film metal) passive samplers deployed and retrieved
- 3 ED (empore disks) and PDMs (polydimethylsiloxane organic) passive samplers deployed
- Along transects, three different foraging grounds sampled for water, sediment and seagrass with multiple grab sub-samples collected.

There was no mixing of turtles (no recaptured turtles) found between the foraging ground reefs, demonstrating that green turtles at the Howicks show strong site fidelity. Of the 705 turtles caught 330 were adults (268 females; 61 males; 1 undetermined sex), 127 sub-adults and 248 juveniles. The sex ratios of adult females to males was 4.4:1.

The lavage samples showed that the turtles were feeding primarily on seagrass with few feeding on specific algae species, or a mix of the two. Observations during the environmental sampling highlighted the sparseness of seagrass and patchiness of algae, but these food sources were considered expansive over the surveyed area.

1007 turtles caught

Of which 969 were green turtles,
and 38 hawksbill turtles



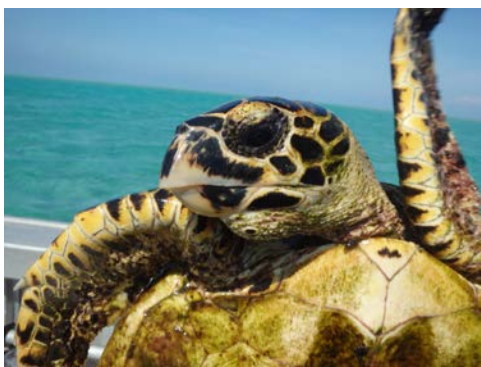
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Other samples were taken for complementary or other projects including:

- 38 hawksbill turtles (28 primary and 10 recaptures) were caught. Blood was taken from 23 for future comparative toxicological and health analysis.
- 574 photos of turtles' postocular scutes were taken to add to the new Turtle Photo ID database.
- 51 blood samples were collected by Dr Jason van de Merwe for nesting site determination, and future toxicodynamic (effect of pollutant) analysis.

The remaining large amounts of samples and data collected will be taken back to our RRT collaborative partners for comparison to the other study sites as part of the RRT project.

Highlights from the trip:



- We saw approximately 15 dugongs and were able to capture five to tag, measure, determine sex and take tissue samples for genetic structure analysis.
- Watching humpback whales swim near outer reef, hearing mangrove golden whistlers and baby seagulls chirp all day.
- Seeing the many species of sharks
- Chris Hof celebrating her birthday (for multiple days) on the island and was treated to a day off relaxing in the sun!
- The corn dog ...
- The supply of fish from the nearby fishing charter – thank you!
- 'Good to Go' attitudes
- Waru, Waru, W-AR-U?
- No email for 3.5 weeks, making new friends and such an amazing view
- Jumping the gutter and night time mangrove rodeo.

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The field trip was primarily supported by WWF-Australia, the Queensland Government's Department of Environment and Heritage Protection (EHP) and Queensland Parks and Wildlife Service (QPWS). A big thanks to Dr Ian Bell for all the logistical support and role as principal investigator for the trip – without the assistance of government departments and their support this trip could not have occurred.

A big thanks to Tim North and his crew on the *Gulf Explorer* for getting Team 1 to Ingram, and to the Torres Strait Regional Authority, Cape Melville, Flinders Group Team 2 rangers for their field work assistance.

WWF-Australia and its partners are leading this pioneering research to protect the Great Barrier Reef and the turtles that call it home. Collaborative project partners of the RRT project include the National Research Centre for Environmental Toxicology at the University of Queensland, the Centre for Tropical Water & Aquatic Research at James Cook University, State Government, Great Barrier Reef Marine Park Authority, local Traditional Owner and natural resource management groups and other supporters and volunteers in the local community.

The next field research trip will be conducted at the other studies sites – Upstart and Cleveland Bays, as we continue to sample our way to unravelling how much a turtle can take...

Until then, I'm signing off – Chris Hof.



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Why we make a difference

Reaching new audiences

We will create new ways to inspire and motivate a new generation of Australians and truly realise our collective power to make a difference to the world in which we live.

High Impact Initiatives

Over the next 5 years, we will accelerate our on-ground conservation and advocacy work, focusing on new priority areas where we have the greatest impact and influence.

Building a strong network

We will draw strength from WWF's 50 years of rich history, knowledge and experience, harnessing our network of people around the world.

Walking the talk

We will continue to commit to reducing our overall environmental footprint, with an ambitious vision to reduce energy consumption by 30% and emissions from travel by 50% by 2015.

Loyal supporters

WWF's supporters make an invaluable contribution to our conservation work. We couldn't do without their loyalty, generosity and personal involvement. We will expand the ways in which supporters can connect with WWF, giving them a greater choice of programs from which they can choose to protect our planet's future.

Transforming business

Through building influential relationships with business and industry, we will continue to create solutions to address the major threats to our natural environments.



Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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WWF-Australia National Office

Level 1/1 Smail Street,
Ultimo NSW 2007
GPO Box 528
Sydney NSW 2001

Tel: 61 2 8228 6800
FreeCALL: 1800 032 551
Fax: 61 2 9281 0369
Email: enquiries@wwf.org.au