BIRD'S HEAD SEASCAPE
Raja Ampat • Triton Bay • Cenderawasih Bay

500 baby sharks to be released: An exclusive look at an unprecedented mission by Greg Welch, images by David Doubilet & Jennifer Hayes (National Geographic)

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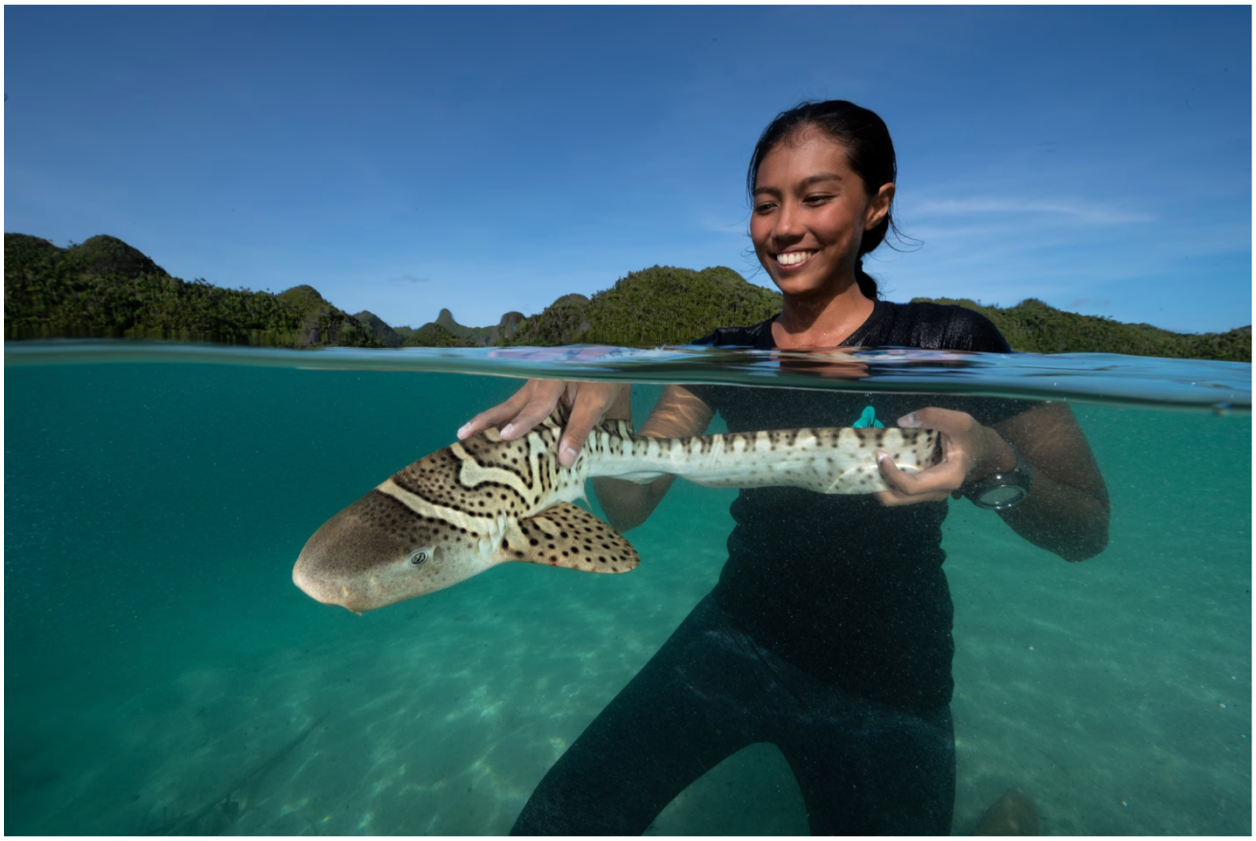

Scientist Nesha Ichida releases the second zebra shark of the day, a young female named Kathlyn, in Indonesia's Wayag Islands. Ichida is part of a new group, ReShark, led by 44 aquariums from around the world, that aims to rebuild endangered shark populations by reintroducing sharks raised in captivity to their native waters. (Ichida had released Charlie, Kathlyn's older sibling, and the very first shark set free through this program, 20 minutes earlier.

A team spanning 15 countries is raising endangered sharks from aquariums and reintroducing them to the wild, starting in Indonesia. It's never been done at this scale, but experts think the plan might work.

By Craig Welch
Photographs By Jennifer Hayes And David Doubilet
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A new organization with partners in 15 countries—including 44 aquariums—is raising endangered zebra sharks in captivity and aims to release 500 of them in Indonesia to try bringing back a self-sustaining wild population that has been teetering on extinction.

This is a global first. While scientists often reintroduce rare captive animals on land—think California condors or giant pandas in China—nothing quite like this has ever been tried with sharks, which are disappearing around the world at an alarming clip.But some of the top shark scientists in the world believe this effort has a shot at working. And zebra sharks may be just the beginning. This new group, calling itself ReShark, is already assessing plans to apply the same approach to other shark species in different parts of the world.“It’s such a milestone,” said Nesha Ichida, an Indonesian marine scientist helping manage this work for ReShark. “This is such a hopeful, momentous moment.”

Nesha Ichida gently ferries a juvenile zebra shark through the sea pen on Kri Island to a team of shark caretakers for the shark’s final health check the day before it’s released to the wild.

Why the world's first shark rewilding is happening in Indonesia

Aquariums are releasing captive-raised zebra sharks in Indonesia's Raja Ampat archipelago to bring the species back from the brink—a first. They aim to try that with other shark species next.

The unique advantages of the Raja Ampat archipelago

Raja Ampat's adoption of a shark sanctuary and a network of nine marine protected areas helped many shark species, but zebra shark numbers still remained low. Scientists believe that the reintroduced zebra sharks will likely still stay near the protected areas in the sandy shallows —their preferred habitat.

Rosemary Wardley, NG Staff.
Sources: MPAtlas (March 2023);
K. Traylor-Holzer, Population Viability Analysis (PVA) Report for Population Augmentation of Zebra Sharks, IUCN 2021

A new wild shark

On a hot day in January, I watched Ichida kneel in a turquoise lagoon in Indonesia's Raja Ampat archipelago and gently cradle a baby shark. The creature was thin and muscular and ringed with a mix of pale stripes and circles that spiraled down a tail that seemed to go on forever.

This 15-week-old zebra shark, like all zebra sharks, had developed in an egg. But that egg had been laid at Sea Life Sydney Aquarium in Australia and was flown to Indonesia, where it hatched in a tank in a new shark nursery. The shark's parents had been captured many years earlier from the Pacific Ocean off North Queensland, where the zebra shark population is healthy. But here in Raja Ampat, 1,500 miles northwest, zebra sharks are nearly gone, victims of the global shark trade. Between 2001 and 2021, despite 15,000 hours of searching, researchers had counted only three.

This region has since protected sharks, and Ichida was here to jumpstart an ambitious rewilding operation. She held in her hands the first captive animal that would be freed in these waters, a young zebra shark called Charlie, named for a West Papuan provincial official who'd championed this project. Below towering limestone formations in the remote Wayag Islands, 90 miles by boat from the nearest town, I watched the young shark sway beneath her fingers.

Before a small crowd of government officials, the indigenous Kawe villagers who manage Wayag, and a few celebrity wildlife advocates, including actor Harrison Ford, Ichida shared a parting wish: She hoped this shark would ignite a movement to restore ocean predators. "I'm feeling very hopeful that Charlie is going to be the ambassador" for all shark species, she said.

Moments later her palms opened, and Charlie slipped away, his long tail curling as he dove toward the sandy bottom and an unfathomable future.

Like everyone else, Ford stood in the crowd and held up a phone to document the scene himself.

Shark caretaker Kyra Wicaksono uses a light to illuminate a zebra shark embryo inside its egg case at a new shark nursery at the Misool Resort in southern Raja Ampat, Indonesia. The egg, also called a mermaid's purse, was shipped from Sea Life Sydney Aquarium. Soon, a shark will emerge and will live in a tank before eventually being moved to an outdoor sea pen and then the ocean.

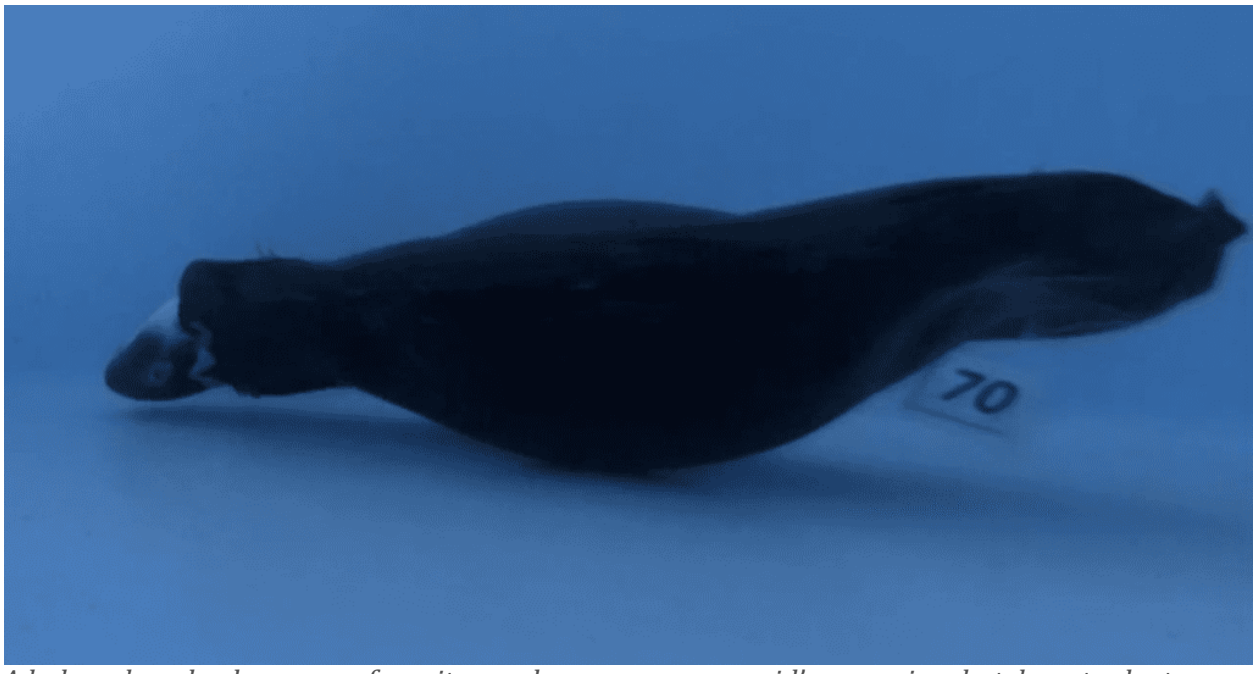
Ancient creatures on the brink

Sharks are among the planet's oldest vertebrates, having survived five mass extinctions over more than 420 million years. But today they are the world's second-fastest disappearing vertebrate group after amphibians. More than 37 percent of 1,199 species of sharks and rays face extinction risks, according to research led by Nick Dulvy, who spent 11 years as head of the International Union for the Conservation of Nature's Shark Specialist Group, the global body that tracks threats to sharks. The driving cause is overfishing. Fishing—both legal and illegal—contributes to every at-risk shark species and is the only major threat for two-thirds of them.

Millions are killed yearly for meat, consumed in countries from Brazil to the United States, India and Iceland. The shark fin byproduct is then used in soup in Asia and elsewhere around the world.

Curbing overfishing is essential to protecting sharks, and sharks are essential to the marine world. They keep ocean food webs in check by making sure smaller creatures don't grow too numerous and destroy the natural systems that feed billions of people.

But Ichida's colleagues at ReShark started with a simple query: Could we also restore some of the shark populations we've already lost? They're on their way to answering that question.



A baby zebra shark emerges from its egg, known as a mermaid's purse, in a hatchery tank at Misool Resort in Raja Ampat, Indonesia. When young, baby zebra sharks resemble banded sea kraits, venomous snakes, so predators are less likely to eat them.
Kyra Wicaksono Misool Foundation

The day before the very first two juvenile sharks, Charlie and Kathlyn, are released into the wild, handlers at a sea pen on Kri Island stretch one of them to measure it and check its health for the very last time.

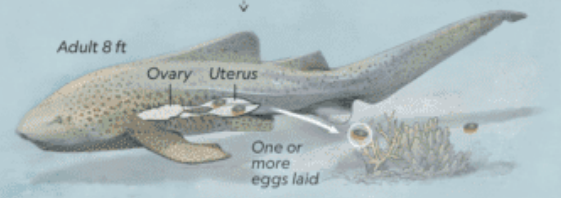
In January, Ichida released two sharks, Charlie and his sibling, a female called Kathlyn. Ichida has released another since and will set more free this year. Meanwhile, the team is debating which other species might benefit from this approach, from angel sharks in the Canary Islands and off the coast of Wales, to nurse sharks in East Africa, to bowmouth guitarfish in other parts of Asia, and critically endangered sawfishes, noted for the toothy blade-like appendages on their snouts. It's too soon to know which projects they'll ultimately tackle, but "the hope is that this list increases exponentially as we go forward," said Lisa Hoopes, senior director of research and conservation at Atlanta's Georgia Aquarium, a ReShark partner.

RAISE AND RELEASE

The international ReShark collective seeks to restore threatened shark and ray species to their known historic ranges, a boon for marine ecosystems. Its first project: to rewild Indonesian waters.

How sharks reproduce

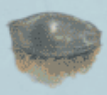
The zebra shark—docile, endangered, and egg-laying—is an ideal first candidate for reintroduction. Eggs are easier to transport than live sharks.



1 Egg selection
Partner facilities breed the sharks and assess eggs for health and genetic viability.

EGG

1 week



Egg case 7 in

2 Shipping
Selections are carefully bagged, boxed, and mailed internationally through official customs.

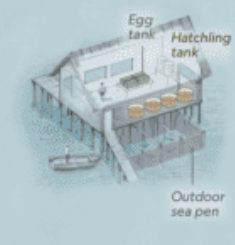
Egg tank

3 Hatchery in Raja Ampat
Local teams care for pups in tanks, then transfer them to sea pens to learn survival skills.

HATCH

Pup tank

Hatchling 12 in



TAGGED

Outdoor sea pen

28 in or more

4-5 months old

4 Release and monitor
Juveniles are tagged and, when ready for the wild, released into a marine protected area.

Fernando G. Baptista, NGM Staff. Lawson Parker
Sources: Nicholas K. Dulvy, Simon Fraser University; Erin Meyer, Seattle Aquarium; Kady Lyons, Georgia Aquarium; Jennifer Wyffels, Ripley's Aquariums; Christine Dudgeon, University of Queensland.

This is no small task. Marine reintroductions are complex and rare. Ocean life is difficult to see and track. Threats are tough to manage. “Everything is harder when the ocean is involved,” said David Shiffman, biologist and author of *Why Sharks Matter: A Deep Dive with the World’s Most Misunderstood Predator*. Other groups have returned captive sharks to the wild. An aquarium in the Republic of Malta, for example, gathers eggs from dead sharks sold in fish markets and rears and releases their hatchlings into the Mediterranean Sea. But these efforts, though well-intentioned, are tiny in scope and often don’t even involve threatened species. There’s little evidence they’ll drive population-level improvements—in part because they often skirt the thorniest issue: Until overfishing is stopped where sharks are released, adding more won’t bring species back.

That’s why Dulvy initially was skeptical of ReShark’s plans. The Simon Fraser University ecologist had seen it all. “I was getting jaded by these hopeful but useless (recovery) projects,” Dulvy told me. So he asked tough questions—and came away surprised. “This initiative is different.”

His IUCN successor, Rima Jabado, agreed. It’s the first shark reintroduction project she’s come across that “may provide an opportunity for species not to go extinct,” she said.

That’s because Charlie and Kathlyn were starting their new lives in a place now off-limits to shark fishing.

Cardinal fish and glassy sweepers pulse and swirl around a sea fan draped in crinoids beneath a coral ledge in the Wayag Islands. Raja Ampat is home to some 1,600 species of fish and more than three-quarters of the world's coral species, and Wayag is among its most spectacular regions.

The Wayag Islands in northern Raja Ampat are a labyrinth of sandy beaches and turquoise lagoons and atolls broken by limestone towers. Fishing boats once packed these remote waters, nearly wiping out zebra sharks, but now a marine protected area—one of nine covering 8,000 square miles—patrolled by rangers provides a refuge for sharks, rays, turtles and other marine life.

Black tip reef sharks patrol shallow sea grass beds near Kri Island. These sharks, now common, had been a rare site before Raja Ampat's network of nine marine protected areas covering 8,000 square miles allowed sea life to begin recovering. So many zebra sharks were killed that the few that remained were unable to find mates. They've never come back, which is why scientists are trying to jumpstart the population through reintroduction of captive-raised animals.

Headed to safer waters

In Raja Ampat, atolls, sandy cays, and emerald mangrove bays give way to deep blue where the Indian and Pacific oceans meet. These are among the most species-rich waters on the planet. Some 1,600 hundred species of fish call this home, along with three-fourths of Earth's known coral species.

Sharks here, like many other places, had been culled over decades. By the 1990s, few remained. By the mid-2000s, though, the region had adopted nine marine protected areas covering a region half the size of Switzerland—some 8,000 square miles. Soon fishing for sharks and rays was banned outright across an even bigger area. Enforcement patrols regularly hunted for illegal fishing nets and boats. By 2012 shark populations were coming back, especially grey, blacktip, and whitetip reef sharks.

But not zebra sharks. Zebra sharks are supposed to cruise the seafloor near reefs from South Africa to Australia and as far north as Japan. Instead, they're at risk of extinction everywhere outside Australian

waters. Despite their fearsome reputation, few shark species are actually aggressive toward humans, and zebra sharks are less menacing than most. That made them easy to catch. Scientists suspect fishing killed so many in Raja Ampat that too few remained to find mates.

But more than 100 aquariums around the world have them on display. So for years, Mark Erdmann, a marine scientist with Conservation International, who'd worked in Raja Ampat for a quarter-century, mulled an audacious idea. Could their offspring be reintroduced?

Erin Meyer, vice president of conservation programs and partnerships at the Seattle Aquarium, chatted with Erdmann in 2018. "My initial reaction was like, 'Oh, that's a fantastic idea,'" she told me.

Erdmann had shared his brainstorm with other aquariums, and by spring of 2020, Meyer was heading up a multi-aquarium committee crafting plans to act.

An adult female zebra shark glides through the Wild Reef exhibit at Shedd Aquarium in Chicago. Adult zebra sharks are endangered everywhere outside Australia, but there are more than 100 in aquariums around the world. So several, including Shedd, are letting adults mate and produce eggs, which will be shipped to Indonesia.

Charting the way forward

Of course, reintroduction is no cure-all for what ails sharks. Globally, we're killing sharks faster than aquariums could ever replace them. It also won't work for all species. Many sharks—great whites, makos—are too big and fast for captivity. Some travel so far it's hard to adopt no-fishing zones large enough to ensure newly released young avoid nets.

Reintroductions also can fail. Young sharks can succumb to disease, get eaten by bigger sharks, or struggle to find food. Most shark species also give birth to live young, which are harder to care for in captivity than those that develop inside eggs, like zebra sharks do.

But dozens of potentially suitable candidate shark species live in waters where this approach might work. Where strong protections exist, experts see the zebra shark project as a model. In a few places where they don't, the mere possibility of reintroduction is already encouraging a renewed push for sanctuaries or reserves. Baby sharks, it turns out, make powerful ocean emissaries.

By the time the small crowd of people, including Ford, vice president of Conservation International's executive board, who was lending his considerable celebrity to this project, began gathering in Wayag, Meyer was on edge.

For days she'd found herself choking up, a nervous parent preparing to send her young charges out into the world. And after three long years, the moment had finally come. As Ichida let Charlie go, Meyer, on the beach, just let her tears flow. "I'm happy. And excited. And hopeful," she told me.

When I asked what was coming next she smiled through her tears and stage-whispered: "More eggs! And the next species."

Photographers Jennifer Hayes and David Doubilet have spent decades documenting the far corners of the planet's oceans. The National Geographic Society has funded their work to create understanding and protect marine ecosystems.

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