

A slippery subject

Grappling with the enigmatic American eel

by Janet Wallace

Think “Atlantic fishery” and cod, lobster, and scallops come to mind. But what about eels? Traditionally, the American eel has been a key ingredient in Mi’kmaq and Acadian diets. Currently, Asian demand has led to lucrative fisheries for eels and elvers (young eels). Now, however, the future of the fish is up for debate, considered “vulnerable,” in the U.S., and “a species of special concern” by the Committee on the Status of Endangered Wildlife in Canada.

Including the species on a list suggesting it may be at risk is controversial in Atlantic Canada because there is a commercial eel and elver fishery, and because of the eel’s significance in Acadian and Mi’kmaq

cultures. The eel played a significant role in the recognition of First Nations’ rights when, in 1999, the Supreme Court of Canada confirmed that the late Donald Marshall Jr. had a treaty right to catch and sell the fish.

Another factor contributing to the controversy is that there is no definitive evidence of an overall decline in eel populations in this region. But neither is there evidence that there is no decline – there are simply no baseline data.

To fill the void, Parks Canada has been conducting a study at five national parks in the Atlantic Region. The goal of the five-year project is to learn about eels through scientific research and the sharing of traditional knowledge.

In the Great Lakes, it appears there is, “clear evidence of a major decline

in the number of eels,” according to Dr. Deborah Austin, the project manager of the Atlantic eel study. Hydroelectric dams are often blamed for the decline. The dams can affect the migration of mature eels from rivers to the ocean simply by blocking their passage, or by chopping up the eels in what scientists call “turbine mortality.” Right now, said Austin, 60 percent of mature eels leaving the Great Lakes are taken by turbines in the hydroelectric dams.

“The Great Lakes,” said Goodbrand, “tend to have large old fecund (fertile) females – so the damage to the population is more serious when they are killed.”

Climate change might also threaten the eels by changing the course of the Gulf Stream. The northward shift of



Eel traps are emptied at Fundy National Park as part of a Parks Canada study. Scientists and First Nations communities are working together to learn about eels through scientific research and the sharing of traditional knowledge.

the current might disrupt the migration of the larvae. The species might also be harmed by commercial overfishing in certain areas, by biological factors such as parasites and exotic species, and chemical contaminants.

Some people are convinced elvers are in decline in the Maritimes. For example, a once viable elver fishery near Fundy National Park closed because there were no longer enough elvers to support it. Others argue that the decline in one location cannot be interpreted as a decline in the overall population of eels.

Collecting baseline data will enable scientists to assess whether populations are in decline. Besides simply recording numbers, researchers are trying to determine when elvers enter the rivers, and at what size. In each of the parks a “mark recapture” study is being conducted. Young Yellow eels up to two feet in length are caught in nets, tagged, and released upstream. Meanwhile the traps downstream will catch some of the marked eels. The data collected can be used to estimate



In Fundy National Park, eels enter the estuaries and travel up the tidal rivers. Shown here is a trap used to collect eels.

population size and learn more about behavior.

Eels are found throughout rivers and estuaries in Atlantic Canada. In Fundy Park, for example, eels enter the estuaries and travel up the tidal rivers. There are stories of huge eels more than 70 years old trapped in Bennett Lake, which was created by damming a river in the 1940s.

“There’s a lot of eel folklore,” said

Goodbrand. She recounts stories of “dammed rivers harboring populations of enormous eels which crawl through wet grass to migrate, and stories of elvers crawling up vertical walls.”

The Parks Canada study involves public education about eels. “The more interested and the more involved the public are, the better chance of the survival of the species,” said Goodbrand.

The incredible eel

“The eel has been around forever but we don’t know much about their basic ecology,” said Livia Goodbrand, coordinator in 2009 of the on-going eel research project at Fundy National Park. “The lack of knowledge could be because they tend to move at night, they’re slimy, and people don’t love them.” Nonetheless, “The eel’s basic biology is fascinating. . . . They really are an incredible species.”

American eels begin their lives as eggs laid in the Sargasso Sea, an area of the Atlantic Ocean east of the Bahamas and south of Bermuda. The eggs hatch into tiny, transparent larvae, shaped like willow leaves. After about a year of drifting with the ocean currents, the larvae become “glass eels.” The young eels are thin, about two inches long, and still transparent. They head towards

the Atlantic coast carried by the Gulf Stream. (European eels also spawn in the Sargasso Sea but somehow the European eels end up on the coast of Europe and the American eels end up on our shore.) When they reach estuaries along the Atlantic Coast, anywhere from South America to Greenland, the eels are up to four inches in length, are dark colored, and now are called “elvers.”

In the Bay of Fundy, elvers arrive in the estuaries in the spring and move upstream with each incoming tide, burying themselves in the mud between tides and that way not losing ground. They slowly make their way up river systems, sometimes taking several years to cover a few hundred miles.

Along the eastern coasts of Canada and the United States elvers are caught by the millions and exported live to Asia.

As those elvers that escape capture age, they grow larger and their color

changes again, turning them into Yellow eels. At this stage, they are like teenagers, close to adult size but not fully mature. Yellow eels burrow in the muddy river bottom during the day and emerge at night to prey upon fish, frogs, and aquatic invertebrates.

At some point (and scientists cannot identify the trigger), eels mature, turn a dark grayish brown on top with silver bellies, and become either male or female. As their sexual organs develop, their guts become completely absorbed. Mature eels leave the freshwater rivers they have lived in for many years (at least six and possibly more than 30 years). Unable to eat again, they rely on their energy reserves to make the long journey back to the Sargasso Sea. Upon returning to their place of origin, the eels spawn and die, and the cycle begins again. ●



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Collected eels are anesthetized for re-research purposes as part of the Parks Canada study. (Janet Wallace photos)

The research project involves First Nations, as well as scientists. Environment Canada's Species at Risk program provides funding to aboriginal groups for traditional data collection, and encourages scientists to hire First Nations workers. In New Brunswick, the Fort Folly and Elsipogtog First Nations participate in the study.

The approach is "two-eyed seeing," a term coined by a First Nations elder to describe how traditional knowledge must be combined with scientific

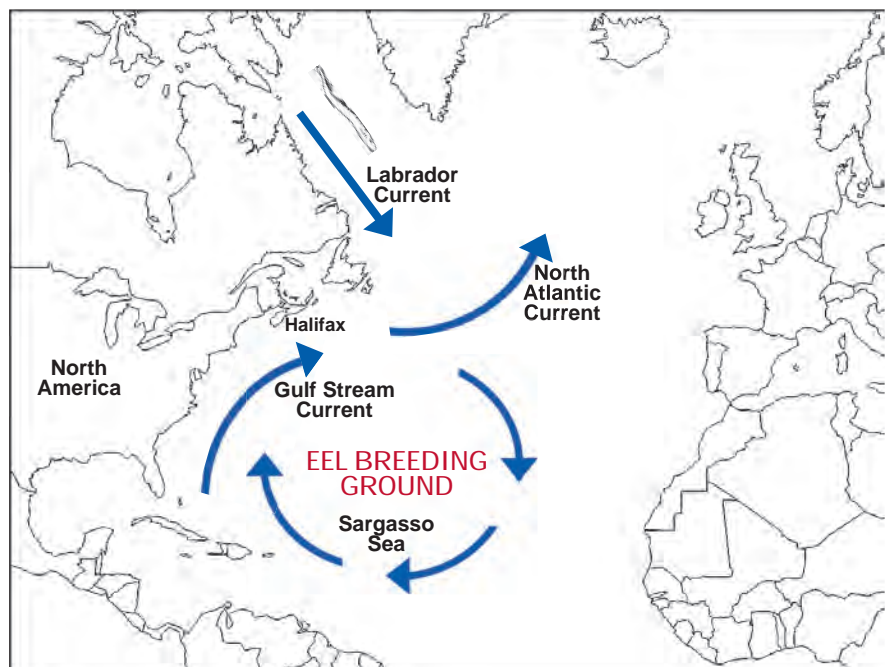
research to develop a comprehensive view of a subject.

"Science and the old teachings work together," said Blayne Peters, the Aquaculture, Salmon and Eel Project Manager at Elsipogtog First Nation. "For example, the Mi'kmaq say that salmon don't move when the water is muddy because they are a proud fish. Scientists say they don't swim in muddy water because the silt clogs their gills."

"Every little bit of information we can gather from the elders," he added, "even if it seems irrelevant now, could be valuable in the future." ●

Count the rings

One way to learn more about the eels is through analysis of their otoliths, which function like the ears. Dr. Deborah Austin, project manager of the Atlantic eel study, said otoliths are like tree rings. Each year, another layer of mineral is deposited. The otoliths can be used to assess the age of the eels, but also, explains Austin, "you can tell when and how long they have been in freshwater, estuaries, or the ocean." ●



Eels in Mi'kmaq culture

by Janet Wallace

“You can't talk about any aspect of Mi'kmaq life without talking about the eel and the salmon and the lobster,” says Marilyn Ingram, a Mi'kmaq Elder and an interpreter at Kouchibouguac National Park in New Brunswick. “To take away any of these is to take away our ancestors and our culture.”

Eels play several roles in Mi'kmaq life, both past and present. “Eels figure prominently at gatherings (now called powwows, a term adopted from First Nations in Western Canada),” says Ingram. “It is ceremonial to share eels at each gathering.”

Eels were an essential component of the traditional Mi'kmaq diet and also had medicinal uses. Also, the eel has played an important role in the recent history of First Nations across Canada. The late Donald Marshall Jr.'s capture and sale of eels in 1993 led to the Marshall decision, which stated that he had a treaty right to catch and sell fish.

For the Mi'kmaq, eels were a main source of food up until the 1930s. “In the Great Depression when towns all around were suffering,” says Ingram, “our populations weren't affected. The ones taught by the elders would go out and get the fish and medicine from the land. This is the last population that knows how to do this.”

Joe Clair, an eel fisherman from the Elsipogtog First Nation (formerly Big Cove Band) in New Brunswick, adds that when they couldn't afford to buy shoelaces, people used thin strips of eel skin instead. “But,” he laughs, “they didn't last all that long because the cats would chew them up.”

The Mi'kmaq catch eels year round. Clair recalls ice fishing using spears more than 10 feet long. “You just keep jabbing the spear in the hole trying to hit one, then move on to the next hole, and keep going on like that.”

“We used to spear them but there's no market for those now,” says Blayne Peters, Aquaculture, Salmon and Eel Project Manager, Elsipogtog First Nation. “The

buyers don't want the holes in the eels. They have to be undamaged. The eels are bought by a local buyer and sold locally.”

Traps called weirs were also used to fish eels. Some say the Acadians designed the weirs and the First Nations

**Joe Clair always sees
“something different”
when he fishes for eels.**

copied them. Others say the Acadians followed the Mi'kmaq style. Ingram suggests the Mi'kmaq designed the stone weir system but the Acadians “finessed” it. “Then, the Mi'kmaq adopted the Acadian style of weir.”

Each tribe adapted the tools and techniques to reflect their environment. For example, in the sandy rivers around Elsipogtog, near Richibucto, New Brunswick, there is no history of stone weirs. But they were used in the rocky rivers of Nova Scotia's interior.

Clair recounts his experience fishing eels. “All night, we would be spearing and the next thing you know, it's daylight. We would only take a break when we needed fuel (for lanterns), then we would eat a lunch. While we were having our break, we could hear the eels in the boats making smacking sort of noises. Some would manage to crawl out of the boat and back into the water. Sometimes I've caught eels that have scars from where they were speared before,” he says. Once they came ashore, the fishermen would use the sand on the beach to “clean the slime off” their hands.

He has been catching eels for food and science for more than 40 years. He says he always sees “something different” when he fishes for eels. For example, once he saw an eel standing head down, tail up, eating a clam. Another night he saw something that has been described by naturalists around the world. As with so much about eels, the behavior is not well understood.

“At this place,” Clair says, “the sand was white and I could see right to the bottom. I saw a ball of eels rolling along the sand. I never saw that before or since. I've talked to some old fishermen and they said they've heard of this, but not often. Some say they're mating and there's one female surrounded by many males, but science says they mate in the Sargasso Sea, not here. Others have thought that maybe this is for defence. I think it could be sign or omen of good things to come,” he sighs and adds, “All of the elders who could answer the question have passed away.”

Ingram recalls going fishing with her grandfather and other men in the summer. “They couldn't afford flashlights so instead they used a stick with the top covered with pitch and tar and held this over the edge of the boat. Another man used to put oil on the water to make the eels easier to spot.”

When he was growing up, Clair says people sometimes just wanted eel to get the taste of fish in the winter. As soon as someone suggested eels for dinner, he says, “We would break through the ice with an axe and get enough eels for a meal or to give to neighbors.”

Sharing was part of the culture. “We would divide up the catch of eels among our people. If we didn't catch enough for everyone to have a whole eel, we would cut up the eels and give a portion to each family,” says Clair.

“The old teachings say that no one was rich and no one was poor,” adds Ingram. “If one person ate, everyone ate, and if one person was hungry, everyone was hungry. We all depended on each other to survive.”

She was told that if she remembered this for the rest of her life, she would never be hungry.

“We even used to pass a soup bone around when times were hard,” says Peters. “One person would put it in their soup pot, and then pass it on to someone else.”

Some people complain it has become more difficult to find good eel beds, but there is debate over whether this means the total eel population is in decline.

“There could be tons of eels left but we just don't know where they are,” says Ingram. She applies the analogy of a road closure. When traffic is detoured, there isn't as much traffic behind the detour as



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there was before, but there is still the same number of vehicles on the road.”

However, she acknowledges that there is a decline. “Everything is going down. The numbers of lobster, salmon, eels... people are doing this,” she says.

“The dams have been very damning to the eels,” she adds with a wry laugh. Clair says, “The populations are smaller, and the size is smaller.”

He recalls catching 200 to 300 pounds of eels a night. “I used to be a fisherman, now I’m a conservationist,” he says. “We need to look long in the future.” ●

How to cook an eel

“How do you cook an eel?” I ask.

“Until it’s done,” says Marilyn Ingram, with a laugh. Ingram is a Mi’kmaq Elder and an interpreter at Kouchibouguac National Park in New Brunswick.

“You can smoke, boil, or bake eels and serve them with onions and potatoes. Some people add garlic or pepper,” she adds, “now that we’ve gone gourmet.”

“I like them boiled, or broiled with potatoes and onions, or baked plain, or stuffed. You need to eat them with our bread, bread like bannock,” says Joe Clair, an eel fisherman from the Elsipogtog First Nation (formerly Big Cove Band) in New Brunswick. He works on the Parks Canada eel study (see accompanying story).

“At my house, after a good feed of eels,” Clair says, “we want to leave the dishes in the sink and lie down and sleep. There’s an ingredient in the eel, a brown piece near the bone, that’s a bit poisonous. It makes some people sleepy.” Another theory is that if you have a high protein diet and then eat a meal of eels, the protein overloads your system and shuts it down.

They recount stories of kids being scared by cooking eels. They say the nerves stay alive after the eel is killed and sometimes the pieces jump in the pan.

Traditionally, smoked eels were brought on long hunting trips. Ingram says, “When the men on the hunting trip would eat the eel that had been smoked by their wives, they would think about the women.” ●