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# Marine Turtle Newsletter

## Linking Micronesia and Southeast Asia: Palau Sea Turtle Satellite Tracking and Flipper Tag Returns

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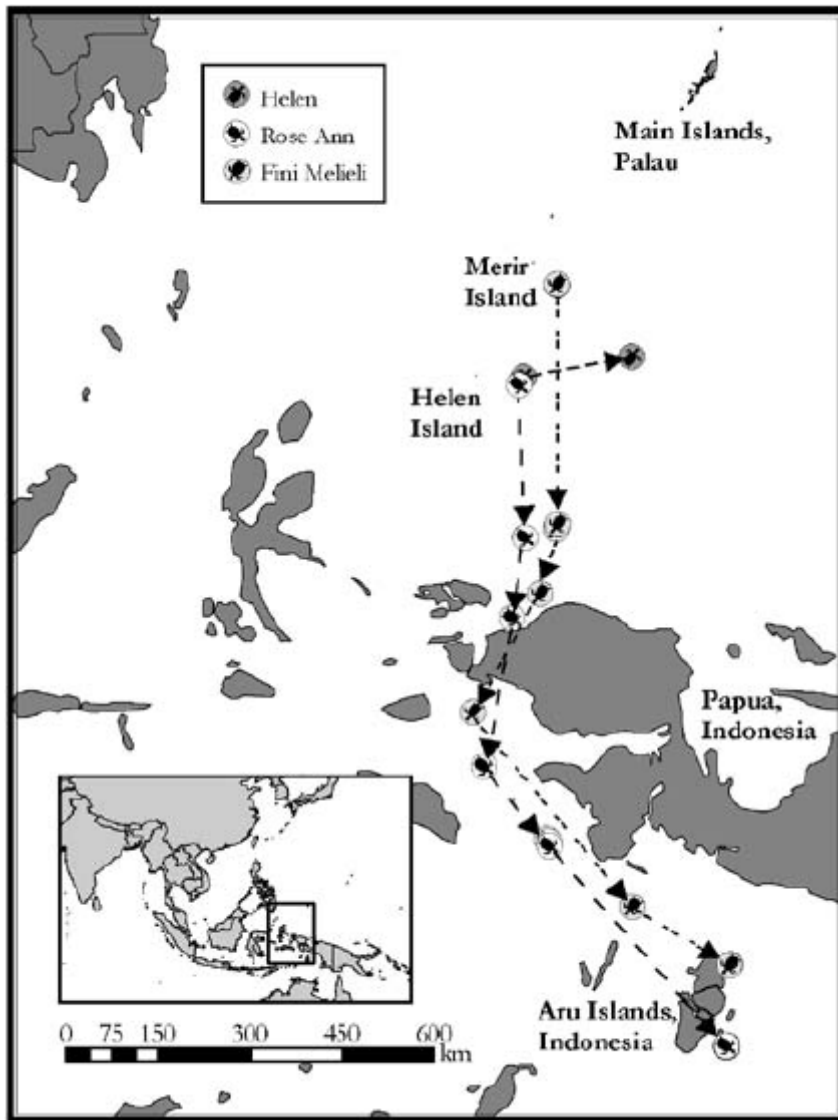
The richness of the ocean surrounding the nation of Palau has played an essential role in sustaining the Palauan people for millennia. Marine turtles, a highly valued part of this marine biodiversity, are a source of food and hawksbill shell is used to make *toluk*, traditional women's money that circulates at funerals and first birth ceremonies (Matthews 2005; Guilbeaux 2001). Palau's most frequently harvested turtle species are hawksbill turtles, *ngasech*, and green turtles, *melob*. These species are listed as critically endangered and vulnerable, respectively, according to the World Conservation Union (Meylan & Donnelly 1999).

An ongoing challenge for the Republic of Palau and the Pacific Region is to adequately monitor turtle populations to determine their relative abundance, distribution, and migration patterns. As a result, the Bureau of Marine Resources (BMR) within the Palau National Government initiated the Marine Turtle Conservation and Monitoring Project (MTCMP) in September 2004. The project, coordinated by BMR, is a collaborative effort involving the Koror State Rangers, Division of Fish & Wildlife Protection, Palau Conservation Society, Palau Automated Land and Resource Information Systems, Community Conservation Network, Helen Reef Project, Sonsorol State Turtle Project, and Kayangel State.

The Republic of Palau has one of Micronesia's largest nesting populations of hawksbill turtles (*Eretmochelys imbricata*) (NMFS & USFWS 1998). In Palau, hawksbill turtles nest primarily in the Rock Islands Southern Lagoon area of Koror State, an area particularly important for recreational and tourist activities (Matthews 2005). The majority of Palau's threatened green turtles (*Chelonia mydas*) nest on Helen Island and Merir Island in the remote Southwest Islands (NMFS & USFWS 1998).

To raise public awareness of sea turtles and shed light on their migration routes, the MTCMP began a satellite tracking and flipper tagging project. Four Telonics ST-20 Platform Terminal Transmitters (PTTs) were attached with marine resin and fiberglass cloth to the carapace of one hawksbill and three green turtles after nesting, following the methodology of Balazs *et al.* (2005). Their movements were tracked using ARGOS/CLS technology. Spatial information from the transmitters was sent via e-mail to the MTCMP office where the most accurate positions, with location classes (LC) of 0, 1, 2, 3, or A at biologically realistic speeds (Blumenthal *et al.*

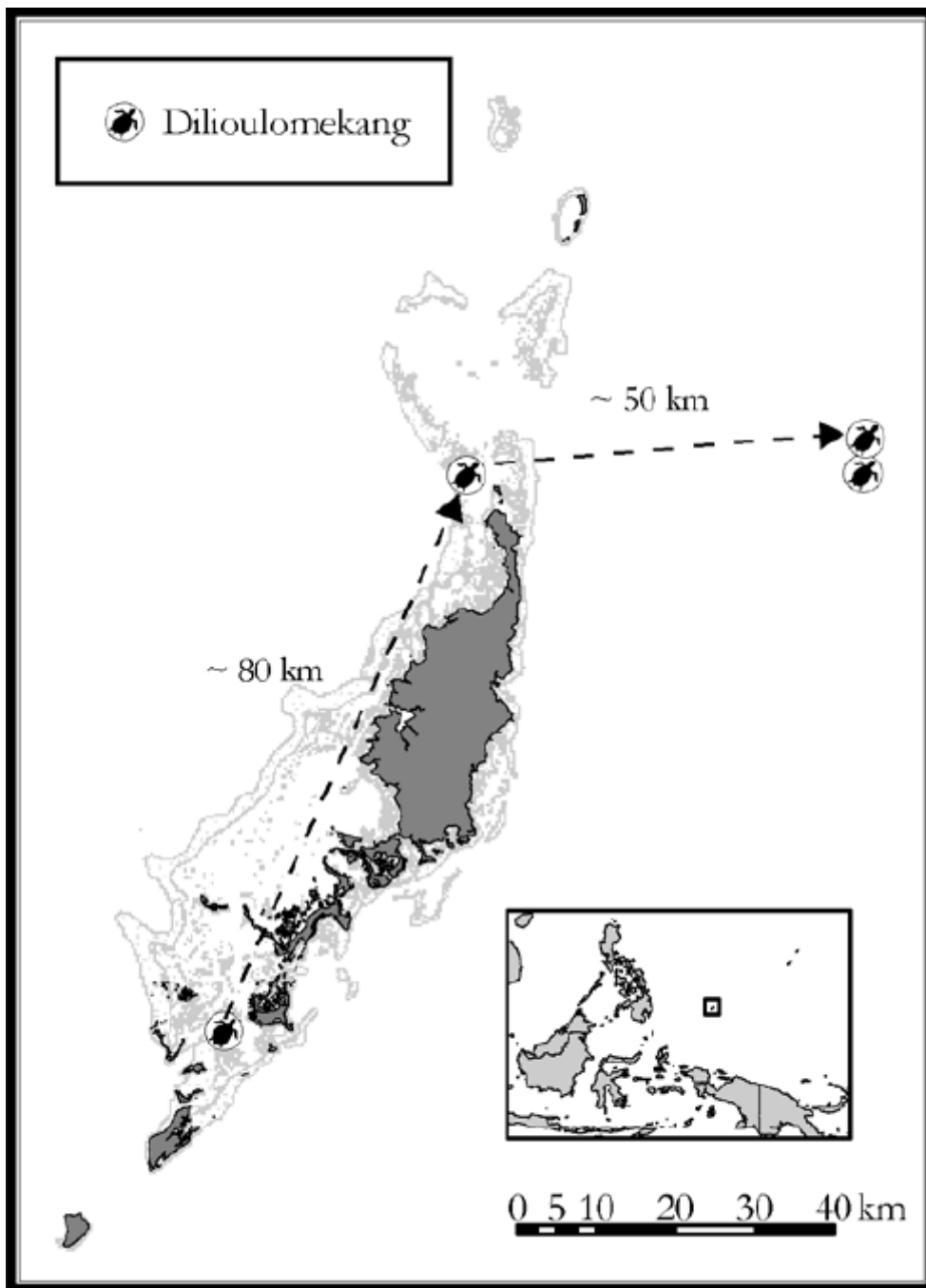
2006), were mapped to construct routes and estimate distance traveled (Figure 1). These coordinates were imported into ArcMap GIS 8.3© to create custom maps. The MTMCP also established an account on seaturtle.org using the Satellite Tracking and Analysis Tool (STAT, Coyne & Godley 2005).



**Figure 1.** Migratory routes of three post-nesting green turtles, two of which were tracked from Palau's Southwest Islands to Indonesia's Aru Islands.

**Satellite Tracking.** On July 27, 2006, a satellite transmitter was mounted on a hawksbill, Dilioulomekang, that nested in the Southern Lagoon in Koror state. A second transmitter was mounted on Helen, a green turtle nesting on Helen Island, on September 27, 2006. This turtle's transmitter sent four location class B messages, the last of which was received on October 9, 2006. Conservation officers reported that she returned to Helen Island to nest again on October 12, but her transmitter ceased to transmit. A third transmitter was attached to a nesting green turtle, Fini Melieli, on Merir Island on November 1, 2006. An additional ST-20 was mounted on a post-nesting turtle, Rose Ann, on Helen Island on December 8, 2006.

Results of the tracking (Figure 1) show that both Fini Melieli and Rose Ann migrated directly south to West Papua, Indonesia. Fini Melieli migrated approximately 1,500 km to the northeast of the Aru Islands in 37 days where she last transmitted on February 11th, 102 days after she began transmitting. Rose Ann migrated approximately 1,300 km to reach the southeastern shores of Aru Islands in 39 days. Rose Ann has remained in the same vicinity, sending numerous LC B messages, but only 3 LC A messages. The last LC A transmission was March 2, 84 days after she was fitted with a transmitter. Based on this tracking information, the foraging grounds of these two green turtles appears to be the Aru Islands.



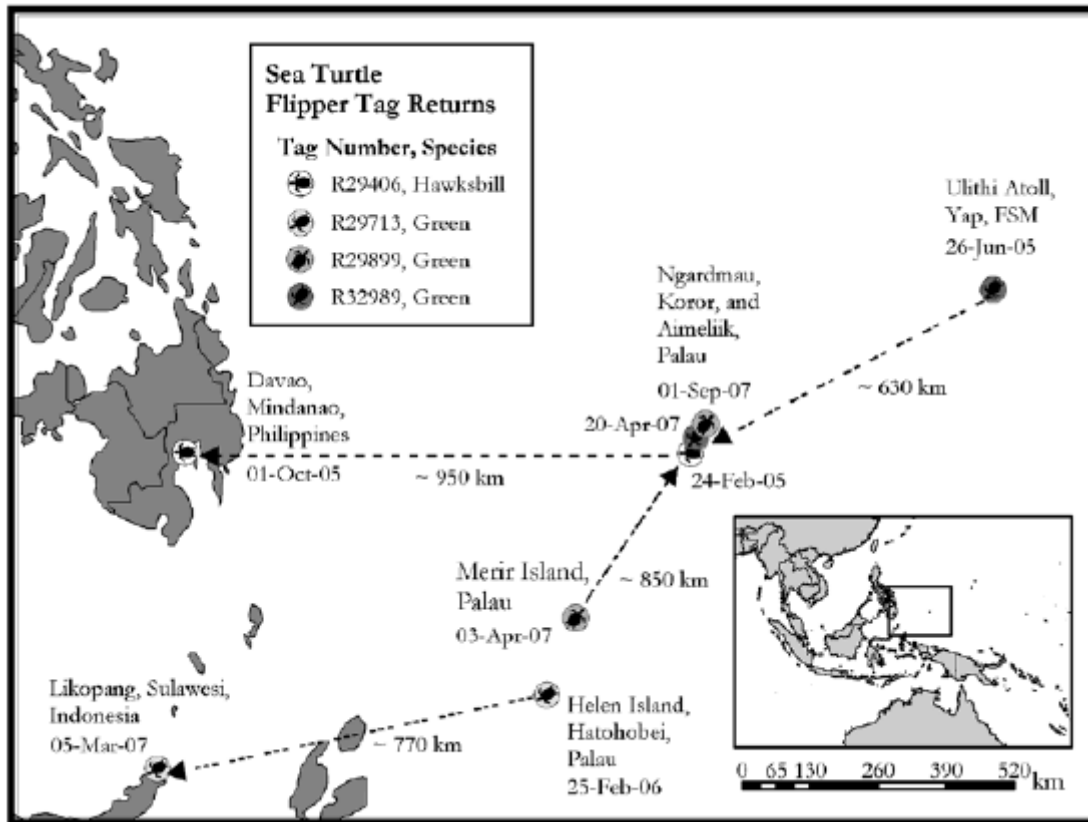
**Figure 2.** Tracking the hawksbill turtle Dilioulomekang near the Main Islands of Palau.

The hawksbill's transmitter sent messages lacking latitude and longitude until June 6, 2007 (Figure 2). The MTCMP speculates that the numerous limestone Rock Islands of Koror State interfered with her earlier transmissions. Dilioulomekang was tracked approximately 135 km from the beach where she nested when her last transmission was received on June 24, 2007.

The MTCMP plans to mount another transmitter on a post-nesting hawksbill turtle in the Rock Islands of Palau to learn more about the animal's migration. The MTCMP hopes that this planned tracking project will spotlight a hawksbill as Palau's government is considering a five year moratorium on hawksbill harvest with the support of the Palauan women's group.

Satellite tracking reflects the movements of a small number of sea turtles, not populations as a whole. It is likely that there are several foraging sites for green and hawksbill turtles that nest in Palau and the satellite tracking work together with the flipper tagging recaptures in the region have identified a few of these areas. Similar to the tagging recapture results from neighboring Yap State of the Federated States of Micronesia (Kolinski 1995), the turtles that nest in Palau range widely in the Western Pacific and Southeast Asia.

**Flipper Tagging.** In addition to satellite tracking, flipper tagging is ongoing in Palau. Turtles are tagged on both front flippers with titanium flipper tags using Stockbrands, Inc applicators. The piercing site is proximal of and adjacent to the first large scale on the posterior edge of the flipper (Balazs 1999).



**Figure 3.** Tag recaptures linking Micronesia, Indonesia, and the Philippines.

Since 2004, 187 nesting green turtles, 51 foraging green turtles, and 6 foraging hawksbills have been tagged on Helen Island. The foraging turtles were captured with a dip-net and by in-water rodeo methods developed by Ehrhart & Ogren (1999) which included sighting, pursuing, and capturing the turtles from a small boat. On Merir, 73 nesting green turtles have been tagged. On the main islands of Palau, three nesting greens, two captured and released olive ridleys (*Lepidochelys olivacea*), and 16 captured and released hawksbills have been tagged. The majority of the turtle tagging has been accomplished by state conservation officers who are working in partnership with the national turtle monitoring program.

The MTCMP office received recapture information on a hawksbill turtle tagged on February 24, 2005 in Malakal, Palau, then caught with a fisherman's net in Davao, Philippines on October 1, 2005 (Figure 3). This hawksbill was released after the tag was removed. This hawksbill tag recapture information was provided by the Secretariat of the Pacific Regional Environment Programme, the organization that provides flipper tags to member countries including the Republic of Palau and the Federated States of Micronesia.

On February 25, 2006, Helen Reef Conservation Officers tagged a post-nesting green turtle on Helen Island in Hatohobei State that was caught by a fisherman in Likopang, Northern Sulawesi, Indonesia on March 5, 2007 (Figure 3). After measuring the minimum curved carapace length (106 cm in 2007 compared to 105 cm measured in 2006), this turtle was released by WWF-Indonesia in Manado.

A turtle with a tag in each front flipper was caught near Aimeliik State off the southwestern shores of the main island of Palau on March 20, 2007 (Figure 3). This green turtle nested approximately 630 km away on Gielop Island in Ulithi Atoll, Yap State, Federated States of Micronesia, where the post-nesting turtle was tagged nearly two years ago on June 26, 2005. This tagging was done as part of the Yap State Marine Turtle Project.

On September 5, 2007, a fisherman caught a tagged green turtle in Ngardmau Channel near the main island of Palau. Sonsorol State Conservation Officers tagged this turtle that nested on Merir Island on April 3, 2007.

Similar to traditional Micronesians who were among the world's greatest seafarers, this tracking and tagging information demonstrates that Palau's marine turtles navigate vast stretches of open-ocean. Tracking turtle migrations with flipper tags and satellite transmitters has been a catalyst leading to increased exchanges of information among Palau and neighboring countries. Since sea turtles are a shared resource in the Pacific, responsibility for their management must also be shared. International collaboration is necessary to ensure the future of these species threatened by over-harvesting, habitat destruction, nest poaching, pollution, and off-shore fisheries impacts.

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