

# Ships of Opportunity

## Releasing Satellite-tagged Loggerheads on the High-seas to Study their Pelagic Ecology

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Life on the high seas is one of the last great frontiers for sea turtle exploration, inquiry and discovery. In the Pacific ocean, significant progress has begun in understanding the ecology and oceanic movements of juvenile pelagic loggerhead in northern and southern hemispheres comprising distinct genetic stocks derived from nesting beaches in Japan and New Caledonia/Australia respectively. Our advances in knowledge to date have been made possible by the availability of smaller satellite-linked tracking tags and the enhanced sensitivity of CLS Argos receivers on board orbiting satellites. We have overcome the immense challenge of directly capturing immature loggerheads on the high seas by substituting robust aquarium-reared turtles transported by ship for offshore release. We have also utilized turtles taken as pelagic long line by-catch then satellite-tagged and released by trained shipboard observers. Turtles incidentally taken in offshore commercial pound nets targeting pelagic fish have also contributed to our international research partnership program.

From 1997-2012, 523 loggerheads with satellite tags have been released, 374 of which were aquarium reared involving 14 deployments after 2003 from eight different ships, including fishery training vessels, cargo vessels, a passenger liner, a French Navy ship and a whale-watching tour boat. Eighty-eight turtles from the New Caledonia Aquarium des Lagons were released south of the equator, and 286 from the Port of Nagoya Public Aquarium (Japan) were released in northern latitudes. Carapace lengths ranged from 23-75 cm. Deployment locations included: the Kuroshio Current off Japan (30-35N, 131-141E); the Sea of Japan (37N, 136E); midway between Japan and Hawaii (33N, 176E); midway between New Caledonia and New Zealand (30S, 171E); and 200 nm southeast of New Caledonia (25S, 163E). Tracking lasted up to 1434 days in the northern hemisphere and 764 days in southern latitudes. Maximum distance traveled by a northern-stock turtle was 25,900 km and 15,290 km for a southern-stock turtle. Detailed findings to date of our pelagic loggerhead investigations are presented in 12 journal publications available at:

Three overall conclusions can be drawn from the success of our work:

- 1) International partnerships of mutual understanding, trust and goodwill are essential to study sea turtle populations that span an ocean basin;
- 2) Aquarium-reared loggerheads released into appropriate high-seas habitats are acceptable replacements for the research of wild-captured turtles; and
- 3) our voluminous archive of tracking data constitutes a significant resource for new analytical approaches involving collaboration.



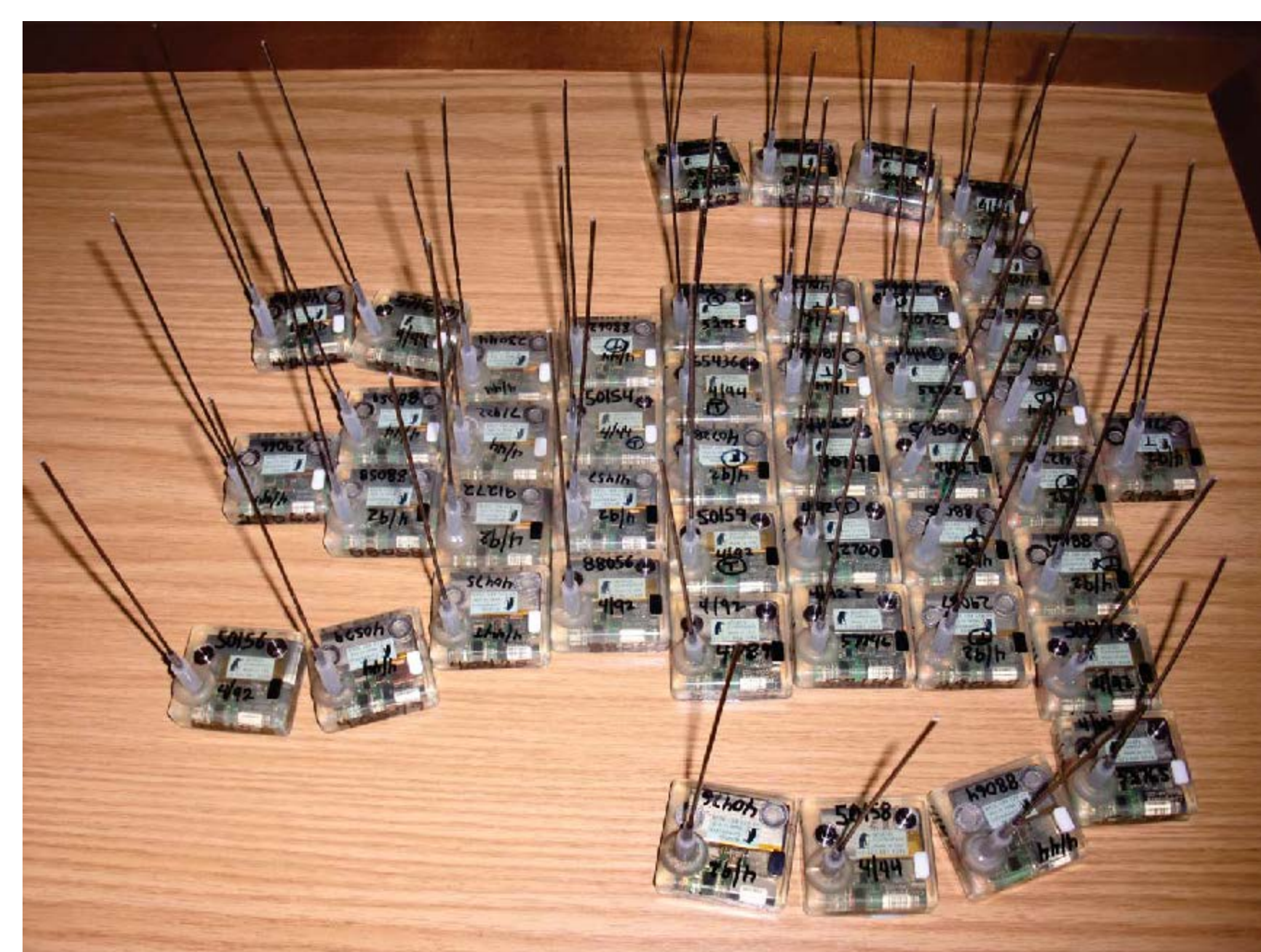
Above is the Port of Nagoya Public Aquarium and below is Aquarium des Lagons where loggerhead turtles have been raised and used in these satellite tracking studies.



Above are four of the ships that we have used to deploy some of the 374 juvenile loggerheads raised at the Port of Nagoya Public Aquarium, Japan and the Aquarium des Lagons, Nouvelle Caledonie. From left to right, top to bottom, French cargo ship (Nouvelle Caledonie), Japanese Fisheries training vessel, Japanese whale watching vessel and a Japanese Taiheiyo Ferry. Additional vessels that have been used are a French Navy vessel, a Japanese deep sea crab fishing vessel, and a Singapore cargo ship.



Two of the ways we released satellite tagged juvenile loggerheads: on the left 48 juveniles are released from a cargo ship southwest of New Caledonia and on the right juveniles are release off the coast of Japan.

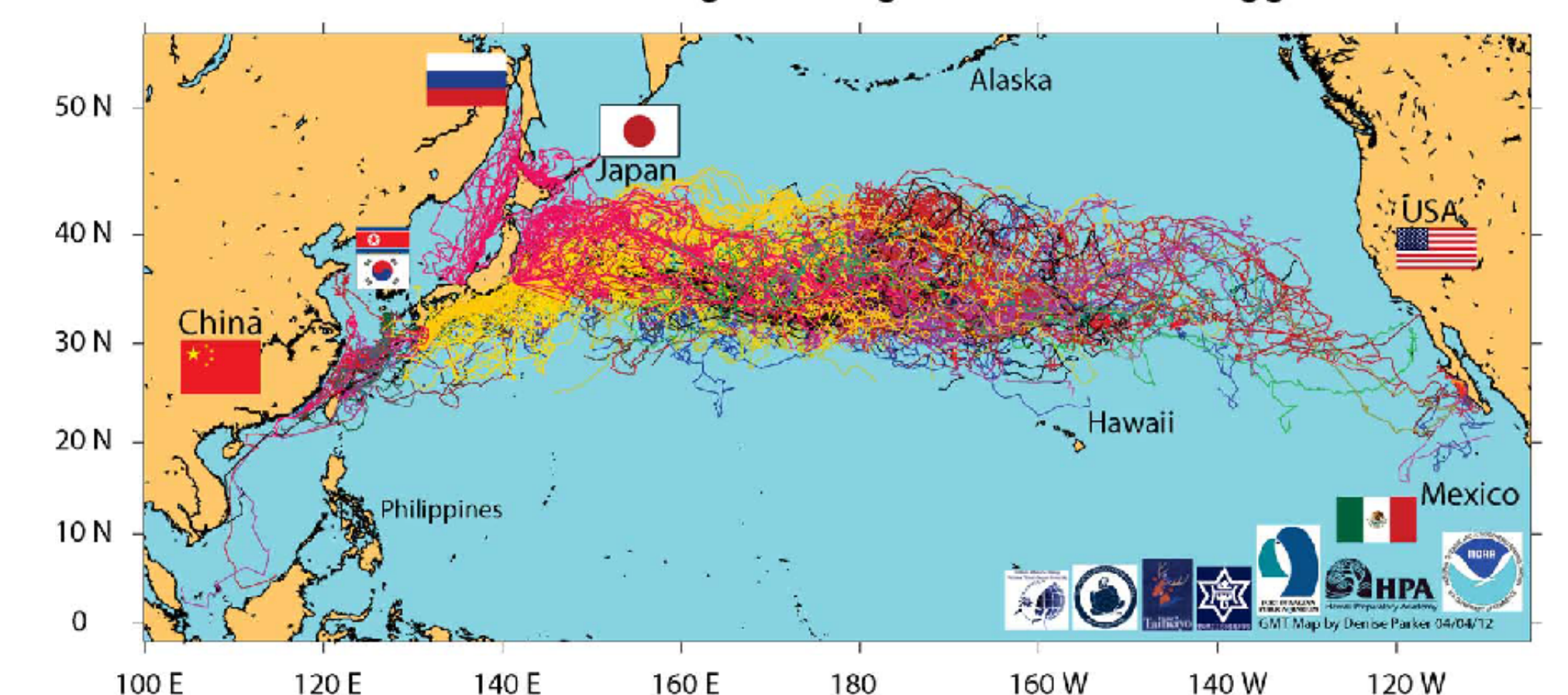


An array of SPOT5 satellite tags prior to their attachment to juvenile loggerhead turtles at Aquarium des Lagons, Nouvelle Caledonie.



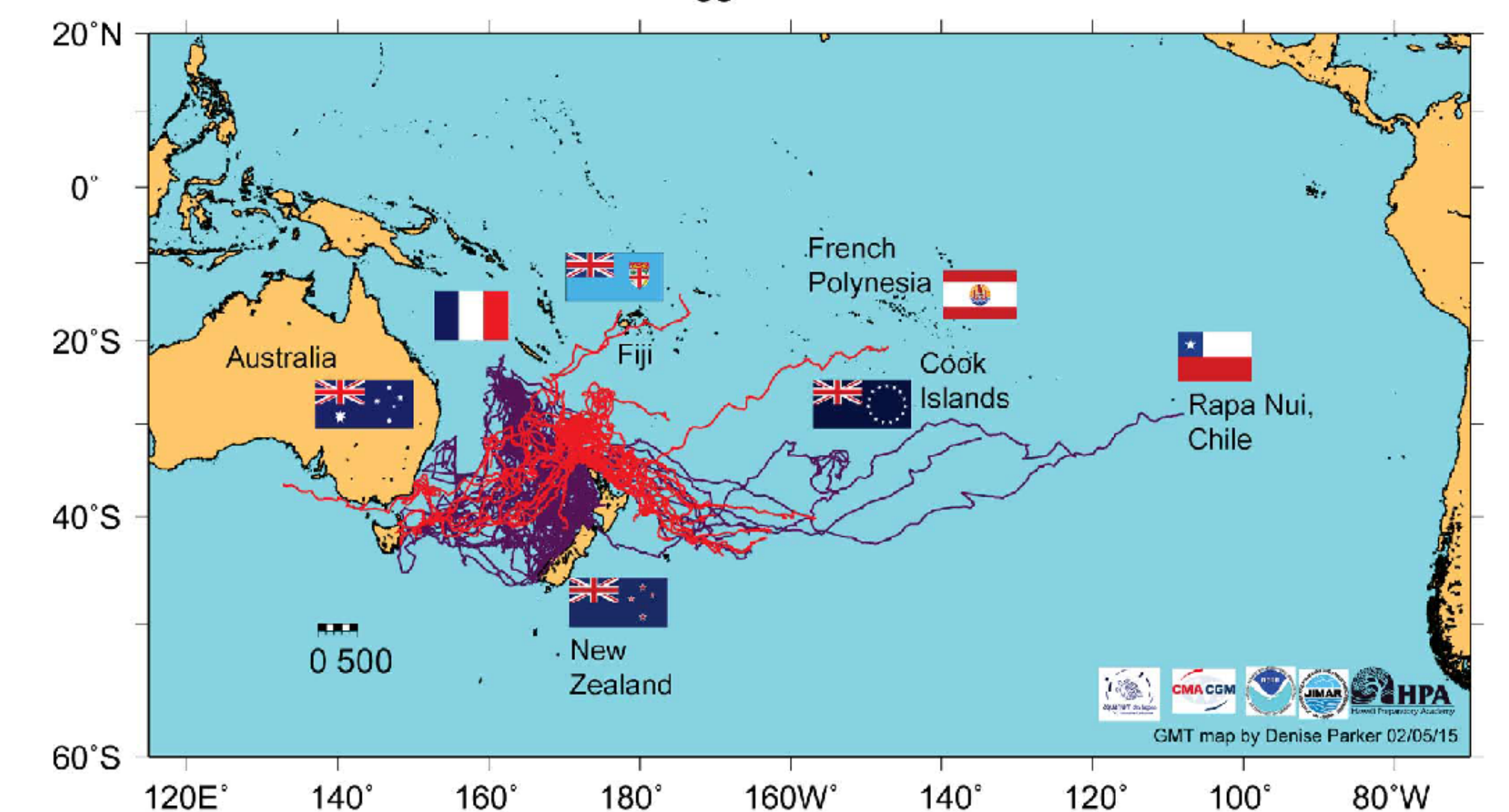
Six satellite tagged juvenile loggerheads are ready for transport to one of our Ships of Opportunity and release into the open ocean.

1997-2013 Satellite Tracking of Pelagic North Pacific Loggerheads



Satellite tracks of juvenile loggerheads raised at the Port of Nagoya Public Aquarium, Japan and released into the North Pacific Ocean.

2008-2014 Satellite tracks for loggerhead turtles released in the South Pacific



Satellite tracks of juvenile loggerheads raised at Aquarium des Lagons, Nouvelle Caledonie and released into the South Pacific Ocean.

