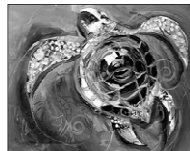




Environmental Enrichment for Sea Turtles in Rehabilitation

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Background



- 6 of the world's 7 species of sea turtles are found in Australian waters. The most common turtle found in waters off Townsville, North Queensland, is the green sea turtle (*Chelonia mydas*)
- Lack of seagrass has caused a sharp rise in stranded turtles due to starvation
- Emergency centre established at JCU's School of Veterinary & Biomedical Sciences in mid-2011 to help support Townsville's Reef HQ Turtle Hospital

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The Study



Rationale



- Therrien et al. (2007) suggested that EE is as effective with marine reptiles as with other animals and should be encouraged for captive sea turtles
- In the wild, sea turtles would have rocks to rub against, caves to hide in and vegetation to swim through
- Hence, it was decided to enrich the environment of the tanks at JCU to enable the turtles to express more natural behaviours to enhance their health and hopefully speed recovery

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Conditions



- Ethical approval was granted by JCU's Animal Ethics Committee to investigate the effects of EE on the behaviour of turtles in rehabilitation
- The turtles in this study were 4 juvenile green sea turtles of unknown sex from Cleveland Bay, near Townsville, housed at JCU for rehabilitation after starvation from Dec 2011 – March 2012
- All turtles were presented as 'floating' with a lateral tilt and all regained buoyancy during rehabilitation
- Exposed to enrichment devices in last weeks of care before release when active/alert and in reasonable body condition

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Meet the Turtles



1. "Davo" was found at Crocodile Creek. He was released into Cleveland Bay in March 2012. At this time he weighed 15.2 kg and his CCL was 56.5 cm.

- Tag N° QA15633



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Meet the Turtles



2. "Hector" was found in Townsville Port. He went to Reef HQ for more rehabilitation after leaving JCU. At this time he weighed 23.5 kg his CCL was 66.2 cm.

- Tag N° QA15991



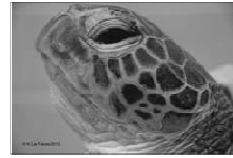
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Meet the Turtles



3. "Peanut" was found at the mouth of the Ross River. He was released into Cleveland Bay in March 2012. At this time he weighed 14.7 kg and his CCL was 52.8 cm. More about Peanut later...

- Tag N° QA15634



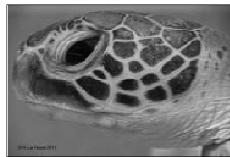
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Meet the Turtles



4. "Niblet" was found on the beach at Toolakea. He was released into Cleveland Bay in late December 2011. At this time he weighed 8.6 kg and his CCL was 45.0 cm.

- Tag N° QA15881



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Method



- Housed individually in 1000 L oval RELN tanks
 - Filtered, re-circulated seawater at 30-35 ppm
 - Water temp of 24 – 27°C
- Diet of squid and pilchards
- Starving turtles often present as "floaters" and have special needs regarding their environment. Hence, a range of EE devices, both sunken and floating, were added to each tank for a period of 20 minutes (5 repetitions)
 - Sterilised in a chlorine bath and rinsed between uses

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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. Jug without food
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken

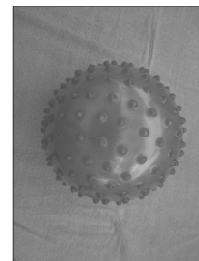


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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. Jug without food
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken



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The Enrichment Devices



1. Waterfall
2. Ball
3. **Box**
4. Platform
5. Broom – floating
6. Jug without food
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken

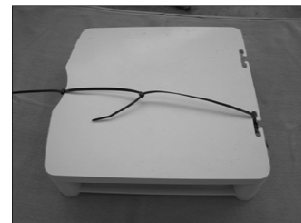


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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. **Platform**
5. Broom – floating
6. Jug without food
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken



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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. **Broom – floating**
6. Jug without food
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken



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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. **Jug without food**
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken



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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. Jug without food
7. **Jug with food**
8. Pipe – floating
9. Pipe – sunken
10. Brush – sunken



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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. Jug without food
7. Jug with food
8. **Pipe – floating**
9. Pipe – sunken
10. Brush – sunken



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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. Jug without food
7. Jug with food
8. Pipe – floating
9. **Pipe – sunken**
10. Brush – sunken

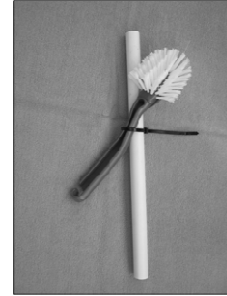


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The Enrichment Devices



1. Waterfall
2. Ball
3. Box
4. Platform
5. Broom – floating
6. Jug without food
7. Jug with food
8. Pipe – floating
9. Pipe – sunken
10. **Brush – sunken**



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Observed Behaviours



- Based on Therrien et al.'s (2007) observations, 6 behavioural categories were identified **with** and **without** (control) enrichment devices present
 - Resting
 - Pattern (repetitive) Swimming
 - Random Swimming
 - Focussed Behaviour,
 - Orientation
 - Non-categorised Behaviour
 - Anytime the turtle was not involved in a defined behaviour
- Time spent in each behaviour was compared **with** and **without** enrichment

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Hypothesis

*It was hypothesised that when enrichment was present, a **decrease** in Resting and stereotypic Pattern Swimming would be seen along with an **increase** in Random Swimming and Focussed Behaviour.*



Image: www.reefhq.com.au/turtle-hospital-at-reef-hq-aquarium/turtle-hospital-partners

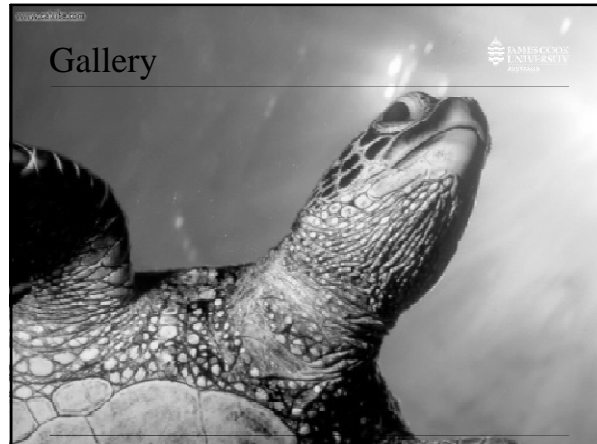
Results



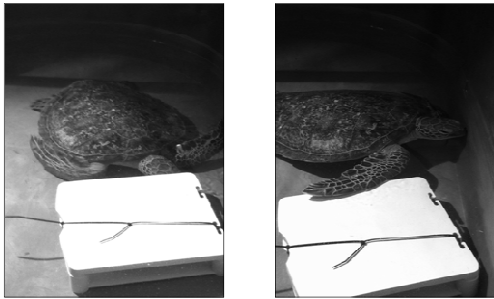
- Preliminary results show that there were significant ($p < 0.05$) differences between the time spent in all 6 behaviours for all 4 turtles, and that the behaviour of individual turtles was significantly different from each other depending on what enrichment device was present
- Resting behaviour was significantly reduced, and Focussed Behaviour increased when enrichment devices were present

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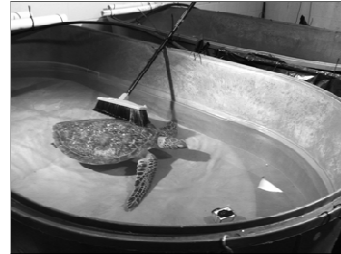
Gallery



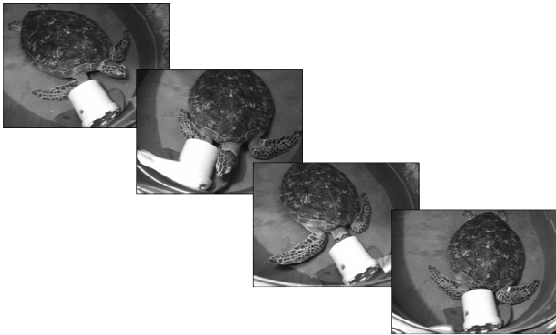
Peanut and the Platform



Peanut and the Broom



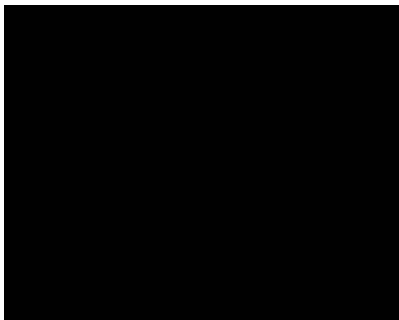
Hector and the Pipe



Niblet (and Alexis) Released



Toys for Turtles



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Conclusion



- This pilot study explored the use of different enrichment devices and concluded that enrichment was an effective means of encouraging more focussed behaviour/movement for turtles in rehabilitation
- Introducing simple enrichment devices offers a cheap, practical (and safe) way of adding complexity to the environment
- The turtles appeared to have preferences as they did not behave the same way with all enrichment devices
- Further research required to look at effects of specific devices on behavior, as well as variables like colour and size

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Outcomes



- Local wildlife carers/veterinarians are using food dispensing toys for some turtles in temporary rehabilitation
- Reef HQ is using 'turtle toys' as a routine part of care/rehabilitation and public display

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Tracking Peanut



Peanut was released on March 9, 2012 from Pallarenda Beach (Cleveland Bay) in Townsville. He was fitted with a \$1500 custom built satellite tracking device to help follow his movements and learn more about green sea turtles.

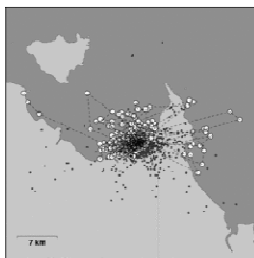
This project is supported by Queens Beach Action Group, NQ Dry Tropics, NQ Bulk Ports Corporation, Queensland Parks & Wildlife, Juru Traditional Owners, Bowen Primary School, James Cook University and the Sea Turtle Foundation.

Peanut's Satellite Device



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Peanut's Movements...



- 9 March 2012
 - Released into Cleveland Bay
 - Travelled across entire bay in under 24 hours (20 km)
- 15 July 2012
 - 16 km off Townsville coast
 - Distance travelled = 926 kms
 - Straight-line distance = 20 kms

http://www.seaturtle.org/tracking/index.shtml?tag_id=112908&full=1&lang=

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Acknowledgements



- Many thanks are extended to Kathy La Fauce and all the volunteers for their marvellous work in looking after the turtles at JCU, and to Cathy Gonner for time spent on behavioural observations for the EE study

Reference: Therrien, C. L., Gaster, L., Cunningham-Smith, P., & Manire, C. A. (2007). Experimental Evaluation of Environmental Enrichment of Sea Turtles. *Zoo Biology*, 26, 407–416.

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Peanut is still Transmitting...

