

BERMUDA TURTLE PROJECT

Annual Report for 2020

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The Bermuda Turtle Project (BTP) continued in 2020, 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 2020 included field and laboratory research, and public education via presentations, the media, and the Bermuda Turtle Project website.

Due to the Covid-19 Pandemic and Travel Restrictions, the BTP was unable to conduct its annual sampling of the Bermuda green turtle aggregation in August 2020. While the regular course and sampling could not be carried out, team members continued with activities to further the goals of the project.

BTP's working relationship with the genetics faculty at Eckerd College continued during 2020. During 2020, we were able to sequence an additional 90 genetics samples, 72 green turtles and 18 hawksbills. Among the green turtles, we identified seven different haplotypes; among the hawksbills, six different haplotypes. The green turtles included 31 samples for which a humerus had also been collected, 24 were international recaptures for which we now have a long (~800 bp) sequence, and five were samples that were run to confirm that tissues preserved in saturated salt rather than SED buffer would provide sequence data. Two of the hawksbill samples are also associated with a collected humerus.

Analyses of sex ratios of the Bermuda green turtle foraging aggregation over time continued with help from Jeff Schwenter, South Carolina Department of Natural Resources, Dr. David Owens, emeritus faculty of the College of Charleston, and Dr. Brett Tornwall, a statistician formerly with the Florida Fish and Wildlife Conservation Commission. Collaborations continued in 2020 with Dr. Larisa Avens, NOAA, on a skeletochronology-based study of age and growth of green turtles; on green turtle diet with Dr. Karen Bjorndal and Alexandra Gulick, UF; and on

changes in diet using stable isotope analyses with Dr. Simona Ceriani, Florida Fish and Wildlife Research Institute.

Two international tag returns of green turtles originally tagged in Bermuda were received during 2020. Both involved green turtles that were tagged as immatures and then subsequently seen in a different country. One (MB2248/MB2249) was a 51 cm turtle captured on 14 February 2020 on the east coast of FL at the St. Lucie Nuclear Power Plant cooling canal. It had originally been captured on 14 August 2018 at Tudor Hill, Bermuda. A second green turtle, tagged at the Vixen on 27 May 1993, was observed on the nesting beach at the Archie Carr National Wildlife Refuge, Melbourne, FL, on 19 July 2020. The turtle (BP3766/MM463) had been tagged by BTP 27 years prior at a size of 61 cm straight carapace length. This is the second time a Bermuda-tagged green turtle has been observed on the nesting beach at the Archie Carr National Wildlife Refuge. Coordination of tag returns is handled by the Archie Carr Center for Sea Turtle Research.

BTP continues to work closely with the Bermuda Aquarium Museum and Zoo Wildlife Rehabilitation Centre (WRC) providing support, equipment, and tags, and helping with response to the Sea Turtle Stranding Hotline and strandings. The WRC received a total of 116 sea turtles in 2020, including 3 loggerhead turtles 1 hawksbill turtle and 112 green turtles. (59 DOA, 18 alive released, 33 alive died, 2 alive still in rehab). During 2020, green turtle strandings ranged from 25.2 cm to 54 cm in straight carapace length.

Necropsies are used to attempt to determine the cause of death of stranded turtles. During 2020, a total of 20 green turtles and 1 small loggerhead were necropsied. Of the 20 green turtles, 45% were female and 55% were male, 80% had macroscopically visible parasites. Four had been tagged by BTP in Bermuda. One necropsy session was observed by students from the BZS Conservation Camp. Samples collected during necropsies performed by Dr. Gaëlle Roth throughout the year are being used by collaborators for multiple purposes, including genetic identification, diet and feeding biology, determination of age-at-recruitment and identification of threats to sea turtles in Bermuda. In October 2020, there was a significant increase in green turtles needing rehabilitation due to buoyancy issues. These turtles had air trapped in the gastrointestinal system. Previously, observed buoyancy issues have been associated with hyperinflation of the lungs.

Given the importance of seagrasses in the lives of green turtles and its serious decline in Bermuda, BTP team members Jennifer Gray (BTP Bermuda Director) and Dr. Gaëlle Roth (Veterinary Affiliate, Bermuda Aquarium, Museum and Zoo - BAMZ) assisted DENR with the creation of a seagrass sanctuary in the Lagoon on Ireland Island. The goal of this effort is to establish a site in Bermuda within which seagrasses have an opportunity to propagate without grazing by green turtles. The plan was to fence off the Lagoon and remove all green turtles. During two sessions in August and September 2020, the team removed a total 16 green turtles from the Lagoon and released them in Hospitals Crawl. The BTP team collected morphometric data, tissue samples, and tagged the animals. Collectively, the Lagoon green turtles ranged from 26.3cm to 43.8cm in straight carapace length.



Two manuscripts involving BTP were published in 2020. One in *Herpetological Review* (51,1) authored by A. Meylan, R. Hardy, P. Meylan, J. Gray, B. Shamblin, H. Frandsen and D. Shaver, documented the recapture of a green turtle originally tagged in Bermuda and subsequently found cold-stunned in Texas. The turtle had traveled a minimum distance of 3,405 km. This record was the first evidence of connectivity between the Bermuda green turtle feeding aggregation and the coastal lagoons of Texas. P. Meylan, A. Meylan and J. Gray were also coauthors on a publication (*Regional Studies in Marine Science* 36 (2020) <https://doi.org/10.1016/j.rsma.2020.101318>) describing the sources (including Bermuda) and movements of marine turtles in the Gulf of Venezuela; the lead author is Hector Barrios from Venezuela.

Covid-19 Pandemic and Travel Restrictions prevented BTP from conducting its annual International Course on the Biology and Conservation of Sea Turtles. Dr. Gaëlle Roth gave project presentations in 2020 for BZS students attending Trunk Island Conservation Camp and to the children of the BZS Science Club. Jennifer Gray provided a sea turtle encounter on the BAMZ premises highlighting the research of the project which resulted in a BTP donation. Video presentations were produced in 2020 by Jennifer Gray. The first was an overview of Bermuda's sea turtles which aired on World Oceans Day. The second and third were titled 'Bermuda's Nesting Sea Turtles' and 'Celebrating 400 Years of Sea Turtle Protection'. All three were disseminated by the Bermuda Zoological Society via social media. As a part of the genetics work done by Eckerd students, Peter Meylan gave a lecture to the genetics classes that highlights BTP and how its work and conservation genetics elucidate the role of Bermuda in the green turtle life cycle.

Information about the Bermuda Turtle Project is available at <https://www.bermuidaturtleproject.org> which is maintained by the Sea Turtle Conservancy.

During 2020, the BTP website received over 1,630 unique visitors who accounted for over 3,000 page views. In addition, there were 1,234 page visits of Bermuda satellite-tracked turtles from 2014-2019. The decrease in BTP website visitation is primarily due to not having a course and not having any satellite tagged turtles for people to follow online. BTP continues to increase its social media presence through Facebook at <https://www.facebook.com/Bermudaseaturtles/>.

A total of 152 volunteer hours were donated to the Bermuda Turtle Project by 4 volunteers in 2020. We are especially grateful for the hours contributed by team member and veterinarian, Dr. Gaëlle Roth, and Debbie Boyer who produces outreach materials for the project.

BTP has, in 2020, entered into a succession strategy with training for Dan Evans and Rick Herren to replace Anne and Peter Meylan as Scientific Directors of BTP. Gaëlle Roth is in training to succeed Jennifer Gray as the Bermuda Director of BTP. The work of the Bermuda Turtle Project in 2020 was made possible by generous support from the Atlantic Conservation Partnership, the Bermuda Zoological Society, the Helen Clay Frick Foundation, Eckerd College, Florida Fish and Wildlife Conservation Commission, and the Sea Turtle Conservancy.