Community Flatback turtle monitoring report

Eco Beach 2018

Broome Western Australia

Conservation Volunteers Australia (CVA)

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Community Flatback turtle monitoring report Eco Beach 2018

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The primary purposes of this report are

- to record details of the method for reference of future leaders of the program and data analysts
- to provide a summary of the outcomes for Traditional Owners, participants and other stakeholders
- to provide the general findings of the Eco Beach turtle monitoring program to the Department of Biodiversity, Conservation and Attractions (DBCA) to contribute to their broader marine turtle conservation program

Data collected during the survey was provided to DBCA for full analysis. The results shown here are a summary of the data with no statistical analysis but does provide some valuable information on basic trends.

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Summary

The Eco Beach Flatback turtle annual monitoring program began in 2008 and is a Conservation Volunteers Australia (CVA) Wild Futures initiative to contribute to long term data on these turtles through a collaboration between CVA, Eco Beach Resort, and DBCA (Department of Biodiversity, Conservation and Attractions, formerly DPAW Department of Parks and Wildlife). The long-term data collected through this project makes it particularly valuable. This year CVA worked closely with DBCA, Yawuru Country Managers and Eco Beach Resort staff to make the project a success.

Nightly and morning patrols were carried out and data was collected on all turtles and tracks encountered.

Senior Research Marine Scientist Tony Tucker from DBCA joined the team for the first two nights to support the program.

A summary of the results of surveys since 2008 shows that 2018 was a higher than average year for nesting turtles at Eco Beach and an average year for successful nests. 193 track records were counted, and 39 turtles (12 of which were tagged for the first time during the program) were encountered over the standard 14 nights. A further 5 were encountered and 78 tracks recorded over the following 3 nights with a school group. This was outside the identified survey period but the additional survey data was also provided to DBCA.

Volunteers were mainly engaged through CVA's Better Earth program while a few were engaged through one of the final Naturewise Tours Program. This year, weekend Resort guests were not invited to attend information talks or to participate in turtle research during nightly tours because the teams were larger than the last 2 years and the logistics would have been more complicated than in the past. As an ecotourism product, the Eco Beach marine turtle project was again very successful.

A combination of walking and driving the beach for the turtle survey was used to maximise survey results by covering more of the nesting area than would have been possible on foot. It also gives the best volunteer experience with minimal disturbance of turtles and provided a safeguard for volunteers with varying fitness levels and environmental conditions.

Other achievements included recording data from data loggers and collecting sand samples for a research project on microplastics in the marine environment.

Recommendations are included in this report to consider for the 2019 project.

Introduction

The Eco Beach Flatback turtle annual monitoring program is a CVA Wild Futures initiative to contribute to long term data on these turtles. Wild Futures projects work with the community to provide practical on-ground action to conserve 12 threatened species, including Flatback turtles.

Background

Flatback turtles (*Natator depressus*) are listed as 'Vulnerable' in Western Australia and under the *EPBC Act 1999* and 'Data deficient' by the IUCN (The World Conservation Union). In fact, the Flatback turtle is the only marine turtle species listed globally as 'Data deficient' meaning, there is not enough information to tell whether Flatback turtle populations are declining, stable or increasing. The data gained from the Eco Beach and other Flatback turtle research contributes to data the IUCN needs to determine the status and management needs of Flatback turtles.

According to the SPRAT website:

- While there is no data to indicate any decline in flatbacks to date, physical changes that may occur with global warming have the potential to alter their occurrence.
- There are not many records of Flatback turtle foraging distribution, with just a few from fishery bycatch in the East Coast trawl fishery.

- Flatback turtles are the only sea turtles that occur mainly within the Australian continental shelf and the only ones that lack an oceanic phase, remaining in the surface waters of the continental shelf.
- Not much is known about Flatback turtle diet or foraging habitats, but young flatbacks feed in the open ocean while adults feed on animals in the depths of sub-tidal soft bottomed habitats.
- The time of year when nesting occurs varies from area to area, even on the West coast of Australia.
- Flatback turtles breed on average every 2.7 years.
- Flatback turtles nest around every 15 days and lay approximately 50 eggs in an average of 2.8 clutches per season.
- Eggs incubate for around 6 weeks before hatchlings emerge.
- Not much is known about how many flatback hatchlings survive to adulthood, but it is thought to be less than 26 in 1000. Once a turtle reaches maturity it has a very high survival rate.

Temperature data is used by researchers to estimate mortality and sex ratios of hatchlings and to understand climate change and the impacts to turtles on a wider scale. For marine turtle species, as for some other reptiles, sex ratio and survival of hatchlings is determined by the temperature of the sand surrounding the nesting chamber. The pivotal temperature is where equal ratios of males and females are produced and for Queensland this is 29.3°C (Limpus 2007) and in Western Australia is 29.4°C (Stubbs et al 2014). Below 27°C produces all males and above 31 4 °C produces all females (Boys are cool, girls are hot). Few marine turtle hatchlings in Queensland have been known to survive temperatures above 34°C, yet a Conservation Volunteers report compiled by CVA in 2012 found that hatchlings have survived at higher temperatures at Eco Beach, so there must be more to the story. Monitoring programs such as this will help complete the picture.

The Eco Beach Sea Turtle Monitoring Program commenced in October 2008. The annual monitoring program gathers data on the species and the site and provides a quality educational experience for participants.

Glenn McFarlane – former Marine Species Manager for CVA – has written comprehensive reports for the years of 2008 through to 2013. He left the organisation before the 2014 survey, but surveys continued each year. Trends and results from 2014 and 2015 have not been analysed. The 2008 to 2013 surveys were carried out over 40 nights, but subsequent surveys have been done for 14 to 18 nights , with 14 nights identified by DBCA as the minimum useful survey period.

The nesting population density at Eco Beach is not as high as other Flatback turtle nesting sites in Western Australia (WA), such as Cape Domett, Barrow Island or other rookeries in the Pilbara region however, this research remains significant for the following reasons:

- DNA analysis of the Eco Beach population indicates that this population is a separate and distinct genetic management unit of *N.depressus* in Western Australia. (MacFarlane 2014).
- Satellite tracking and DNA sampling have shown different migratory routes and foraging grounds from southern flatback nesting turtles (MacFarlane 2014 & Whiting et al 2017).
- The 12km nesting beach and survey area is freely accessible, yet has minimal human development that can impact on nesting turtles and hatchlings.
- Sand temperatures have been recorded since 2008 and records include nest hatch success rates of up to 100% in nests with temperatures above an expected embryo mortality level (34°C) (MacFarlane 2014).
- CVA has collected over 10 years of data, making it a long term data set

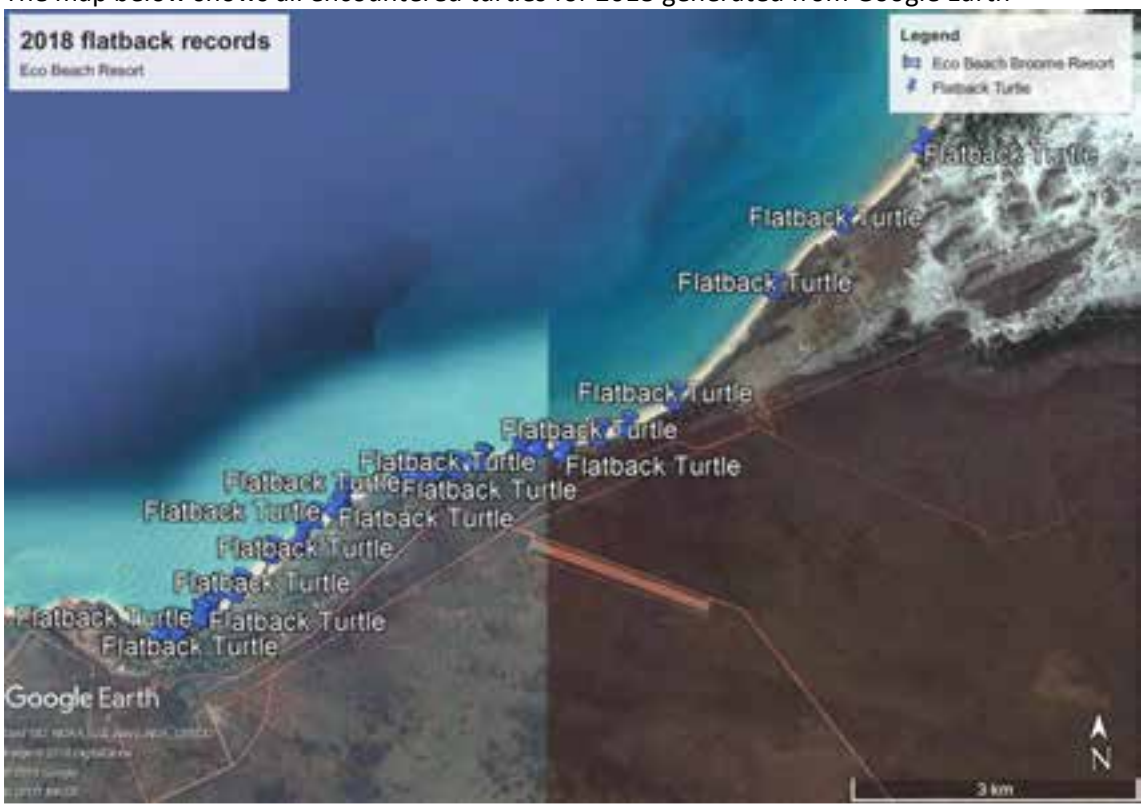
Results

Data sheets were provided for full analysis to DBCA in Perth.

This report includes general statistics and data and program logistics and acknowledgements to make recommendations for future surveys. Full analysis of the data will be undertaken by DBCA.

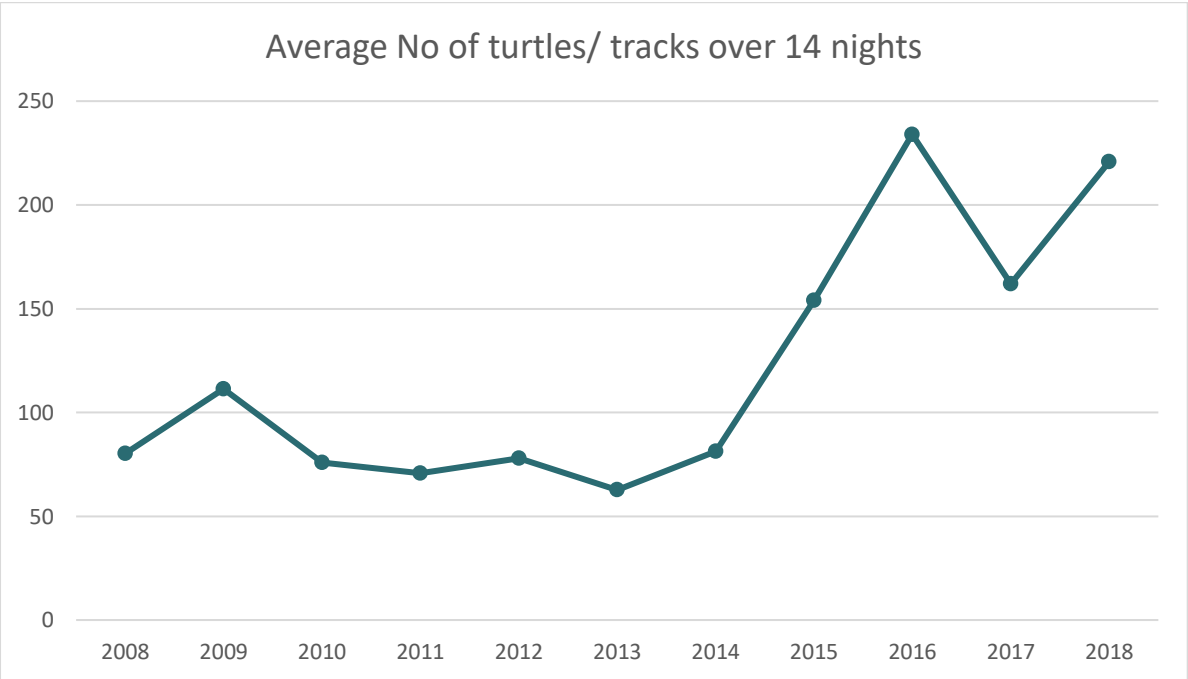
Nesting turtles recorded

The map below shows all encountered turtles for 2018 generated from Google Earth



Annual results summary

A summary of the results of surveys since 2008 shows that 2018 was a higher than average year for nesting turtles at Eco Beach and an average year for successful nests.



Year	No of survey nights	Total turtles & tracks recorded during survey period	Total nests recorded during survey period	% of successful nests during survey period	Average No of turtles/ tracks per night	Average No of turtles/ tracks over 14 nights	Average No of nests per night	Average No of nests over 14 nights	No of remigrant turtles	No of new turtles tagged	% remigrant turtles	% turtles encountered
2008	40	229	53	23%	5.7	80.2	1.3	18.6	0	29	0%	13%
2009	40	318	91	29%	8.0	111.3	2.3	31.9	6	42	13%	15%
2010	40	217	65	30%	5.4	76.0	1.6	22.8	21	22	49%	20%
2011	40	202	67	33%	5.1	70.7	1.7	23.5	15	14	52%	14%
2012	40	223	55	25%	5.6	78.1	1.4	19.3	17	13	57%	13%
2013	40	179	77	43%	4.5	62.7	1.9	27.0	21	10	68%	17%
2014	16	93	8	73%	5.8	81.4	Nests and false crawls were not analysed where tracks only were seen		10	1	91%	12%
2015	14	154	6	46%	11.0	154.0			4	5	44%	6%
2016	14	234	64	27%	16.7	234.0	4.6	64.0	16	12	57%	12%
2017	14	162	29	18%	11.6	162.0	2.1	29.0	31	8	79%	19%
2018	18	284	75	26%	15.8	220.9	4.2	58.3	16	13	55%	18%

Daily results summary

In past surveys the numbers tend to be higher around new moon. The figures from this year's survey are consistent with that observation.

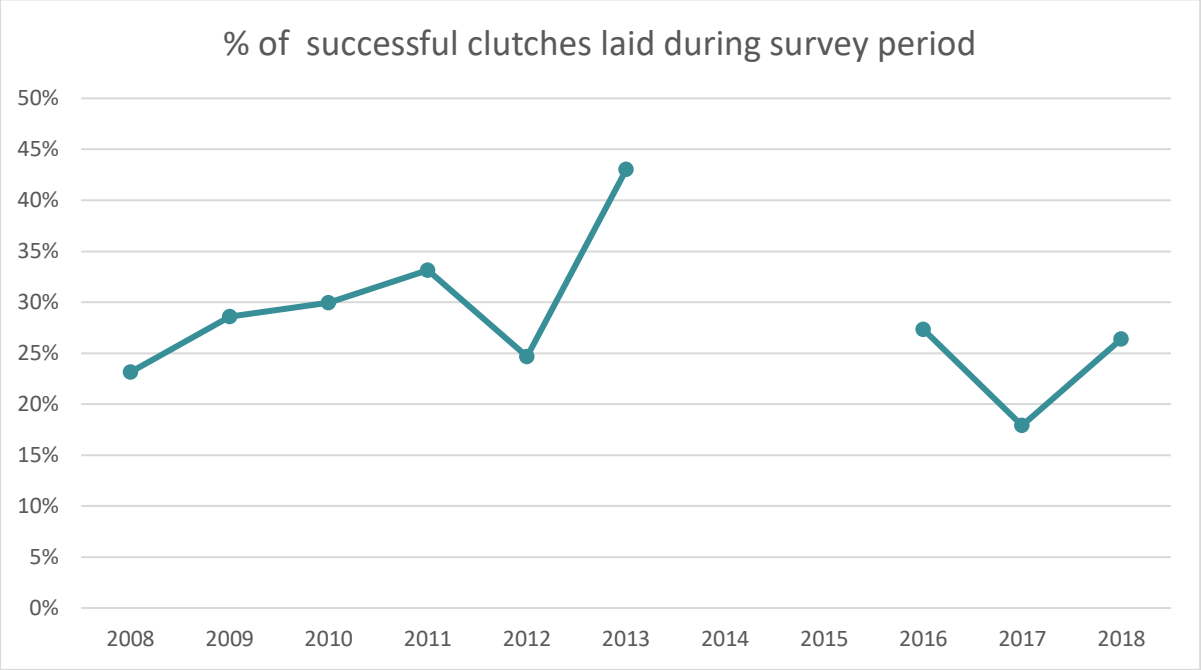
	Full moon						
	Wednesday	**Thursday**	**Friday**	**Saturday**	**Sunday**	**Monday**	**Tuesday**
	21/11/2018	**22/11/2018**	**23/11/2018**	**24/11/2018**	**25/11/2018**	**26/11/2018**	**27/11/2018**
Tracks	8	15	5	7	9	18	17
Turtles	3	3	1	4	1	5	2
Tracks+turtles	11	18	6	11	10	23	19
% Turtles seen	27%	17%	17%	36%	10%	22%	11%
Transport	drive/walk	drive/walk	drive/walk	drive/walk	drive/walk	drive/walk	drive/walk
Sector	Resort	Resort	Resort	Resort	Resort	Resort	Resort
Hrs on beach	4.5	4.5	4	4	5	4.5	3.5
Team							
CVA leaders	1	1	3	3	3	3	3
DBCA	1	1	0	0	0	0	0
Better Earth	9	9	10	10	10	10	10
Naturewise	0	0	2	2	2	2	2
Yawuru	0	0	0	0	0	0	0

Half moon							
	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday
	28/11/2018	29/11/2018	30/11/2018	1/12/2018	2/12/2018	3/12/2018	4/12/2018
Tracks	9	7	12	13	8	15	10
Turtles	1	1	3	0	4	6	5
Tracks+turtles	10	8	15	13	12	21	15
% Turtles seen	10%	13%	20%	0%	33%	29%	33%
Transport	drive/walk	drive/walk	walk	drive/walk	drive/walk	drive/walk	drive/walk
Sector	Resort	All sectors	Resort	All sectors	All sectors	Resort	All sectors
Hrs on beach	2.5	5	3	2.5	4.5	4	3.5
Team							
CVA leaders	3	3	3	3	3	3	3
DBCA	0	0	0	0	0	0	0
Better Earth	7	7	6	7	7	7	7
Naturewise	0	0	0	2	2	2	2
Yawuru	3	2	2	0	0	0	2

New moon					
	Wednesday	Thursday	Friday	Saturday	Sunday
	5/12/2018	6/12/2018	7/12/2018	8/12/2018	9/12/2018
Tracks	13	27	16	30	0
Turtles	0	1	3	0	1
Tracks+turtles	13	28	19	30	1
% Turtles seen	0%	4%	16%	0%	NA
Transport	no survey	walk	drive/walk	no survey	walk
Sector	no survey	Resort	Resort	no survey	Resort
Hrs on beach	0	1	4	0	3
Team					
CVA leaders	2	2	2	2	2
DBCA	0	0	0	0	0
Better Earth	0	0	0	0	0
Naturewise	0	20	20	19	19
Yawuru	2	0	0	0	0

Nest Success

The ratio of successful nests to false crawls was around average compared to previous years at Eco Beach.



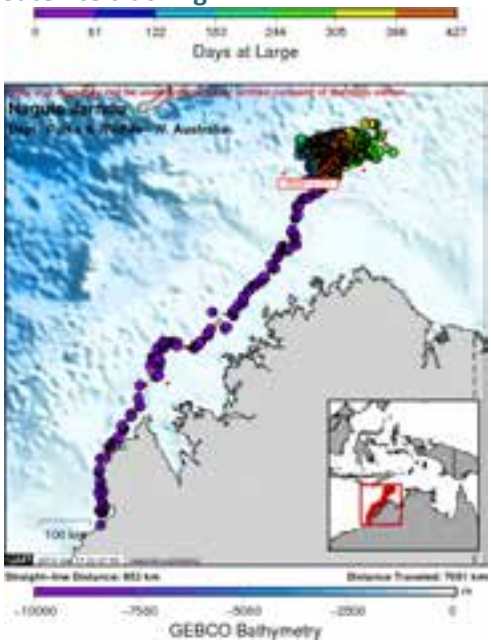
Sand samples

Sand samples were collected and labelled from a section of the resort sector beach for a research project on microplastic s in the marine environment.

Temperature data loggers

Two data loggers were retrieved and redeployed at the Jack's Ck site. No loggers were retrieved at the Resort site. One new logger was deployed at the resort site.

Satellite tracking



In 2017, Nagula Jarndu (WA89730, WA89731) was the 16th turtle to be tagged with a PTT as part of the Eco Beach monitoring program. As of 18 January 2019 the tag was still transmitting her position which can be followed on http://www.seaturtle.org/tracking/. She has travelled 7061kms since the PTT tag was fixed to her carapace.

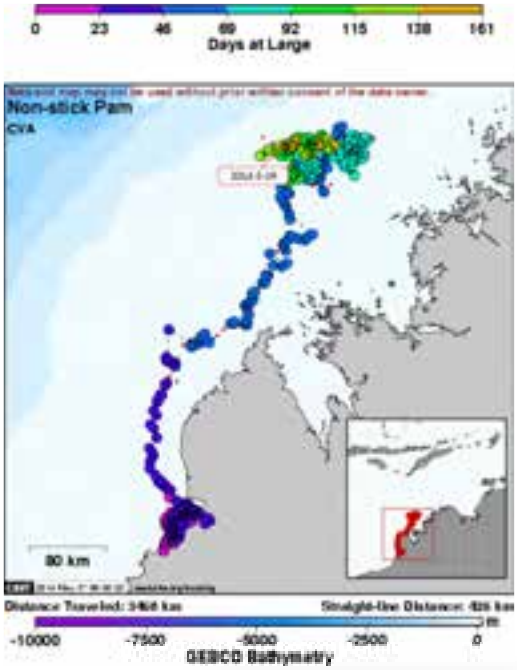
Nagula Jarndu has followed a similar path to several of the previously PTT tagged Eco beach turtles, and almost identical to *Lucy* and *Betty Barnacle.*

Summary of turtles tagged at Eco Beach with PTT (satellite tags).

	Name:	Left tag:	Right tag:	Date deployed:	No. of days	Kms travelled	Straight line kms
1	Lucy Roscoe	WA83729	WA83730	11/12/2009	329	5858	441
2	Lucy	WA52508	WA52854	13/11/2009	434	9667	795
3	Lucy Jack	WA83870	WA52493	17/11/2010	819	2600	37
4	Miss Kimberley	WA83742	WA83811	16/12/2010	259	3307	351
5	The Great Turtle	WA83807	WA83808	10/12/2011	315	3591	313
6	Lesley	WA83890	WA83891	14/12/2011	434	2327	22
7	Trash	WA52477	WA83854	15/12/2011	511	490	5
8	Kurlibil	WA83851	WA83852	16/12/2011	581	7197	114
9	Princess Anne	WA87929	WA87931	24/11/2012	343	2786	170
10	Corinne	WA83776	WA83777	27/11/2012	364	4535	997
11	Kerrypace	WA83763	WA83767	9/12/2012	343	4052	1124
12	Betty Barnacle	WA83740	WA83741	10/12/2012	658	10464	746
13	Felicia	WA87940	WA83811	15/12/2012	511	6383	406
14	Mrs Wiggle	WA87943	WA87944	28/11/2013	259	3198	596
15	Non-stick Pam	WA87932	WA87933	9/12/2013	161	3468	426
16	Nagula Jarndu	WA89730	WA89731	21/11/2017	427	7061	853

DNA sampling

DBCA requested DNA samples to be taken where possible from all turtles encountered in 2018, particularly those that were tagged with PTT satellite tags during previous surveys. Tag numbers of these turtles were supplied. Samples were taken from 25 of the 28 individual turtles encountered.



Non-Stick Pam (WB7756, WA87933) who was tagged with a PTT in December 2013 was encountered on 30 November and 2 December (false crawls) then nesting on 3 December 2018. This turtle was tracked for 3468km over 161 days. A biopsy was taken on 30 November for DNA (Sample No F8436).

Non-stick Pam was first flipper tagged at Eco Beach late in the 2012 nesting season. She was originally recorded as having minor right front flipper damage. No damage was recorded in 2018. It was noted that she did not have a distinct notch.

Loggerhead turtle

A mumified Loggerhead turtle carcass was recorded on the Jack's Beach sector on the morning of 22 November 2018. The skull was collected by Tony Tucker from DBCA.

The skull of another loggerhead turtle was found in 2016 at Jack's Creek by the managers of the resort.

Participant feedback

Feedback received in response to questions

Participants were asked for feedback on their trip experience. A summary of responses to 3 questions is included below.

What did you like?	What did you learn?	What would you change or do differently?
Feedback from Better Earth volunteers		
• Seeing turtles! Loved watching, especially laying • The way we are all here for the same thing • Meeting new people from different walks of life with the same interests but from different perspectives • You can learn a lot from the trainers and from other people • The opportunity to be involved and to volunteer • Interaction with the turtle from starting to come up, to body pit, to finishing • Having a voluntary basis for camp jobs rather than rosters • The location- the number of different species is unbelievable • Lots to do besides turtling • Information from the project was great, Emily did a great job - she was very good at prompting us when needed • Teamwork from the start and allocation of roles • Team leaders were lovely • Good treatment of volunteers • The resort and the accommodation and the pool - Kris and the staff were amazing • Felt included and trusted to do things, • Making an impact • Flexibility was good, taking time off if you wanted to	• So much. What didn't we learn? • Leant more in this week than at Uni • Everything about turtles and bats and goannas … • Sponges are great to get a vehicle out of a bog • Hermit crabs do vacate their shells • Blue noodles are better than red noodles [in the pool] • Why turtle monitoring is so important • A lot about Western Australia • What a cattle musterer is • Practical skills – PIT tag scan was my favourite	• Too many people with one group, smaller groups with turtles are better • Make sure people know the importance of the order of tasks when there is a turtle- i.e. What's the priority? • Ensure volunteers understand that not all people are required for the morning drive each day, i.e. people can have a rest if they are tired. • The Resort information on the bushwalk etc. could be better maintained. Track and trail signage was a little difficult to follow. [Idea = CVA project to work on signs] • Information package from the database and the eco beach project info were different regarding what to bring (i.e. auto generated information said to bring a sleeping bag). • Head torch - red filter was not on the information. • Would like the option of having a different room/villa at scaled pricing instead of bunking in together. • Optional marine debris project [Idea = separate CVA project or combined with signs] • Send a list of participant names to everyone before the project

What did you like?	What did you learn?	What would you change or do differently?
• A good amount of people • Steve's jokes were really great • Fantastic food, good system having someone cook each night, self serve was good		• Consider a singles trip and couples trip • Have same job for 5 nights instead of different job every night (most people however preferred trying all the jobs) • Red writing on tape measures can't be read with red torchlight. • A bit rushed an overwhelming at the beginning when volunteers arrived • Remind the volunteers about what they can do to make a difference every day
Feedback from PEGS student volunteers		
• Participation & independence • Being hands on with real tools • Learning how CVA works • Extreme heat • Huge biodiversity of the area • Variety of everything on the project • Induction PowerPoint & familiarisation • Looking for and learning about turtle & predator tracks • Seeing the whole beach in the morning run • The project was more than the turtles • Neil's Yawuru presentation & the conversation it generated • The food	What did you learn? • What data is needed for a turtle monitoring program e.g. GPS, measurements etc. which was more than we expected • How much work is involved to study a species • How to ID species and tracks • How to sustain yourself in the heat & that you should reapply sunscreen • Information in the PowerPoint about what we are doing here, data deficient meaning, genetic diversity between beaches etc. • How tags are used to identify individual turtles • Long pants are important for work • That dogs are turtle (hatchlings) predators • The effort involved for turtles to nest vs swim	• Have watermelon every day • More days, but less intense • Include a boat ride • Organise a place where students could get together in bigger groups during leisure time • Map of villas for each group on the first night to help with orientation • Avoid "jetlag" • Meals at Melbourne times not WA times • A wider variety of vegetables, more steamed (i.e. not all cooked on the BBQ)

Discussion

2018 marked the 11th consecutive year of CVA turtle monitoring at Eco Beach, making it a valuable long-term monitoring program.

It is worth noting that the area was subject to some major weather events in late 2017/early 2018 as follows (reported by resort manager):

- Cyclone Hilda 150km winds 27 Dec 2017 made changes to the beach profile
- Cyclone Joyce 11 Jan 2018 had little noticeable effect
- Monsoon trough delivered >600mm rain 26 to 28 Jan 2018 causing major flooding of resort and made changes to beach profile
- Cyclone Kelvin 20-23 Feb 2018 had little noticeable effect

Survey success

Data collected during the survey was provided to DBCA for full analysis. The results shown here are a summary of the data with no statistical analysis but provide some valuable information on basic trends.

The summary of results of surveys since 2008 shows that 2018 was on the high side of average with respect to number of turtles, and the percent of nests compared with false crawls was around average.

PTT Satellite tag

Nagula Jarndu was tagged with a Platform Terminal Transmitter (PTT) on the first night of the 2017 survey by Tony Tucker from the Marine Science Program of DBCA with the Yawuru County Managers and Conservation Volunteers Australia. Nagula Jarndu is a Yawuru name that means 'saltwater woman'.

Nagula Jarndu was still transmitting throughout the 2018 survey but was not encountered. Her track can be followed on www.seaturtle.org/tracking.

The satellite track indicates that she did not return to Eco Beach in the 2018 season. As Flatbacks generally nest on average every 2.7 years, this is not a surprise. However, previous records for this turtle were 24/11/2016 and 21/11/2017 which suggested that she might nest in 2018 if she follows an annual nesting pattern.

Temperature data loggers

We were asked by DBCA to locate and download the four temperature data loggers that were deployed in 2016. The markers at the Jacks creek site were still in good condition due to maintenance done in 2017. The data loggers were retrieved, downloaded and redeployed successfully. The vegetation logger was difficult to retrieve as it was buried over 1m deep by the changed dune and took 3 attempts to dig it out. The sand is very fine on the beach and the hole was only made possible with a barrel converted to a tube to

HOBO Water Temp Pro

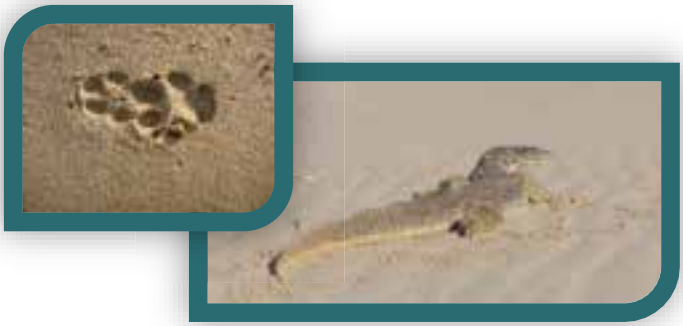
maintain the sides of the hole, and water to stabilise the sand.

Conservation volunteers Fred Meyer, Erin Milroy and Rebecca Jones worked very hard with Steve and Anne to help retrieve the Jack's Creek loggers.

Measurements will contribute to ongoing temperature records of the sand temperature at Eco Beach which will help tell the story of hatchling results and whether climate change is increasing the sand temperature.

Predators

Predators recorded included goannas, foxes, dogs and a cat. Apart from tracks, 2 goannas, 2 fox cubs and a black dog were seen on or above the beach. No dingoes were seen this year.



Two nests were predated by a goanna.

Hatchlings

Two hatched nests were recorded on 4 and 8 December. No actual hatchlings were seen. Each had tracks from approximately 40 hatchlings.

Other wildlife

Some other wildlife sightings of note included a stranded golden sea snake, a bustard, terns (including crested, lesser crested, little, gull billed, whiskered and Caspian terns) and migratory shorebirds of several species (including pacific golden plovers, sand plovers, great knots and whimbrels. There were a few regular raptors including ospreys, Brahminy kites, brown goshawk and white belied sea eagles. A pair of resident beach stone curlews were present as usual, but no chicks were observed this year.

At least 2 king brown snakes were seen, one of which was over 1.5m long. It is important to tell people in tents to make sure their zips are done up tight each time they are used, and that a torch should be used when walking at night.

In 2017 there was a group of around 100 little terns near Jack's Creek. These birds were nesting on the dune where the eggs could be in danger of being run over and the adults were susceptible to disturbance. This year there were only around 20 terns with at least one nest. Both years we made sure we turned around before that area to minimise disturbance to this threatened species.

DNA samples

Twenty biopsies were taken from the 25 individual turtles encountered. One of these was from a high priority turtle, Non-stick Pam that was released in December 2013 with a PTT satellite tag and flipper tag numbers WA87933 and WA87933. She seemed in good health and is now tagged WB7756 and WA87933.

Sand samples

Sand samples were collected at the request of DBCA for a research project on microplastics in the marine environment. Microplastics are small-sized plastic particles, commonly defined as below 5mm in size. Many plastics contain toxic leaching substances that are added during the manufacturing process.

Stakeholder involvement and satisfaction

CVA worked closely with DBCA, Yawaru Country Managers and Eco Beach resort staff to make the project a success. CVA coordinated participants and logistics and employed project leaders to run the program. Yawuru supported and participated in the program, sharing their knowledge and experience and gaining hands on experience, receiving training in turtle tagging and monitoring. DBCA provided methodology, advice and financial and logistic support as well as hands on assistance and training from Senior Research Scientist Tony Tucker. Eco Beach was the accommodation site and provided logistic support and a donation to the program. All four stakeholders are key to the ongoing success of the project.

The last group of volunteers was from a Conservation group at PEGS (Penleigh and Essendon Grammar School). This was a new arrangement for the Eco Beach survey which has worked well for CVA on other projects. The student feedback confirmed that they got a lot out of the experience.

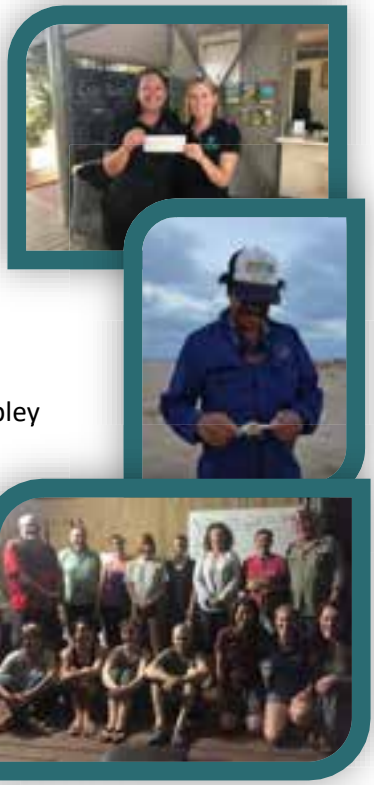
Yawuru guide Neil was organised to run a tour for the school group which was really popular with the group and generated a lot of conversation.

Acknowledgements

Many thanks to

- Yawuru Traditional Owners of Eco Beach for support of the project
- DBCA for logistic and financial support and clear advice, especially Chris Nutt, Tony Tucker and Scott Whiting
- Tony Tucker for on-site assistance and training

- The management and staff of Eco Beach for logistic support, project donation and friendly welcoming service
- CVA organisers Emily Zhang, Jacki Smith, Clem Whittles, Tristen Duke and Jo Issaverdis
- The team leaders Clem Whittles, Steve Winderlich and Anne O'Dea
- Yawuru Country Managers Pius Gregory, Ronald Wade, Johani Mamid and Vaughn Lee (especially to Ron and Pius for helping with the troopie fan belt)
- Participants for enthusiastic contribution to the survey
  - Team 1: Linda Davies, John Harris, Kathy Himbeck, Scott Martinson, Yoke (Nantawan) Kanokudom, Holly Bradley, Jade Larkman, Irene Zhang, Jaclyn Smith, Dirk Stuber and Vicki Shipley
  - Team 2: Erin Milroy, PJ (Prabhjot) Dhaliwal, Wendy Binks, Caitlin Spence, Frederic Meyer, Stefania Basile, Nicola Helper, Margie Jones and Rebecca Jones
  - PEGS team: Alex Scott, Emily Syme, Oscar LoMoro, Devan Workman, Darci Workman, Lauren Frankas, Ellyn Ryan, Emma Weston, Ben Ackerman, Austair Mackay, Trent Nicholls, Jaidyn Sessa, Zoe Lack, Allison Cao, Madeleine Surane, Manashni Mirza, Harrison Palmer, Rebecca Borkut, Sofia Merlo and Isabella Aichurst



- **and** Ivy Helen, new little granddaughter of Anne and Steve, who hatched on Nov 24 and waited patiently for the turtle survey to finish before we could meet her. And thanks Wendy for the books and painting.

References

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