Hereditary Chief Ernest Mason, 77, pilots a boat during the annual Kitasoo/Xia'xias herring spawn harvest along British Columbia's Central Coast. | Courtesy of Jack Plant

How Indigenous memories can help save species from extinction

From Canada to the Amazon, scientists are trying to build on Native knowledge before it's too late.

By Karen Pinchin | Jun 24, 2021, 8:30am EDT

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From his home in remote coastal British Columbia, Ernest Mason, a 77-year-old elder and hereditary chief of the Kitasoo/Xai'xais Nation, remembers. He remembers a childhood fishing trip with his father, when they packed sleeping bags but caught so many halibut they were home before dark. He remembers setting traps for pink Dungeness crab and floating hemlock branches to collect edible herring eggs.

He also remembers watching the first two times the herring stocks collapsed, and then, fearing a third collapse, telling the Canadian government that he and the other chiefs were banning commercial fishermen from their traditional territorial waters. "I said, 'We'll do

what it takes to protect what we have,'" Mason told Vox. "This is one of the ways our grandfathers taught us, how to look after things. That's one of the chores now."

For coastal Indigenous communities like Mason's, these ancestral lessons can be the difference between plenty and poverty. Mason is one of the province's few elders who was not forced into Canada's residential schools, which stripped Indigenous children of their languages, oral histories, and cultures. This is one reason Mason, who often wears a baseball cap over his silver hair, remembers so much.

Around the world, the memories of elders like Mason are playing a powerful role in understanding and helping to preserve marine species. A growing group of researchers, some of them from within Indigenous communities, is translating the qualitative stories of fishermen into quantitative data, in a process that often requires sensitive negotiations and uncomfortable conversations between Indigenous leaders and Western institutions. Their recollections can help fill historical and geographical gaps that have eluded scientists until now.

Five years ago, University of Victoria PhD candidate Lauren Eckert interviewed Mason for hours about his **earliest fishing memories**. Since then, a series of Indigenous-led research projects — based on those memories and others — have rewritten best practices on the management of two species, Dungeness crab and yelloweye rockfish. "Science is exceptionally good at taking accurate snapshots that approach truth," Eckert says. "But Indigenous knowledge includes long-term datasets that provide this massive canvas of information that spans decades to thousands of years."

Lauren Eckert, a conservation researcher at the University of Victoria, measures a yelloweye rockfish, one of the world's longest-lived fish species. | Courtesy of Natalie Ban

Both yelloweye rockfish and Dungeness crab are essential to coastal Pacific ecosystems. Dungeness crab, according to one government description, is "**the most important crab**

species harvested" in the country's western province. Yelloweye is threatened because adults must live 15 years before they start to spawn, making them vulnerable to overfishing.

But government managers only have reliable information on yelloweye abundance starting in 2001 — the same year a population crash forced them to start a **targeted conservation plan**. Yelloweye are considered a "data-poor" species, according to the plan, because data was only collected "sporadically" from the 1980s onward. This made it difficult for government scientists to tell how steeply the population had fallen since the advent of big-boat commercial fishing in the 1970s, says Eckert.

One place they hadn't looked, however, was in the memories of those who were there all along.

To **reconstruct the historical abundance**, or baselines, of rockfish and crab, Eckert drew on an interview methodology developed after the 1990s Atlantic cod collapse. In this "vessel-based approach," fishermen in Newfoundland and Labrador were asked to recall memories of specific boats on which they had fished; this prompted specific memories of fish size and abundance, as well as when and where fish had been caught. Researchers translated the accounts of Central Coast fishers into box graphs estimating size, which corroborated the official modern catch records to an astounding — but not surprising — degree, Eckert says.

As biodiversity loss and climate change loom large over our planet's fate, these types of projects are beginning to model healthier, less extractive relationships between biologists and the communities in which they work. In the process, they could also bring key species back from the brink of extinction.

Useful Indigenous knowledge for managing species has been brushed aside

Reached by phone in late May, Mason says he still fishes whenever he can, and had spent the past few weeks chasing a run of spring salmon. He speaks of a strong connection to the species that have sustained him. "Everything within our world — that's where our stories are told, that is where our history is told," he says.

When Mason was growing up in Klemtu, a verdant village in traditional Kitasoo/Xai'xais territory, it seemed as if a yelloweye rockfish hovered in every deep ocean crevasse. Often caught as unintended bycatch, these highlighter-orange fish have bulging amber eyes, scooped, goldfish-like pectoral fins, and a crown of towering dorsal spikes. Yelloweye can

grow to nearly a meter and are one of the world's longest-lived fish species — one caught in Alaska in 2013 was 121 years old.

As a young man, Mason received the name Niis'muu-tk, meaning a person who helps and gives. He has been fishing to help feed his community for decades. | Courtesy of Ernest Mason

In the days before refrigeration, every yelloweye Mason and his father landed was eaten fresh, salted, or dried. Nothing went to waste. The years passed, and with them arrived faster, higher-powered commercial trawlers. Soon, Mason and his peers started noticing they weren't catching enough yelloweye, even for their ceremonial potlatches, and the fish they were catching were getting smaller. The same was true for Dungeness crab.

Kitasoo/Xai'xais technical staff and political leaders had long expressed concerns about both species, and others, to Fisheries and Oceans Canada (DFO). Yet the experiences of elders and fishermen were dismissed as merely anecdotal, says Alejandro Frid, an ecologist at the Central Coast Indigenous Resource Alliance. Founded in 2010, the CCIRA

works to incorporate the best of Indigenous and Western knowledge, says Frid, and represents four nations including Mason's.

For more than 10,000 years, the Central Coast nations have developed and practiced **intricate harvesting techniques** based on respect and reciprocity — like harvesting herring eggs on hemlock boughs — that long allowed the species they relied on to thrive alongside their annual harvests, says Frid.

That Indigenous stewardship was swept aside with the arrival of European settlers, who were, says University of British Columbia marine biologist **Daniel Pauly**, "a bunch of racists." Science, when properly done, Pauly says, draws on all available evidence. Canadian authorities "thought that the First Nations didn't know what they were doing," he says. "And in 20 years, *they* destroyed the salmon run."

Dungeness crab, according to one government description, is “the most important crab species harvested” in British Columbia. | Yalonda M. James/San Francisco Chronicle/Getty Images

Yelloweye is threatened because adults must live 15 years before they start to spawn, making them vulnerable to overfishing. | Getty Images

Even Canada's very first fisheries legislation tried to force Indigenous memories and stewardship out of the equation, says Andrea Reid, a Nisga'a Nation citizen and the principal investigator at UBC's new Centre for Indigenous Fisheries. The government went so far as to ban freshwater fishing weirs and nets that allowed for sustainable harvesting.

One great irony, Reid says, is that Indigenous "ways of knowing" are now widely seen as "inherently scientific" in her field, in that they use experimentation and observation to learn about nature. "Many Indigenous fishing approaches stem from relational values that treat fish as relatives that we live in reciprocity with," says Reid. "Not commodities that we exploit or command and control."

The Central Coast Nations are **not alone** in this boundary-breaking work. In one **paper** from 2004, researcher R.J. Hamilton lived alongside Western Solomon Island spearfishers for his research into topa, or bumphead parrotfish. In addition to biological surveys, Hamilton also conducted in-depth translated interviews with 21 fishermen, many of them elderly. Near the top of his paper, he made an effort to explain the importance of Indigenous knowledge, adding that "the anthropological nature of indigenous knowledge makes it a topic that is not well understood by many marine biologists."

More recently, the construction of a hydroelectric dam on the Amazon's Xingu River spurred research into small-scale Indigenous fishers in a 2015 **study** published in the Brazilian Journal of Biology. The dam would cause a permanent disruption of a traditional way of life, wrote the authors, a conclusion that came to pass within a year. "It used to take an hour to get to the fishing grounds. Now it takes twice as long," Natanael Juruna, a member of one Indigenous community, **told journalist Isabel Harari in 2016**. "Some places are inaccessible because the water level is too low and we can't pass [in our boats]."

Capturing vanishing memories is validating for those who hold them

While the scientific approach to gathering memories may differ, there are patterns across research projects. Many papers published in this emerging field **draw heavily** on the methods of anthropology — a field that has **its own history of racism and colonialism**.

Often, data takes the form of anecdotes and recollections, which are gathered during confidential, hours-long, in-person interviews.

In the case of the work done by Eckert's team and the Central Coast Indigenous Resource Alliance, interviewees were questioned on specific places and times as prompts — for instance, the first boat they worked on, or their earliest memories of catching fish — and promised that their fishing locations would be kept secret. Finally, the researchers anonymized, collated, and analyzed these memories before drawing conclusions from the patterns that surfaced.

Mason often felt frustrated that even as his nation fought for its tribal rights, many members of his community seemed to show deference to the Canadian government's approval. Local and ancestral knowledge has been discounted even within Indigenous communities, says Reid. While working on her doctoral research, she herself often encountered elders who were ecstatic that their hard-won expertise was finally being taken seriously. "It has a legitimizing effect," she says. "Even though they know more about salmon than I ever will."

"EVERYTHING WITHIN OUR WORLD — THAT'S WHERE OUR STORIES ARE TOLD, THAT IS WHERE OUR HISTORY IS TOLD." —ERNEST MASON

Indigenous knowledge can actually surpass and transcend the grasp of Western science, argues Frid, the CCIRA ecologist. Stories some refer to as "myths," adds Pauly, are often vital insights passed down through generations, capturing truths and teachable lessons about everything from floods to famines. "It's a sad statement of how there was an undervaluing of traditional and local knowledge, that [Fisheries and Oceans Canada] couldn't see it for its own value, that it had to be translated into their own terms," says Frid. "But it did initiate a transformation."

In 2017, after a decade of data-gathering by the coastal nations, DFO announced it would establish a **decision-making pilot program** that required Indigenous leaders and government executives to agree on Dungeness crab management strategies. It was part of the government's commitment to reconciliation, which included 2019 changes to the fisheries act designed to "lay the groundwork for better and more collaborative fisheries management," says DFO spokesperson Jo Anne Walton. (While some DFO scientists support this blended approach, Frid encountered some reluctance that she likened to

"kicking and screaming.") The nations have yet to see changes in how yelloweye are protected.

Living up to an old adage

Years ago, Mason met with Fisheries and Oceans Canada envoys and listed off the many species that rely on small, oily herring: ling cod, halibut, red snappers, quillbacks, salmon. From there, he says, he worked his way up the food chain: "I named off humpback whales, killer whales, sea lions, seals, otters, and the birds; the loons, eagles, ravens."

Ernest Mason (right) fishing in the rain in 2018. | Courtesy of Alejandro Frid

Later, Mason recalls, a federal minister expressed confusion about why orcas were dying off. With the knowledge he grew up with, it seemed simple: Without herring, the salmon went hungry; without salmon, orcas starved. He didn't need a research study to tell him that. "For goodness' sakes, you're supposed to be looking after the fisheries," he remembers thinking.

But Mason says that today, he focuses on preserving and reviving his nation's lands and waters for future generations, not past harms. "Hopefully, we'll get it back to a point where all our traditional foods are plentiful again," he says. Even in the leanest, hardest times, Mason's ancestors could harvest abalone, clams, cockles, mussels, sea cucumbers, and

Dungeness crab from the low-tide ocean bottom. The ultimate goal, he says, is to live up to the old adage he once heard from his father: “When the tide is down, the table is set.”

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