

Satellite Tracking of Rehabilitated Sea Turtles in the South China Sea

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Introduction

Sea turtles are globally endangered species and face anthropogenic threats. National Museum of Marine Biology and Aquarium regularly receives stranded sea turtles in need of medical treatment from public reports in southern Taiwan. Green turtle (*Chelonia mydas*) is the most common species encountered. These sea turtles are treated and rehabilitated at the NMMBA, and then released when considered physically fit.

The Objectives of this Study

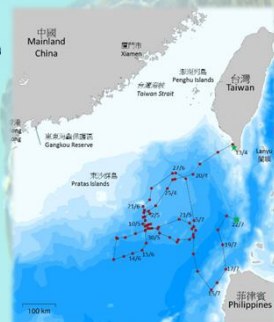
To understand the post-release movements and survivorship of these turtles, and to enrich knowledge of the foraging grounds of sea turtles in the South China Sea, we have developed since 2013 an on-going collaborative project to satellite track the rehabilitated sea turtles.

Materials and Methods

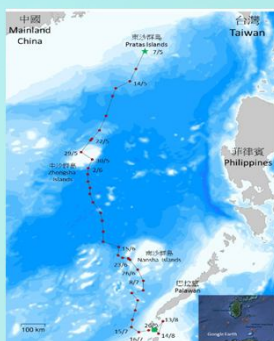
A satellite transmitter was attached to the carapace of each suitable turtle with fiberglass resin protocols described by Balazs et al. (1996). Tracks were plotted using only the most representative and accurate daily location points by Maptool (SEATURTLE.ORG, Inc. <http://www.seaturtle.org/maptool/>). To date, eight sea turtles, including six green turtles and two olive ridley turtles, were tagged with satellite transmitters and released. Background and tracking results of these rehabilitated sea turtles are summarised as follows:

Results

1. A sub-adult olive ridley turtle was released from the beach of the NMMBA in April 2013. From the 100-day tracking results, the turtle moved in several cyclonic patterns nearby Dongsha (Pratas) Islands and the northern Philippines. This kind of movement pattern indicates the pelagic foraging behavior of olive ridley turtles in the open sea, which appears to follow the direction of currents as reported in Polovina et al. (2004).



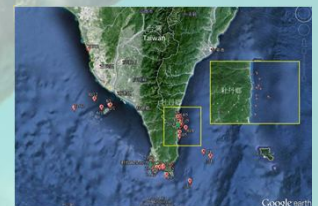
2. A juvenile green turtle was released at Dongsha Island, where it was first found stranded in an abandoned fishing net, in May 2013. From the 142-day tracking results, the turtle travelled in a relatively determined course and reached its foraging ground in south of Palawan, the Philippines. Interestingly, this same foraging ground was visited by nesting green turtles from Taiping Tao, Nansha Archipelago (Cheng, 2007) and Wan-an Island of Taiwan (Cheng, 2010).



3. A juvenile green turtle was released at NMMBA in September 2013. Transmitter signals were started to receive in September 2014. According to the signal, the transmitter (possibly the turtle) was stranded in the area north to NMMBA. The track ended in 16 days.



4. A sub-adult green turtle was released at Kenting in December 2013. During the 237-day tracking, the turtle first travelled to the waters around Liouciou Island, then moved southwards and then eastwards and stayed in the coastal waters of East Taiwan for around two months before the track ended.



5. A juvenile green turtle was also released at Kenting in December 2013. The turtle travelled to East Taiwan in two weeks and settled there for around 4 months before the track ended. The tracking lasted for 147 days. Foraging pastures of both turtles no. 4 and no. 5 are in the same area of East Taiwan.



6. A juvenile green turtle was released at NMMBA in April 2014. During the first month of tracking, the turtle resided in waters of southern and eastern Taiwan. According to the signal, the transmitter (possibly the turtle) was found stranded on Tosaku Bay, Taitung since July until the signal ended in October 2014.



7. A juvenile green turtle was released at NMMBA in May 2014. The turtle travelled northwards along the west coast in around 25 days before it settled in Danshui for more than 3 months. The tracking lasted for 124 days.



8. A male olive ridley turtle was released at NMMBA in October 2014. The turtle travelled along the west coast and started to move in a cyclonic pattern in the southern Ryukyu Islands, Japan for about 3 weeks. This again demonstrates the pelagic feeding habit of olive ridley turtle. The turtle then moved further northwards and settled around Nanju Shan of Fujian, mainland China. The tracking lasted for 88 days.



Conclusion

The above trackings revealed that rehabilitated sea turtles survived well in the wild. This project also enriches our understanding on the distribution of foraging grounds of green turtles and olive ridley turtles in Taiwan (in particular East Taiwan), the South China Sea (i.e. the Philippines). We gratefully acknowledge the Marine National Park Headquarters to support this project and thank City University of Hong Kong for supplying satellite transmitters.

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野生物和棲地的保育和經營管理

南海康復海龜的衛星追蹤

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Sea turtles are globally endangered species and face anthropogenic threats of all kinds. Dr. Tsung-Hsien LI of the National Museum of Marine Biology and Aquarium (NMMBA) regularly receives stranded sea turtles in need of medical treatment from public reports in southern Taiwan. Green turtle (*Chelonia mydas*) is the most common species encountered, followed by the hawksbill turtle (*Eretmochelys imbricata*), the olive ridley (*Lepidochelys olivacea*) and rarely the leatherback turtle (*Dermochelys coriacea*). These sea turtles are treated and rehabilitated at the NMMBA, and then released when considered physically fit. To understand the post-release movements and survivorship of these turtles, and to enrich knowledge of the foraging grounds of sea turtles in the South China Sea, we have developed since 2013 an on-going collaborative project to satellite track the rehabilitated sea turtles. A satellite transmitter was attached to the carapace of each suitable turtle with fiberglass resin protocols described by Balazs et al. (1996). The weight of the transmitter package was less than 5% of the body weight of the turtles to minimize potential impact to the turtles. Tracks were plotted using only the most representative and accurate daily location points by Maptool (SEATURTLE.ORG, Inc. <http://www.seaturtle.org/maptool/>). To date, eight sea turtles, including six green turtles and two olive ridley turtles, were tagged with satellite transmitters and released. Background and tracking results of these rehabilitated sea turtles are summarised as follows:

1. A sub-adult olive ridley turtle was released from the beach of the NMMBA in April 2013. From the 100-day tracking results (Map 1), the turtle moved in several cyclonic patterns nearby Dongsha (Pratas) Islands and the northern Philippines. This kind of movement pattern indicates the pelagic foraging behavior of olive ridley turtles in the open sea, which appears to follow the direction of currents as reported in Polovina et al. (2004).

2. A juvenile green turtle was released at Dongsha Island, where it was first found stranded in an abandoned fishing net, in May 2013. From the 142-day tracking results (Map 2), the turtle travelled in a relatively determined course and

reached its foraging ground in south of Palawan, the Philippines. Interestingly, this same foraging ground was visited by nesting green turtles from Taipin Tao, Nansha Archipelago (Cheng, 2007) and Wan-an Island of Taiwan (Cheng, 2010).

3. A juvenile green turtle was released at NMMBA in September 2013. Transmitter signals were started to receive in September 2014. According to the signal, the transmitter (possibly the turtle) was stranded in the area north to NMMBA (Map 3). The track ended in 16 days.

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5. A juvenile green turtle was also released at Kenting in December 2013. The turtle travelled to East Taiwan in two weeks and settled there for around 4 months before the track ended. The tracking lasted for 147 days (Map 5). Foraging pastures of both turtles no. 4 and no. 5 are in the same area of East Taiwan.

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7. A juvenile green turtle was released at NMMBA in May 2014. The turtle travelled northwards along the west coast in around 25 days before it settled in Danshui for more than 3 months. The tracking lasted for 124 days (Map 7).

8. A male olive ridley turtle was released at NMMBA in October 2014. The turtle travelled along the west coast and started to move in a cyclonic pattern in the southern Ryukyu Islands, Japan for about 3 weeks. This again demonstrates the pelagic feeding habit of olive ridley turtle. The turtle then moved further northwards and settled around Nanju Shan of Fujian, mainland China. The tracking lasted for 88 days (Map 8).

The above trackings revealed that rehabilitated sea turtles survived well in the wild. This project also enriches our understanding on the distribution of foraging grounds of green turtles and olive ridley turtles in Taiwan (in particular East Taiwan), the South China Sea (i.e. the Philippines). We encourage consistent efforts be devoted in the research of wildlife rehabilitation and management. We gratefully acknowledge the Marine National Park Headquarters to support this project and thank City University of Hong Kong for supplying satellite transmitters. Connie Ka-yan NG thanks her co-authors and Denise M. Parker for their science support of her dissertation research.

Keywords: sea turtle, rehabilitation, satellite tracking, South China Sea