

FEATURE

Albatross Wanderings

When 1.2 million birds of the same species breed on a few tiny islands, how do they find food? If they're albatrosses, they take to the sky. Scientists tracked one mother who flew 38,706 miles in four months to feed her chick.

By Carl Safina

Photography by Frans Lanting

I have to say, the bird I'm trying to admire is not the most engaging one I've ever met. She's been sitting on her single egg for nearly two weeks now--there are nests on the ground all around us--and incubating albatrosses seem detached from reality. In a place without predators, they need not remain alert. And they're not interested in you. They just sit, day upon week.

Perhaps this one's dreaming of the glorious day when her mate will relieve her, when she'll spread her wings and sail across the lagoon, beyond the reef's towering breakers, out upon the open ocean, and . . .

What happens next is the unbelievable part. The new findings have staggered ornithologists. Albatrosses endure a life so extreme that until recently it was scarcely imagined. But now we're beginning to understand this life better, thanks to Wake Forest University professor Dave Anderson and graduate student Patty Fernández. For the past two years they've been working here on Tern Island--a tiny speck roughly 500 miles northwest of Honolulu--using satellite-tracking transmitters to discover where Hawaiian albatrosses go during their breeding season.

Nesting albatrosses cover longer distances when foraging than any other bird. In fact, almost everything about them is long. Their long, narrow wings make them long-distance gliding machines. Wandering and royal albatrosses wield the longest wingspans in nature--about 11 feet each. Their reproductive cycle is long, too. The two albatross species that nest on Tern Island, the black-footed and the Laysan, don't begin breeding until they're eight years old. Courtship lasts two full years, and the breeding season stretches eight months--longer in some species. Eggs are incubated for about two months. Males and females incubate in shifts as long as three weeks. The death of a mate costs the survivor one full breeding cycle, and many healthy breeders nest only every other year. A chick may pip the egg for as



long as six days before finally emerging. A large chick may wait two weeks for a meal. After fledging, young albatrosses remain at sea for several years, never landing upon a solid surface, perhaps not even glimpsing land. With good luck, an albatross may live five decades or longer.

Not least of their lengthy attributes is the distance one must go to see them nesting. The roughly two dozen albatross species (the taxonomy is unsettled) inhabit all oceans except the Arctic and the North Atlantic. The Hawaiian Islands are the most geographically isolated in the world, and the most isolated parts of the archipelago are the Leeward, or Northwest Hawaiian, Islands, which stretch in dots and dabs for 1,200 miles northwest of what we think of as Hawaii. The Hawaiian Islands National Wildlife Refuge was established by executive order of President Theodore Roosevelt in 1909, to protect the birds from plume hunters, egg collectors, and guano miners. Plume hunters alone killed millions of albatrosses in the North Pacific. Now these tiny islands are crammed with 14 million birds of 19 species, including some 60,000 black-footed and 600,000 Laysan albatross pairs--virtually the entire breeding populations of those species.

Tern Island is part of an atoll called French Frigate Shoals. Arriving by air, this world seems elemental: a blue disk of sky above, a blue disk of sea below, and clouds creamed between--a seabird's world. Three hours from Honolulu with the morning sun behind you, French Frigate Shoals appears as a turquoise smudge in that blue ocean. Waves break into lacy foam on its 17-mile semicircle of reef and sandy islands.

Tern is an odd little island, less than a mile long and perhaps an eighth of a mile wide, militarily modified during World War II to serve as a kind of terrestrial aircraft carrier. Its middle third is all runway, its two outer thirds all bird colony. Most of the "shoreline" is a low wall of rusty metal. But as the plane door opens, this artificial aspect vanishes amid the dazzling action of seabirds by the tens of thousands and the din and dancing of courting albatrosses.

Most of the albatrosses arrive here in November, the males about a week before the females. When previously mated albatrosses reconnect, they generally skip the prolonged courtship of their youthful past. Well-acquainted mates may copulate within an hour of their reunion. Then they go to sea for about 10 days. The female lays her soda-can-size egg a day after arriving back at the colony. Then she leaves--usually the same day--and the male sits on the egg for three solid weeks, until she returns. Then he goes to sea for three weeks. After that it's two weeks on the egg for dad, a week for mom, and five days for dad.

With all those alternating periods of activity and inactivity, the birds' bodily condition fluctuates dramatically. Male Laysans, the more studied of the two albatross species on Tern Island, show up weighing nearly seven and a half pounds; females weigh close to seven. A male loses about half a pound in the first 10 days or so, then regains much of it at sea. When the female lays that big egg, she instantly loses 10 percent of her body weight, but she regains it at sea during the male's first incubation shift. Meanwhile, without food or water, he's getting lighter. Albatrosses with an infertile egg or a no-show mate have incubated for more than 100 days in vain. Once they lose a third of their weight, hunger forces desertion. But in a normal incubation, the chick stages its slow-motion breakout after about 65 days.

The Laysan albatross closest to the barracks where I'm staying is a female with a satellite transmitter on her back; I've begun referring to her as Amelia. Her chick hatches on February 6, while her mate is at sea. When he comes to relieve her three days later, Amelia launches herself from the runway and strikes northward over the reef's breakers. Each day, the satellite interrogates the transmitter, then beams Amelia's coordinates to Anderson's North Carolina laboratory. The transmitter's dialogue with the satellite tells us for certain where she is, how far she flies in which direction, and when she shifts course. But we also know enough to sketch a plausible picture of what she might be doing and experiencing.

An hour after Amelia leaves, the last visual trace of French Frigate Shoals falls away. Amelia's brain contains a compass--unlike the human brain--and an accurate clock. And, of course, she has those wings. Albatrosses usually spend 80 to 90 percent of their time at sea flying, day and night. What to us is trackless blue ocean is to Amelia a familiar mosaic, riddled with signs. As we know that a supermarket will hold food, children will fill the schoolyard, and a bus will appear at the bus stop, Amelia knows the sea's vast and changing neighborhoods.

She sticks near the sea surface like an oceangoing bloodhound, sifting scents. She skillfully reads the terns and frigate birds that occasionally cross her line of vision. Terns flying low, in a straight line, have found fish and are commuting. They are worth following. Terns 50 feet above the water are searching, as she is. If it's late in the day, a pod of dolphins is worth following; a hunt may erupt, making fish available. Diving flocks of terns and boobies signal tuna; tuna signal eating-size flying fish, plus a worthwhile area in which to linger after dark for squid. A line of weeds or flotsam--marking the border between two water masses--is the best place to find floating objects with flying fish eggs attached. If the breeze is off a border

like this, the wafting scent may tell Amelia of an unseen meal miles away. She knows when to keep going and when patience will pay.

The ocean swells roll and fall away beneath her. Amelia's flight mimics them as she rises 20 feet or so, her belly to the wind, then turns and lets gravity pull her downward and forward like a wind-driven snowflake. Her wing tip etches into the sea, creating a thin track that vanishes in moments. She goes like this for hours, wings quivering against the breeze. She averages 15 miles an hour, double that when the wind blows up. The broodiness gone, she is now keenly alert.

When the wind drops in the late afternoon, Amelia rises on her own power, flapping more than she'd prefer. As her breast muscles pull down the long bones of her wings, thrusting her feathers forward into the air, she uses up more of the energy she's here to replenish. By now she's flown 165 miles east from Tern Island, and by the look of her straight track, she's found nothing. Abruptly, she alters course, from east to northwest.

Most of the night she flies steadily, though half of her brain is asleep. By dawn Amelia is 115 miles due north of Tern Island. All day she searches the sparse tropical sea, working 124 miles westward. The more food she finds, the more she feels that new chick pulling, like a downy rubber band. Nearly 156 miles from Tern Island, after two days at sea, she suddenly sets course directly for home. For 10 hours she sails straight to her unseen nest and baby. It is February 11.

Amelia and her mate exchange brief greetings, and dad leaves on his own overnight foraging foray. Their chick, unveiled to sunshine, lifts its wobbly head and opens its stubby bill to a V. This ritual stimulation makes Amelia retch on cue. She leans forward, centers her gullet on the V, and fills the chick with gooey regurgitated food. Then she settles in to brood.

Amelia has been losing weight since her chick hatched. She's taken four foraging trips, logging 506, 99, 876, and 2,388 miles. Her devotion shows: Her chick has grown vigorous and healthy. But she has put all her surplus energy into the chick, and now she's seriously hungry. She sets out again on February 26, after just a few minutes' rest from her most recent trip. She walks slowly to the runway, turns into the southerly wind, cranks herself into the air, and puts the wind behind her. It's a good start, because this will be a longer trip (see "Amelia's Flight Plan," page 76). The small size of her chick makes her begin by looking for food nearby. For four days Amelia dallies, first heading northwest for 170 miles, then looping back southeast before heading 80 miles northeast. She's not finding much, and she's traveling continuously. For an albatross, it's no way to make a living.

An hour before dawn on March 3, Amelia catches a whiff of something different. It's the smell of fat, very faint. Not blubber, not the feast of a dead whale. This mild aroma is from sea foam, the whipped fat of diatoms whose microscopic bodies have been broken by rough seas. The foam drifts along the border between two water masses in a very subtle line called a drift line. It's invisible in the dark, but the scent is familiar enough, and it rouses Amelia to full wakefulness. She knows from experience that following this smell will eventually yield squid, fish, and fish eggs. She's finally on to something.

Amelia passes through the scent upwind, and the air goes pure salty again. She turns, and the aroma resumes. She begins weaving along its line of origin, hunting in the shine of mid-ocean starlight with eyes nearly as dark-adapted as an owl's.

At the water boundary she sees a few lantern fish, the blinking lights along their bodies flickering signals to one another. They're too small for her to catch, but Amelia knows their presence means squid--squid that have followed the lantern fish 1,000 feet up from the depths since sunset. In the inky water, those puckering hunters will become the hunted.

Amelia sees a small pod of squid rushing the lantern fish, several of them successfully. As the squid maneuver their wriggling victims toward their beaks, they blush to warn their school-mates away from their hard-earned meals. Thus occupied, they fail to detect Amelia's night-cloaked approach.

She plows in heavily, and puffs of ink explode in the water. The squid scatter safely--all but one. As the lantern fish and their pursuers drift downward with the first light, an ailing squid lingers at the surface. Amelia lands and paddles forward, nailing it on her bill.

At sunrise Amelia is 400 miles north of Tern Island and a little east. The shining sea stretches away like a gold-threaded tablecloth. A strong wind has dissipated the drift line to an indistinguishable gradient, scattering anything that would be food. She turns north, then stops to forage almost exactly where she was about a week ago. Her last, marginal trip worked well enough for the chick, but what worked well enough then doesn't work now. It's a week later, farther into Amelia's hunger and loss of weight. Her devotion to home wavers. Her blood chemistry is signaling to her brain. The long averaging process of natural selection steps in, as though whispering, "No chick benefits from a mother starved to death." The seesaw between maternity and hunger tips, and hunger wins.

Amelia will go for food--real food. She ignores every faint cue from this clear, warm ocean about small snacks or fish eggs here and there. Amelia is no longer foraging. Now she is truly traveling. And she knows exactly where she's headed: due north, to the edge of cold water. For the first time in months, Amelia will fully unfurl.

On a favoring wind, she sails nearly 600 miles in 30 hours. The sea temperature slowly, slowly drops. Amelia crosses out of the Tropical Water Mass, the northward limit of 68-degree Fahrenheit water. Several hours later, she zooms past the Subtropical Frontal Zone, then the Subtropical Central Pacific Water Mass. She's now at the southern border of a major transition zone between the warm-hearted central Pacific and the chill subarctic.

Amelia slows along this edge, 1,000 miles from Tern Island. The cooler water is friendlier to drifting single-celled plants--phytoplankton--and so is greener. It has lost its tropical clarity, and with it the tuna and the tropical seabirds. In six days at sea, Amelia has flown from latitude 23 degrees north to latitude 40 degrees--the distance from southern Baja California to Eureka, California.

She scrutinizes the greener water. She backtracks toward the south, following a 100-mile meander in the current, then loops back as the meander swings north again. But she's still traveling many miles between mouthfuls. She breaks off her search and again swings straight north, skimming wave after wave, until an additional 180 miles of water flow between her and Tern Island. She is now on the northern edge of that broad transition zone called the North Pacific Current.

This fountain of change flows across the entire northern Pacific Ocean, waving like an unmanned fire hose. It separates the warmer and more saline subtropical water from the cooler and fresher subarctic water. It originates in the western Pacific as the Kuroshio Current, sweeps past Japan, and undulates eastward to Vancouver, British Columbia. It then flows south as the California Current, keeping the coastal ocean cold all the way to southern California.

Amelia is foraging at the Subarctic Front, where the water dips to 54 degrees. The air is chilly. This is the wintry kingdom of fulmar, herring, and salmon. Few marine animals can handle both this world and the solar realm of frigate birds, flying fish, and tuna. But albatrosses do. For the first time since she arrived at Tern Island, Amelia feels fully at home.

She works this zone for five days, searching for concentrated scents, temperature gradients, and other signs of life. She moves west into the current for 225 miles one day, 250 the next. Then, finally, she

finds what she's looking for. The water is squirming with squid. Amelia spends three days loading up, putting on weight and storing extra food. With her belly full, the seesaw between maternity and hunger tips again--and this time maternity wins.

She lights out on a compass heading that will take her directly home and flies for 40 hours--600 miles, nonstop. She crosses back into subtropical water and spends a day zigzagging 100 miles to the southwest, probably feeding along a weak front between two water masses. Then she streaks toward Tern Island again. She smells the air growing saltier and warmer as she bores back into the tropics. After an additional 630 miles in 42 hours, she crosses French Frigate Shoals' thundering reef and lands clumsily on Tern Island. It is March 14. After 16 days at sea on a 4,200-mile odyssey, she feels as though her body is still gliding with gusts and swaying to swells. She waddles over and calls to her surprisingly large chick, who immediately responds. "That you?" "Yes, alive."

Amelia hasn't seen her mate in weeks, but by the looks of the chick, dad, too, has been faithful to his duties. The chick is big enough now to be aggressive, and it hasn't been fed in about a week. It practically attacks Amelia, whining and battering her bill with its own hooked beak. Amelia regurgitates a sizable squid and several meaty fish chunks in the first payload. This goes a long way toward filling the chick, which suddenly pauses to swallow the meal, mucousy strings of goo dangling from the corners of its mouth.

After the briefest pause, the chick demands more. This time the meal comes as a liquefied high-calorie oil, stored from food Amelia caught at the beginning of her journey. The noisome oil is unique to albatrosses and their relatives, the petrels and the shearwaters. It squirts from Amelia in a strong brown stream. No chick could ask for more.

But this one does. In maternal devotion, Amelia pours her heart out. The chick quiets, briefly. Her parental duties discharged, Amelia walks away. She surveys the noisy island, the birds of many species crisscrossing overhead, the younger albatrosses courting and dancing with youthful ardor--and no adult responsibilities. Amelia's seen it all before. She registers only that her chick is alive and vigorous, and that means one thing: It will need more food. In a mere 10 minutes she's on the runway, good for takeoff.

It's mid-May, and 65 percent of the Laysan and black-footed albatross eggs laid on Tern Island have hatched chicks that have survived their first three months. The young Laysan albatrosses weigh as much as the first-arriving adult males did, and they're 25 percent heavier than their overworked fathers. For the beleaguered

parents, this marks the low point in bodily condition.

On May 27 Amelia returns from a two-week trip of 5,600 miles. Her big chick seems crazed with hunger. This is its last major growth spurt. Its bones are building, as are its thousands upon thousands of feathers. It needs enough nutrients to make those feathers thick, insulating, waterproof, and tough enough to endure a couple of years' punishment in the salt and sun and wind and water.

The chick batters Amelia so aggressively that she tries ducking away at first. But its tantrum stimulates her to disgorge. The chick scissors in, squealing and quivering with excitement. Out comes a large squid. A large flying fish. Fish eggs. Finally, a stream of oil, until Amelia is cleaned out. She rests a few hours. For the moment, life is thick. For her chick, graduation is on the horizon.

But Amelia will not be attending. When she leaves the next day, May 28, her parenting will be finished. Her chick will face whatever lies ahead alone.

As the parents leave Tern Island, the chicks lose weight for the first time. They hunker quietly, conserving energy and water, growing in place like melons. In a couple of weeks, when they begin exercising their wings, they will lose more weight. It's a timed free-fall.

By mid-June Amelia is beyond the North Pacific, on the back side of the Aleutian Islands. This is Albatopia, the promised land, the land of milt and herring--herring swarming to breed, herring injured by whales or nicked by nets, herring whose eggs glow on every strand of kelp like caviar at a wedding. Amelia no longer thinks about her chick, 2,000 miles away.

Back at Tern Island, the albatross chicks have spent the past two weeks exercising their wings, leaping and flapping. Finally, this morning, some other scientists and I are watching fledgers. A chick, lofted by the breeze, leaves the berm for the first time, flapping with all it's got. It lands in the turquoise lagoon. Now begins the usual terror of adolescence: the race between learning and luck.

We're not the only ones gathered for this event. Soon a big, square snout, followed by an awkwardly gaping mouth, breaks the surface two feet from the goose-size fledgling.

The bobbing bird peers at it quizzically with wings half opened. In a clumsy rush, the nine-foot tiger shark charges its intended prey--and shoves it aside with its bow wave. The shark turns, and on its next approach the chick, finally alarmed, actually pivots to bite the huge snout, which again misses because of the pillow of water it is

generating. The scene plays in excruciating slow motion. With each pass the shark grows more determined, and the chick grows more alarmed. Just ahead of the next oncoming bulge, the chick patters and flaps safely into the air. Several other chicks are bobbing nearby, and when the next fledger hits the water it attracts another big tiger cruising near shore. This chick does not read the message in time, and on the shark's third pass it gets its jaws around the bird's body. The albatross, pecking furiously, vanishes. A slick of oil and some feathers appear at the surface.

In the days that follow, one of 10 fledglings will nourish a tiger shark. That's the deal evolution has made with the albatross: heavy mortality among the young in exchange for long life and extraordinarily high natural rates of adult survival-93 to 95 percent from about age 8 through at least age 20. A lot of albatrosses live much longer, though scientists aren't sure exactly how long. Many of the birds now living have been wearing bands for 40 years, outlasting some of the original researchers.

Outside the reef, the atoll's slopes drop away sharply, and less than a mile from the shallow turquoise lagoon, the ocean is so deeply blue that it looks purple. A lone Laysan albatross is paddling those cobalt swells, and only the sleek, uniform darkness of its mantle-no sun-bleached wear and tear-tells me the bird is a freshly minted chick. It opens its perfect wings, the breeze lifts it, and it strides northward on the propelling wind, getting smaller and smaller. If a multitude of luck holds, in a few years it may again swing its feet down to touch dry land.

Marine ecologist Carl Safina founded the Living Oceans Program of the National Audubon Society in 1993. Last year he won both a MacArthur Fellowship and the Lannan Literary Award for nonfiction.

The Hand of Man

Albatrosses eat just about anything they can swallow or hook their bills into, and for millions of years, this behavior served them well. Nowadays, it gets them in trouble. Nesting colonies are often littered with puked-up cigarette lighters, plastic bottle tops, toy soldiers, toothbrushes, and other flotsam that albatrosses have eaten and fed to their chicks. In some cases a chick eats so much plastic that there's little room in its stomach for food. You can often tell where a chick has died by the pile of colorful plastic that used to be its stomach.

The birds get in trouble with commercial fishing fleets, too. Through the 1980s and into the '90s, hungry albatrosses found a lot of dead fish and squid tangled in driftnets, which were 30 to 40 miles long and hung down 40 feet into the ocean. The nylon webbing made for dangerous dinners, killing some 4,400 black-footed and 17,500 Laysan albatrosses a year until the United Nations outlawed the nets in 1993.

The main threat today is longlines. Five to 80 miles long, depending on the type of fish being sought, they're baited with thousands of hooks each. When longlines are let out behind a moving boat, the birds try to snatch the bait before the line sinks. Sometimes they get hooked. Longlines are causing some albatross populations, especially in the Southern Ocean, to decline 1 percent a year. The wandering albatross is listed as endangered in Australia, and 20 albatrosses are on the Red List of the International Union for the Conservation of Nature.

Longliners can fish without killing birds. Fishermen in Alaska, for instance, use a system of streamers that scare birds from the bait until the line sinks out of reach. Birds will follow the boat avidly but will not swoop in among the dangling lines and splashing floats. The Alaska fishermen initiated the regulations themselves: They feared closure of their fishery if too many endangered short-tailed albatrosses were killed; they also felt that protecting birds was the right thing to do.

Albatross populations as a whole cope well with food scarcities and predators. But evolution leaves them unequipped to deal with high or even moderate adult mortality--the kind that usually comes at the hand of man.

--C.S.

© 2001 NASI

**Sound off! Send a [letter to the editor](#)
about this piece.**

Enjoy Audubon on-line? Check out our [print edition!](#)

HOME 