GUARDIANS OF THE DEEP

# This Remote Hawaiian Island Had Vanished. Here's Why Its Comeback Is Crucial

The storm destroyed a primary nesting site for endangered sea turtles and monk seals. East Island's reemergence in this remote atoll has become an unexpected sign of resilience against climate change.

By Nathan Eagle / About 13 hours ago

*Editor's note: This is the second story in an occasional series about the scientists who are studying the ocean environment of Papahanaumokuakea Marine National Monument in the remote Northwestern Hawaiian Islands.*

The team of marine scientists motors their small rigid-hull inflatable boat toward a speck on the horizon where ocean meets sky.

From a distance, it looks like a few misplaced pixels in an otherwise postcard-esque photo of the deep blue Pacific pocketed by shallow pools of turquoise and topaz.

But as the view through sea salt-sprayed sunglasses comes closer, it's clearly there. A narrow strip of white sand barely sticking above the gentle lapping of the waves on all sides, a pair of monk seals basking on one end.

The boat coxswain navigates the complex reef system and shifts down to idle as the four scientists aboard take it in.

East Island, a remote spit of sand 550 miles northwest of Oahu, is making a comeback six years after Hurricane Walaka wiped it off the map.

East Island has reemerged since Hurricane Walaka destroyed it in 2018 but still barely rises above sea level. (Nathan Eagle/Civil Beat/2024)

Part of Lalo, also known as French Frigate Shoals, the island played a crucial role in the ecosystem of the Hawaiian archipelago, serving as the primary nesting site for threatened green sea turtles, a major breeding ground for critically endangered monk seals and home to an array of seabirds.

Today, it serves as a litmus test for resilience to climate change.

In early October 2018, a Category 3 storm ripped through this stretch of the Pacific Ocean, erasing East Island, battering nearby Tern Island and obliterating part of the unique and thriving reef system. The low-lying island ring is ill-equipped to ever fully recover from the side effects of a warming planet, including more frequent and powerful storms, but seeing the lost island's reemergence offers a bright spot in an often bleak world.

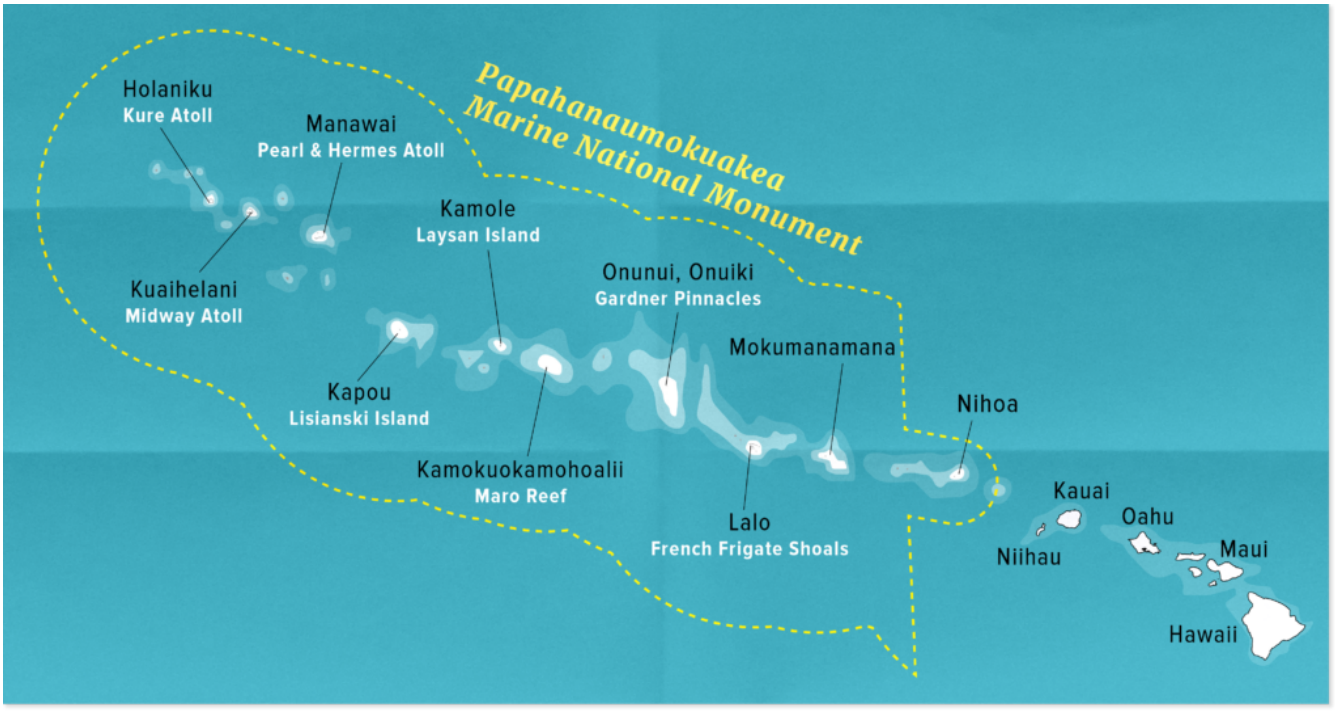
Scientists say East Island had been around for nearly 2,200 years before Hurricane Walaka hit in October 2018.

Scientists with the National Oceanic and Atmospheric Administration returned to East Island this fall to take stock as part of a three-week reef assessment within Papahanaumokuakea Marine National Monument. It's one of the world's largest protected places, spanning 582,000 square miles around the Northwestern Hawaiian Islands, most of it covered in water.

They spent three days diving around Lalo, dispatching teams of scientists from the 224-foot research ship Oscar Elton Sette onto smaller boats to map coral and count fish. Their work will inform plans for managing the natural, cultural and historical resources of the area, such as the recovery of corals after a mass bleaching — scientifically sound approaches that can be deployed in the Main Hawaiian Islands and elsewhere in the world.

## Papahanaumokuakea

East Island is part of Lalo, also known as French Frigate Shoals, one of many atolls and uninhabited islands in the Northwestern Hawaiian Islands that are protected as part of Papahanaumokuakea Marine National Monument.




Click to expand. (April Estrellon/Civil Beat/2024)

East Island was a refuge for Hawaiian seals, green turtles and seabirds. Hurricane Walaka changed that.

(Nathan Eagle/Civil Beat/2024)

## A ‘Tantalizing Question’

Floating in a 19-foot inflatable boat just off of East Island one sunny morning the monument’s deputy superintendent for research and field operations for NOAA scanned the shoreline. No turtles anywhere.

Near the shoreline, Randy Kosaki examined some shallow grooves. It was as if someone had dragged a saucer sled out of the water up onto the golden sand: Turtle tracks. They’d been back.

Scientists have determined that about 96% of the world’s 4,000 nesting Hawaiian green sea turtles do so in Lalo, and over half of those used to bury their eggs in the sand of East Island. One out of every seven Hawaiian monk seals also was born there.

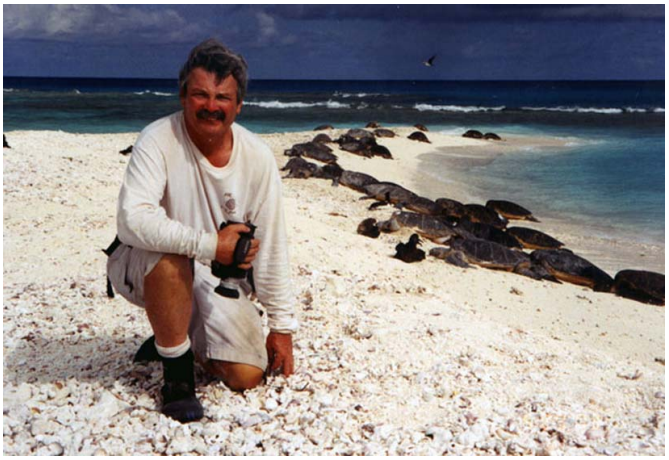
The turtles, which can weigh up to 350 pounds, are the same ones that migrate to the Main Hawaiian Islands. When they aren’t lying on the beach while tourists take their photos, they’re eating algae around Oahu, Kauai, Maui and the Big Island, lawnmowers of the sea that keep the reefs healthy.

Aerial video of East Island in September revealed hundreds of nesting sites as well as tracks from Hawaiian green sea turtles that likely bred there this summer before migrating back to the Main Hawaiian Islands. (Nathan Eagle/Civil Beat/2024)

For decades, biologists camped on East Island from May to August. They would count and tag turtles at night as they slept in the cool pockets of sand they dig out with their flippers. Their work there over the past half century told a remarkable comeback story of the turtles, which had been hunted nearly to extinction.

Field camps in the mid-1970s documented a few dozen turtles. The state and the federal government took action, listing them as endangered.

Before Hurricane Walaka, biologists were counting several hundred female turtles each summer — so many that it was hard to walk without tripping over one.



George Balazs, a retired NOAA biologist, spent decades making monthslong field trips to East Island to count and tag the endangered green sea turtles, or honu. Photographed here in the 1990s on East Island. (Courtesy: George Balazs)

Charles Littnan, a conservation biologist with NOAA when the storm hit, said there was no doubt East Island had become “the most important single islet for sea turtle nesting.”

As news broke of Walaka’s wallop, conservationists immediately thought of the turtles.

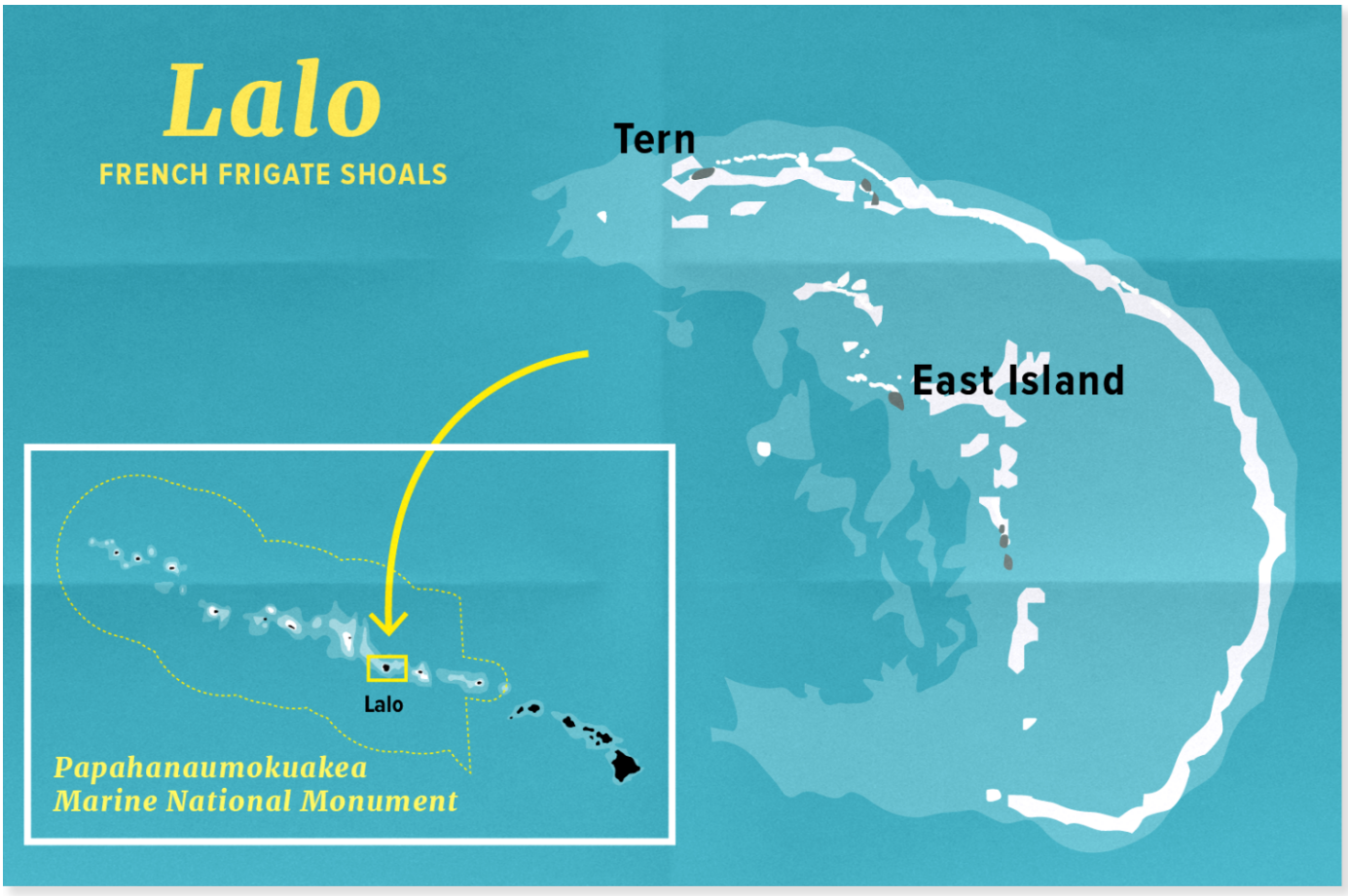
Renowned University of Hawaii climate scientist Chip Fletcher called it a “holy shit moment,” lamenting the 2,171-year-old island’s demise.

Fletcher is an expert in sea level rise, measuring it through storms and surges around the world. This hurricane’s pathway wasn’t guided by climate change, he said, but its strength and timing were consistent with the effects of a hotter ocean and rising global temperatures that make storms more intense.

Some worried the loss of East Island could undo the decades of progress the Hawaiian green sea turtles had made.

George Balazs was more sanguine. The retired NOAA biologist, who began studying turtles in Lalo in the early 1970s, remembers getting the call in 2018. He was en route to Hong Kong on a layover in Guam when a former NOAA colleague reached him on his cell.

“I wasn’t worried,” Balazs said. “My first thought was, ‘Well, sooner or later, we knew this was going to happen.’”




Tern Island, roughly 7 miles from East Island in Lalo, is where scientists suspect turtles and seals likely went to nest the year after Hurricane Walaka. (April Estrellon/Civil Beat/2024)

Sea level rise projections had long signaled trouble for East Island but he had faith in the turtles’ resiliency, figuring they would find another stretch of sand, returning if East Island put itself back together.

“I asked the sort of tantalizing question: ‘What do you think they’re going to do, roll over and die?’” Balazs said.

The good news is biologists think most of the turtles were not on East Island when Walaka hit because it happened during their seasonal migration to the Main Hawaiian Islands and elsewhere in the Pacific.

The bad news is that scientists suspect many returned to nest the following summer at one of the nearest strips of sand, Tern Island. That location is problematic for many reasons, including leftover toxic materials from when it was used by the U.S. military.

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## Pupping Grounds

The Hawaiian monk seal is one of the world's most endangered marine mammals. The current population is estimated at 1,600, and all but about 400 live in the Northwestern Hawaiian Islands. Scientists were on East Island, one of the primary pupping grounds for the seal, just a few weeks before Hurricane Walaka hit in 2018.

Scientists were on East Island in 2018 soon after a Hawaiian monk seal gave birth. They removed the placenta. (Alana Eagle/Civil Beat/2018)

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A Navy runway made of crushed coral takes up about 20 of the island's 27 acres. It's too hard for the turtles to dig down into to lay their eggs. A spot on its northwest end known as the Bulky Dump is full of concrete, metal wires, heavy equipment, generators and propane tanks left years ago by the Navy and later the U.S. Coast Guard, which ran a long-range navigation radio station on Tern until 1979.

The Environmental Protection Agency considered establishing Tern as a Superfund site after confirming it was contaminated with lead and PCBs from military waste. That and an onslaught of marine debris threatened this key oasis, as the EPA's 2014 assessment described it, in an area already designated as critical habitat for the green sea turtle as well as the monk seal and 18 species of seabirds.

Being named a Superfund site would have compelled federal agencies to clean up the mess — but it never happened.

Anna-Marie Cook, who retired in 2021, did extensive work assessing Tern while she was managing Superfund sites at the EPA. She said the biggest threat there remains a dilapidated sea wall but the agency was able to determine through sampling in 2018 that there were enough hot spots of toxic waste to warrant cleaning it up.

NOAA's Jason Leonard, left, and Randy Kosaki head out at Lalo on a rigid-hull inflatable boat that launched from the Oscar Elton Sette research vessel. (Nathan Eagle/Civil Beat/2024)

Funding was eventually secured to do so, and the federal government deployed a cleanup crew this summer.

“It’s not on the top of everyone’s list of funding to help clean up,” said Marylou Staman, a science coordinator with NOAA’s Marine Turtle Biology and Assessment Program. “It doesn’t have a human community that’s being threatened, but it does have a community of seals and turtles and birds.”

Balazs and biologists after him have used Tern as a base to do turtle surveys on East Island for days or weeks at a time. Scientists relied on satellite imagery and periodic cruises around East Island to assess the ongoing recovery while East Island remained unsafe.

Now, as confidence in East Island’s stability grows, Staman said a full-time camp is planned there for next summer to again tally nesting numbers and assess nest success.

“With climate change projected to increase the frequency of storms like Walaka,” she said, “there is definitely concern about the longevity of emergent land at Lalo that so much wildlife depends on.”

A Hawaiian green sea turtle rests on East Island in July 2018, two months before Hurricane Walaka hit. Some 96% of the population nests in Lalo — over half of which did so on East Island. (Alana Eagle/Civil Beat/2018)

Balazs was ecstatic when he saw Civil Beat's drone video from East Island this fall. The tracks Kosaki had spotted were indeed from sea turtles. But Balazs also identified the circular sand indents covering nearly the whole island like the dimples on a golf ball as sea turtle nesting sites.

With some quick back-of-the-napkin science, he started with about 600 nesting sites visible in the video. He factored in a number of variables and a margin of error to estimate that "a few tens of thousands" of hatchlings likely made it to the sea from East Island over the summer.

“This is astonishingly great news,” Balazs said. “Oh my good God … It’s more than I ever would have imagined.”

The turtles, which have evolved in Hawaiian waters over the past 50 million years, adapted once again.

“Things change,” Balazs said. “All you have to do is live ’til you’re 81 to see that change is the norm and so you see the sea turtles have switched and changed and acclimated.”

East Island has returned to about 60% of its original size after Hurricane Walaka wiped it off the map in 2018. (Nathan Eagle/Civil Beat/2024)

## An Island Reforms

East Island today is regaining a hold on its former self — now just over half the size it was before the storm but still little more than a sandbar.

The vegetation has yet to return, which could explain the lack of seabirds, but a dozen monk seals were basking in the warm sun near a laundry hamper during the September visit. Chunks of plastic littered parts of the island, marine debris already finding its way back in currents and waves even though no humans are allowed within 200 miles of the Northwestern Hawaiian Islands without a permit from the monument's government managers.

Haunani Kane, left, was on East Island in 2018 with Kainalu Steward conducting island surveys and collecting island core samples two months before Hurricane Walaka hit. (Courtesy: Jason Patterson/2018)

Kainalu Steward, a doctoral student at the University of Hawaii Manoa's Department of Earth Sciences, has been studying East Island's return for several years.

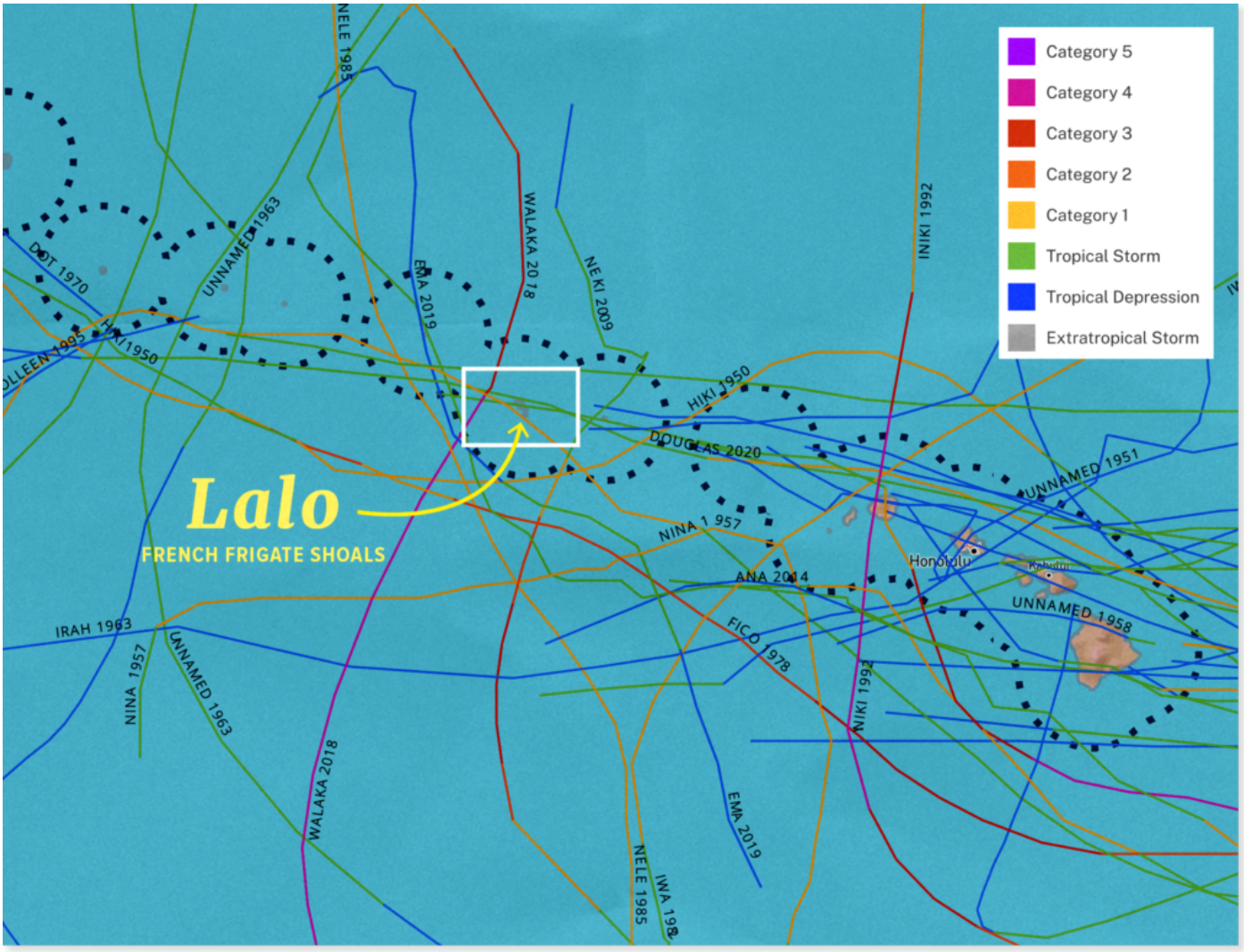
"We're finding the island is recovering at a pretty quick rate," he said.

Relying primarily on satellite imagery and occasional drone videos, he's found the island has returned to about 60% of the size it was before Walaka.

Hurricanes don't do any favors for low-lying atolls, he said, but the wave and wind energy they conjure can actually help stabilize an island by bringing in new sediment, a natural form of shoreline maintenance.

His adviser, Haunani Kane, an assistant professor at UH Manoa, was at East Island a couple weeks before Walaka hit drilling core samples to find out what the island was made from exactly.

"Everything it's composed of is from the reef," Kane said. "The relationship between the health of the reef and the health of the island is interchangeable."




This NOAA map shows the paths of hurricanes that have passed through Hawaii over the past century, including Hurricane Walaka in 2018 and Hurricane Neki in 2009, which crossed near Lalo. (April Estrellon/Civil Beat/2024)

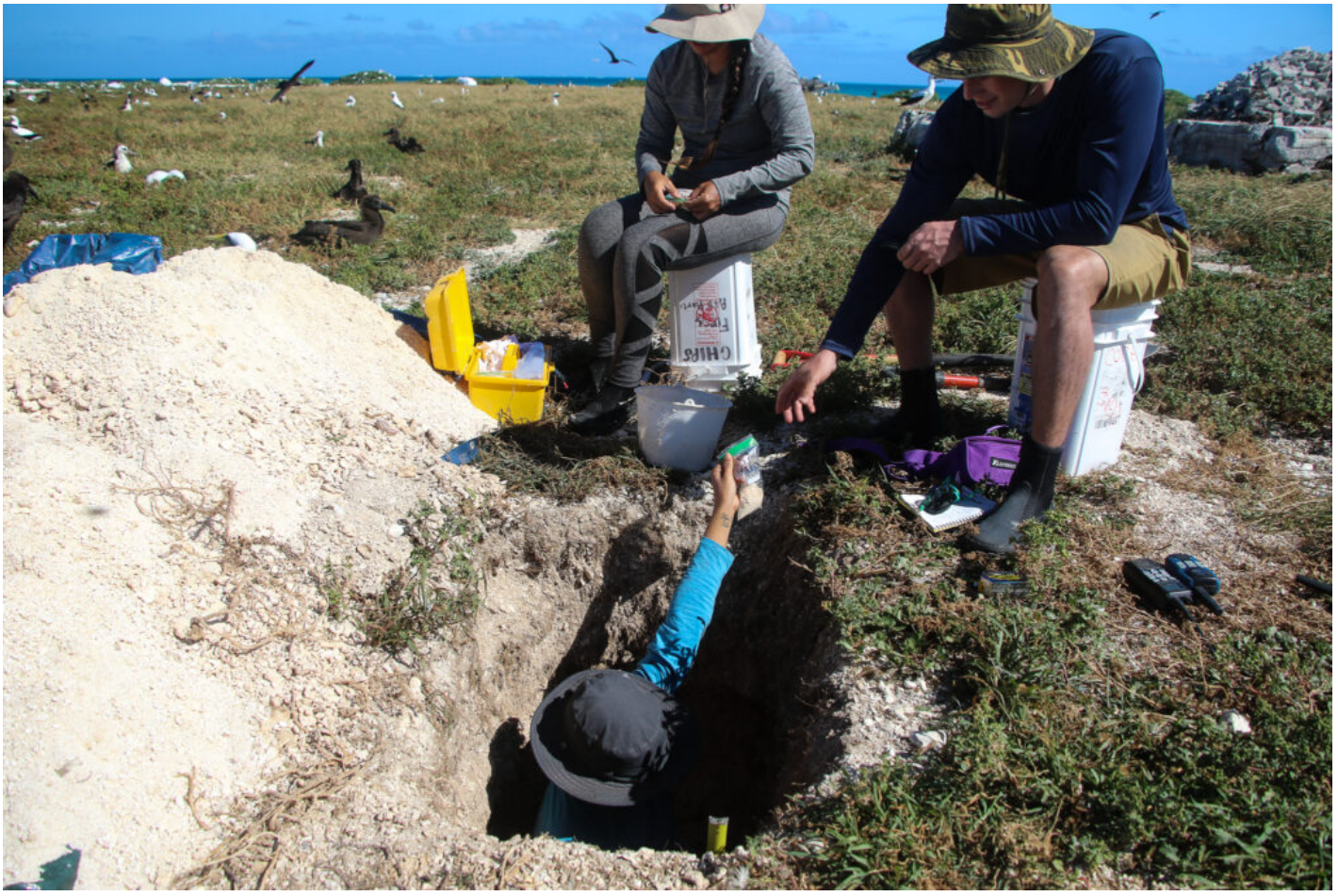
The next question she is working to answer is if the East Island that is returning is really the same island. Is it the same sediment that has just moved back into place, or is it composed of new pieces of reef and coral swept off from the storm? And what does that mean for the variety of species that had lived there?

“It was a tragic event but there’s just so much knowledge that we’re gaining from this event that will help to guide our long-term

understanding of how our islands are resilient or vulnerable to the changes that are to come," Kane said.

She and Steward share their data with the monk seal and turtle scientists who can then use it to determine if the island is reforming in a way that will provide suitable habitat, for instance, or help answer questions about why birds haven't yet returned in large numbers. It's work that has broader implications throughout the region.

Core samples tell scientists more about the island's composition and history. (Alana Eagle/Civil Beat/2018)



A team gathers sediment samples from East Island, two months before Walaka hit. (Alana Eagle/Civil Beat/2018)

Thousands of birds used to call East Island home. They have yet to return in numbers, likely because the vegetation has yet to come back. (Alana Eagle/Civil Beat/2018)

Scientist Chip Fletcher drills a core sample off the coast of East Island in 2018. (Alana Eagle/Civil Beat/2018)

Islands around the world are disappearing. Some Pacific nations, such as Tuvalu, are facing an existential crisis as rising seas threaten everything from their native wildlife to their sovereignty, and force mass migrations.

Other places, like the Main Hawaiian Islands, are grappling with tough policy decisions as the ocean encroaches. Ban sea walls to save private property and public infrastructure, but then lose the adjacent beaches

and with that the island's economic vitality and culture? Retreat from the shoreline? But who pays for that?

Sea level rise maps show parts of Honolulu underwater with passive flooding in the decades to come, and access cut off along key highways connecting coastal communities.

East Island was actually one of two islands in Lalo that disappeared over a two-month period in 2018. The difference is that scientists had been documenting the gradual demise of nearby Trig over the course of years, while East Island vanished virtually overnight.

Other islands at Lalo have been lost forever. Whale-Skate Island, which slowly eroded until it became submerged in the late 1990s, has not returned.

East Island's future, and that of others in the atoll, depends in part on the recovery of the reef around it, also severely damaged by Walaka. The island is made of sand, and that sand predominantly comes from coral. Reefs also give islands structure and buffer them from the incessant surf.

Scientists surveyed the reefs around Lalo at several sites over the course of a few days in September. (Nathan Eagle/Civil Beat/2014)

## Documenting Progress

Atsuko Fukunaga, an ecological research statistician with the University of Hawaii, has been studying the coral health and fish population at Lalo for much of the past decade.

Using underwater cameras, she and her colleagues have taken thousands of photos at the same dive sites to document how they change.

Sitting on the side of a small boat as it heads away from East Island toward the team's next dive site, Fukunaga recalls the stunning table corals that once dominated Lalo, providing food and refuge to dozens of species of fish, sponges, mollusks and more. It was an underwater forest

filled with schools of yellow and red butterfly fish, white- and black-tipped reef sharks, huge silver ulua and tiny masked angelfish found nowhere else in the world.

Lalo is the only place this type of reef-building acropora – a hard table coral that is often brown but can be shades of green or purple – is found in abundance in the entire Hawaiian archipelago.

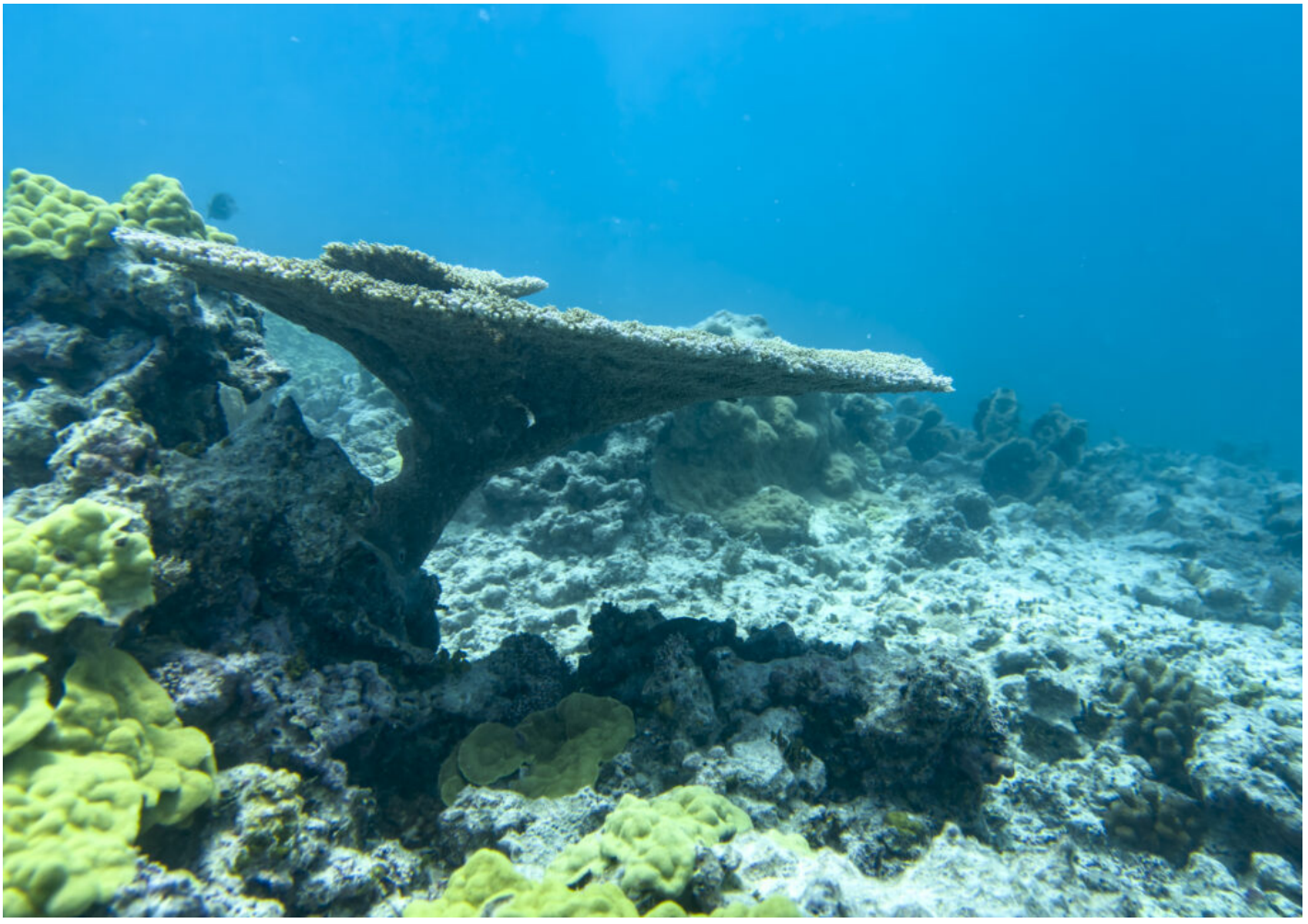
Marine scientists Kukui Gavagan, left, and Atsuko Fukunaga sit on the side of a rigid-hull inflatable boat before diving Rapture Reef in Lalo this fall. (Nathan Eagle/Civil Beat/2024)

But Walaka, which peaked as a Category 5 storm as it raged up from the south, destroyed some areas, including the nearby Rapture Reef. Strong swells ripped coral colonies from their bases, churning and pulverizing virtually everything in its path.

It was one of the first places Fukunaga and her team went in 2019 to take stock of the hurricane's damage.

That year, she and other marine scientists saw sites at the southern end of the atoll that had deteriorated from 70% table coral to 99% sand and rubble. They did not spot a single reef fish at Rapture in 2019 — just one Galapagos shark swimming over a barren seafloor.

When Fukunaga returned in 2021, however, she and her colleagues counted 35 reef fish species and discovered coral returning, although not the iconic acropora. Less sand and rubble covered the ocean floor at Rapture as the shifting sediment had slowly begun to meld into a mortar-like compound that corals might eventually be able to attach to and grow.



Reef-building acropora is a table coral only found in Hawaii at Lalo. (Nathan Eagle/Civil Beat/2024)

Encouraging signs, but slower than past recoveries in Lalo. After Hurricane Neki passed through Lalo in 2009, the corals had been well on their way to being reestablished within a few years.

Fukunaga had been anxious to get back in the water this fall to see how Rapture was faring. Now, as the boat coxswain punches in the GPS coordinates and routs the boat to the first dive site, she pulls on her wetsuit and readies her scuba gear.

Joining Fukunaga on the dive to nearly 90 feet are Kailey Pascoe, a Kaneohe native working on her doctorate in Hilo, and Kukui Gavagan, an intern from Maui studying marine biology at the University of Hawaii Hilo. All three work out of The MEGA Lab, a research lab based out of UH Hilo.

Nitrox scuba tanks strapped to their backs, they take a couple test breaths out of their regulators and clip on their “implements of science,” as they jokingly refer to the collection of measuring sticks, cord reels, cameras, backup oxygen and other gear they take down for each survey.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One by one, the scientists backroll off the side of the boat at the Rapture Reef site. Within minutes, their bubbles are the only clue to their whereabouts as they descend the equivalent of eight stories to the bottom. A few curious Galapagos sharks — frequent visitors on nearly every dive — patrol overhead.

Roughly 40 minutes later the team resurfaces. Randy Kosaki leans over the side of the boat to ask how the corals are doing down there.

Better, they say, but just marginally.

There were full-grown cauliflower corals a foot in length, and more species in general than the last time they dove Rapture Reef back in 2021, including stony lobe corals that vary from yellow to pink to orangish-brown in color. They also saw “more recruitment,” science-speak for the number of baby corals settling on the reef.

Fukunaga and her colleagues will take the data they collected back to the lab in Hilo. They’ll build 3D models from the thousands of photos they took in a nearly 540-square-foot area to assess how the reef, or what’s left of it, is recovering over time.

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### Rapture Reef 3D Modeling

Scientists with the Hilo-based The MEGA Lab have surveyed Rapture Reef at Lalo for the past several years. They take thousands of photos at the same site to create the 3D modeling, which shows in detail exactly what the reef looked like in 2017, before Hurricane Walaka hit, and how it’s progressed each year since the storm reduced the coral to rubble.

This 3D modeling shows Rapture Reef at Lalo in 2017, 2019, 2021 and 2024. (Courtesy: The MEGA Lab)

Scientists also look to learn which organisms and animals play a role in a reef's recovery after it's destroyed. That could give marine managers more information on how to respond to similar events at Lalo, in the Main Hawaiian Islands or elsewhere.

A second dive a few miles away, shallower at 30 feet and in a more protected area inside a lagoon, offers additional grounds for hope. Divers surface there reporting more corals seem to be growing, and some of the table corals spared by the storm are teeming with life. Two large ulua — giant trevally fish that may pose the greatest safety risk to the scientists from wildlife during the cruise — followed them during each pass of the transect line.

Ulua, such as these in the waters off Manawai, are omnipresent in Papahanaumokuakea Marine National Monument. (Nathan Eagle/Civil Beat/2024)

## Recovering From ‘A Triple Whammy’

Randy Kosaki is cautiously optimistic. He’s still worried even a moderate winter swell could wreck all the progress, both on the seafloor and at East Island. But things seem to be headed in a positive direction.

Still, there’s a limit to the resilience of the animals that call Lalo home. They can only relocate if there are islands to relocate to, not lost by

storms or submerged by sea level rise. Scientists are already linking lost habitat to fewer monk seals there.

From a manager's perspective, not much can be done. There have been discussions about trying to protect habitat against sea level rise, such as by building up reefs in certain areas to act as sea walls. But it's a controversial and costly proposal.

Since Lalo falls within a protected national monument, its sea life is already guarded against direct fishing threats, introduced predators like dogs, cats and mongoose that would eat turtle eggs, and artificial lighting that can distract hatchlings looking for the ocean.

Randy Kosaki, NOAA's chief scientist aboard the Oscar Elton Sette research vessel, watches the sun rise with other marine scientists as the ship cruises through Papahanaumokuakea Marine National Monument in the Northwestern Hawaiian Islands. (Nathan Eagle/Civil Beat/2024)

But Kosaki has used the science related to Hurricane Walaka as an example of why people should take action to limit global warming internationally to lessen the ravages of a changing climate.

Places like East Island and the reefs around it get a "triple whammy" from climate change, he said. Ocean acidification, coral bleaching and stronger storms combine to make them more vulnerable and recovery more challenging.

At dinner one evening on the Oscar Elton Sette during its five-day transit back to Pearl Harbor, Pascoe, the doctoral candidate from Kaneohe, reflected on what the scientists had learned about East Island.

"It's probably never going to be what it used to be," she said, "but things are progressing there."

*Civil Beat's coverage of climate change is supported by The Healy Foundation, Marisla Fund of the Hawaii Community Foundation and the Frost Family Foundation.*

## More Reading

### Next President Will Shape The Future Of America's Largest Marine Monument

With the effects of climate change bearing down, the race is on to ensure Papahanaumokuakea remains protected.

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## ABOUT THE SERIES

**Guardians of the Deep** explores the work of marine scientists in Papahanaumokuakea Marine National Monument who study the good, the bad and the ugly found in these protected waters.

Finding new species, protecting native species and researching invasive species were all part of the job on the National Oceanic and Atmospheric Administration's three-week cruise this fall. The dive trip spanned the entire 1,200-mile length of the Northwestern Hawaiian Islands, a remote string of islands and atolls enveloped by coral reefs and open ocean.

*Reporting, photography and videography by Nathan Eagle*

*Graphics and art direction by April Estrellon*

*Video production by Kawika Lopez*

*Project editing by Amy Pyle*

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