

Tale of the unlucky tags: the story of a rescued, rehabilitated, and released green sea turtle (*Chelonia mydas*) in southern Taiwan

Fu-Wen Kuo ¹, Tung-Yung Fan ¹, Connie Ka-Yan Ng ²,
Yaru Cai ³, George H Balazs ⁴, Tsung-Hsien Li ^{1*}

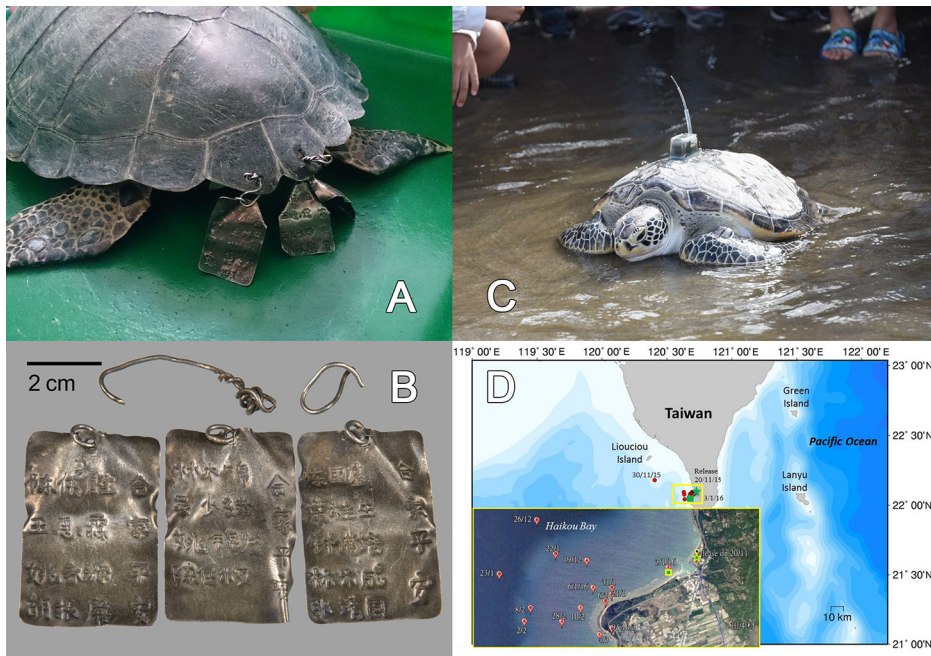
¹ National Museum of Marine Biology and Aquarium, Pingtung 944, Taiwan, ROC.

² Department of Biology and Chemistry and State Key Laboratory in Marine Pollution, City University of Hong Kong, Kowloon Tong, Hong Kong Special Administrative Region, PRC.

³ Marine National Park Headquarters, Kaohsiung City 811, Taiwan, ROC.

⁴ Pacific Islands Fisheries Science Center, National Marine Fisheries Service, Honolulu, Hawaii 96822-2396.

* Corresponding author email: <liht@nmmba.gov.tw>, telephone: 886-8-8825001.



Sea turtles are a source of fascination to many, and yet human interactions with these animals are more often negative than positive. Sea turtles are important components of ocean ecosystems; however, their numbers are in decline in many regions (Spotila et al. 1996, Jackson et al. 2001, Chan 2006). Fortunately, some sea turtle populations in the world have been increasing over the past two to three decades following implementation of conservation strategies (Chaloupka et al. 2008). Five sea turtle species can be found in Taiwanese waters, including the green [*Chelonia mydas* (Linnaeus, 1758)], loggerhead [*Caretta caretta* (Linnaeus, 1758)], hawksbill [*Eretmochelys imbricate* (Linnaeus, 1766)], olive ridley [*Lepidochelys olivacea* (Eschscholtz, 1829)], and the leatherback [*Dermochelys coriacea* (Vandelli, 1761)] turtles. The green turtle has a worldwide distribution in tropical and subtropical seas, and is the most common species in Taiwanese waters. This species is known for its long-distance migrations of hundreds to thousands of kilometers between nesting and foraging sites.

Each year the National Museum of Marine Biology and Aquarium (NMMA) in Taiwan receives many calls from the public regarding stranded and injured marine animals, including whales, dolphins, and most commonly, sea turtles. The major factors responsible for injury, sickness, and death of these sea turtles include the consumption of marine trash, boat strikes, entanglement in discarded fishing nets, and ingestion of, or impalement by, fishing hooks.

On June 15, 2015, the coast guard received a call about a unique and unfortunate situation where Buddhist beliefs and animal welfare are in conflict. There is a belief in Buddhism (termed *fang sheng*) that suggests releasing tagged animals into the wild will bring about mercy and good fortune. However, inappropriate tags and tagging can be harmful to turtles. Local soldiers came across a small green sea turtle (*C. mydas*) that was unable to dive and, as a result, was floating precariously inside Haikou harbor (22°05'28N, 120°42'52E) off southern Taiwan. The soldiers thought that the turtle may have been hit by a fishing boat, so they brought it to shore and contacted NMMBA. We promptly went to the harbor to tend to the turtle and found a sea turtle with a tag attached to its posterior carapace. Upon further observation, we discovered that small holes had been drilled into its posterior carapace to enable the attachment of "homemade" silver tags (Panel A). The tags were engraved with people's names and the lucky Chinese characters, 合家平安, which means to bring blessings to one's family (Panel B). Regrettably, this incident of human-turtle interaction brought about an unfortunate result. Because of repetitive rubbing of the silver tags, the turtle's rear flippers were severely swollen and there was evidence of substantial infection. This turtle would likely have died from this infection and was lucky to have been spotted by the soldiers.

We transported the turtle back to NMMBA, where its condition was assessed and a thorough health exam was undertaken. The injured green sea turtle was a juvenile (sex unknown) and the curved carapace length was 51.3 cm. An initial plasma biochemistry profile revealed high plasma creatinine kinase (5160 U L⁻¹) concentration due to muscle damage to the flippers, and high blood urea nitrogen (122 mg dl⁻¹) concentration due to dehydration. Fortunately, radiographic assessment indicated no fishing hooks present in its esophagus and stomach. Analysis of the turtle's fecal matter, however, did reveal evidence of consumed plastic bags, and parasites.

The road to recovery for this turtle was long, and at times challenging. Of particular concern was the young turtle's initial refusal to eat upon arriving at NMMBA, but as medication was administered and the treatment regimen for its flippers progressed, it finally began to eat. After 5 mo of treatment, the turtle gained 2 kg, its injuries healed, and its rear flipper function was comparable to that of other rehabilitated turtles without flipper injuries. The turtle was successfully released, equipped with a satellite transmitter (Panel C) at Haikou Beach with the help of local school children on November 20, 2015. The first tracking signal was received on November 30, 2015. During the 105 d of tracking (Panel D), the turtle did not undertake any long-distance migration, but rather resided in the coastal waters of Haikou Bay. The tracking data suggested that the rehabilitated turtle continued to live well in the wild and stayed in the area where it was initially found stranded.

The interactions that this turtle has had with people is a clear demonstration of both the harmful and helpful influence that humans can have on marine animals. The experience of this turtle was unfortunate, but it also presents an excellent opportunity for public education. We hope that by involving many people in both the recovery and release of sea turtles, we can play a role in enhancing the understanding and importance of sea turtle protection.

ACKNOWLEDGMENTS

Sea turtle rehabilitation work at the National Museum of Marine Biology and Aquarium was approved and supported by the Forestry Bureau of Taiwan. We thank the Southern Coastal Patrol Office, especially Team #62, who initially caught and temporarily settled the injured turtle. We thank YR Liu and C McRae for their kind and generous help preparing this manuscript, and are greatly appreciative of LB Wang and JY Su for their photography contributions.

LITERATURE CITED

- Chaloupka M, Bjørndal KA, Balazs GH, Bolten AB, Ehrhart LM, Limpus CJ, Sugauma H, Troëng S, Yamaguchi M. 2008. Encouraging outlook for recovery of a once severely exploited marine megaherbivore. *Glob Ecol Biogeogr.* 17:297–304. <http://dx.doi.org/10.1111/j.1466-8238.2007.00367.x>
- Chan EH. 2006. Marine turtles in Malaysia: on the verge of extinction? *Aquat Ecosyst Health Manage.* 9:175–184. <http://dx.doi.org/10.1080/14634980600701559>
- Jackson JBC, Kirby MX, Berger WH, Bjørndal KA, Botsford LW, Bourque BJ, Bradbury RH, Cooke R, Erlandson J, Estes JA, et al. 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science.* 293(5530):629–637. <http://dx.doi.org/10.1126/science.1059199>
- Spotila JR, Dunham AE, Leslie AJ, Steyermark AC, Plotkin PT, Paladino FV. 1996. Worldwide population decline of sea leatherback turtles going extinct? *Chelonian Conserv Biol.* 2:209–222.

Date Submitted: 10 October, 2016.

Date Accepted: 1 December, 2016.

Available Online: 9 January, 2017.

