



Takin' a Ride on the EAC

... across the Southern Pacific Ocean

By MICHELLE BOYLE, NANCY FITZSIMMONS, COLIN LIMPUS, SHALEYLA KELEZ, XIMENA VELEZ-ZUAZO, and MICHELLE WAYCOTT

According to that loveable loggerhead Crush—the surfer-dude sea turtle from the movie *Finding Nemo*—the East Australia Current (EAC) is a sea turtle highway, where turtles hitch a free ride from one place to another, and this observation isn't too far from the truth. New research has revealed that the EAC plays a critical role in transporting turtles between habitats across the southern Pacific Ocean.

Tiny loggerhead hatchlings—4 centimeters (1.6 inches) long—emerge from nesting beaches on the *western* side of the southern Pacific Ocean in Australia and New Caledonia, while larger juveniles—up to 73 centimeters (29 inches) long—are often captured in longline fisheries off Peru and northern Chile, on the far *eastern* side of the Pacific Ocean, where loggerheads do not nest! So what explains the discovery of the different-sized loggerheads on opposite sides of the same ocean? The key piece to this transoceanic puzzle is found in turtle DNA. Nesting female sea turtles show a high degree of fidelity to their natal beaches; as a result, turtles hatched in the same place bear the same genetic signatures. In areas where turtles from multiple populations aggregate, such as coastal feeding grounds, scientists can gather tissue samples and can study the turtles' genetic signatures to determine where the animals originated as hatchlings, which is also where they will likely return to breed as adults. Hence, genetic studies are crucial to understanding sea turtle migratory patterns.

A team of Australian and Peruvian researchers used genetic techniques and the size distributions of juvenile turtles to reveal that larger juveniles found off South America have the same genetic signatures as



the nesting females in Australia and New Caledonia. This similarity demonstrates that juvenile loggerheads found across the southern Pacific Ocean belong to the same population, originate from the same nesting beaches, and thereby follow transoceanic migration patterns similar to those observed in loggerheads in the northern Pacific (nesting in Japan and feeding off the coast of Mexico) and northern Atlantic oceans.

According to the new findings, researchers think that the loggerhead life cycle in the southern Pacific Ocean works as follows: when post-hatchlings swim offshore after emerging from the southwest Pacific nesting rookeries, they encounter the southward-flowing current of the South Pacific Gyre—the EAC. As the EAC swings away from the Australian coast and travels in an eastward direction, it slingshots the little turtles across the southern Pacific toward Peru and Chile.

This discovery highlights the importance of international collaboration to study and protect animals that inhabit entire oceans during their lives. It also shows that Crush was right: the best way to get to your destination—especially if you're a sea turtle near the EAC—is to go with the flow. ■

THIS PAGE, FROM TOP TO BOTTOM: The puzzle of the loggerhead life cycle in the southern Pacific Ocean is solved by tracing the path of the currents. A recent genetics study showed that little loggerheads from Australia and New Caledonia, small juveniles in New Zealand, and larger juveniles in Peru belong to the same population, which is connected by major currents that link opposite sides of the southern Pacific Ocean. Blue arrows indicate currents, and red text indicates turtle body size. © MICHELLE BOYLE A loggerhead turtle swims in The Bahamas. © DOUG PERRINE / SEAPICS.COM AT LEFT: A researcher at Rancho Nuevo, Mexico, scans a nesting Kemp's ridley for an internal microchip (PIT) tag, which contains a unique code that is used to identify her each time she nests. © DOUG PERRINE / SEAPICS.COM