Bermuda Turtle Project

Annual Report for 2017

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BERMUDA TURTLE PROJECT

"To promote the conservation of marine turtles through research and conservation"

Bermuda Turtle Project • PO Box FL 145 • Flatts FL BX • Bermuda
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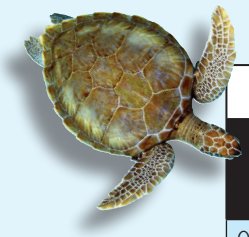
The Bermuda Turtle Project (BTP) continued in 2017, committed to the goal of promoting the conservation of marine turtles through research and education. BTP is a joint project of the Bermuda Zoological Society (BZS) and the Sea Turtle Conservancy (STC). Project activities during 2017 included field and laboratory research, training of international and local students, and public education via presentations, the media, and the Bermuda Turtle Project webpage.

Sampling of the Bermuda sea turtle aggregations was carried out for 10 days during August 2017 by Jennifer Gray (BTP Bermuda Director), Drs. Peter and Anne Meylan (BTP Principal Investigators), Dr. Gaelle Roth (Veterinary Affiliate, Bermuda Aquarium, Museum and Zoo – BAMZ), Patrick Talbot (Curator, BAMZ), Dr. Roldan Valverde (STC), students in the annual Sea Turtle Biology and Conservation course, and numerous other volunteers. Camilla Stringer (BZS) and Barbara Outerbridge (BAMZ) assisted with course administration. The BZS research vessel, *RV Endurance*, served as the main vessel for the sampling session and was captained by Nigel Pollard, with Emily Andrew as first mate. The catch boat, *Chevron*, was captained by Jennifer Gray, with Jorge Sanchez or Patrick Talbot as first mate. A second catch boat, *Vee Be Gone*, was used for sites where large numbers of turtles had been captured in previous years. This additional vessel was captained by Robert Chandler with Patrick Talbot or Daniel Gray as first mate.

Sampling with a new 1406 ft. entrapment net was conducted 14 – 25 August 2017. A total of 194 green turtle (*Chelonia mydas*) captures were made at 14 sites around the island. The captured green turtles ranged in size from 25.6 to 59.0 cm straight carapace length (SCL) (see sampling log).

All turtles captured in the entrapment net in 2017 were judged to be immature based on previously established shell and tail size criteria. They were tagged, biometric data were collected, and then, the turtles were released at or near their capture site. Blood samples or skin biopsies were obtained from a sample of the animals for genetic analysis to study nesting beach origins of Bermuda green turtles, and for hormone analyses to establish gender and sex ratio.

Of the 194 green turtle net captures, 66 (34%) were recaptures of animals tagged in previous years. This compares with 33% in 2016, and 30% in 2015.



Net Sampling Log for Bermuda Turtle Project 2017

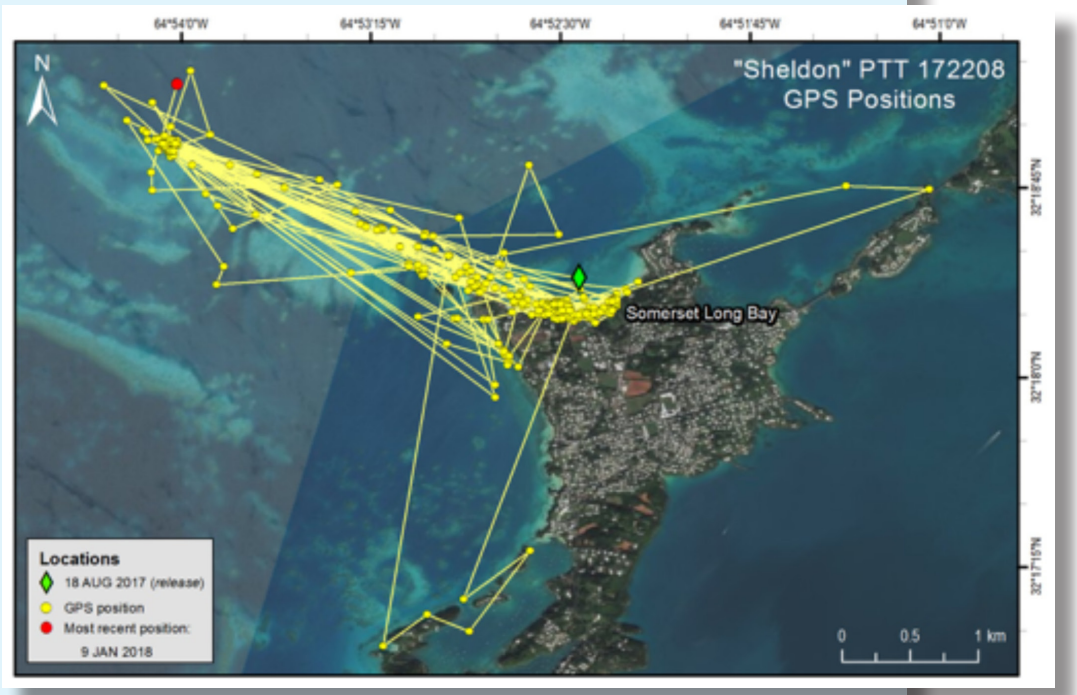
Date	Sample No.	Location	Set No.	Latitude	Longitude	Bottom Temp (°C)	# of Turtles	Depth (ft.)
08/14/2017	709	Baileys Bay	1	32.35043	64.72417	27.5	31	5.2
08/15/2017	710	Wreck Hill	1	32.27877	64.88603	28.5	7	7.8
08/15/2017	711	Tudor Hill	2	32.27347	64.88357	29.5	4	7.9
08/16/2017	712	Blue Hole	1	32.34872	64.70823	29.5	7	6.5
08/16/2017	713	Grotto Bay	2	32.3539	64.71000	29.5	0	7.9
08/17/2017	714	Baileys Bay	1	32.34906	64.72562	29	46	4.2
08/18/2017	715	Somerset Long Bay	1	32.30564	64.87414	28	10	9.8
08/21/2017	716	Somerset Long Bay	1	32.30446	64.87334	28.5	56	4.9
08/22/2017	717	Ferry Reach	1	32.3612	64.70832	29	0	10.9
08/22/2017	718	Walsingham Bay	2	32.34423	64.70715	28.5	7	7.3
08/23/2017	719	Annies Bay	1	32.3558	64.65907	27.5	20	7.3
08/23/2017	720	Long Bay	2	32.35067	64.65425	29.5	2	12.3
08/24/2017	721	Fort St. Catherine	1	32.38953	64.66956	29	0	13
08/24/2017	722	Crescent East	2	32.39871	64.80694	28.5	0	17
08/25/2017	723	Cowground Flat	1	32.31793	64.87156	29	3	11.6
08/25/2017	724	Vixen	2	32.3064	64.88676	28	1	10.8

Total # of Captures for 2017 through Sample 724..... 194
Total # of Captures since 1992.....4645

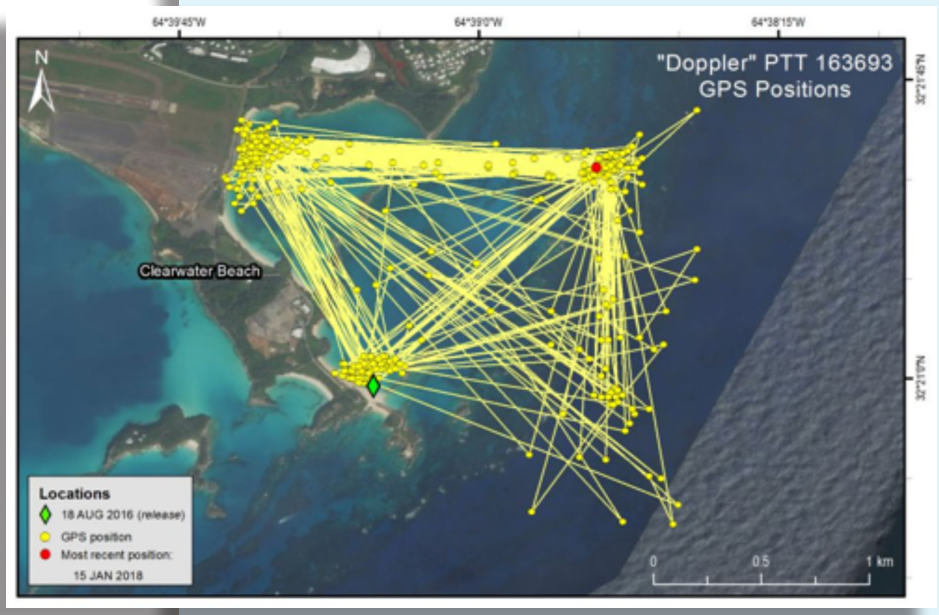
The recapture rate is greatly affected by the extent to which the exact same sites are sampled as in previous years. Most recaptures occurred on the same grass bed on which the animals were first tagged.

No turtles captured in 2017 exhibited signs of the disease fibropapillomatosis.

A satellite transmitter was deployed on a green turtle captured with the net at Somerset Long Bay on 18 August 2017. The transmitter (PTT 172208) was attached to a 59.0 cm SCL turtle, nicknamed "Sheldon". This individual remained within Somerset Long Bay following release, spending a majority of daytime and nighttime hours within shallow waters of Somerset Long Bay.



Sheldon made occasional westward movements towards Daniel's Head and Vixen. During October, Sheldon moved farther west to Ely's Flatt and spent prolonged periods in adjacent waters of 10 – 20 m depth. This transmitter continues to function normally and is providing positional information at the time of report preparation.



We continue to receive data from a transmitter that was deployed on "Doppler" (PTT 163693), a 57.1 cm SCL male green turtle captured at Long Bay near Clearwater Beach on 18 August 2016. Doppler has a long history of residence at Long Bay having been captured there 7 times over the last 11 years. He appears to use the grass beds near Long Bay and the area near Clearwater Beach where we also set the net. This continues to be an interesting case due to the length of this deployment and because it may be the first example of tracking an individual that regularly transits between two of our study sites. During mid-day and nighttime hours, Doppler uses an offshore reef site that is due east of Clearwater Bay. Doppler also uses the same site during fall and winter. At the time of writing, we have received over 1000 GPS positions collected during the more than 500 days since the transmitter was deployed. This transmitter also continues to provide data.

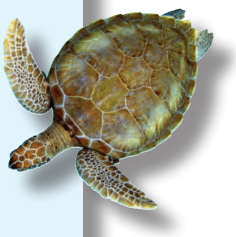
Emily Andrew with recovered transmitter

Another transmitter that was also deployed in 2016 continued to send data through July 2017. It was attached to a 58.5 cm SCL green turtle nicknamed "Aquarius" (PTT 163692) that was captured at Somerset Long Bay on 15 August 2016. Her first capture was at this same site on 19 August 2015. This transmitter was recovered in the fall of 2017 by a member of our own team (Emily Andrew) who found it while she was snorkeling. It was shipped to the company in the US that manufactured the tag and valuable data remaining on the unit was recovered.

During 2017, genetics classes at Eckerd College (Peter Meylan's home institution) obtained additional genetic sequences for both green turtles and hawksbills. Spring semester classes worked with green turtle samples and were able to confirm a haplotype for 23 individuals for which a significant growth record is available. This will be used in a study to determine if various covariates, such as genotype, affect growth rate. The haplotypes observed had all been observed in Bermuda before and are typical of samples from recent years. Five green turtles that had been recaptured overseas were also assigned a haplotype; three of these had been recaptured in Cuba, one in Nicaragua and one in Venezuela. In fall 2017, the Eckerd genetics class worked on hawksbill samples and produced sequence data for nine additional Bermuda hawksbills. These added to the growing data set that suggests that hawksbills recruit to Bermuda from all over the greater Caribbean.

Approximately 500 hormone samples from Bermuda green turtles were shipped to Jeff Schwenter, South Carolina Department of Natural Resources, in 2017, for determination of gender. Analysis of these samples from 2013 – 2016 was delayed while a new radioimmunoassay was developed. Results are expected early in 2018. Analyses of sex ratios of the Bermuda green turtle foraging aggregation over time continued with help from Dr. Brett Tornwall, statistician with the Florida Fish and Wildlife Conservation Commission.

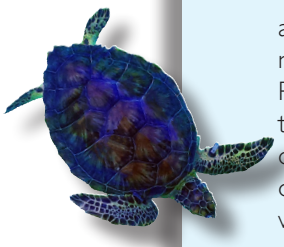
Dr. Simona Ceriani, of the Florida Fish and Wildlife Conservation Commission, conducted stable isotope analyses on samples collected in 2016 to address the question of size at recruitment of green turtles into Bermuda waters. Values for carbon and nitrogen vary depending on the diet and environment of the animals, hence a shift from the open ocean to seagrass beds should be detectable in biological samples. Dr. Ceriani is also working to develop a method to measure stable isotopes in blood samples rather than skin samples, reducing the need for biopsies. Preliminary results suggest that it will be possible to develop a conversion equation between the two tissues for juvenile green turtles. Additional samples for this study from live captures, as well as strandings, were collected in 2017. Digestive tract contents were collected from 15 dead stranded turtles in 2017, for a related study on green turtle diets in Bermuda being conducted by Dr. Karen Bjorndal, University of Florida.



During 2017, Dr. Larisa Avens, National Marine Fisheries Service, carried out analyses on 21 humeri (main bone of front flipper) from green turtles that stranded and died in Bermuda in 2014, 2015 and 2016, to estimate growth rates and age at recruitment onto the Bermuda Platform. Sample sizes were small within specific size classes but valuable data was obtained. Additional green turtle humeri were collected for this study during the 2017 necropsy session.

Four international tag returns of green turtles originally tagged in Bermuda were received during 2017. One turtle tagged in 1999 was recaptured off the Guajira Peninsula of Venezuela in an area where other Bermuda turtles have been captured in the past. This is a straight-line distance of approximately 1,500 miles. Another recapture involved an immature green turtle tagged in Bermuda, satellite tracked to Florida, and subsequently observed when it cold-stunned off Padre Island National Seashore in Texas. This location is over 2000 miles from Bermuda. It is the first record of a Bermuda-tagged green turtle using the well-known foraging areas along the coast of Texas. One Bermuda green turtle was reported captured and killed by fishermen off the coast of Nicaragua. A fourth green turtle, tagged in Bermuda in 1994, was discovered on a nesting beach at South Ponte Vedra Beach, near St. Augustine, Florida, in July 2017. This beach is not patrolled at night but volunteers from the South Ponte Vedra Beach Marine Turtle Patrol discovered her trapped under a dune walkover during their morning beach survey

Green turtle, tagged in Bermuda in 1994 and discovered on a nesting beach at South Ponte Vedra Beach, near St. Augustine, Florida, in July 2017 making her way back to the ocean.



and freed her. She had attempted to nest but was obstructed by the walkover pilings. They noticed and photographed her metal flipper tags which had been attached by the Bermuda Turtle Project 23 years earlier when she was a 36.3 cm juvenile. This is the first Bermuda-tagged turtle to nest in Florida, and only the fourth turtle tagged by BTP that has been subsequently recorded on a nesting beach. Tag returns provide important information about the destinations and the fate of turtles after they leave Bermuda waters. Coordination of tag returns and payment of rewards were provided by the Archie Carr Center for Sea Turtle Research and the Sea Turtle Conservancy, respectively. The Nicaraguan tag recoveries were received via researchers Dr. Cynthia Lagueux and Dr. Cathi Campbell.

The Bermuda Turtle Project offered its International Course on the Biology and Conservation of Sea Turtles for the 21st time from 13-25 August 2017. The course is offered by the Bermuda Zoological Society and the Sea Turtle Conservancy, and is provided free-of-charge thanks to donor support. The two-week course consisted of lectures, class discussions of assigned readings, a necropsy session, and ten days of field work aboard the *RV Endurance*. The students learned to capture immature green turtles using the entrapment net and searched for hawksbills on reefs. They also gained extensive practical experience in collecting data from the turtles once they were captured and brought on board the research vessel. The course was taught by Drs. Peter and Anne Meylan, Jennifer Gray, and Dr. Gaëlle Roth. This year's course participants were drawn from Anguilla, Bermuda, Canada, France, Guatemala, Jamaica, Mexico, and the United Kingdom. The students came from a number of backgrounds, including universities and natural resource agencies in the Caribbean region and beyond.

Instructors and Participants of the Bermuda Turtle Project's 2017 Sampling Session.

Participants hailed from Anguilla, Bermuda, Canada, France, Guatemala, Turks and Caicos, Jamaica, Mexico and the United Kingdom.

As part of the course, students conducted necropsies of 14 dead turtles that had been collected and frozen by the Bermuda Sea Turtle Stranding and Salvage Network (BAMZ) during the previous year. Veterinarian, Dr. Gaëlle Roth performed a detailed necropsy at the beginning of the session, and then helped the student teams as they conducted necropsies themselves. In addition to providing an opportunity to learn basic anatomy of sea turtles, the necropsy session enables participants to learn first-hand about some of the mortality factors for sea turtles, such as entanglement in monofilament line, ingestion of hooks used in various fisheries, disease, and boat collisions.

Over the twenty-one years during which the Sea Turtle Biology and Conservation course has been offered, it has served 197 students from around the world. Participants have been drawn from Anguilla, Antigua, Argentina, Aruba, Belgium, Belize, Bermuda, Bonaire, Brazil, the British Virgin Islands, Canada, the Cayman Islands, Colombia, Costa Rica, Cuba, El Salvador, France, Grenada, Guatemala, India, Italy, Jamaica, Mexico, Mozambique, the Netherlands, Nicaragua, Panama, Peru, Portugal, St. Kitts/Nevis, Saint Lucia, Saint Maarten, Saint Vincent, Spain, Trinidad and Tobago, Turkey, the Turks and Caicos Islands, the United Kingdom, the United States, Uruguay and Venezuela.

During 2017, an analysis of growth rates of green turtles throughout the West Atlantic Ocean was published by Karen Bjorndal, Alan Bolten and others (including BTP team members J. Gray, R. Hardy, and A. & P. Meylan) in Global Change Biology. This paper included a large data set (845 growth intervals) contributed by BTP for Bermuda green turtles. In combination with similar studies for loggerheads and hawksbills, the results showed a regionwide decline in sea turtle growth rates beginning in 1997, likely due to effects of the El Niño Southern Oscillation combined with an unprecedented warming rate over the last two to three decades.

Teamwork: while Canadian, Jaclyn Walker carefully holds a captured turtle, Giovanni Hughes of Anguilla signals to crew the animal is ready to be collected.

French participant Magali Marion, hauling in the new 1,406 ft. entrapment net

Also in 2017, BAMZ registrar, Barbara Outerbridge, and Drs. Peter and Anne Meylan worked with Armando Santos (Fundação Pró-TAMAR) and others on a manuscript describing long-distance migrations of hawksbills originally tagged in Brazil. One of the recaptures was made in Bermuda. The manuscript was submitted for consideration for publication in the Marine Turtle Newsletter.

In April of 2017, Jennifer Gray was presented The Cedar Chair Award by the English Speaking Union (ESU) in recognition of beneficial service to Bermuda and for her many years running the Bermuda Turtle Project.

A total of 1,387 volunteer hours were donated to the Bermuda Turtle Project by 34 volunteers in 2017. The volunteers included local and international students, BZS-BAMZ volunteers, STC staff and visitors, and other members of the community. We are especially grateful for the many hours contributed by Debbie Boyer to upgrade our logo and design a new look for our outreach materials.

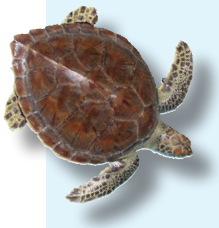
Environmental education goals of the project were furthered by several presentations in 2017. In August, Dr. Roldan Valverde (STC) gave a public lecture at the aquarium about the nesting behavior of the olive ridley turtle, *Lepidochelys olivacea*, on Pacific beaches in Costa Rica. Jennifer Gray was busy in 2017 giving project presentations for the BZS Natural History Course, The America's Cup teams (USA, UK, Sweden, France and Japan), the America's Cup Race Management Committee and the Race Authority. Prior to the beginning of the racing, presentations on appropriate response to sea turtle trauma at sea were given at all race marshal training sessions. Jennifer also presented at the WIDECAST meeting held in Curacao in March of 2017.

Early in 2017, BTP worked closely with local partners to establish and promote a Sea Turtle Hotline for public responses to sightings of, or encounters with, sick or injured sea turtles. The posters were distributed widely both in print and across social media platforms.

A group of teenagers from the Trunk Island Residential Conservation Camp joined the BTP project as observers on one of our sampling days. Sea turtles featured in the BZS education programming throughout the year.

An article on the BTP by past student Fiona Dobson was featured in a magazine published by the Cambridge University Geographical Society in the UK. BTP was also featured throughout the year in the Royal Gazette.

Sea Turtle Hotline Poster

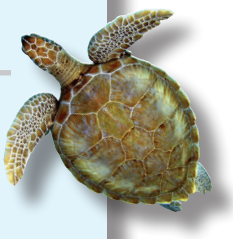


The outcomes of the Bermuda Turtle Project in 2017
were made possible by generous support from:

Atlantic Conservation Partnership
Bermuda Zoological Society
Chevron International Bermuda
Clay Frick Foundation
Eckerd College
Florida Fish and Wildlife Conservation Commission
Global Indemnity Insurance
Sea Turtle Conservancy

Satellite transmitter deployed by BTP in 2017 was funded by
RenaissanceRe

The new entrapment net
used for the 2017 sampling session was funded by the
Sea Turtle Conservancy



Information about the Bermuda Turtle Project is available at:
http://www.conserveturtles.org/bermuda/
which is maintained by the Sea Turtle Conservancy.
During 2017, this site received 2,331 unique visitors who accounted for 5,396 page views.
In addition, there were 14,970 page visits of satellite-tracked turtles from 2014-2017.

Bermuda Turtle Project continues to increase its social media presence through Facebook at:
https://www.facebook.com/Bermudaseaturtles/

Bermuda Turtle Project 2017 Field Team

Dr. Anne Meylan, Principal Investigator

Dr. Peter Meylan, Principal Investigator

Jennifer Gray, Bermuda Director

Patrick Talbot, BAMZ Curator, Aquarium & Zoo

Dr. Gaëlle Roth, Veterinary Affiliate

Bermuda Turtle Project 2017 Field Team

Nigel Pollard, Captain, "RV Endurance"

Camilla Stringer, BZS Onshore Support

Jorge Sanchez, 1st Mate "Chevron"

Emily Andrew, 1st Mate "RV Endurance"

Daniel Gray (l) and Robert Chandler (r), Volunteer Support

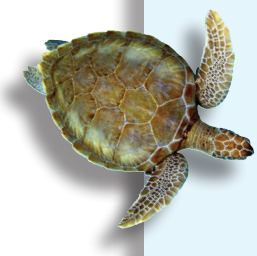
Bermuda Turtle Project 2017 Students

Damany Calder, Jamaica

Sandra Gallegos, Mexico

Miguel Batun, Mexico

Canadian, Jackie Walker, who works in Turks & Caicos



For the love of Turtles and the goodness of Conservation

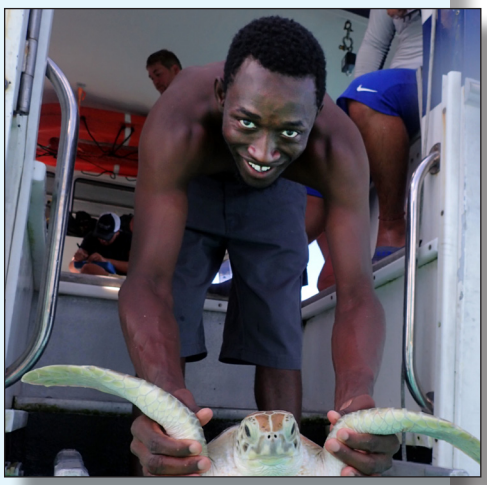
Tannia Sandoval Galeano, Guatemala

Bermuda Turtle Project 2017 Students

Giovanni Hughes, Anguilla

Joshua Stephens, Bermuda

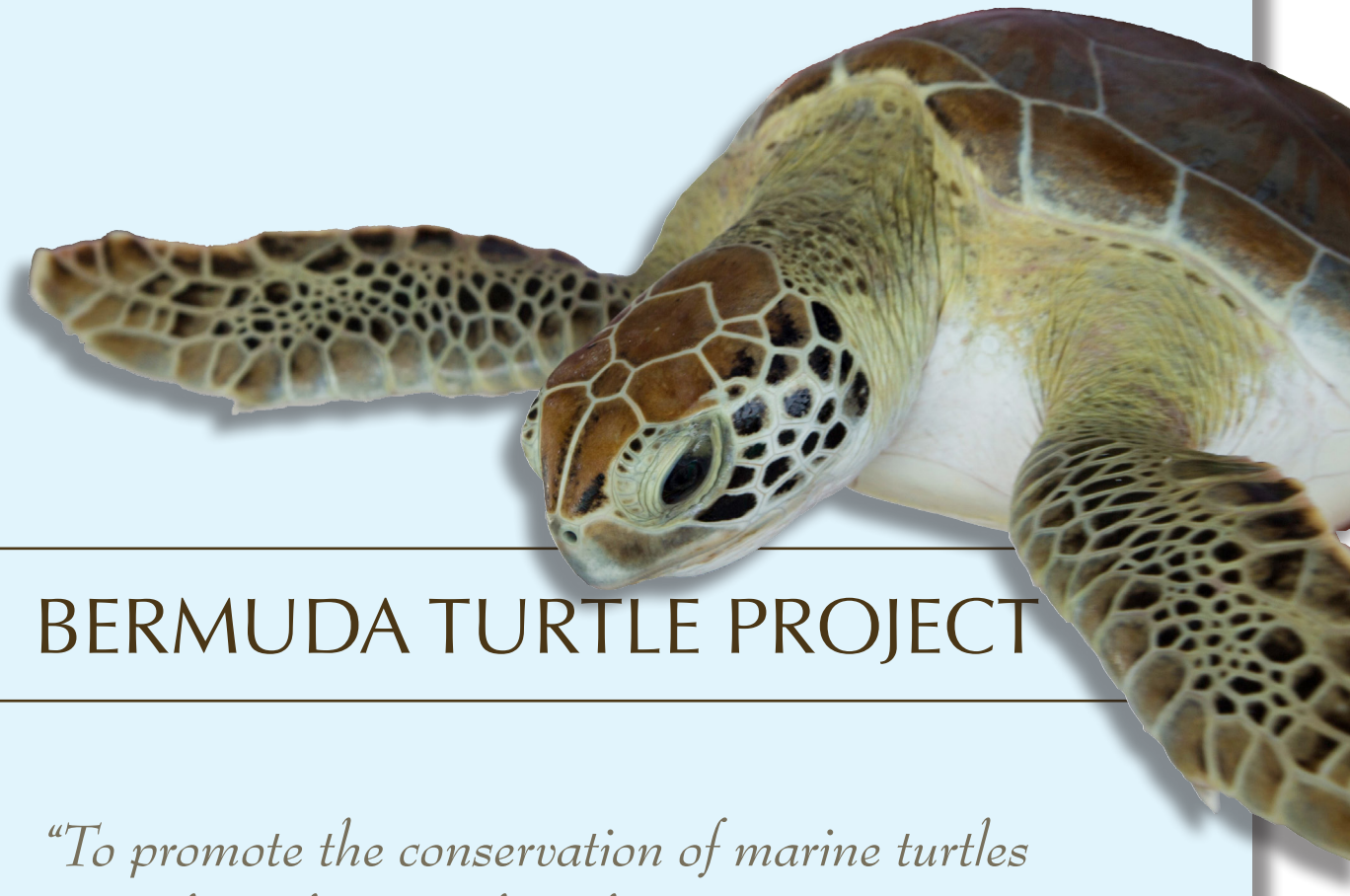
France's, Magali Marion, who works in Costa Rica



Remone Johnson, Anguilla

British, Abigail Alldis, who works in Bermuda

For the love of Turtles and the goodness of Conservation



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"To promote the conservation of marine turtles through research and conservation"

Photo: Johnny Singleton