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HOWICK GROUP FIELD RESEARCH

UPDATE #11

The Rivers to Reef to Turtles Project

We embarked on our third *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 third and last 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.

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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/what-we-do/species/green-turtle/rivers-to-reef-to-turtles

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The Field Trip – 27 July to 12 August 2016

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 pollutants 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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With a team from all sectors and walks of life, we arrived on Ingram Island on 27 July 2016 courtesy of the Marine Parks vessel "*Reef Ranger*".

The weather was again 'challenging' this year with only a few days of spectacular calm mixed with more days of strong wind warnings. But that didn't deter our incredibly enthusiastic team mesmerised by the beauty of the offshore coral cay of the far northern section of the Great Barrier Reef.

The trip focus was to undertake turtle toxicological and health sampling, tag, weigh and measure turtles for mark recapture population studies, and undertake environmental sampling. The opportunity to collect data for complementary or other projects was also available to the researchers participating in the field trip, including toxico-dynamics (effects of pollutants), turtle photo identification, stable isotope assessment, and hawksbill turtle population and toxicology studies.

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The research team consisted of volunteers and scientists whose homes stretched as far as the Netherlands, including turtle biologists, veterinarians, toxicologists, Traditional Owners, government representatives and WWF – and we all hit the beach and boats running!

Typically for this time of year in northern Queensland, the weather was marginal, but it did not deter our ambition to deliver on the project priorities and catch a target of more than 500 turtles.

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We worked three foraging sites within the Howicks - Ingram, Combe and two unnamed 'outer reefs' (which we have aptly named *BellHof* reefs). These sites 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 the trip with inductions on safety, daily life in the field, the project's objectives and training on turtle rodeo and data collection. We were also treated to a safety video presentation from Dr Bell reminding us that although we've done it '*a million times*', we can't be lax working remotely.

From the early hour starts to the night time processing by head torches – we hit the water, rodeoing, tagging, weighing, measuring and taking lavage (diet samples), blood, tissue, and scute samples from turtles. We deployed and retrieved passive water samplers, working in with the tides and less than average weather to collect grab samples of benthic habitat over the duration of the trip. At night we were catching turtles in the mangroves or spinning blood samples and entering data. After 13 full days of field work, challenged by the wind, clouds and rain squalls, and waxing and waning energy levels, we 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, show that the Howicks is proving to be a good control site based on the analyses 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 as a result of this project 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 (of islands and reefs) 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 is being 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. Finer scale sampling was conducted at each of the three foraging grounds. The sediment and forage samples were collected along a transect between three sites within each of the three foraging grounds, and water was collected adjacent to each passive sampler.

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.

Because of this project, we are gaining significant knowledge about turtle and environmental exposure, turtle population dynamics and health at all the study sites. Using both a non-targeted 'screening' and targeted approach has provided great insight into the thousands of chemicals accumulating in both turtles and their habitat. The results of the four year project will be available in 2018.

Turtle Stats:

A total of **625** green, hawksbill and loggerhead turtles were caught, tagged and measured.

For the purposes of this study:

- 601 green turtles were caught, tagged and measured
- 444 primary (first time) turtles caught
- The recapture rate for the 2016 trip was 30%
- 24 within-season recaptures (turtles caught on the same trip) and 133 inter-season recaptures (turtles caught between trips)
- Smallest was 38.8cm and longest 116.7cm
- 6 females caught had previously bred in the Capricorn Bunker Group dating from as far back as 1984
- 5 females caught had previously bred on Raine Island dating from as far back as 1984
- 35 blood and scute turtle samples from all age classes taken for toxicological (metal and organic) and health analysis
- 66 turtles of all age classes lavaged (to determine diet composition and for toxicological analysis)
- 6 tissue samples taken of new recruits to determine haplotype diversity (green turtle genetic stocks).

Environment Stats:

- 2 ED (empore disks) and 1 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 to individual reefs. Of the 601 turtles caught 364 were adults (269 females; 81 males; 14 undetermined sex), 64 sub-adults and 173 juveniles. The sex ratios of adult females to males was 3.3:1.

Interestingly, there were at least 17 turtles with flipper damage presumably from shark or other predator attacks.

625 turtles caught

Of which 601 were green turtles, 23 hawksbill turtles and 1 loggerhead turtle

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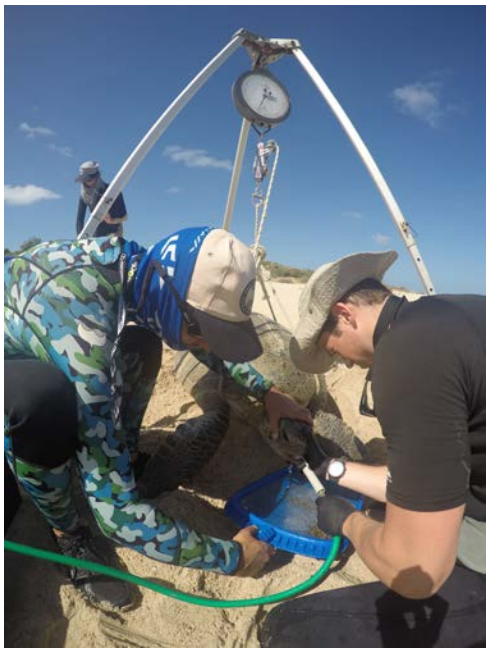

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The lavage samples showed that the turtles were feeding on a mixture of algae, mangrove and seagrass. Observations during the environmental sampling highlighted the sparseness of seagrass and patchiness of algae, but these food sources were considered expansive over the surveyed area.

Other samples were taken for complementary or other projects including:

- 23 hawksbill turtles (17 primary and 6 recaptures) were caught. Blood was taken from 21 for future comparative toxicological and health analysis.
- 151 photos of turtles' postocular scutes were taken to add to the new Turtle Photo ID database.
- 93 blood and tissue samples were collected by PhD student Owen Coffee for determining diet in resident foragers and the foraging grounds of nesting turtles based on stable isotope 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 11 dugongs and where able to capture three to tag, measure, and determine sex.
- Watching humpback whales swim just offshore from our camp at Ingram Island.
- Being visited by our regulars - Steve, Allan and Jonathan seagulls.
- Finding a nudibranch
- Seeing 6 species of shark, particularly the hammerhead and tiger!
- Chris Hof celebrating her birthday (for multiple days, once again)!
- 101 ways of using super glue ...
- Spearfishing and crayfish for dinner
- Delivery of dessert from the *Reef Ranger* mid trip
- Running the gutter and night time rodeo
- Last day, last turtle – a hawksbill and a bingo!
- ***"IAN!!!"***

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 would not have happened.

A big thanks to Cape Melville, Flinders Group and the Torres Strait Regional Authority 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, Griffith 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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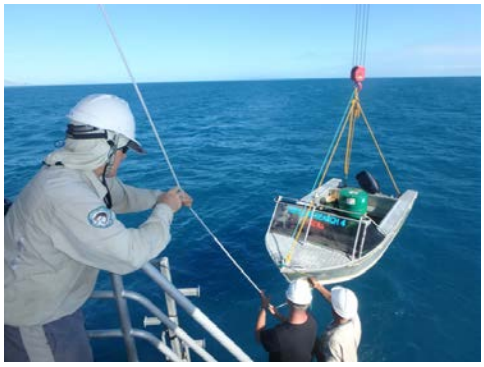
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"Rivers to Reef to Turtles investigation is made possible with the help of Banrock Station wines"

Why we make a difference

Reaching new audiences

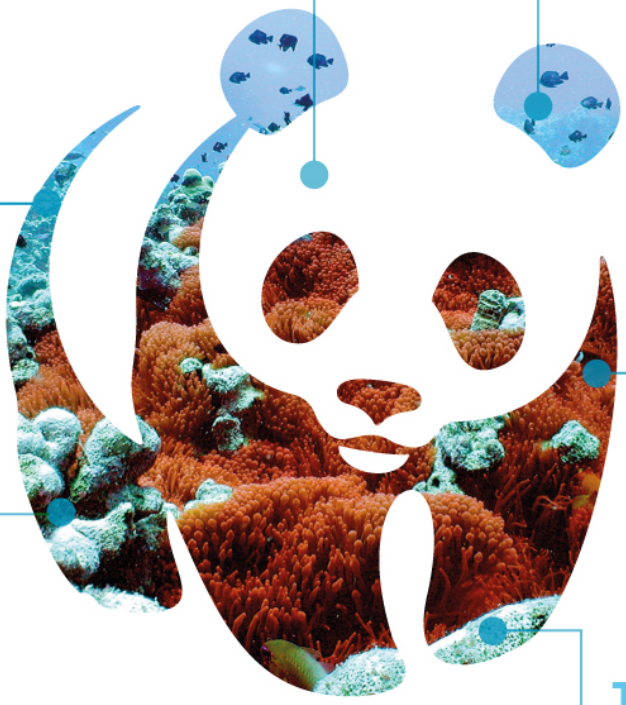
We will create new ways to inspire and motivate a new generation of Australians and truly realise our collective power to make a difference to the world in which we live.

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.

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WWF

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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