

Plamu

Mi'kmaq Ecological Knowledge:

Atlantic Salmon in Unama'ki

Plamu Mi'kmaq Ecological Knowledge: Atlantic Salmon in Unama'ki

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We would like
to dedicate this
publication to
beloved family
members and
Elders of Unama'ki
who have carried
on the traditions
and shared their
knowledge and
passion for
the resource.

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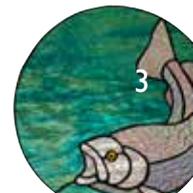
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Introduction

Aboriginal Traditional Knowledge (ATK) is a broad description of an integrated package of knowledge that includes the local knowledge of species, environmental practices and management systems, social institutions that provide the rules for management systems, and world views that form the basis for our beliefs. ATK comes from watching and listening, through direct experience of song and ceremonies, through the activities of hunting and daily life, from trees and animals, and in dreams and visions. Knowledge, values, and identity are passed down to the next generation through practice, ceremonies, legends, dance, or song. ATK, and more specifically Mi'kmaq Ecological Knowledge (MEK), the Mi'kmaq way of life, is derived from centuries of interaction, observation, and adaptation to the natural environment. It is the Mi'kmaq science of survival intertwined with spirituality and culture unique to the people.

The collection and preservation of ATK is becoming more important. Initially used in land negotiations, ATK is increasingly recognized for use in scientific assessments, management plans, and recovery strategies for several species protected through Canadian legislation, known as the Species at Risk Act. Because of the potential use for MEK for culturally important species such as the American eel (katew) and Atlantic salmon (plamu), demand for specific ecological knowledge held by the Mi'kmaq is increasing. While there are protocols in place for the collection of MEK, little documentation has been produced for sharing this knowledge beyond the community's use and culture.

The Unama'ki Institute of Natural Resources (UINR) is an organization that represents the five Mi'kmaq communities of Unama'ki (Cape Breton Island, Nova Scotia) on natural resources issues. UINR contributes to an understanding and protection of the Bras d'Or Lakes' ecosystem through research, monitoring, education, management, and by integrating Mi'kmaq and conventional ways of understanding, known as Two-Eyed Seeing. UINR was identified as the lead organization to collect, interpret, and store MEK for this region.



Mi'kmaq World View

The Mi'kmaq are part of Wabanaki, the Algonquian-speaking confederacy that includes four other Nations; Maliseet, Passamaquoddy, Penobscot, and Abenaki. Mi'kma'ki (land of the Mi'kmaq) includes the five Atlantic provinces and northern Maine.

Mi'kma'ki was held in communal ownership. Land and its resources were not commodities that could be bought and sold but were considered gifts from the Creator. This view is very different from the Western view of land. As Mi'kmaq, we were the caretakers of the seven districts of Mi'kma'ki and we strived to live in harmony. This belief remains strong in our culture today.

We view the world and all that is in it as having spirit. We consider all life equal to our own and treat it with respect. We developed an intimate understanding of the relationships between the living and non-living so that each plant, animal, constellation, full moon, or red sky tells a story that guides our people so they can survive. These beliefs affect the manner in which we treat the natural world for sustenance and survival. Animals and plants are not taken if they are not needed. All spirits are acknowledged and respected as relatives and are offered tobacco, prayer, or ceremony (or combination) when taken. No part of an animal is wasted. All parts that cannot be used are returned to the Creator. The consciousness is described by the Mi'kmaq word, Netukulimk.



The Mi'kmaq right to fish for food, social and ceremonial needs, and for a moderate livelihood, is recognized by the Supreme Court of Canada and protected by the Constitution of Canada.



Bras d'Or Lakes

The Bras d'Or Lakes, situated in the center of Cape Breton Island, Nova Scotia, are a large estuarine body of interconnecting bays, barachois ponds, channels, and islands. The Bras d'Or Lakes formed approximately 10,000 years ago when the existing basin that was carved out of soft sandstone from the last glacial period became flooded by adjacent ocean water.



The term “Lakes” refers to two main components. The North Basin and the Bras d'Or Lake, connected by a 500 m wide opening (Barra Strait), are known collectively as the Bras d'Or Lakes. The smaller component, the North Basin, branches into two channels that lead to separate small openings to the Atlantic Ocean.

The Great Bras d'Or Channel is 30 km long with an average depth of 19.5 m, average width of 1.3 km and is the source of the majority of saltwater exchange between the Lakes and Sydney Bight (Atlantic Ocean).

St. Andrew's Channel connects to Sydney Bight through a much more restrictive opening known as the Little Bras d'Or Channel. This channel, 8 km in length, less than 100 m wide and approximately 5 m deep, does not contribute significantly to temperature and salinity distributions. At their southern-most point, the Bras d'Or Lakes connect to the Atlantic Ocean through a small, man-made canal that allows only an occasional exchange of water during vessel movements.

The Bras d'Or Lakes has been designated in the World Network of Biosphere Reserves by the United Nations Man and the Biosphere Programme.



The perimeter of the Bras d'Or Lakes measure approximately 1,000 km and have a total area of 1,080 km². Their average depth is 30 m but varies throughout. St. Andrew's Channel, for example, has a maximum depth of 280 m while small bays and coves have average depths of 10 m or less. Tidal range diminishes rapidly from the Great Bras d'Or Channel inward, with tidal ranges between 16 cm near the entrance to 4 cm at Iona. Currents also follow the same pattern but are stronger in the channels and choke points. Salinity and temperature varies by area. Salinity ranges from 30 ppt in the Great Bras d'Or Channel to salinities lower than 18 ppt in semi-enclosed basins, but averages tend to fall around 22 ppt in most of the open regions. Winter temperatures fall to just below 0°C and the coves and ponds freeze over. However, in the past few years, some of these areas did not freeze. Summer temperatures exceed 16°C in July and surface and sub-surface temperatures are even higher (>20°C) in shallow coves, especially in River Denys Basin. Substrata are primarily silt with smaller proportions of sand, gravel, and boulders.

The environmental quality of the Lakes is still considered to be very good. Sewage is the primary source of pollution. Sediments from land are becoming increasingly difficult to control and have the potential to alter important habitats. Organic contamination and heavy metals in sediments, water, and biota are well below the federal sediment and water quality guidelines. The Bras d'Or Lakes has been described as having a relatively low level of natural productivity.

The Bras d'Or Lakes are home to a variety of biota. Warm and cold water fish and invertebrates are present with several fish species, such as mackerel, herring, and salmon migrating to the Lakes annually to spawn. The primary commercial fisheries are for lobster, eel, and gaspereau. Invasive species such as the green crab, the MSX oyster disease parasite, eel swimbladder parasite, and the golden star tunicate have found their way into the Bras d'Or Lakes. With their rare physical and chemical oceanography, range of temperate, arctic biota occurring in less than 10 km of water, and diversity

of habitats, the Bras d'Or Lakes are truly a unique ecosystem.

The Bras d'Or Lakes are of great significance to the Mi'kmaq heritage in this region. The Mi'kmaq word for the Bras d'Or Lakes is Pitu'paq, meaning "to which all things flow." The Bras d'Or Lakes have provided a food source for the Mi'kmaq. Numerous fish species, such as mackerel, trout, salmon, smelt, gaspereau, cod, hake, flounder, herring, eel, and others provide protein to our diet, as do resident invertebrates such as lobster, mussels, oysters, clam, scallops, whelks, and quahogs. Numerous bird species, such as geese and duck, have thrived here and were hunted. These gifts are important to communal health and are intertwined in our culture. The Lakes are also a means of transportation between hunting and fishing areas and those used for spiritual solidarity, like Malikewe'j (Malagawatch) or Mniku (Chapel Island).



Knowledge Gathering

Mi'kmaq ecological knowledge gathered for this report was collected from Mi'kmaq harvesters through a series of interviews and workshops.

For knowledge collection and sharing, UINR follows Mi'kmaq Ecological Knowledge protocols established by the Assembly of Nova Scotia Mi'kmaq Chiefs, Mi'kmaq Ethics Watch (Unama'ki College), Unama'ki Parks Canada sites (prepared for Parks Canada by UINR 2007), and advice of Elders and fishers.

In September 2011, the application for the collection of Mi'kmaq ecological knowledge on salmon was submitted to the Mi'kmaq Ethics Watch for consideration for approval. Approval was obtained in December 2011.

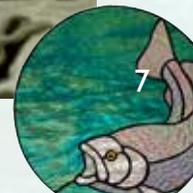
A workshop was held March 5, 2012 in Membertou, Cape Breton, Nova Scotia. Selection of participants included a balance of Elders, current harvesters, Aboriginal Fishery Guardians and knowledge holders. Knowledge holders were not randomly selected. Selection of Elders was based on a referral method from UINR's Elder Advisor. Current harvesters were selected from a pool of individuals who were representative of active harvesters.

Another workshop was held March 28 and March 31, 2012 to add to existing knowledge and to interpret and review the knowledge gathered.

Knowledge

The views in this report do not represent those of the entire Mi'kmaq nation. Participation by UINR and the Mi'kmaq in this workshop group is not, and should not, be construed as consultation. Any new areas being proposed by the Crown(s) to have expanded legal protection would require separate consultation under the Mi'kmaq-Nova Scotia-Canada Consultation process.

The knowledge contained in this report is strongly connected to Mi'kmaq tradition, the practice of salmon harvesting in the Bras d'Or Lakes, and the transfer of knowledge between generations through stories and practice.





Salmon Harvesting

Salmon are most frequently captured in rivers using rods (fly and lure), spear, diving, snares, seines or weirs. Weirs made by using rocks were designed to lead salmon into an area lined by alder branches standing upright in the gravel. Salmon, if captured in the estuarine waters of the Bras d'Or Lakes, were taken through gill net. Spearing is common and typically occurs at night and referred to as 'saqsikwemk.'

Harvesting occurs throughout the year but is concentrated at the time of, or just prior to, spawning runs. In the 1980s and earlier, salmon was also harvested in winter in the Bras d'Or Lakes. Long herring nets were set under the ice to catch herring and salmon.

Salmon harvesting took place in many rivers and barachois in the Bras d'Or Lakes watershed and around Unama'ki. Once widespread, salmon harvesting is now concentrated in the Margaree River on the western side of the island and North River in St. Ann's Bay on the eastern side of Cape Breton.

Historically, at least 22 locations in the Bras d'Or Lakes watershed and at least 35 other locations on the perimeter of the Island were traditionally harvested.

Plamu/Atlantic Salmon in Unama'ki

Salmon harvesting spans many generations and is a reflection of local and intimate understanding of salmon ecology in our traditional territory of Unama'ki, known today as Cape Breton Island. The traditional practice of spearing salmon continues today and is maintained through harmony and respect for the spiritual relationships between ourselves and plants, animals, and elements on Earth.



Historical salmon producing areas included:

Aspy River (Middle, North and South)

Aucoin Brook

Baddeck River

Balls Creek

Barachois River

Barachois-McLeod Brook

Belfry Lake

Benacadie River

Benacadie Pond

Big Brook

Black Brook

Breac Brook

Catalone

Cheticamp River

Crooked Lake

Denys Basin

East Bay Barachois

Fifes (Aconi) Brook

Framboise River

French Brook

Frenchvale Brook

Gabarus

Gabarus Lake

George's River

Gillis Brook

Gillis Lake

Grand River

Grantmire Brook

Indian Brook (Eskasoni)

Indian Brook (St. Ann's Bay)

Ingonish River

Leitches Brook

Little Bras d'Or Channel

Lorraine Brook

Malagawatch

MacDonald's Cove

MacIntosh Brook

Margaree River (NE, SW)

Marie Joseph Brook

McAdam's Lake

McIver's Cove

McKinnon's Harbour

Middle River

Mira River

Mirror Cove

Morrison Lake Brook

North River

Red River

River Bennett

River Denys

River Inhabitants

River Tillard

Salmon River

Salmon River (of Mira River)

Skye River

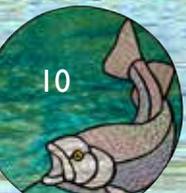
South Gut to St. Anns Harbour

Sydney River

Warren Lake Brook

The majority of these areas are no longer harvested because of conservation concerns for local salmon populations. Some areas, such as Sydney River, Baddeck Bay, Balls Creek, and Frenchvale Brook, were not harvested because of concerns about industrial pollution in the area.





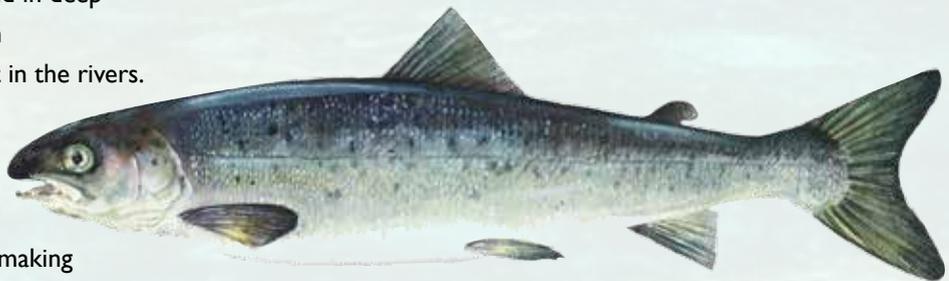
Habitats

Salmon spend much of their lives in brooks and rivers. In all seasons, rivers are important salmon habitat. Ideal habitat is described as primarily consisting of cool, clean water. This description encompasses conditions that are free of pollution and siltation, and having adequate shelter to maintain cool temperatures and insect life for additional food. Natural debris is seen as natural shelter for salmon so that they can avoid predators. Adequate shelter was observed as having alders and natural hardwood, such as birch and maples, along the river banks. Areas in the river where the banks have overhanging tree stumps and old logs are ideal places for salmon. The bottom cannot be sandy. Rocky bottom with gravel and cobble were identified as ideal substrate.

Parr are found in between the rocks of the river and are observed year round. Occasionally they move about during the summer, likely seeking cooler water. Parr are feeding and remain in the brook until big enough to move out of the brook.



Smolt are found in rivers along the edge and in deep pools (1 m) before they travel downstream in the spring. Smolt will live alongside trout in the rivers.



Salmon was also captured in the barachois ponds. These areas were identified as a holding area for the smolt as they were leaving the rivers, and adult salmon before making their way up river.

People contribute to habitat destruction and overharvesting, and forget the importance of salmon for all animals. Bears, seals and birds, such as eagles, mergansers and seagulls, also feed on salmon. Trout and introduced species, such as smallmouth bass and chain pickerel, also feed on salmon fry.



Salmon Movements and Cues from Nature

Adult salmon come into the Bras d'Or Lakes' rivers in early to mid-fall for spawning, depending on the temperature. Salmon come into rivers around the perimeter of the Bras d'Or Lakes in the spring to fall. Other factors that affect salmon movement up river are current speed and depth. Salmon will wait until the water is deep and flowing fast. Salmon come into the river as runs, with some runs smaller or larger than others. Each river had a different time for when the large run of salmon came in. Often, salmon will move into smaller rivers and brooks at

night but will move out to avoid predators during the day. The emerging fireflies and completion of strawberry blossoms signal the timing of the spring run.

Salmon spawning depends on rainfall and temperature. Salmon begin the process of spawning in the fall after a heavy rain. If the temperature is too warm, the fish will stay and will not travel further. Some observations that salmon are approaching to spawn is when two or three are seen together, as if they were swimming in families. Often, when the salmon runs are occurring, you will hear bears and see more trout in the area.

Salmon kelts (post-spawners) are commonly found in the rivers in the spring but have also been found in late fall and winter. Kelts will remain in the river until the spring, leaving after heavy rain.

Smolt leave rivers during spring time after the ice is gone and stay in the estuarine areas, especially if there is a barachois pond between the river and the Lakes.



Salmon Producing Rivers

Salmon are known to occur and spawn in the Margaree, Middle, Skye, Denys, Baddeck, Indian Brook, Aspy, and North Rivers, and 30 other smaller brooks in Unama'ki. Their productivity is likely related to limited human access to the rivers because of private property laws and less habitat destruction, such as fording and clear-cutting.



Preparation and Uses

Salmon is an important food source for the Mi'kmaq people. Unfortunately, fewer salmon are available for general consumption and are now reserved for special occasions, such as feasts, powwows, and other celebrations.

Individual tastes guide preparation methods. Some modern methods of preparation include stuffed salmon, fillets, and steaks. Once scales are removed, salmon can be boiled, barbequed, smoked, or marinated. Roe is smoked or fried. Internal organs were offered to the river or forest as food for other animals, as bait for eels, or consumed (tastes like clams). Bones and tails are used as fertilizer and pet food. Salmon heads are stock piled and shared with local Asian cultures.

In the fall, oil was collected from salmon during the cooking process and taken internally for medicinal purposes.

Salmon harvesting traditionally occurs in the fall because they are in better condition as food. Roe provides a source of protein. Roe can be baked in the oven to produce a sauce for the cooked salmon.

Historically, salmon was smoked or baked over an open fire lined with heated rocks. Salmon can be roasted by digging a pit on the beach and making a fire. Cinders are removed before the salmon is placed in the pit, with rocks placed on top and roasted. Vegetation (tall grasses) from the river side was used to wrap the salmon before placing it on the heated rocks.

The whole salmon is used. The head and tail is boiled and eaten. Salmon is stuffed and served with a dipping sauce called "plamuiplk". Other methods of preparation include salting and drying, smoking, pickling, and frying. Bones are used for garden fertilizer. All parts of a salmon are put to use with little to no waste.

There is no one method of preparation preferred over another. The deciding factor is whom the fisher is sharing it with. For big events and celebrations, salmon is often stuffed to feed large crowds and families.





Observations on Salmon and Their Behaviour

Generations of salmon harvesting provided an opportunity for harvesters to develop relationships with salmon in their natural habitat, allowing them to take note of interesting behaviors and observations.

- Salmon are high jumpers and wave their tails to catch momentum and to remove sea lice. Jumping loosens sea lice and the water splashes help to knock them off.
- They are very strong fish and can endure rough waters.
- Salmon move faster before storms and will hide under leaves, rocks, etc.
- They remain still and can camouflage themselves with the bottom.

- If conditions are not favourable, salmon will not spawn. For example, harvesters are catching salmon that have not spawned in coastal rivers in December and January.
- Kelts leave the Skye River in December immediately after spawning.
- Salmon are not as large as they used to be.
- Smolts are not found in local fresh water lakes.
- Lamprey marks are evident on salmon in the Margaree River. An unusual mark was seen on one fish that could either be a puncture wound or bacterial infection.
- Ice cover is thought to affect salmon fin rays. Salmon fins appear damaged.
- Salmon have a good sense of smell and are aware of changes in nature.



Observations on Salmon Conditions

Most individuals observed sores in adult salmon and worms inside the muscle in salmon from the Margaree River. Lice was observed on the gills of smolt. Parasites were observed in salmon from Grand River, Indian Brook and Balls Creek/French Vale Brook. River Inhabitants is also an area where lamprey is found. Sea lice are common in salmon in the summer around Whycomomagh Bay but are also evident in the fall months, especially in the Margaree River. Scrapes and bite marks have been noticed on some salmon in this area.

Sea lice are often found in warmer waters in August and September. Other areas where sea lice were observed on salmon include Grand River, Barachois River, Balls Creek, and Sydney River. Sea lice are more common in areas closer to the ocean.

Salmon from rivers inside the Bras d'Or Lakes' watershed also had sea lice and lamprey marks. In 2004, in the area around Wagmatcook, lamprey bite marks were observed on the belly area of salmon.

The Value of Salmon and Salmon Harvesting

There are important dietary considerations for harvesting salmon. Many people enjoy the flavour and health benefits of wild salmon. Farmed salmon are thought to have too many chemicals from the feed and antibiotics and is not a substitute for the health benefits wild salmon provide. Salmon is one of the staple foods at community celebrations and powwows because of their size. It is a large fish that can feed many people. Sharing is very important to the Mi'kmaq and harvesters will often share their catch, especially with those who cannot harvest for themselves.

Salmon consumption is linked to longevity. The Mi'kmaq people lived long lives on their traditional foods. As our traditional diet is replaced with processed foods, our people are prone to illness, disease, and untimely death. Many cannot afford to purchase salmon in the grocery store nor is there a desire to do so. If they cannot have it wild then many will not have it at all.



The experience of salmon harvesting is also important to the Mi'kmaq. It is part of the culture and many grew up harvesting salmon and other fish species. It is part of the social norm to spend time with family learning about harvesting practices and netukulimk (sustainability). Many enjoy time spent outdoors even if salmon is not caught. In some cases, salmon harvesting can be very relaxing.

Salmon harvesting was a means of sustenance. Harvesting was done for survival. There were times when salmon would be left alone and another species would be harvested. People were very alert to times when salmon would migrate up river.

In the 1970s and 1980s, Mi'kmaq had to purchase licenses which many could not afford. Today salmon harvesting is still limited and restricted because of conservation concerns. When a salmon is caught, Elders are taken care of first.

Netukulimk: Traditional Salmon Management

Several concepts of traditional management or netukulimk are employed by the Mi'kmaq of Unama'ki when harvesting salmon. These concepts vary among individuals based on their beliefs or teachings as to what contributes to salmon conservation. This means harvesting efforts are balanced in terms of stage of salmon or time harvested. For example, some harvesters let large salmon spawn because they have more eggs and experience, while others feel this may be the salmon's last spawn and it will die soon after. Many will not harvest kelts because of the meat's condition, while others prefer kelts because they have successfully spawned, contributing to the future salmon population.

Another example of traditional management is the size of salmon captured. This is a reflection of the adoption of imposed size restrictions and care for broodstock. Many harvesters will carefully return salmon under 63 cm (24.5 inches) back to the river. Many prefer the feed of larger, >63 cm (>24.5 inches), salmon but will let the really large salmon, >74 cm (>29 inches), continue its journey up river to spawn. Others will take these salmon because they have likely spawned successfully before and are closer to the end of their life span than smaller, spawning salmon. Some harvest in the fall, while others harvest in spring and summer.

As with other species, salmon are harvested at certain times of the year. Sharing salmon among multiple families is the backbone of Mi'kmaq culture. Salmon are harvested when needed or if the season allows their harvest. Several communities are limited in the number of salmon tags issued. Other communities are not limited by regulations but rather limit themselves by practicing netukulimk. Some individuals have resorted to purchasing licenses to gain access to more salmon and to avoid conflict with fishers of other cultures.

Handling salmon affects their ability to survive. Smolt and parr are carefully released if captured by rod. Smolt and parr are not targeted by spear, diving, or snares.



Salmon are more commonly harvested in the fall when they travel upstream. Because they are in spawning condition, conservation is practiced. Harvesters take only what they need. Salmon will not take bait if they are not hungry, therefore spearing or snaring will take place.

Large salmon produce larger quantities of eggs. They are the breeding stock for the population and because of this, many choose not to target them or will carefully release one if captured. If large females that are ready to spawn are captured, their eggs may be fertilized with the milt of a male and placed into the gravel of the pool (redds). These are set up along the river as incubation ponds. Even if the eggs do not become fertilized, the eggs will become food for other animals.



Current State of the Salmon Population and Justification

The salmon population is considered low and has been for many years. Improvements are seen in several rivers as the number of salmon and runs have increased, but they are still so low there is general concern for their sustainability. These areas are Skye River (We'koqma'q), Grand River, Indian Brook (Eskasoni), Indian Brook (St. Ann's Bay), MacIntosh Brook, Gillis Brook, River Denys, and Benacadie Pond. The Margaree and North Rivers are still good rivers, while the Middle and Baddeck Rivers are showing signs of improvement.

Because of the predictable timing of salmon runs, the time it takes to capture salmon is a good indication of change in abundance over the years. Fifteen years ago it took two to three hours to catch approximately 22 salmon in the fall months. Now, it takes five hours to get four salmon. In the spring, it could take approximately eight hours to get four salmon. To fish salmon in North River now, it may take all day to get one salmon. However, in the Margaree River, a salmon will bite right away if the right bait is used at the right time of day and year. An increase in salmon has been observed in this river over the past few years.

Overall, it takes longer to catch salmon. They are not as plentiful as they were 40-60 years ago, or even 10 to 15 years ago. The population has declined and this decline is consistent across all rivers.



Mi'kmaq Concerns

Salmon habitats are deteriorating. Many impacts and activities were identified as causing harm to their habitats. These include overharvesting of trees along river banks, acid rain, garbage, pesticides, sewage, and siltation from gravel pits and eroding banks and fording. Naturally and non-naturally occurring landslides, and oil and gas developments in fresh water systems that feed the rivers affect water and sediment quality.

Sedimentation and siltation in Margaree River is getting worse. There are changes occurring in the river from clear cutting, farming, and increased rainfall events. Increased sedimentation also means that harvesters cannot see and target salmon.

Fish ladders, while promoting up-river migration, can contribute to overharvesting. During their spawning migration, salmon are vulnerable to predators, especially humans.

Smolt are a vulnerable part of the food chain and must compete with other fish species for food and space. They are part of the food chain for other animals. What affects it has impact on other species. Salmon, in all its stages, is a shared resource among humans and animals. Also noted is a decline in rivers' species such as smelt and gaspereau.

Commercial development has affected traditional spawning rivers. Farms affect water quality by introducing organic waste, increasing sediments that cover gravel in pools, and increased water temperature from lack of shade from trees along the banks.

Smolts mistakenly identified as trout are taken by younger harvesters.





A Call for Action

Habitat preservation, improved management, and education were identified as approaches to salmon conservation and sustainability.

Habitat for all stages of salmon are necessary. We must preserve habitats so they can be productive for spawning salmon as well as juveniles. We need to address the causes of habitat destruction rather than just identifying symptoms. To our best abilities, we must prevent pollution and siltation and keep our rivers cool.

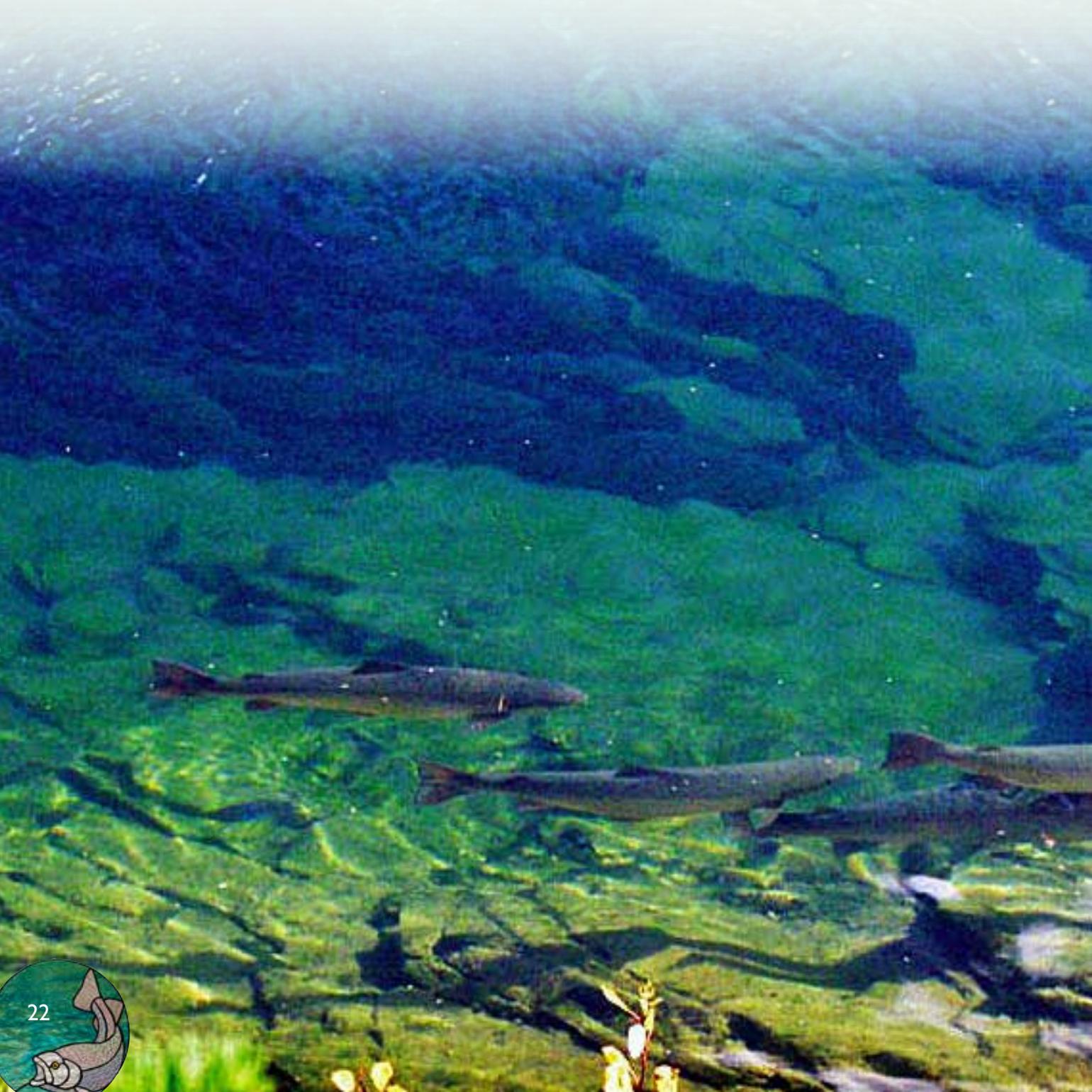
Improved management is needed on many levels. Illegal harvest of salmon is unacceptable and more must be done to prevent it. No amount of money from fines can replace the value of a salmon to the Mi'kmaq culture. Current bag limits are too high for the recreational salmon fishery. Non-natives have more access to salmon than the Mi'kmaq communities. Private lands should be appraised and included in river habitat assessments to identify areas that should be improved. To prevent pollution, oil, gas, and mine development should not be allowed at headwaters. We need to consider other forms of management actions and ideas. We could alternate pools when harvesting to allow salmon to spawn. We should respect spawning season and the time needed for preparing redds, mate selection, and spawning.

Education is needed across cultures. Mi'kmaq harvesters are often verbally and physically attacked during the salmon harvest. A greater presence of RCMP and Conservation and Enforcement Officers is needed. Conservation and Enforcement Officers and other salmon conservation groups should be educated in Mi'kmaq Rights and Title, Mi'kmaq worldview, and history so they can educate other cultures. Education is needed among younger harvesters in the Mi'kmaq community on species identification for trout and salmon. There is an imbalance in the understanding of rights and responsibilities among the younger generation that could be taught through mentoring programs. Open houses are needed to educate youth, Chief and Councils, and non-Mi'kmaq populations on the seriousness of the status of the salmon population in Canada and to show how preservation and improvements to salmon habitat relate to current community land practices.

Rivers and streams must be enhanced. Rules must be set. Buffer zones are needed to protect banks on private property and in First Nations communities. As spawning occurs in pools, they should be treated with respect and protected.

Youth must be educated and involved. It would be beneficial to see a "Fish Friends" program set up in the schools to reintroduce salmon to maintain populations. Education on all species and the interconnectedness of our environment should be part of the curriculum in our schools.





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UINR represents the five Mi’kmaq
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