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GUARDIANS OF THE DEEP

A ‘Devil’ Seaweed Is Spreading Inside Hawai‘i’s Most Protected Place

An invasive algae has wrecked huge sections of reef in Papahānaumokuākea Marine National

Nathan Eagle/Civil Beat/2024

Monument. Scientists are racing to find out what it is, where it came from and whether anything can stop it.

By Nathan Eagle / December 11, 2024

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

It began more as a curiosity than a concern.

Scientists spotted a seaweed they didn't recognize as they dove around an atoll in the Northwestern Hawaiian Islands. In 2016, it looked like brownish-red threads stitched into a few pockets of branching coral.

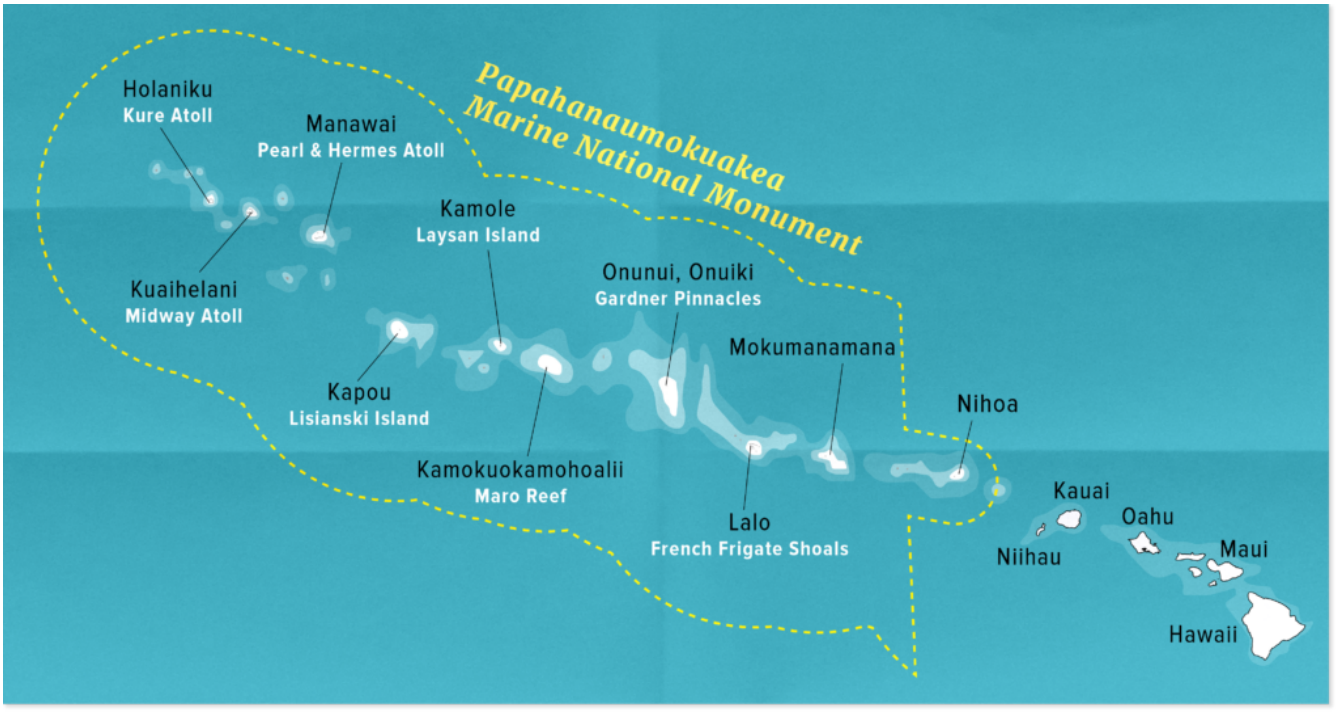
They returned three years later to the remote waters of Manawai, also known as Pearl and Hermes, to find the seaweed had formed mats several inches thick. Blankets of it — some bigger than football fields — were smothering the atoll's outer reef system.

Peering through holes in the seaweed, divers could see the white skeletal remains of coral that had been the backbone of a thriving ecosystem. Huge schools of reef fish, some found nowhere else in the world, were mysteriously absent. The green water was murky and menacing.

The reef was clearly under siege despite being 1,200 miles from urban Honolulu and its polluted runoff. This intruder was operating deep within the boundaries of Papahānaumokuākea Marine National Monument, the country's largest protected place.

Papahānaumokuākea

Manawai, also known as Pearl and Hermes Atoll, is where scientists found an invasive seaweed in 2019 smothering reefs. It's deep in the Northwestern Hawaiian Islands, protected as part of the nearly 600,000-square-mile Papahānaumokuākea Marine National Monument.



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

Scientists with the National Oceanic and Atmospheric Administration immediately feared the consequences of the seaweed spreading to nearby atolls, or worse. If it reached the Main Hawaiian Islands, it could deliver a disaster as much economic as environmental.

The state depends on a healthy ocean for the panoply of activities that attract tourists and make local residents want to stay. Reefs also function as natural seawalls that diffuse the destructive power of storms and provide habitat for the fish people rely on for food, culture and recreation.

“It is the scariest thing I’ve seen in 40 years of diving,” said Randy Kosaki, a research ecologist who serves as NOAA’s deputy superintendent of Papahānaumokuākea.

And he knows scary, or at least what most might consider scary. He talks of being “tornadoed” by dozens of sharks on dives in the most isolated parts of the Hawaiian archipelago. But as Kosaki says, he and his colleagues are “the type of people who jump into the water when someone yells shark.”

Randy Kosaki, deputy superintendent for NOAA of Papahānaumokuākea Marine National Monument, dives in the Northwestern Hawaiian Islands. (Nathan Eagle/Civil Beat/2024)

Among hundreds of dives during his post-graduate work at the University of Hawai‘i in the 1980s, one took him into the water around an active lava flow off of Big Island. It was to research how the marine environment changes during volcanic events. He and his buddy Rich Pyle, now an acclaimed scientist at Bishop Museum, joined scientist Gordon Tribble to check out the action below the surface.

With the underwater visibility at almost zero, Kosaki prodded actively forming pillow lava with a crowbar. One of Pyle’s fins began to melt, eventually getting stuck in the lava. An explosion caused by hot lava

hitting the cold water cracked the dome lens casing on Tribble's underwater film camera.

"I'm really more of an explorer, a discoverer," Kosaki said. "If I lived on the mainland, I'd be a paleontologist."

Randy Kosaki, deputy superintendent for NOAA of Papahānaumokuākea Marine National Monument, grabs his scuba gear for a dive in the Northwestern Hawaiian Islands. (Nathan Eagle/Civil Beat/2024)

After decades of discovering new species of fish and algae, he did not expect to be confounded by a seaweed taking over one of the largest reefs in the Hawaiian archipelago.

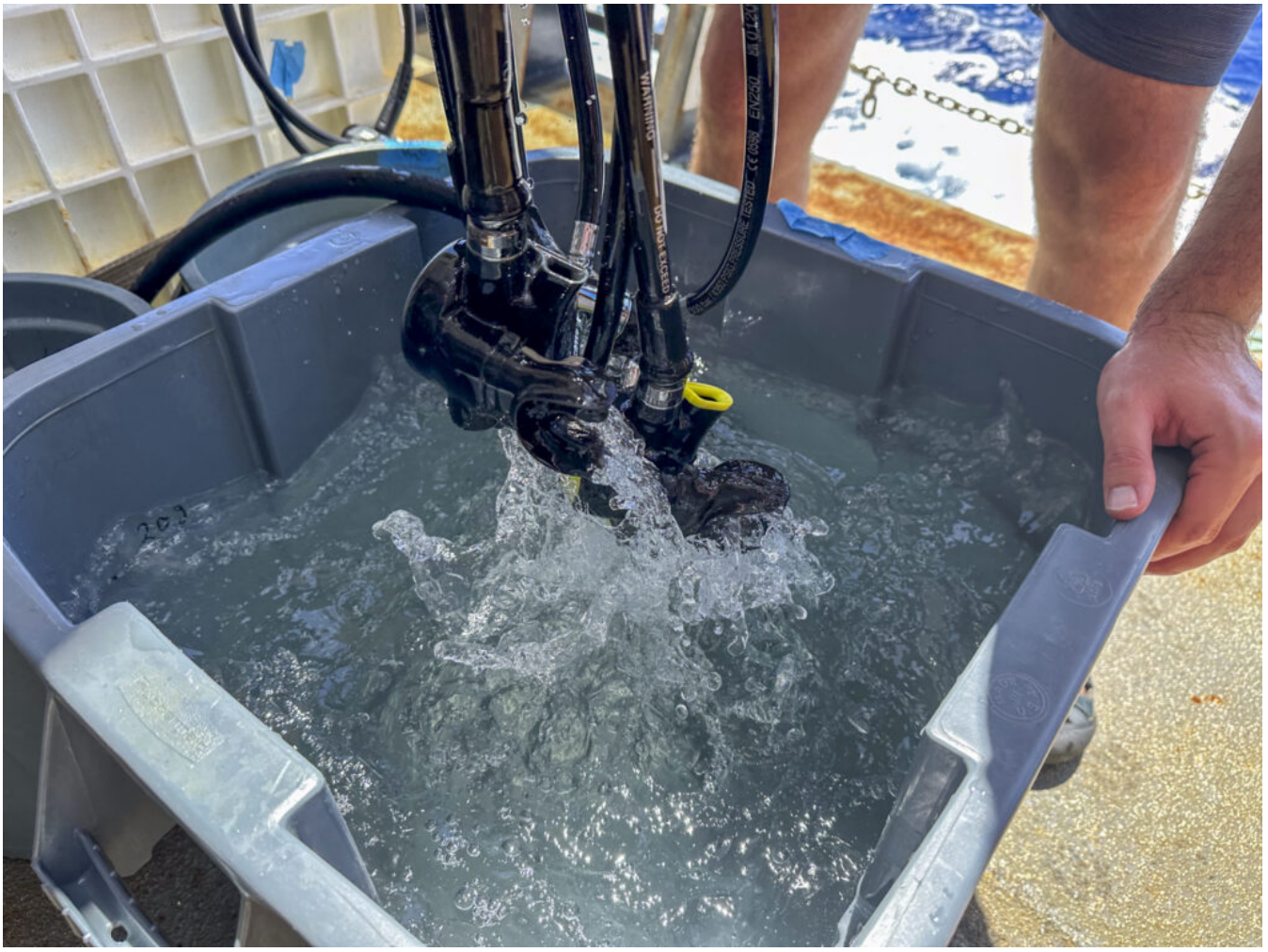
First he needed to figure out what it was. A new species of native algae? An invasive that drifted in? If so, from where? And, most importantly, could it be stopped?

Kosaki found himself anxious during the 2019 trip to get samples collected in Manawai back to the lab on O‘ahu. He had alerted state and federal colleagues in Honolulu the same day they found it. That threw a wrench in his plans: Some state officials were so alarmed they directed the NOAA crew to stay put at Manawai for fear their ship itself would be a carrier for the killer algae.

“They treated us like this leper ship,” he said.

The team used the extra days stuck on the research vessel developing ways to disinfect it. That meant soaking their dive gear in a solution with so much bleach their hands tingled for hours.

Scientists soak their dive gear in a bleach solution to prevent the spread of chondria. (Nathan Eagle/Civil Beat/2024)



The bleach may be hard on their scuba gear but it stops invasive seaweed from hitching a ride back to the Main Hawaiian Islands. (Nathan Eagle/Civil Beat/2024)

Wetsuits, masks, finns, buoyancy vests, regulators, weight belts and scientific tools are all soaked in bleach following dives in known chondria locations. (Nathan Eagle/Civil Beat/2024)

Some aboard worried about how to use enough bleach to kill the seaweed but not so much that it ruined their wetsuits and expensive buoyancy vests. Kosaki was thinking about who could help him identify this mystery seaweed as soon as they docked.

“This is something,” he said, “that could take down entire islands, entire atolls.”

Detailed Detective Work

Allison Sherwood, a taxonomist and associate dean at the University of Hawaii's College of Natural Sciences, has made a career out of identifying new species of seaweed and other types of algae — often from samples brought back in coolers labeled "Kosaki."

But this one was different.

Sherwood digested the email Kosaki had fired off from the ship soon after encountering the thatches of seaweed choking the corals. She knew they'd need to act fast.

Allison Sherwood, a molecular taxonomist at the University of Hawaii, holds an original sample of Chondria tumulosa, the invasive seaweed collected in August 2019 from Manawai. (Nathan Eagle/Civil Beat/2024)

The top priority became identifying the seaweed Kosaki brought to her lab. She split her team in two. Half focused on its morphology — shape, form and structure — and half on its DNA.

Sherwood worked the microscopes. That revealed clues right away. It was a red algae, and they could narrow it down to a genus. Most likely chondria.

The problem was there are well over 100 different types worldwide, including five already known in Hawai‘i, yet few if any wreak this level of havoc.

“There’s nothing recorded anywhere that’s like what happened here,” she said.

Scientist Allison Sherwood methodically went through every known species of chondria to try to identify the mystery seaweed from Manawai. (Nathan Eagle/Civil Beat/2024)

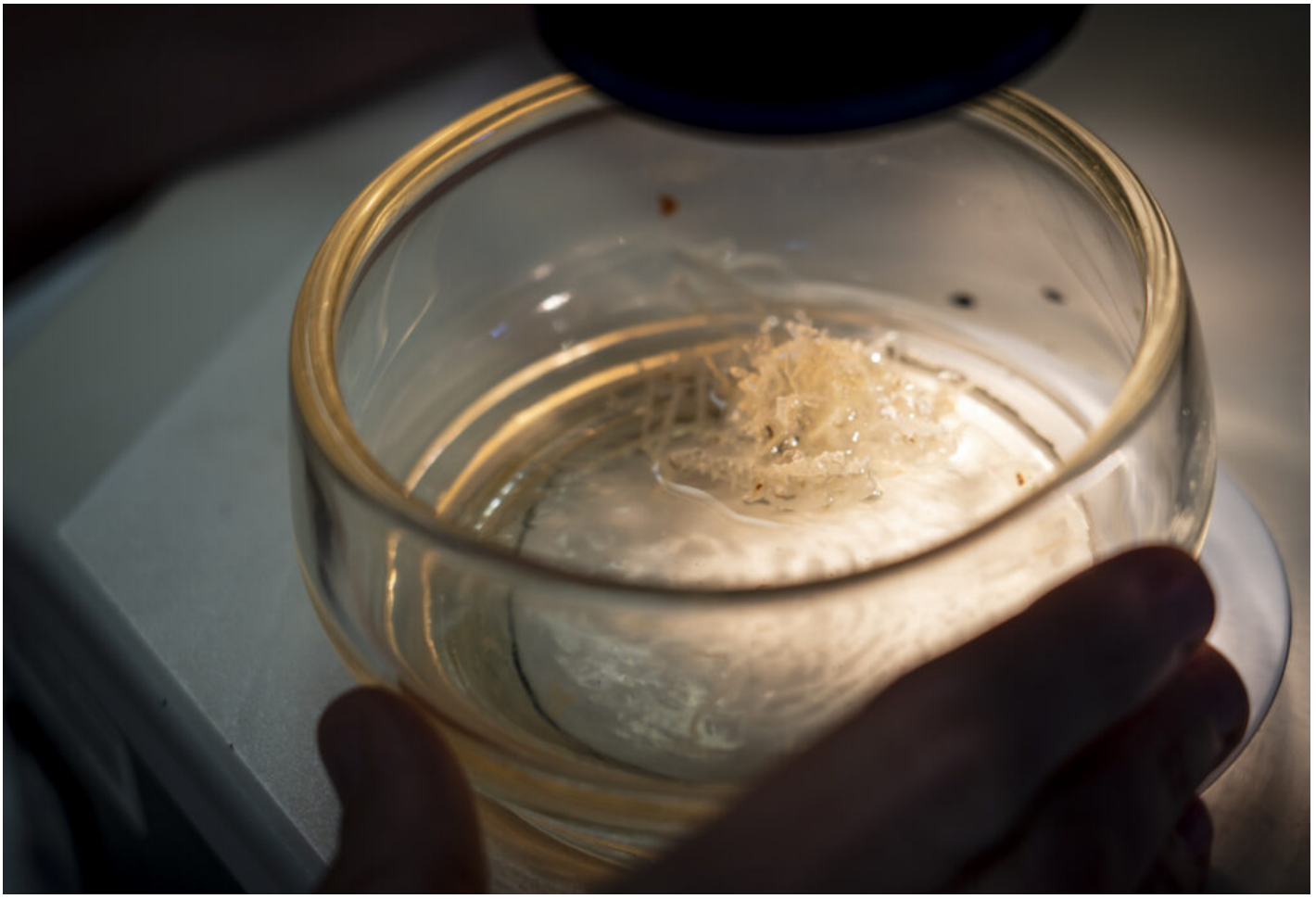
Sherwood built a sprawling Excel sheet listing the name of essentially every species of chondria. She then tracked down the original descriptions for each, tediously poring through scientific literature dating back to the 1800s. She uploaded any photos she could find.

With help from seaweed expert John Huisman, curator at the Western Australian Herbarium, the lab team searched for a match. A few were close, but not identical.

Meanwhile, the other half of the team started getting results back from their DNA tests, hoping for the kind of big breaks police get when they

run blood samples through databases to solve a crime. No direct hits there, but the process ruled some out.

Eventually, Sherwood and her team rounded up five or so suspects. After further sleuthing, those were eliminated, too.



Within a year, scientists confirmed they'd found a previously unidentified seaweed at Manawai. (Nathan Eagle/Civil Beat/2024)

Given the sense of urgency, Sherwood made a decision. The seaweed found at Manawai would become a new species with a new name: Chondria tumulosa, Latin for mounds.

The team's research paper in 2020 announcing the discovery served as a beacon to scientists worldwide. It let anyone who might have encountered any similar species know to come forward at once.

No response.

'What The Reef Could Look Like'

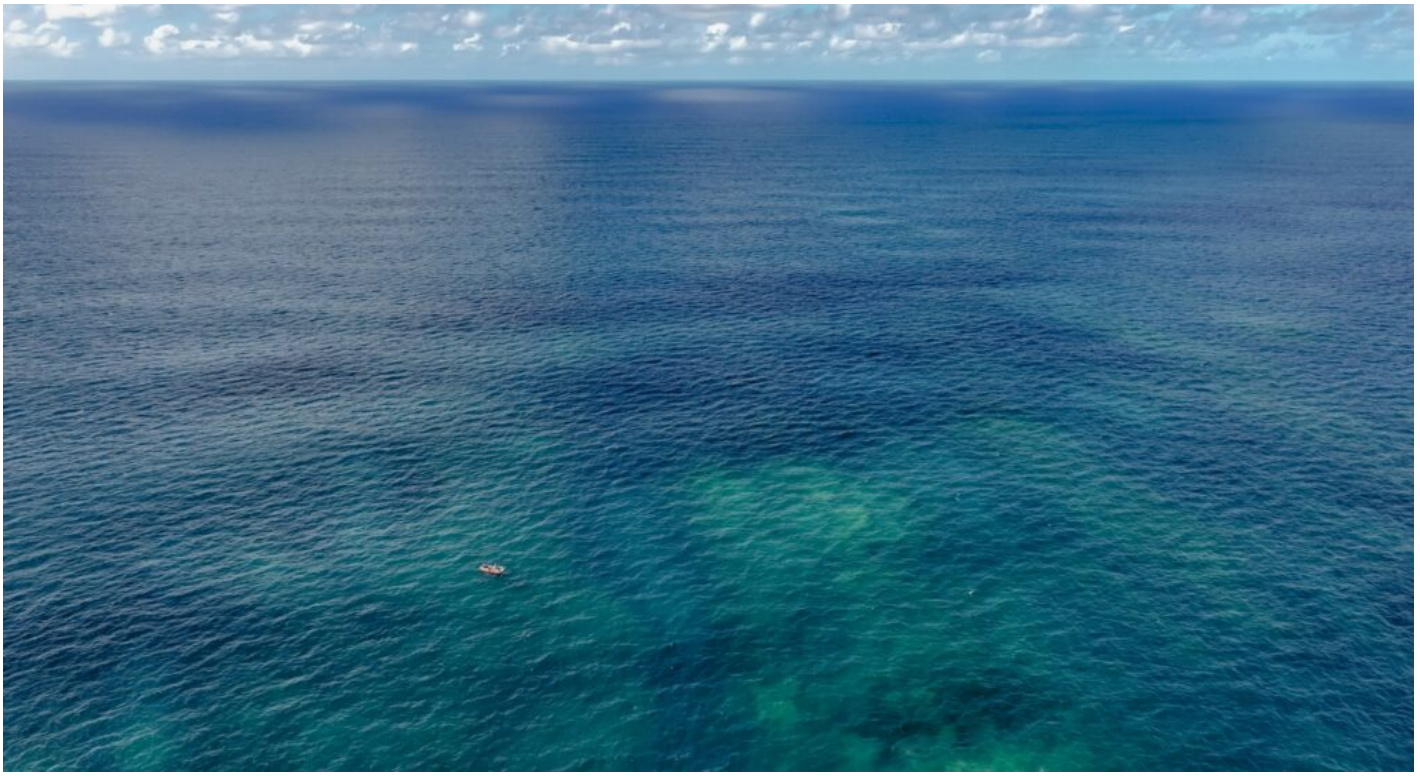
A shark swims over the reef at Manawai, also known as Pearl and Hermes Atoll, in Papahānaumokuākea Marine National Monument in September. (Nathan Eagle/Civil Beat/2024)

Kosaki has been a self-described science nerd for as long as he can remember. He still has a newspaper clipping from a 1978 article in the Honolulu Star-Bulletin about a “big coral discovery” at Lalo that “will raise more questions than answers,” furthering his curiosity of the Northwestern Hawaiian Islands. He dreamed of going to this remote part of the archipelago that he first saw photos of in an old Dillingham tide chart calendar. But he didn’t know how to make it come true.

He is Japanese and Native Hawaiian, adopted at birth by two university professors in Manoa. They were trailblazers — his dad in academia and his mom as the first woman on the boards of Hawaiian Electric Industries and the Honolulu Advertiser newspaper. They were, he says, “the best parents anyone could ask for,” who nurtured his interests, including an obsession with fish.

His first memory was underwater. He had fallen off the surfboard his dad was towing while hunting octopus. Instead of panic, Kosaki felt joy, fascinated by the bubbles below the surface. He’d grow up on the beach in Waikīkī, where he played in the water while his dad read onshore. Later, his parents would drop him and his friends off farther up the coast by Aina Haina with a couple sticks and a mesh bag to catch snowflake and zebra morays.

But Kosaki almost didn’t graduate high school on O‘ahu. Leaving Occidental College with a bachelor’s degree in hand had been another close call. He was more interested in fishing, collecting fish, eating fish and photographing fish than studying fish as a career.



Scientists on board one of the small rigid hull inflatable boats that are deployed from NOAA's research ship approached a dive site at Manawai in September. (Nathan Eagle/Civil Beat/2024)

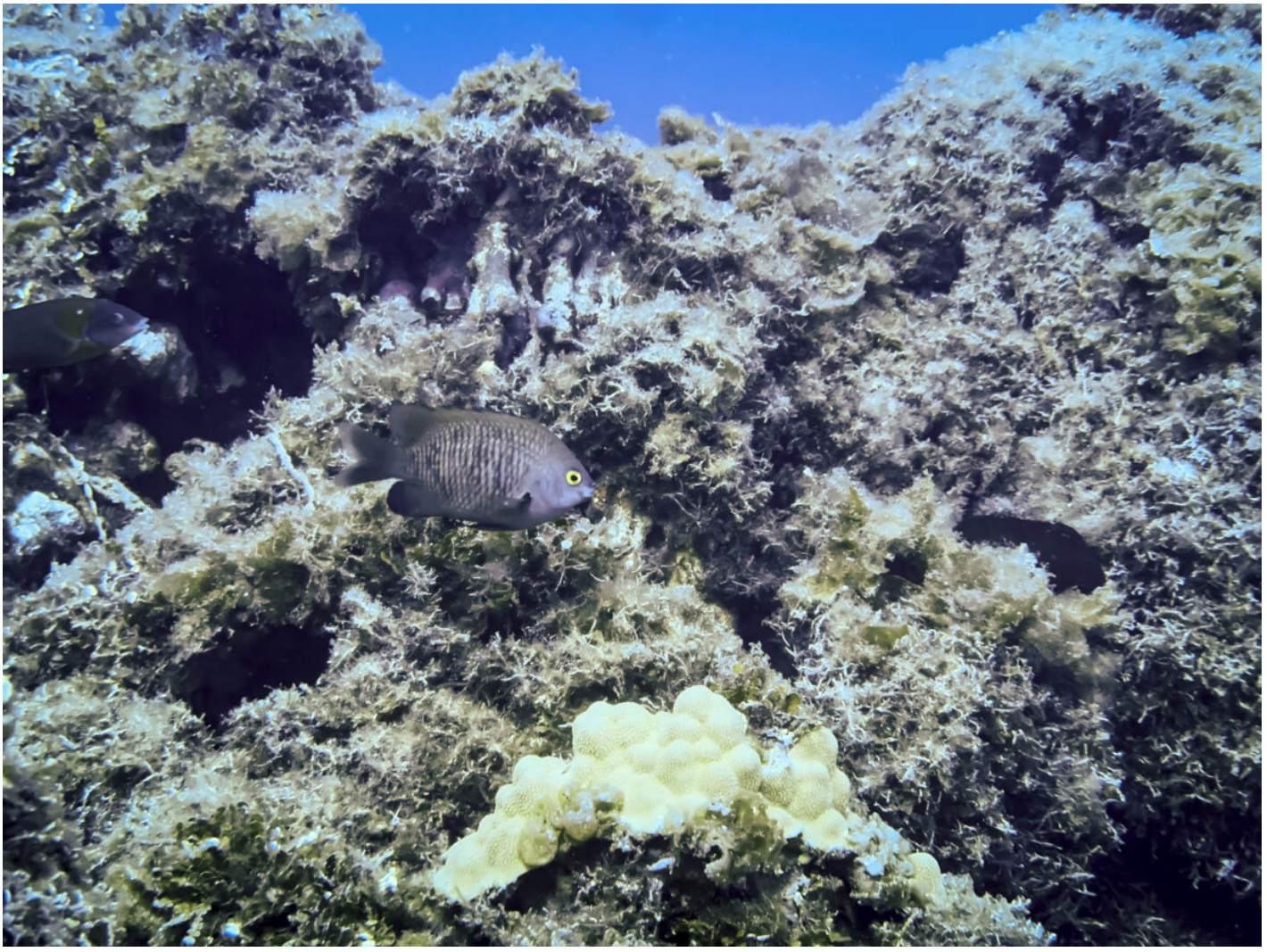
He came home from college and started working as an aquarist at the Waikiki Aquarium. After two years of that, he decided to pursue a master's degree in zoology at UH where he took a newish course called QUEST, short for quantitative underwater ecological surveying techniques. He excelled. It at last landed him a spot on a research cruise to the Northwestern Hawaiian Islands in 1982 as an intern with the state Department of Land and Natural Resources.

"It was a life-changing trip," Kosaki said. "It taught me what a Hawai‘i reef could look like."

And it wasn't anything like the foreign shag carpet of seaweed that by 2019 was burying some of the richest and rarest communities of corals

on the planet.

Forensics Team Delivers ‘Game-Changer’



Chondria, an invasive seaweed, has smothered parts of the reef at Manawai in the northwestern part of Papahānaumokuākea Marine National Monument. (Nathan Eagle/Civil Beat/2024)

Kosaki was ready to get back to the monument to survey more areas for chondria. Was it spreading? How much? Where?

First they needed new tools, particularly to aid in detection. Collecting gallons of water samples at various dives sites, hauling the bags back to the ship to be filtered, then sending them off to be analyzed for traces of chondria was taking too long and costing too much.

It was Sherwood who turned to Peter Marko for help. He runs a molecular genetics lab at UH and had just the graduate student for the job. Patrick Nichols took the lead in creating a novel solution: An environmental DNA test.

Divers could clip a modified makeup removal pad — a circular cotton swab a couple inches wide — onto the back of their scuba tanks that could later be quickly analyzed to determine whether chondria was present in whatever water they had been diving.

“Definitely a game-changer,” Nichols said. “We made it sensitive enough to detect even the smallest amount so, in theory, if you caught it early it would be much easier to manage.”

Environmental DNA tests were used to detect the presence of chondria in water around Hōlanikū and Manawai in September. (Nathan Eagle/Civil Beat/2024)

Randy Kosaki attached an eDNA test to the scuba tank on scientist Makoa Pascoe before a dive at Hōlanikū. (Nathan Eagle/Civil Beat/2024)

Scientists armed themselves with these eDNA tests when they went back to the monument in 2021, but it turned out the divers didn't need them to determine that mats of seaweed were continuing to suffocate the reefs at Manawai. They could clearly see that. And they saw something even more concerning farther up the island chain: It had marched north to Kuaihelani, also known as Midway Atoll, although it didn't seem as abundant. At least not yet.

By 2023, though, there was more bad news: Scientists found chondria at Hōlanikū, or Kure Atoll.

It had reached the far northwestern end of the archipelago.

Targeting The Source

This fall, a dozen or more state and federal scientists along with UH graduate students and interns hauled their dive bags up the gangway onto the Oscar Elton Sette from a dock in Pearl Harbor.

It was time to go back. NOAA's 224-foot vessel set sail for three weeks of research in the monument. One main mission: find chondria.

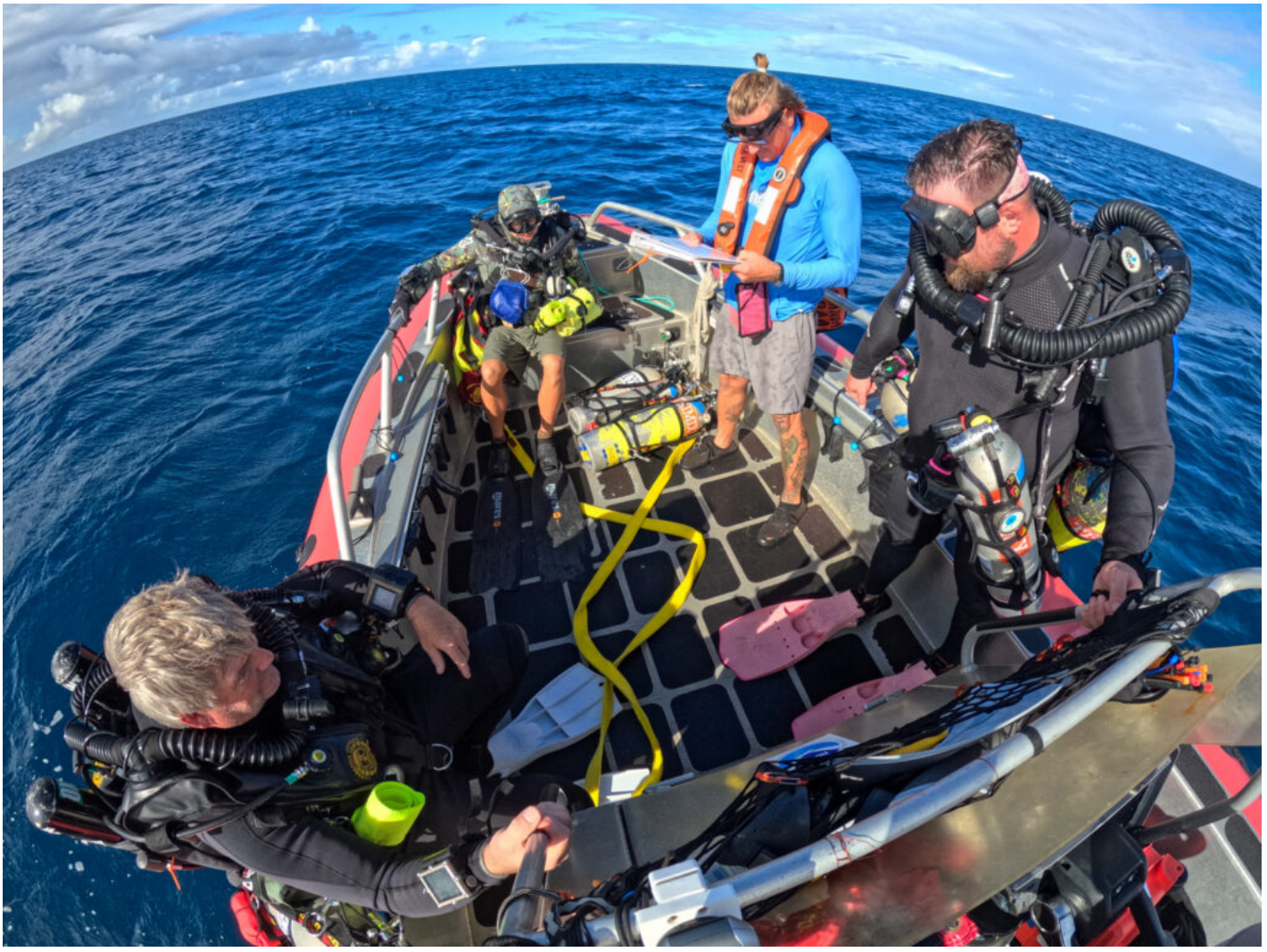
Scientist Atsuko Fukunaga, foreground at left, ties up the small rigid hull inflatable boat to the Oscar Elton Sette, NOAA's research vessel. (Nathan Eagle/Civil Beat/2024)

At first, everything went smoothly as they made stops along the way, at Lalo (French Frigate Shoals), Kamole (Laysan Island) and Kapou (Lisianski Island). There, the scientists surveyed reefs still recovering from mass coral bleaching events years earlier followed by unprecedented hurricane damage in 2018.

There was no sign of chondria spreading to these sites southeast of Manawai. Good news.

The Sette eventually reached Hōlanikū, the farthest atoll from the Main Hawaiian Islands and the turnaround point in the trip. They'd spend two days there diving a couple dozen sites before an overnight voyage to Manawai, by design the last stop on the trip to avoid inadvertently spreading chondria from what could be its ground zero.

Scientists collected a few fragments of chondria at shallow sites around the lagoon at Hōlanikū on the first day but they weren't finding any large mats. More good news.



Rebreather divers gear up for a deep dive in Papahānaumokuākea Marine National Monument as NOAA's Mikey Kent goes over the safety protocols. (Nathan Eagle/Civil Beat/2024)

Kosaki dispatched three divers to a site 225 feet deep, which required them to use closed-circuit rebreathers. These highly technical devices recycle a diver's air, adding oxygen while scrubbing out the carbon dioxide, and make it possible to stay underwater longer and go deeper than with traditional open-circuit scuba.

Rebreather dives have become Kosaki's favorites in recent years, taking divers to a hardly explored zone full of wonder and undiscovered native species.

He jumped in the water on this day as a support diver to help them ascend the final 70 feet, ferrying their excess tanks to the boat. A dozen Galapagos sharks periodically diverted his attention, swimming within inches to check out these curious gear-laden creatures appearing in their wide open ocean.

Jason Leonard, NOAA's field operations coordinator for Papahānaumokuākea, came back to the surface holding a Ziploc bag full of seaweed. It was chondria — the deepest it's ever been found.

Samples of chondria, an invasive seaweed, were collected at Manawai in September. (Nathan Eagle/Civil Beat/2024)

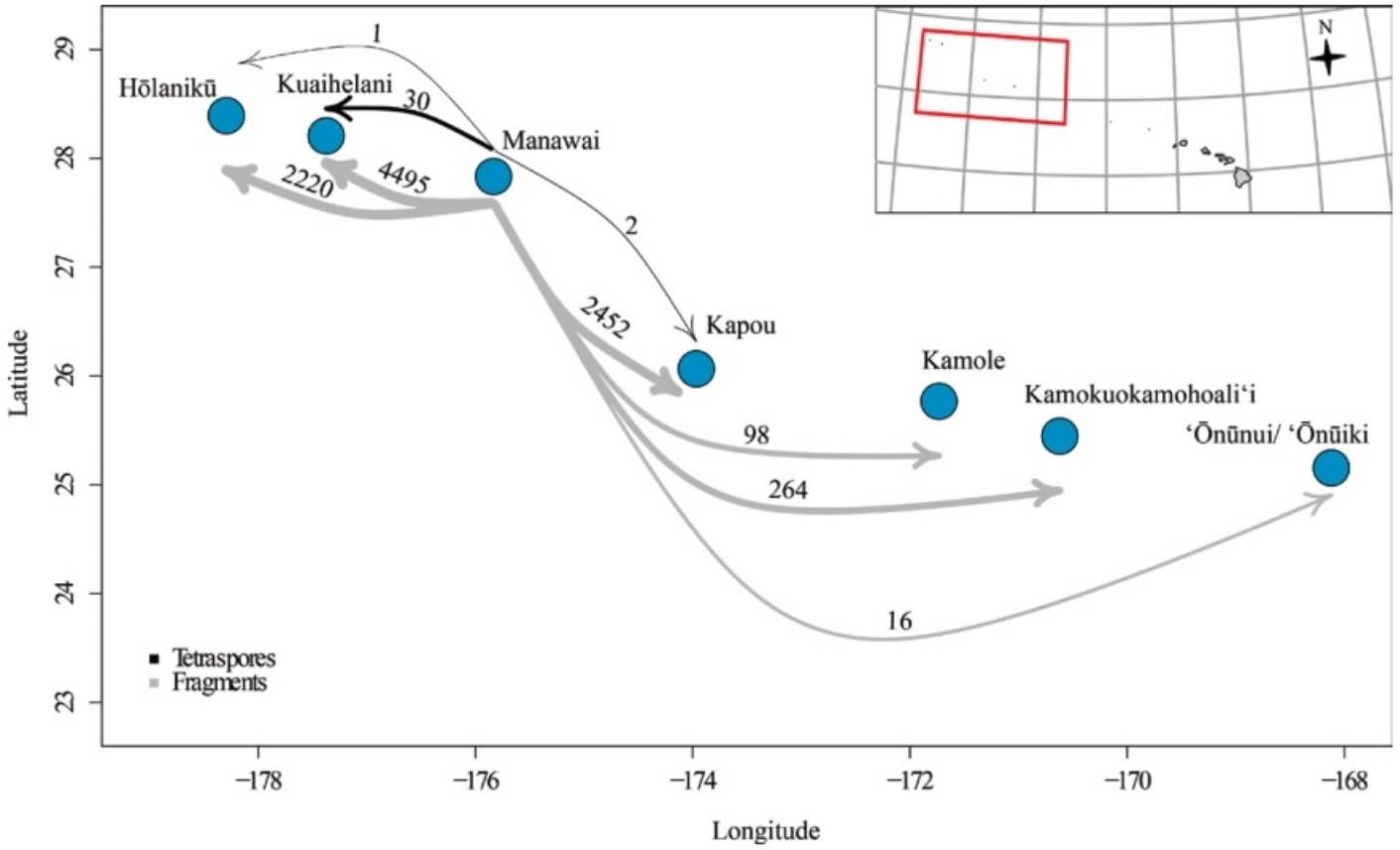
Kosaki had mixed feelings. He wished it hadn't been there but he was glad they had found it. It reaffirmed their understanding of how this type

of seaweed travels.

Chondria is not buoyant, so it doesn't typically drift on the surface from place to place. It's more like a tumbleweed, with chunks rolling down the underwater volcanic slopes of these ancient atolls.

After soaking his dive gear in a bleach solution, Kosaki went back to his stateroom on the Sette. One perk of serving as the expedition's chief scientist is a slightly bigger room that you only have to share with one other person instead of up to five. It's tidy but still a bit cramped. Just enough room for a bunk bed, small desk, chair and mini fridge. A round port window looks out at the sea.

Flipping open his laptop, Kosaki clicked on one of the many emails that had flooded his inbox after the ship's delicate WiFi came back online. His eyes widened. A research paper had just come out that offered new clues about how chondria might be spreading.



This map models how chondria could spread among the Northwestern Hawaiian Islands. Islands are represented as blue dots with tiny spores of chondria represented in black and fragments below in gray. The red box in the inset map shows the location of the study region with respect to the remainder of the Hawaiian archipelago. (Courtesy: James Fumo/Aquatic Invasions/2024)

Published by lead author James Fumo in the September edition of Aquatic Invasions, the study modeled chondria's movement throughout Papahānaumokuākea. If it latched onto the ever present marine debris floating among the Northwestern Hawaiian Islands — a discarded fishing net, laundry baskets, plastic bottles — the seaweed had a far higher chance of making it from one island's reef system to the next. Like 1,200 times higher.

The study underscored the urgency of removing marine debris from the monument and the need for stronger monitoring with eDNA tests of places the seaweed would likely land.

Over 200,000 pounds of marine trash are hauled out of the monument each year. It would be even more if funding and logistics allowed. A ship contracted by the Papahānaumokuākea Marine Debris Project, the nonprofit that does virtually all the removal work, was the only other vessel scientists on the Sette saw that whole trip inside the monument.

Chondria is much more likely to spread from one island to the next by rafting on marine debris like this abandoned fishing net off Hōlanikū. (Nathan Eagle/Civil Beat/2024)

Kosaki zoomed in on the modeling in Fumo's study. It made a clear case for chondria hitching a ride on marine debris 150 miles from Manawai to

Hōlanikū and Kuaihelani while explaining why they didn't find any to the southeast earlier in the trip.

But it didn't answer where chondria had come from in the first place.

"If we can pinpoint that, then we could target the source," he said.

Modeling of ocean currents and winds has suggested the seaweed could have originated in Japan, but Kosaki said there's just one problem with that: It's not known to exist in Japan.

'Our Only Hope'

The Sette pulled into Manawai at dawn. The winds had picked up overnight. Choppy water slapped the ship. It would be tricky to navigate the atoll's reef labyrinth even on the small inflatable boats that the dive teams use to reach their coral and fish monitoring sites.

A brown booby soars overhead in Papahānaumokuākea Marine National Monument. (Nathan Eagle/Civil Beat/2024)

This is the place where chondria, then just an "unidentified red algae," was found in 2016. There was so little that the scientists assumed they'd never see it again. It's also where it had gone "berserk" by 2019.

They were back at the scene to see what it was doing now.

Seabirds soared overhead, making acrobatic dips as they scanned for mālolo, or flying fish, breaking the ocean's surface. Kosaki asked what the birds are called. It surprised a colleague, who knew Kosaki could rattle off dozens of species of algae and fish in Latin, English and Hawaiian.

Kosaki said he knows his birds by what type of fish they form frenzied flocks over: "There's mahi birds, ahi birds, aku birds." Spoken like a true fisherman.

Manawai Reef 3D Modeling

Scientists with the Hilo-based MEGA Lab have surveyed reefs at Manawai for over a decade. They take hundreds of photos at the same site to create the 3D modeling, which shows in detail what the reef (light brown) looked like in 2017 before the chondria (dark brown) covered it in 2019. It appears to be dissipating this year, showing more of the reef.

This 3D modeling shows the same reef at Manawai in 2017, 2019 and 2024. (Courtesy: The MEGA Lab) [Click to expand]

Activity on the boat was gearing up for the day, too. Scientists rubbed on their first round of sunscreen while checking their scuba tanks for air and pulling out their fins and masks from the dive locker on the bottom deck. The pace was languid compared to previous days, though, as their diving marathon neared its end.

This would be their third day in a row doing several dives without a transit day to give them a break. Their social media posts make the job look like nothing but fun. Those photos fail to capture the cold, the wet, the exhaustion — all adding up to greater risk of an accident 1,000 miles from the nearest hospital.

“It’s a great day for a day,” Mikey Kent, NOAA’s dive safety officer for the expedition, offered during the morning briefing. A moment of levity before their final push.

An ulua swims over part of the reef at Manawai that’s been hit hard by chondria, the invasive seaweed. (Nathan Eagle/Civil Beat/2024)

Three dozen dives over the next three days yielded more questions than answers. They found chondria again as expected at sites around Manawai, especially in areas that matched the modeling of the latest study. They carefully measured the spots where they pulled it out, planning to return in a year to chart its regrowth.

But what they gathered seemed, well, different.

It was crunchier, perhaps, and darker in color. Less dominant, but still prevalent. Kosaki pondered whether this seaweed was seasonal. An algal bloom of sorts. Or better yet, was it dying back, perhaps nearing the end of its natural life cycle?

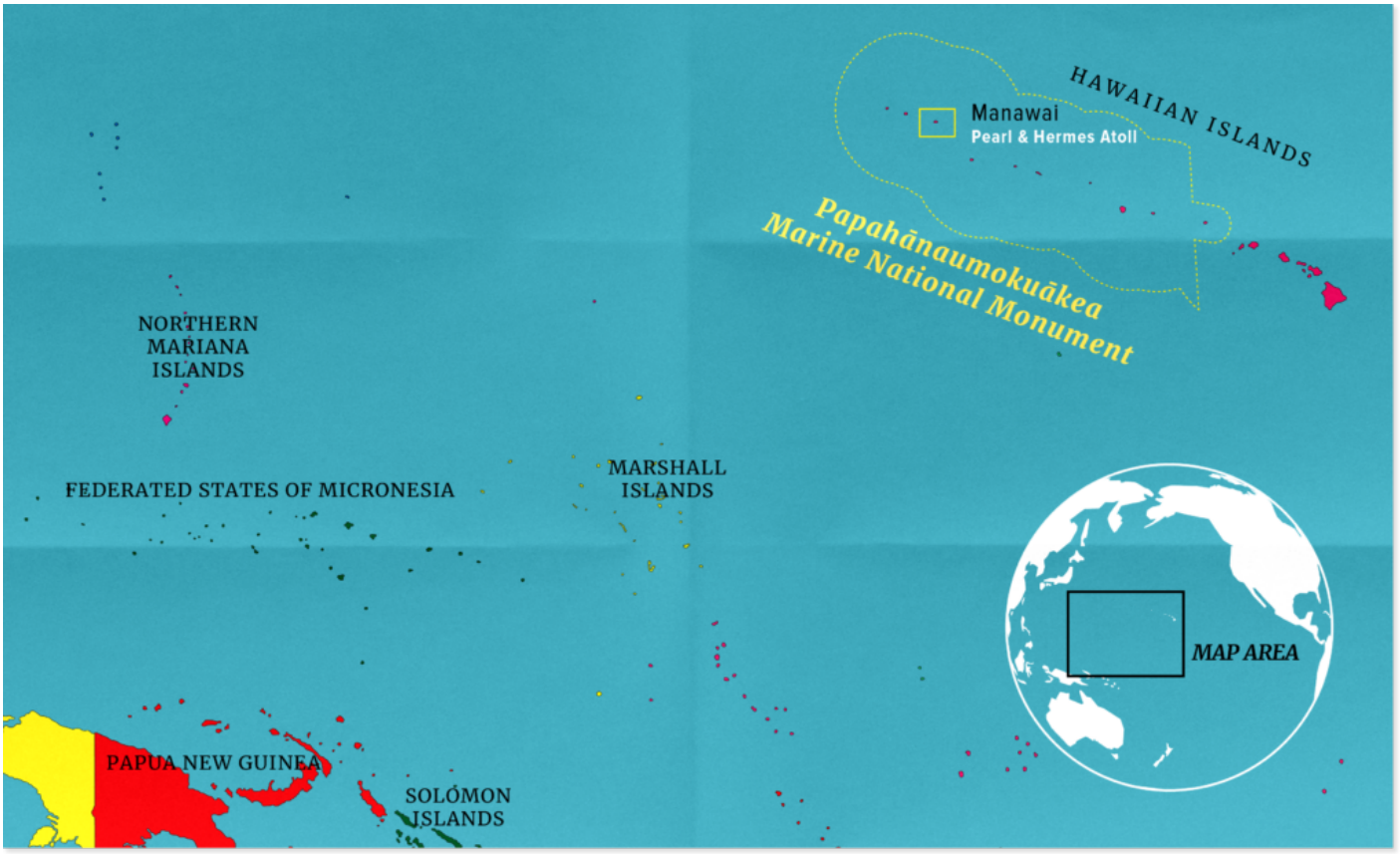
“That’s our only hope,” he said, crossing his fingers and raising them in the air. “We’re never going to remove it all.”

A complex reef system the size of O‘ahu encompass Manawai. (Nathan Eagle/Civil Beat/2024)

Brian Hauk would be the guy for the removal job. He’s the monument’s resource protection specialist, and is more than familiar with chondria. Hauk served as NOAA’s chief scientist on the 2023 cruise that discovered it had spread to Hōlanikū.

He also deployed the “Super Sucker,” a huge underwater vacuum, in a battle against an alien algae in Kāneʻohe Bay. That cleanup then required dumping thousands of sea urchins into the bay to eat the leftover bits and pieces. That won’t work at Manawai. It’s too big — the reef system is the size of Oʻahu — and too far away.

“I get accused of painting the doom and gloom picture but that’s how I see this stuff,” Hauk said. “It will probably have some cycle — a boom and bust — but we don’t know.”



Scientists have confirmed chondria at Manawai and its neighboring atolls, Hōlanikū and Kuaihelani, in the Northwestern Hawaiian Islands. It may now also be in the Marshall Islands and Northern Mariana Islands. (April Estrellon/Civil Beat/2024)

He sees chondria in a broader context, one in a series of threats to reefs in Hawai‘i and beyond.

“Coral reefs around the world are under attack between bleaching, acidification, phase shifts like this,” Hauk said. “If it can happen in a place like Papahānaumokuākea, it can happen anywhere. And if we want our kids and grandkids to know what coral reefs are, we’re going to have to change our behavior.”

Within a month of Kosaki’s voyage, Hauk would seem eerily prescient: A scientist diving in the Marshall Islands would get a positive hit for chondria from an eDNA test — the first time it’s been detected beyond the Northwestern Hawaiian Islands.

Two weeks later, a fisheries biologist with the Commonwealth of the Northern Mariana Islands would share photos with Hawai‘i scientists of a strange mat-forming seaweed in areas around the U.S. Pacific territory. It looked like chondria, too, but only tests would tell.

‘The Devil Weed’

Randy Kosaki holds a sample of chondria in the wet lab on the research ship, which was collected in the Northwestern Hawaiian Islands. (Nathan Eagle/Civil Beat/2024)

At night in the wet lab, Kosaki rummaged through seaweed samples collected from Manawai and labeled them as the ship began its five-day return to O‘ahu.

On the last day of diving, scientists had collected 70 pounds of chondria, enough to fill a garbage bag they will bring back for further research. It’s in the ship’s freezer alongside other specimens from the trip.

Kosaki held a small plastic bag of it up to the light: “There it is, the devil weed.”

Then, he pulled out a piece and took a bite, for science — though he mentioned that he hadn't had dinner yet.

"It tastes pretty good to me," Kosaki said.

He handed another piece to the Civil Beat reporter next to him. It actually doesn't taste too bad at all. Salty. A little fishy. Sort of gristly. Could be good on a poke bowl, sort of like ogo, the reddish seaweed often mixed in with the marinated ahi cubes.

Samples of chondria, an invasive seaweed, were collected at Manawai in September. (Nathan Eagle/Civil Beat/2024)

That’s another mystery. The bountiful schools of herbivore fish in the Northwestern Hawaiian Islands — the uhu and manini, kole and kala that could otherwise keep the Chondria tumulosa in check — are passing on it. Some of the scientists have even seen fish spit it out.

Kosaki wants to know why it’s tasty to humans and not to fish, and he knows who might be able to answer that question.

“We need more people worldwide to study microalgae,” Kosaki said as he explained his plan for the bag of chondria. “Algae and sponges are like the stepchildren of marine biology. They’re great topics but they don’t catch people’s eyes often.”

They have caught the eye of Karla McDermid Smith, an algae specialist and professor in UH Hilo’s Marine Science Department. Kosaki has emailed her from the ship so she is waiting, expecting the frozen garbage bag of chondria.

She’ll run tests next year to see if something in it makes it unappetizing for fish.

Kosaki will coordinate all of that when he gets back from D.C., where he is to be honored for winning the annual NOAA administrator’s award for developing science-based practices to contain chondria — the

Randy Kosaki, 62, smiled as colleagues and the ship's crew sang "Happy Birthday" to him during dinner one night on the Oscar Elton Sette. He's rarely celebrated his birthday (or his wife's) at home on Oʻahu over the past 20 years because the research cruises are usually in September. (Nathan Eagle/Civil Beat/2024)

systematic bleaching of all the dive gear and boats.

He is stoked to take his wife and their son, who's studying aerospace engineering, as D.C. has a fantastic aviation museum. He is less thrilled to dig out his suit and tie. But Kosaki has long straddled the roles of manager and ecological researcher, spouse and parent. He knows when to wear his wetsuit versus his drysuit.

Kosaki married at 40. In one year, he said, he got a wife, two kids from her previous marriage, a mortgage and a job at NOAA. That chapter made sense to him at the time. He was ready for it and remains grateful for the "lucky timing." He's less sure about his next move.

Toward the end of the trip, Kosaki posted a photo on Instagram of himself with recent QUEST students who had joined the expedition. He extolled the program's value four decades after he went through it. He quoted anthropologist Margaret Mead: "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has."

And he wrote that this would likely be his final cruise.

“It’s time for someone else,” he said that evening.

He’s been talked out of retirement before. Many hope that will be the case again.

An Epic Morning

Hokupa‘a, the north star, shined bright above the horizon. Outside on the stern, Kosaki stretched his hand out to the sky, thumb down on the horizon. It was 21 degrees from the tip of his thumb to his pinky, a natural navigational tool he used on a previous trip to the monument aboard the Hōkūle‘a, the famous Hawaiian voyaging canoe.

He came back inside wearing his noise-canceling headphones, listening to some soothing Hawaiian music. He sauntered to his room, squinting at the fluorescent lights, wincing at his laptop and its fresh pile of emails. But he was thrilled about what was finally lining up.

The next morning, the Sette would sail past Nihoa at sunrise.

Kosaki had dreamed of passing by this rugged island at the start of a new day on one of his 25 trips to the Northwestern Hawaiian Islands over the past four decades. The timing had never lined up.

Nihoa, about 275 miles northwest of Oʻahu, holds special meaning to many Native Hawaiians. (Nathan Eagle/Civil Beat/2024)

Nihoa holds special meaning to him. Archaeologists have found evidence on the island of Hawaiians living there until the 13th century, including terraces for homes and farming, and ceremonial structures.

Kosaki's Hawaiian blood came from his biological father, which his adopted parents told him about when he was very young. He has never met him. But in 2004, after the birth of his own son, Kosaki was inspired to find other members of his biological family.

He reconnected with his biological mother about 10 years ago. June

Randy Kosaki, adopted at birth, met his half-sister Kimi Werner about 10 years ago. They quickly discovered their shared passion for spearfishing, the ocean and conservation. (Courtesy: Justin Turkowski/2018)

Werner, who now lives in Kula, had him when she was 17. She was kicked out of school and her house after becoming pregnant with him, so she decided the best thing for his future was to give him up for adoption.

But before his mother, he had reconnected with his sisters, including his younger half-sister Kimi Werner, a champion spearfisher who lives with her family on O‘ahu’s north shore.

“I’m a conservation biologist who loves to fish,” Kosaki said. “She’s a world-class fisher with a world-class conservation ethic.”

Kosaki has long fished with a spear, too. In high school, he’d dive for fish at 50 to 60 feet deep on average, holding his breath a couple minutes during each descent. He remembers targeting uhu on Friday night dives with friends at Black Point. It was good money at the time, too, selling the catch to local restaurants or people tailgating on Saturday mornings before UH football games.

It’s also something he’d never do now, given the sharp decline of herbivores like uhu that take care of the reefs. He and his sister are part of the nonprofit Fish Pono initiative to encourage sustainable fishing.

Randy Kosaki felt contentment at sunrise Oct. 1 as the Oscar Elton Sette sailed past Nihoa. (Nathan Eagle/Civil Beat/2024)

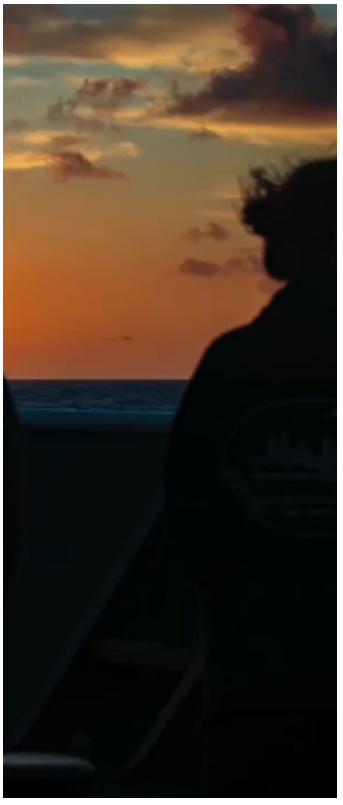
Kosaki sat back down at the desk in his room on the Sette. He clicked through a few more emails before closing his laptop and calling it a night. He wanted to be rested for the following day.

“All of these observations raise far more questions than they answer,” Kosaki said. “The mystery continues.”

He woke up the next morning, Oct. 1, so early the stars were still out. Nihoa's jagged shape could barely be made out at the horizon. Kosaki slipped out of his room and started knocking on his colleagues' doors. "Wake up! This is fucking epic!"

He mustered a dozen scientists on the bow. They stood side by side looking out at the horizon and began a chant, a Hawaiian oli, as the sun came up. Nihoa's black silhouette turned a warm orange. Soon the sun illuminated its swooping green valleys and sharp peaks, by far the highest points in the Northwestern Hawaiian Islands at nearly 900 feet.

"E ala e, ka lā i ka hikina, I ka moana, ka moana hohonu," the group sang, an oli awakening the sun and the light within.



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Scientists sang "E Ala E," an oli welcoming the new day, as the sun rose and their research ship sailed past Nihoa. As they left the monument's boundaries a few hours later, they sang "Oli Mahalo," which is

heard here, a Hawaiian chant of gratitude to the ancestors. (Nathan Eagle/Civil Beat/2024)

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.

VIDEO: Behind The Story — Guardians Of The Deep

Civil Beat deputy editor Nathan Eagle joined scientists on a three-week expedition in Papahānaumokuākea Marine National Monument.

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Guardians of the Deep explores the work of marine scientists in Papahānaumokuākea 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.

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