



2011 FIELD REPORT: TURTLES IN TROUBLE

PI name

Dr Kathy Townsend

Research site/ region

Moreton Bay, Queensland

Country

Australia

Research site latitude/ longitude

27' 15" S 153' 15' E

Protected area status

National Park: Queensland Marine Park

Date field report completed

4/4/2011

Period covered by this report. From

Sept, 2009 to Dec, 2010

Report completed by (name)

Kathy Townsend



Dear Turtle in Trouble Volunteers,

As you are aware, marine debris has become an increasingly significant problem not only in Australia, but worldwide. Studies have shown that hundreds of marine species, including most of the world's seabirds and sea turtles have been recorded to become entangled or ingest marine debris. While entanglement is easy to visualize and quantify, ingestion of marine debris is a hidden killer. When sea turtles ingest marine debris it causes gut impaction, which is a clinically recognized condition that can cause paralysis of the gut, inhibiting the digestion process. The debris can also puncture the gut lining, causing peritonitis, ileus or septicemia. Prior to the current study, little was known about the impact of ingested marine debris on sea turtles found in Australian waters, or of the magnitude of the problem of marine debris on our coast lines.

Highlights of 2010 have been many. Through the support of Earthwatch, we have successfully leveraged additional funding from the Goldring Foundation and other granting bodies, have been invited to speak at a multitude of public events, secured funding for two PhD students, created links with other researchers, presented our work at scientific conferences and even had our work featured in the summer issue of Australian Geographic.

I cannot emphasise enough that this research would not be possible without the dedication and support of people such as yourselves; the Earthwatch Volunteers. Together we have performed over 115 necropsies (post-mortems) on sea turtles and stranded sea birds, we have cleaned up over 77000m² of beach and removed and sorted over 12000 pieces of marine debris. Rubbish, which if left, may have caused harmed to a multitude of marine creatures. I also hope that this experience has made you aware of the little choices you make day to day, for you have seen firsthand where common everyday items can end up and the impact they can have.

So with this in mind, I would like to thank you on behalf of the entire Turtles in Trouble team. Together we have made a difference.

Kindest regards,

A handwritten signature in black ink, appearing to read 'K. Townsend'.

Dr. Kathy Townsend
Lead Earthwatch Scientist

P.S. Remember to keep up to date on all the latest news on our "Turtles in Trouble" fan page on Facebook.

SECTION ONE

Top highlight from the past field season

Highlights of 2010 have been many. Through the support of Earthwatch, we have successfully leveraged additional funding from the Goldring Foundation and other granting bodies, have been invited to speak at a multitude of public events, secured funding for two PhD students, created links with other researchers, presented our work at scientific conferences and even had our work featured in the summer issue of Australian Geographic.

Non-technical overview of results

Together we (researchers and volunteers) have performed over 115 necropsies (post-mortems) on sea turtles and stranded sea birds, we have cleaned up over 77000m² of beach and removed and sorted over 12000 pieces of marine debris. Rubbish that if left may have caused harm to a multitude of marine creatures. I also hope that this experience has made you aware of the little choices you make day to day, for you have seen firsthand where common everyday items can end up and the impact they can have.

SECTION TWO: TECHNICAL RESULTS

REPORTING AGAINST RESEARCH OBJECTIVES

Results and progress towards objectives

1. How widespread is the problem of ingested marine debris for stranded turtles sourced near one of Australia's fastest growing cities?

Marine turtle stranding records from Queensland indicate that interaction with debris (entanglement and ingestion) caused an average of 20% of stranding incidents between 1999 and 2002 for which a specific cause could be identified (Ceccarelli, 2009), while necropsies conducted by the author of this proposal has shown that 36% of turtles sourced from the eastern Moreton Bay region have died through the interactions with marine debris (30% ingestion, 6% entanglement).

2. Are certain species or life stages more susceptible to debris ingestion?

Representatives of all four species studied were found to have died through the ingestion of marine rubbish: Green turtle (*Chelonia mydas*) 28%, Hawksbill turtle (*Eretmochelys imbricate*) 29%, Loggerhead turtle (*Caretta caretta*) 50%, Flatback turtle (*Natator depressus*) 100%. While 30% of all turtles were found to have ingested quantities of marine debris that contributed to cause of death; post hatchlings (67%), lost years (100%) and new recruits (41%) were most likely to be affected. Various factors including size of animal, feeding strategy (surface feeding), location during life stage (open ocean vs. coastal areas) and length of time in open ocean may all play a role in the probability of the turtles dying due to ingested marine debris.

3. What are some of the pathological implications of ingested marine debris (is perforation or impaction more of an issue)?

Of those animals that ingested marine rubbish, impaction (83%) was found to be a bigger issue than perforation (17%). The toxic implications of ingested plastic retained long term in the gastrointestinal tract are yet to be fully understood.

4. Are sea turtles targeting certain types of debris above and beyond what is available in the environment?

Over 50% of the inorganic material sourced from the gastrointestinal tract was from flexible, film like plastics (e.g. plastic bags and cling film). This was significantly more than the proportion of these plastics found in surveys of rubbish washed up on surrounding beaches, supporting the hypothesis proposed by Mrosovsky *et al* (1981) that turtles may be targeting this material. Further investigations into the feeding behaviour and visual acuity of sea turtles may provide insight into why sea turtles target the film like plastics.

Updates to objectives

Since starting with Earthwatch, several linkages have been made and the initial money provided for the project has been leveraged with the Australian Research Council (ARC). The ARC Linkage grant was submitted in Nov 2010 with confirmation of the grant occurring in April 2011.

New and expanded aims and objectives linked within this broader project are as follows:

Our objective is to better understand the impact that marine rubbish has on marine fauna, using endangered sea turtles as indicator species; and to provide management recommendations to reduce this impact.

The specific aims are to:

1. Predict the at-sea distribution of marine debris that turtles may encounter.
2. Describe the distribution of turtles in oceanic and coastal waters and relate this to the predicted at-sea distribution of marine debris to identify where turtles are most likely to encounter marine debris.
3. Conduct experiments to determine how and why turtles interact with marine rubbish by identifying visual and olfactory cues, which may be important in resource selectivity.
4. Describe and quantify lethal and sub-lethal impacts and threats to sea turtles from marine debris.

NOTE: These new and expanded objectives will only become relevant if we are successful in gaining the ARC Linkage grant worth \$1.7m.

REPORTING AGAINST MEASURES OF SUCCESS (MoS)

PARTNERSHIPS

- Darren Burns: Quandamooka Land and Sea Council: Traditional owner, aboriginal representative, provider of turtles and return to country of necropsied turtles.
- Britta Denise Hardesty: CSIRO: Specialist in movement ecology and genetics, work with ghost net issue in Nth Australia, co-supervise PhD students and collaborator on ARC Linkage grant.
- Chris Wilcox, CSIRO, Specialist in applied mathematics and computer modelling, work with ghost net issue in Nth Australia, co-supervise PhD students and collaborator on ARC Linkage grant.
- Qamar Schulyer: UofQ/CSIRO: PhD student measuring impacts of marine debris on sea turtles.

- Julia Reisser: UofWA/CSIRO: PhD student modelling sources and sinks of marine debris and sea turtle movements.
- Justin Marshall: UofQ: Specialist in visual and olfactory systems, has worked on visual systems of sea turtles, co-supervise PhD students and collaborator on ARC Linkage grant.
- Paula Williams: Samford Vet Clinic: Expert in x-ray and scanning technology, developing non destructive techniques for broad scale sampling of sea turtle populations using x-ray and ultrasound, In kind partner for ARC Linkage.
- Blake Harahush: Underwater World: Long term rehabilitation of turtles, supply of dead turtles and access to stranding records. In kind partner for ARC Linkage.
- Sharon Marks: Healthy Waterway Partnership: Link to broader community and stakeholders, funding and in kind partner for ARC Linkage.
- Marny Bonner: Australian Sea Bird Rescue: Access to marine debris sampling equipment and expert advice re: turtle rehab.
- Various vets and vet nurses: Australia Zoo: Expert advice and long term rehabilitation of sea turtles.

CONTRIBUTIONS TO CONVENTIONS, AGENDAS, POLICIES, MANAGEMENT PLANS.

International - The Honolulu Strategy, 2011 and the Honolulu Commitment - my work contributed in a small way to the creation of this document which addresses the importance of the reduction of marine debris within the global community.

National or regional - The Queensland Government recently made a proposal to ban mass balloon releases in the state of Queensland. I was called upon by state government officials to provide images of the impact that balloons can have on the marine environment (in particular - turtles). I provided them with a series of images, that they have used to support their proposal to ban the balloon.

See: <http://www.cabinet.qld.gov.au/mms/StatementDisplaySingle.aspx?id=70905>.

Local - The "Caring for Straddie" campaign which island shop owners no longer offer normal plastic shopping bags but boxes or degradable shopping bags.

DISSEMINATION

Printed

Invited book section:

Townsend, KA (2011) "Sea Turtle Deaths in Moreton Bay" in Wild Guide to Moreton Bay, Queensland Museum (invited book chapter – in press – accepted 11/10).

Fact sheet: Townsend, KA (2010) "Turtles in Trouble" (created 2010).

Conference proceedings:

Townsend, KA, Conroy, C and Jones, H (2010) "Impact of ingested marine rubbish on stranded sea turtles sourced from south-eastern Queensland, Australia" Australian Coral Reef Society Conference.

Townsend, KA and Nette, G (2010) "Biochemical and morphological evidence of a fatal blue-lined octopus (*Hapalochlaena fasciata*) envenomation of an adult green turtle (*Chelonia mydas*)" Australian Coral Reef Society Conference, Coffs Harbour, Australia.

Townsend, KA (2009) "Impact of ingested marine rubbish on stranded sea turtles sourced from south-eastern Queensland, Australia" 29th International Sea Turtle Symposium: Scientific conference: Brisbane, Australia.

Posters:

Schulyer, Q and Townsend, KA (2011) "To eat or not to eat? The roles of choice and vision in ingestion of marine debris by sea turtles." Fifth International Marine Debris Conference, Honolulu, Hawaii.

Townsend, KA and Nette, G (2010) "Biochemical and morphological evidence of a fatal blue-lined octopus (*Hapalochlaena fasciata*) envenomation of an adult green turtle (*Chelonia mydas*)" Australian Coral Reef Society Conference, Coffs Harbour, Australia.

Publications in prep:

"Biochemical and morphological evidence of a fatal blue-lined octopus (*Hapalochlaena fasciata*) envenomation of two adult green turtles (*Chelonia mydas*)" (in prep for Journal of Marine and Freshwater Science).

"Degradation of plastic, degradable and biodegradable bags – Analysis with gastrointestinal fluids from a herbivorous and a carnivorous sea turtle" (in prep for Marine Pollution).

Visual:

Collaboration of artists with scientists - each resulting in artwork around the theme of the Turtles in Trouble research:

- Martha Blaszak Independent Artist 2011 - mix media canvas
- Judy Watson Artist in residence 2010 - Ink and paper
- Joanna Kasparie Artist in residence 2009 - Digital ephemeral art

Digital:

"Earthwatch Turtles in Trouble Research Team", created February 2009 - Administrators James Kramer and Kathy Townsend.

<http://www.facebook.com/home.php?ref=hpskip#!/group.php?gid=51132618634&v=wall>

Note: the above page was disbanded and the new Fan page below was created in October 2010.

"Turtles in Trouble" Facebook Fan page, created October 2010 - Administrators Kathy Townsend and Qamar Schulyer.

<http://www.facebook.com/home.php?ref=hpskip#!/pages/Turtles-in-Trouble/135936746452005>

5459 hits on the page since October 2010.

Mass media:

- Nov 3, 2009 "Turtle research earns fellowship" Bayside Star pg 24
- Nov 20, 2009 "Moreton is a sick bay" Courier Mail, pg 21
- Oct 17, 2009 "Turtle slaughter rate ballooning" Courier Mail, pg 17
- Sept 9, 2009 "Climate change" ABC 612 Brisbane and 4BC Brisbane - radio interviews.
- Aug 6, 2009 "Helping turtles avoid a trashy diet" The Australian, Supplements pg 3
- April 24, 2010 "Force of Nature" Qweekend, pg 24 Four page, full colour spread in the QWeekend – a colored magazine in the Courier Mail.
- April 13, 2010 "Researcher talks turtles" Bayside Bulletin pg 4
- April 1, 2010 "Citizen scientist" Part of a four page, full colour spread in G magazine, pg 60

- April 2010 Relaunch of the Australian wide press and television campaign for UofQ “University of Kathy” add which mentions the Goldring Fellowship.
<http://www.youruq.com/university-of-kathy>
- Aug 20, 2010 “Sisters – what we share” shown in the Australian Pavillion at the Shanghi Expo
- A live link to the “Sisters – what we share” video is:
<http://www.australianpavilion.com/en/downloads/sisters.aspx>
- 2010. As of Aug 20, 2010, five million visitors have visited the pavilion. “Commissioner-General Ms Lyndall Sachs said the record-breaking result was recognition that the Australian pavilion was one of the most popular country pavilions at this, the world's largest ever expo.”
- (http://www.australianpavilion.com/en/news_media/Five_million.aspx).
- Aug 29, 2010 - "Conservation project with marine scientists" 3RRR FM Melbourne - radio interview.
- Aug 26, 2010 - "Brother befriends the turtles" Voice and Data, pg 8
- Aug 21, 2010 - "Turtles in trouble", Village Green, Courier Mail pg 69
- Nov 24, 2010 – “Moreton’s turtles killed by sea trash” Wynnum Herald – pg 6
- Nov 5, 2010 – “Save our marine life – say no to plastic bags” Bundaberg Bugle – Pg 11
- Oct 26, 2010 – “Eco tourism told to plan long term” Lifestyle, AAP Newswire.
- Sept 2010 Kathy was filmed for the television show, Totally Wild – Going to air on Channel 10 on Monday, March 21, 2011 at 8:00am.
- Sept 8, 2010 Public showing of “Sisters” documentary from the Australian Expo pavilion in 2010 at Moreton Bay Research Station.

Oral presentations at the following conferences:

Townsend, KA, Conroy, C and Jones, H (2010) "Impact of ingested marine rubbish on stranded sea turtles sourced from south-eastern Queensland, Australia" Australian Coral Reef Society Conference.

Townsend, KA (2009) “Impact of ingested marine rubbish on stranded sea turtles sourced from south-eastern Queensland, Australia” 29th International Sea Turtle Symposium: Scientific conference: Brisbane, Australia.

Invited Public talks:

- Sept 18, 2009 – Earthwatch Boardmeeting in Sydney.
- Nov 21, 2009 – MBRS Open day on North Stradbroke Island.
- Nov 27, 2009 – Brother Launch in Sydney.
- April 13, 2010 – Earthwatch 24 fund raising event in New York.
- April 18, 2010 – UQ Centenary Celebration Day in Brisbane.
- May 5, 2010 – UQ UniGreen lecture in Brisbane.
- June 17, 2010 “Turtles of Moreton Bay” Redcliffe Museum
- June 23, 2010 “Human impacts on Marine Turtles” Lady Elliot Island Resort.
- Aug 25, 2010 “Turtles in Trouble and Project Manta” Earthwatch Annual PI meeting.
- Aug 31, 2010 “Impact of packaging on the marine environment”, Dunwich State Primary School (year 5 class).
- Oct 18 – Invited speaker for Ashgrove Probis.
- Oct 25 – Invited speaker for Soroptimist International – TiT and PM.
- Nov 1-8 Qamar at Port Douglas – hosting international debris video conference hook-up.
- Nov 19 to 20 – MBRS open day – 2000 people, Earthwatch booth plus lectures from PM (Lydie Couturier) and TiT (Qamar Schulyer) PhD students.
- Dec 2 – Invited speaker at Victoria Point School.

Awards:

- 2009 Received Goldring Earthwatch International Fellowship.
- 2010 Received Peter Doherty Award for Excellence in Science and Science Education.
- 2010 Received Outstanding Presentation Award at ACRS conference.
- 2010 Nominated for an Australia Day Award.

DEVELOPING ENVIRONMENTAL LEADERS

Lectures and labs on the topic "Human impact on the marine environment" to undergraduates from Hobart William Smith Union College; University of California; University of Queensland; and ICTE.

PhD student - Aug 2010 - Aug 2013, Qamar Schyler, USA "Impact of marine debris on sea turtles"

Intern students

- Oct 12, 2009 to Feb 4, 2010 Christin Muller, Germany "Degradation of plastic, degradable and biodegradable bags – Analysis with gastrointestinal fluids from a herbivorous and a carnivorous sea turtle"
- July 12 to 16, 2010 Roland Fritches, Germany "Barnacles as an indicator of health on sea turtles"
- July 12 to 30, 2010 Sarah Dougan, England "Sea Turtle CSI: Forensic analysis of shell epiphytes as an indicator of sea turtle health"

Work experience students - Sept 21 to 25, 2010 - Rhien Oaks - Victoria Point High School

LONG TERM IMPACT OF PROJECT**Taxa of conservation significance enhanced, restored or maintained**

The project worked with 4 species of marine turtle: Green, Hawksbill, Loggerhead, and Flatback as detailed individually below:

1) *Chelonia mydas* (Green turtle); 2) globally threatened, ecologically significant, culturally significant; 3) IUCN Red List status Endangered, 4) Rate of decline globally 48% to 67% decline in the number of mature females nesting annually over the last 3–generations, 5) Impact on species - 28% of animals investigated were impacted by ingestion of marine debris while 6% were impacted by entanglement of in marine debris.

1) *Eretmochelys imbricata* (Hawksbill turtle); 2) globally threatened, ecologically significant, culturally significant; 3) IUCN Red List status Critically Endangered, 4) rate of decline globally 84 to 87% decline in number of mature females nesting annually over the last 3 Hawksbill generations, 5) Impact on species - 29% of animals investigated were impacted by ingestion of marine debris while 4% were impacted by entanglement of in marine debris.

1) *Caretta caretta* (Loggerhead turtle); 2) globally threatened, regionally threatened, ecologically significant, culturally significant; 3) IUCN Red List status Endangered, 4) rate of decline globally has been estimated between 40% to 90% 5) Impact on species - 50% of animals investigated were impacted by ingestion of marine debris while 50% were impacted by entanglement of in marine debris (note only 4 animals were investigated).

1) *Natator depressus* (Flatback turtle); 2) globally threatened, regionally threatened, ecologically significant, culturally significant; 3) IUCN Red List status Data deficient, 4) rate of

decline globally Although it is clear that there are reasons why some declines may be expected in the future, there is no quantitative evidence to suggest 20% decline in the next 3 generations. 5) Impact on species - 100% of animals investigated were impacted by ingestion of marine debris (note - only one flat back has been investigated to date).

Habitats enhanced, restored or maintained

- 1) Habitat(s) affected; beach areas in which sea turtles are known to inhabit.
- 2) Type of enhancement/ resulting affect (extent maintained, condition achieved, restored, expanded, improved connectivity/ resilience, other measure); Removed and quantified marine debris from beach - resulting in a cleaner beach, reducing the possibility of ingestion or entanglement.
- 3) Area of habitat(s) enhanced; beaches on North Stradbroke Island, Queensland, Australia. A total of 77000m² cleaned since 2009.
- 4) Baseline information about previous status of habitat(s) - Prior to this study there were no regular beach cleanups, this now occurs at least once a month with Earthwatch volunteers.

Cultural heritage enhanced, restored or maintained

Tangible: Working with the Quandamooka people of Moreton Bay - retrieval of sick and dead turtles, and returning bodies of necropsied animals to country via Indigenous rangers.

Intangible: Building up a relationship of trust, invited to participate in local festivals, sharing of stories and knowledge between science and indigenous communities.

Livelihood assets enhanced, restored or maintained

Training - interns, work experience students and PhD students.

Employment - as field support for the Turtles in Trouble Earthwatch volunteers.

Community assets - cleaning up beaches regularly frequented by tourists on North Stradbroke Island - important providers for the local economy.

Research team and community relationship:

Turtles in Trouble Fan Facebook page - updated at least every two weeks - open forum to provide feedback.

Invited public talks to the local community - from Industry through to NGO, Government through to schools.

Interviews with newspaper, TV and radio - providing information to the broader public.

Volunteers are sourced locally, either through local supporting businesses such as Brother or Rio Tinto or from local members of the community.

Turtles (sick and dead) are sourced from local community members and groups such as the Stradbroke Island Wildlife Rescue.

Any other actions or activities that enhance natural and social capital

Above and beyond our normal beach clean ups that occur during the year, we also participate in the nationwide 'Clean Up Australia Day'.