

Mi'kmaw and the Atlantic Salmon (*Salmo salar*) in Mainland Nova Scotia



Mi'kma'ki All Points Services

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It is suggested that the interpretation of this report in light of the above mentioned conditions will help clarify the role and purpose in which ATK is provided through SARA and other government

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1) INTRODUCTION

1.1.) SARA and Nova Scotia's Atlantic Salmon

In December 2002 the Federal Species at Risk Act (SARA) came into force in Canada with the purpose of preventing Canadian wildlife and plant species from becoming extinct.

Towards that aim SARA defines a process of assessing and monitoring species populations that are suspected or reported to be at risk, identifying critical habitat for species at risk, and developing recovery strategies to assist species at risk populations in recovering to self-sustainable, 'healthy' levels.

In general SARA outlines three phases: Firstly, a population assessment; secondly, listing of the species in question into categories of 'special concern', 'threatened', 'endangered', 'extirpated' or 'extinct'; and thirdly, the recovery planning.

The species assessment and listing is carried out by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Over the past decades, concerns are being raised in Canada and elsewhere about the health and stability of Atlantic salmon (*Salmo salar*) populations. While the northern populations, those frequenting the rivers of Nunavut, Labrador and most of Newfoundland, appear to be stable and presently not at risk, this is not the case for the remaining populations.

The Inner Bay of Fundy (IBoF) population of the Atlantic Salmon has been declared endangered by COSEWIC as early as June 2003¹, and the remaining populations (Southern Uplands and Eastern Cape Breton) along the Nova Scotian coast followed, with the exception of the southern Gaspé-Gulf of St. Lawrence stock along the Northumberland Strait which is categorized as being of special concern (Fig. 1).

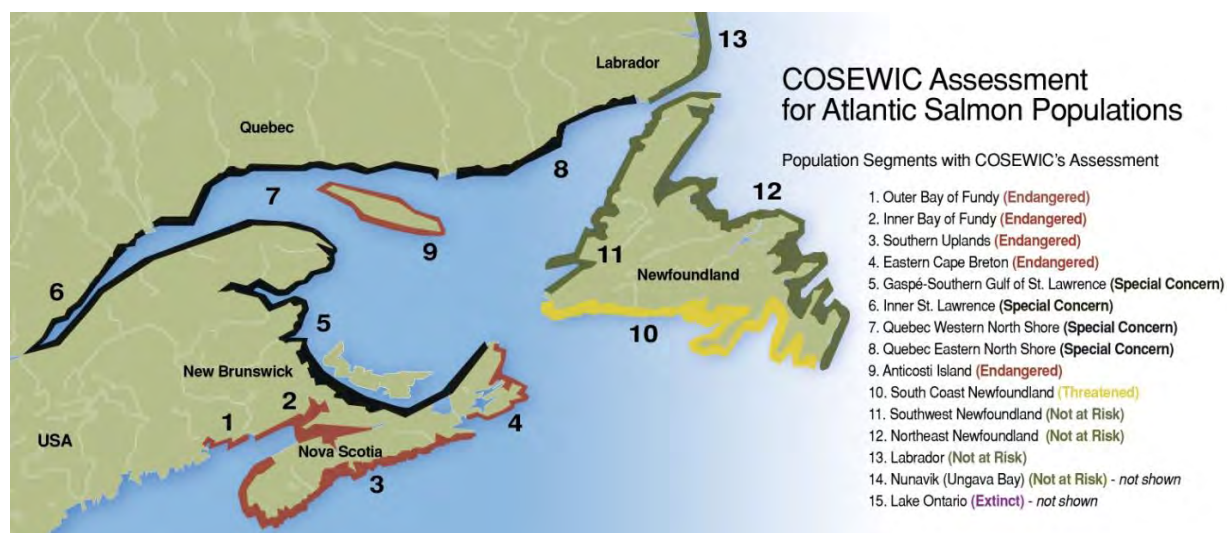


Fig 1: Atlantic Salmon Populations & Statuses based on COSEWIC Assessment Regions²

¹ COSEWIC 2006

² Atlantic Salmon Federation, <http://69.90.163.40/docs/media/cosewic-map.jpg>, retrieved Nov. 2012

This study is concerned with the salmon returning to mainland Nova Scotia rivers and thus belonging to the Inner Bay of Fundy, the Southern Upland and Southern Gulf of St. Lawrence populations.

1.2.) Aboriginal Traditional Knowledge (ATK) and Species Protection

SARA recognizes the need to utilize Aboriginal Traditional Knowledge (ATK) in the population assessment and the recovery planning phases. During the listing process, ATK is also a valuable and, from the Aboriginal perspective, indispensable component. This phase requires an assessment of potential impacts that the listing of a species may have on the Aboriginal community, in which ATK is a key element.

The collection and documentation of relevant ATK is therefore essential for the protection of species and for the meaningful involvement of Aboriginal People in SARA initiatives.

ATK, as it is understood here, is an Aboriginal way of observing, understanding, and explaining the natural world. It is both a science and a philosophy. ATK is holistic as it recognizes the interconnectedness of all elements of nature. It is also spiritual in that it acknowledges that all parts of the natural world are infused with spirit. It also has a moral component as it promotes Netukulimk, sustainable living and a respect for all living things.

ATK is a collective body of knowledge based on long-term observation and hands-on experience, and is transmitted through oral tradition and example.

This type of knowledge is also sometimes referred to as TEK (Traditional Ecological Knowledge) and, in the context of Mi'kma'ki³ specifically, as MEK (Mi'kmaw Ecological Knowledge).

ATK therefore includes:

- Traditional knowledge on wildlife, plants, and the interrelationships between all living things;
- Traditional environmental ethics (Netukulimk);
- Traditional resource management concepts;
- Information on traditional land use & occupancy;
- Oral history, traditions, legends;
- Aboriginal place names.

1.3. Methodology

This study focuses on ATK relating to Atlantic salmon populations in mainland Nova Scotia rivers. These are specifically the Inner Bay of Fundy (IBoF), the Southern Upland, and the Gaspé-Gulf of St. Lawrence populations.

³

Mi'kmaw territory

The methodology employed here involved four components:

Firstly, it includes a review of MAPS' in-house archive and datasets for relevant information. These datasets hold information on historical and contemporary land and resource activities, as well as cultural and socio-economic information.

Salmon is one important kind in the wide spectrum of traditional food resources.

The second component consists of targeted, in-depth interviews with active salmon fishers and other Mi'kmaw knowledge holders. These interviews aim at collecting traditional knowledge through in-depth interviews with knowledgeable Elders and active harvesters regarding the use and status of the target species. The resulting data cover the time-span of living memory, including current observations.

The interview process was designed to combine an approach that has proven itself in MAPS' earlier, multi-year land use and occupancy research with a set of questions geared towards ATK collection in the context of species at risk (SAR) research, in this case Atlantic salmon. Thirteen detailed and extensive interviews have been carried out with representatives from the Mi'kmaw communities of Indian Brook, Gold River, Pennal, Bear River and Paqtnkek.

Thirdly, group meetings were held in Indian Brook and Gold River with salmon harvesters and interested community members to discuss salmon-related observations and concerns.

It needs to be kept in mind, nevertheless, that the report represents a sampling of perspectives.

And finally, this study also takes into account some existing published or unpublished research into salmon related ATK carried out by other Mi'kmaw organizations and researchers⁴.

This report combines and presents the findings of this study project to Environment Canada and Fisheries and Oceans Canada, and the Mi'kmaw community.

2.) Life Cycle, Habitat Preferences & Migration Patterns

Being an anadromous species, Atlantic salmon utilize both marine and freshwater environments during the various stages of their life cycle.

Having spent one or more years at sea, **adult salmon** migrate back to the rivers they have left as young smolt moving upstream between April and November. Those that return after only one year, as young adults, are called **grilse**.

The preferred water temperature for migrating salmon in freshwater appears to be between 14°C and 20°C⁵. During their freshwater ascent they stop feeding and live off accumulated fat reserves.

In late fall adult females dig a nest called redd in a suitable spot in the gravel bottom of the stream. A female may lay about 1500 **eggs** per kg of body weight and the eggs are then

⁴

e.g.: Unama'ki Institute of Natural Resources, Fort Folly Habitat Stewardship Program, Mi'kmaw Conservation Group

⁵

DFO 2012:5

fertilized by the male. After spending the winter in freshwater, the adult Atlantic salmon can return to the ocean the following spring to feed and come back to the river of their birth to spawn again.

Having overwintered in the riverbed gravel, the pea-sized orange eggs hatch in early spring. The partly-transparent 2 cm long hatchlings, called **alevin**, remain hidden in the gravel sustained by their attached yolk-sacks.

As they begin to develop in the security of the gravel bed and feed actively on microscopic water creatures salmon **fry** grow to about 8 cm and transform into parr.

Recognizable by their vertical markings with a red dot in between, **parr** remain in the river for 2 to 6 years depending on water temperature and food availability.

Once they reach 12 to 24 cm the young salmon lose their parr marks during springtime to turn into silvery **smolt**. Adapting some of their organs to enable survival in saltwater they begin their downstream journey to the sea between April and June.

Most Atlantic salmon appear to migrate to the rich North Atlantic feeding grounds that extend from the waters off southwestern Greenland to the area around the Faroe Islands to feed on crustaceans and small fish and **mature**.

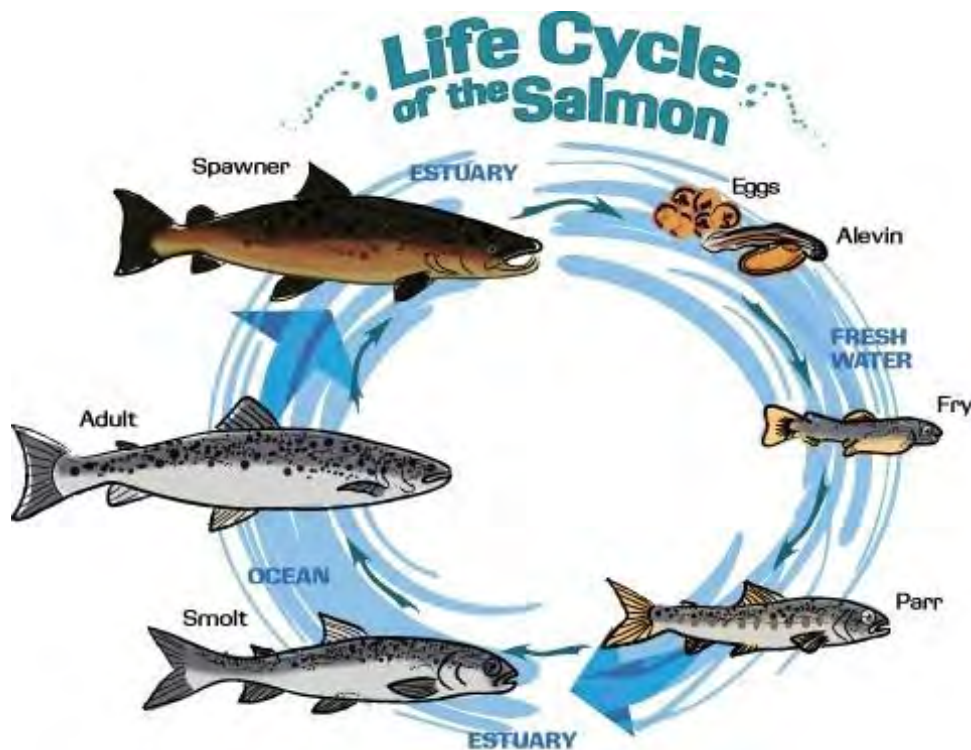


Fig. 1: Atlantic Salmon Life Cycle⁶

⁶ <http://www.ecwinc.org/fish-friends/>, retrieved Sept 2012

3.) The Atlantic Salmon, a Threatened Species

3.1.) Historical Threats and Impacts

The Atlantic Salmon Federation identified 151 historically productive salmon rivers⁷ in Nova Scotia. Of those, 55 no longer feature salmon runs today, and nearly all of those rivers are located in mainland Nova Scotia. Numbers of returning salmon in the remaining mainland rivers have dwindled dramatically.

Losses have been most dramatic in the rivers draining into the Bay of Fundy (Inner Bay of Fundy salmon population) and along the South Shore and Eastern Shore (Southern Upland population), resulting in a COSEWIC status classification of endangered for the salmon populations in both those regions.

In the pre-contact period virtually all major Nova Scotia rivers supported Atlantic salmon, and this species represented one of the key subsistence resources of the Mi'kmaw population of Nova Scotia. This is evidenced by both Mi'kmaw oral tradition as well as archaeological findings⁸.

This remained the case for quite some time after the arrival of Europeans and the beginning of their commercial and recreational salmon fisheries. Early written records from the 17th and 18th centuries consistently remark on this species' extraordinary abundance in Atlantic Canada's streams and coastal waters⁹.

Commercial harvesting of salmon by French and British colonists for European markets began, on a limited scale, in the early 1600s through barter between French and the Mi'kmaw at Port Royal and trading stations such as the ones established by Nicolas Denys following 1632 at LaHave and later at Chedabucto Bay.

As both demand and supply seemed inexhaustible to the newcomers and the numbers of settlers grew, so did the pressure on the salmon stocks.

The town of Liverpool was founded at the mouth of the Mersey River in 1760 specifically for taking advantage of its spectacular salmon runs. First fishing lots were assigned to residents shortly thereafter where net fishing was carried out from April to the end of the salmon run. The schooner *Liverpool Packet*, owned by Liverpool's main fish dealer, was also engaged primarily in trading goods for salmon with the Mi'kmaw. "Within a few years, the inhabitants were reported to be exporting upwards of 1000 barrels of pickled salmon each year"¹⁰.

Another region of heavy non-aboriginal salmon fishing during the same period were the southern Fundy shores between Annapolis Royal and the head of the Minas Basin with the primary salmon rivers at the time being the Bear, Annapolis, Shubenacadie/Stewiacke and

7

<http://69.90.163.40/docs/uploads/rivers/introduction.html>, retrieved June 2011

8

Dunfield 1985:13

9

Dunfield 1985

10

Dunfield 1985:49, source John Harvey, 'General Description of Nova Scotia in 1848', in: Report of the Public Archives of Nova Scotia, 1947:28

Salmon rivers. Due to pressures resulting from the arrival of more settlers, waves of New England Planters, private and public fishing lots were established in 1772 by the Court of General Sessions along much of the coastline between Bear River and the Gaspereau River where settlers fished salmon by means of weirs. With the first post-acadian agricultural communities springing up along the Annapolis and Stewiacke rivers, salmon fishing became a regular pursuit and part of the economy of those communities.

The grants of land given to the continuous stream of new colonists included at the time the right to the fisheries in water bodies bordering each grant, and this right was jealously guarded by the newcomers. Access to the salmon fishery made such lots particularly desirable and played a significant role in the prosperity of the settlers as well as the residents of the nearby towns they supplied with fish¹¹. Netting became the prevalent fishing method.

Along the Eastern and Northumberland shores in general settlement developed later and slower, and so did the non-Mi'kmaw harvesting pressures on the salmon stocks in the rivers of these areas. Salmon returns remained strong there until the early 19th century¹².

In 1787 spearing and dip-netting salmon was outlawed in Pictou County¹³. Mi'kmaw fishers were thus increasingly crowded out of the access to salmon in most of the highly productive freshwater fishing areas in those regions.

The marine fishery in the waters surrounding Nova Scotia increased steadily. Adding to the harvest by Nova Scotia based fishing vessels, American vessels from Boston and other New England towns fished off the Nova Scotia coast and even in estuaries¹⁴. Tolerated by the British Crown, this practice continued even after the American Revolution until the later part of the 19th century.

In the late 1700s, a new threat began to adversely impact salmon stocks across the province. As settlers, following the major South Shore river systems, ventured further and further inland extracting timber resources, sawmills began to spring up on every one of those rivers¹⁵. These structures and associated activities negatively affected salmon habitat in several ways: mill dams obstructed the migration of salmon, the sawdust waste polluted downstream river sections and covered spawning beds, and the periodic log drives from the upper stream basin to the mill pond scoured river beds and shores destroying spawning beds and generally altering original riverine habitats.

The combined impacts of the salmon mortality at sea, the intense freshwater fishing efforts and the degradation of riverine salmon habitat were being felt as early as the end of the 18th century. Historical documents from that period comment on a dramatic decline of an estimated 70-80%

11 Dunfield 1985:62

12 Dunfield 1985:50,51

13 Dunfield 1985:70

14 In 1807, for example, observers reported counting 938 American fishing vessels passing through the Strait of Canso (Dunfield 1985:63-64)

15 e.g.: LaHave, Gold, Mersey, Medway, Jordan, Roseway, Tusket, Salmon rivers. Dunfield 1985:71-72, also Fielding 2012

of the formerly 'extraordinary' salmon fishery on the LaHave, Mersey, Clyde, Shelburne, Jordan, Roseway, Tusket and other home rivers of the Southern Upland salmon population, and by the mid-19th century, the salmon fishery in those rivers had virtually ceased to exist¹⁶.

Along the Fundy coast the Bear, Grosses Coques, Chegoggin and Meteghan rivers still supported modest salmon runs by the mid-1800s. However, the Salmon and Moose rivers, formerly the most productive in the region, had been depleted.

Lequille and Annapolis River runs still existed but were heavily poached, and Economy, Gaspereau, Cornwallis and Avon Rivers still supported salmon migrations. The remaining primary spawning and nursery areas in this region were the unobstructed Round Hill River and the Nictaux River.

While salmon still kept ascending the Shubenacadie and Stewiacke rivers, they were barred from reaching their primary spawning areas in the Grand Lake tributaries by the locks on the Shubenacadie Canal and the netting that continued to be practiced there¹⁷.

Concerns over the impacts of obstructions to fish passage on the salmon fishery were growing gradually and pressured the Legislature to pass a law in 1853 to protect the fishery requiring, among other things, the construction of 'fish passes' at all millponds. Too late and too little, this law was not adequately enforced and proved to be ineffective and the wanton exploitation of the remaining stocks continued¹⁸.

A general report of the state of the salmon fishery in British North America at the time concluded with respect to Nova Scotia that "the salmon has entirely disappeared from some parts of the colony and has ceased to be plentiful in all of the rivers and streams"¹⁹.

The Guysborough County rivers were the last on the mainland that were still experiencing modest salmon runs.

By 1865 the legislature was forced to react, passed more stringent laws regarding fish passages at all mill ponds, banned netting and spearing in all rivers and established fishing seasons for the commercial marine salmon fishery. Yet, the use of illegal nets continued and the requirement of fish passages at dams was not enforced.

In 1867, the salmon fishery on the St. Mary's River was reported to 'utter its last gasp' even though it was one of very few without a dam on the main river. In the tideway alone, "fully 200 nets of all lengths" were "fixed in every spare place"²⁰. Equally gloomy was the situation along the Eastern Shore where mill dams and excessive netting had reduced salmon catches in the Salmon, Ecum Secum, Tangier and Liscomb rivers to about 2% of their former volume²¹.

Along the Northumberland shore, River Philip still provided moderate salmon returns. In Pictou and Antigonish County rivers, salmon continued to be caught in traps in quantities significant

¹⁶ Dunfield 1985:70-71, 134, 139

¹⁷ Dunfield 1985:139-140

¹⁸ Dunfield 1985:135

¹⁹ Sabine 1853:88, quoted in Dunfield 1985:135

²⁰ Vieth 1868:14, quoted in Dunfield 1985:137

²¹ Dunfield 1985:138

enough to support the development of a salmon-canning business²².

The Nova Scotia fishery during the period between the mid-1700s to mid-1800s has been described as a 'war on salmon'²³.

Forced to face the threat of a total collapse of the Atlantic salmon fishery, Nova Scotia finally created a Fisheries Department in 1866 and prepared to implement the Act for Regulating and Protecting the Fisheries that was enacted in 1868. The act introduced a licence system for commercial and recreational fishing, established fishing seasons and regulations regarding fishing gear, and initiated some pollution control measures²⁴.

Full compliance with the fish passage requirement at all dams on salmon rivers was never achieved.

Whereas most of the old mills have shut down over the past decades and many of their dams have since been removed, another series of dams have been installed throughout the 1900s for the purpose of hydro power generation. The Bay of Fundy Tidal Power Station operating at the head of the Annapolis River since 1984 may be the most famous example for this.

Whereas the commercial salmon fishery in New England was shut down in 1948 and in New Brunswick in 1972, it was allowed to continue in Nova Scotia until 1985²⁵.

While the salmon migrations had dwindled to faint shadows of their spectacular historical volume, numbers were still sufficient in some rivers to satisfy a new kind of fishery that was starting to develop in the late 1800s, the recreational fly fishing.

This relatively low-intensity harvesting of sport fishery was initially mainly the domain of the personnel of Nova Scotia's military forts or bases, and of wealthy foreign (British or American) 'sportsmen'.

Most of the sport angling in mainland Nova Scotia occurred along the rivers of the southern and eastern shores. The St. Mary's, Indian and Musquodoboit rivers still supported sufficient salmon runs, and so did the Gold, LaHave and Medways rivers, even though the latter was somewhat "bothered by sawdust"²⁶.

Though arguably somewhat less popular recreational fishing also established itself along the rivers emptying into the Northumberland Strait: the River Philip, Wallace River, West River (Pictou), East River, and South River.

Yet, salmon returns continued to decline steadily in all Nova Scotia Rivers. Since the 1980s, salmon runs in the remaining sport fishing rivers have become sporadic showing in some years no significant spawning migrations at all, especially in southwestern Nova Scotia.

²² Dunfield 1985:140

²³ Dunfield 1985:137

²⁴ Regulations included prohibitions for taking salmon under 3 lbs of weight, the destruction or sale of salmon roe, the fishing in tributaries with spawning beds, and commercial fishing at fish passages. It established a minimum distance of 250 yds between salmon nets and a maximum length of 2/3 of the width of the stream. (Dunfield 1985:151-152)

²⁵ Fundy Issues #17, Spring 2001, <http://www.bofep.org/salmon.htm>

²⁶ Dashwood 1872:73, as quoted in Dunfield 1985:151

3.2.) Contemporary Threats and Impacts

The increasing concentration of industrial development in the northeastern United States and the Great Lakes region over the past century brought about another source of pollution that is felt particularly strongly in southwest Nova Scotia. Prevailing winds transport airborne sulfate-based industrial emissions eastward which then precipitate onto our terrestrial and aquatic ecosystems raising **acidity levels** in our lakes and streams. The specific geology of southwestern Nova Scotia and the Eastern Shore²⁷, and in particular the generally rocky stream-bed characteristics of this region, amplify these adverse impacts. Studies have shown that these high acidity levels (ph-levels below 5.4) adversely affect spawning success and survival rate of the regional southern upland Atlantic salmon population²⁸.

Even though the acidity of precipitation has been declining over the past years, this trend doesn't seem to immediately and consistently translate into lower acidity in Nova Scotia rivers and lakes. The buffering effects of the large number of bogs and fens and the typical riverbed geology encountered in the southwestern and eastern shore river basins seem to inhibit or delay the return to normal ph levels.

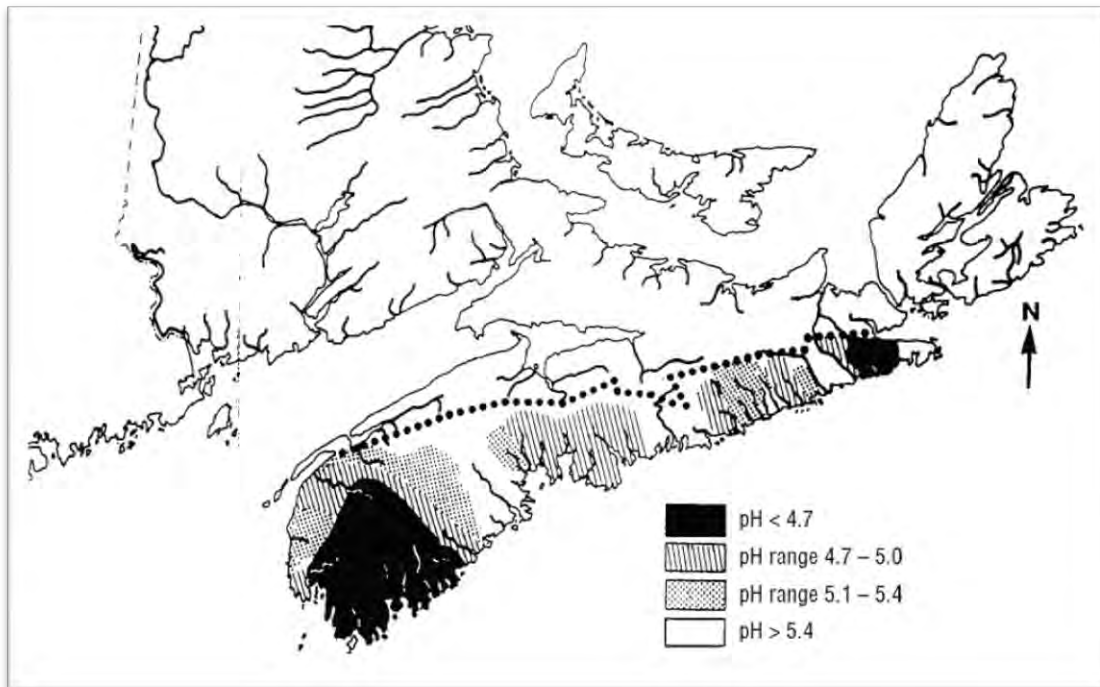


Fig 2: Areas of Annual Mean Ph-levels in 1975-85 in Salmon Streams Above and Below the 5.4 Danger Threshold for Atlantic Salmon²⁹

Another factor adversely affecting salmon habitat has been the increasing mechanization of logging³⁰ since the 1960s. As it promotes **large-scale clear-cutting** and is quite destructive on

²⁷ Dominated by granite and quartzite metamorphic rock, Davis & Browne 1996:163-165

²⁸ Davis & Browne 1996:163-165, Magee & al. 2003, Famer 2000

²⁹ Davis & Browne 1996:165

³⁰ With the introduction of wheeled skidders and slashers in the 1960s, feller forwarders in the 1970s and single-grip

ground cover and the generally thin layer of topsoil, the primary negative impacts have proven to be increased unfiltered runoff into local streams, siltation of spawning beds, increased water temperatures resulting from the loss of shade trees along stream banks, migration barriers through improper culvert installation at stream crossings, and increased pollution with petro-chemical compounds.

The introduction over the past decades of non-native 'sport fish' species such as smallmouth bass (*Micropterus dolomieu*) and chain pickerel (*Esox niger*) also appears to have a significant impact on salmon and brook trout (*Salvelinus fontinalis*) stocks. Smallmouth bass is currently present in most Nova Scotia watersheds, chain pickerel is found in some watersheds in the central and western parts of the province and the ranges of both are spreading³¹. Both these **invasive species** directly compete with salmon for food resources and even prey on fry.

A relatively new economic sector, **aquaculture** around the Nova Scotia coast has grown to currently 200 enterprises³² with the primary products being shellfish (mussels, oysters, etc.) and Atlantic salmon. While the existence and nature of threats to wild Atlantic salmon through the use of open net pens are no longer a point of contention within the scientific community³³, debates still rage amongst stake holders as to the extent to which these threats can be mitigated, and tolerated and justified when weighed against economic benefits.

The main risk factors are the proliferation of parasites and diseases such as sea lice (*Lepeophtheirus salmonis*) and ISA (*infectious salmon anemia*) resulting from the unnaturally dense populations of cultured salmon within their enclosures, and the threat of transfer of these pathogens to sea-bound smolt³⁴ or returning adults.

The extraordinary amount and localized accumulation of waste generated by the concentration of large numbers of contained salmon impacts the surrounding area's water quality and other aspects of the local marine habitat³⁵.

Estuaries and river mouths, where many of the aquaculture sites tend to be found, are considered the sites of highest mortality for out-migrating smolt, and anthropogenic factors such as pollution and aquaculture (sea lice) appear to be adversely affecting smolt survival rates³⁶. A third major threat lies in the potential of interference with the genetic integrity of local salmon stocks through escaped cultured salmon. Cultured salmon is a product of the Atlantic salmon Broodstock Development Program (ASBDP), initiated in 1974 and based on Saint John River salmon³⁷. Recent experiences with salmon farms around Nova Scotia and elsewhere have shown that escapes are not a remote possibility, but events that do occur, often as a result of storms³⁸.

31 harvesters in the 1980s
DFO 2009, Mitchell & al. 2011, Halfyard 2008, McNeill 1995

32 Aquaculture Association of Nova Scotia, <http://www.aansonline.ca/>

33 Milewski 2013, Thorstad & al. 2008, Hansen & Windsor 2006, Jonssen 1997

34 Thorstad & al. 2012, Hansen & Windsor 2006:19

35 Venayagamoorthy & al. 2011, Simpson 2009

36 Thorstad & al. 2012

37 Lawler & al 2009:71

38 Carr & al. 1997, McGinnity & al. 1997, Thorstad & al. 2008, Bourret & al. 2011, Hansen & Windsor 2006:19-20

Even though commercial salmon fishing in Atlantic Canadian waters has been banned for decades, the marine mortality of adult salmon appears to be increasing, partly due to the ever-growing fleet of fishing vessels in the international waters of the northern Atlantic ocean and the increasing efficiency of fishing technology.

Other factors likely playing a role in the diminishing marine survival of Atlantic salmon are the **overharvesting of forage species** the salmon are dependent on (krill, shrimp, herring, smelt, etc.) and **marine pollution**.

Atlantic salmon being a subarctic to boreal cold-water species adapted to oxygen-rich environments, it is also vulnerable to general **climate change** impacts. While ocean warming and the resulting potential impacts (e.g. reduced oxygen levels, declining forage fish stocks, increased exposure to parasites, reduced reproductive success due to altered environmental cues determining migration timetables or routes) are expected to be long-term, climate change impacts are felt more immediately during the freshwater stages of the salmon lifecycle. Increasing temperatures and declining oxygen levels in streams will inevitably lead to reduced spawning success and survival rates of parr and smolts. Reduced stream flow rates usually associated with the warming trends result in barriers to migration and salmon trapped in isolated pools with potentially lethal water temperatures and in general weakened fish more susceptible to predation, parasites and disease.

Following the closure of the commercial fishery for Atlantic salmon, the two remaining principal user groups today are Aboriginal and recreational fishers, with the recreational fishery surpassing the aboriginal one in volume³⁹.

Under the current circumstances of depleted and dwindling stocks, the recreational salmon fishery is presently managed by the Department of Fisheries and Oceans on a river-specific basis where stocks are estimated to be at or above conservation levels.

In mainland Nova Scotia, this presently leaves only some of the Northumberland shore rivers open to recreational salmon angling: River Philip, East River, West River (Pictou Co.), West River (Antigonish Co.), Wallace River and South River. The opening or closure of the salmon angling season on LaHave River, the only one in southwest Nova Scotia, is decided upon a review of early June salmon returns. The situation is similar with respect to the St. Mary's River on the Eastern Shore⁴⁰.

Recreational angling for salmon is limited to fly-fishing and mainly catch-and-release. Yet, in light of the extremely low returns even the average catch-and-release mortality of 16% is significant⁴¹, and the number of allowable catches per person is therefore restricted to a maximum of four daily, depending on management plans. Where and when stocks allow, retention of one or two young salmon (grilse) of a size no longer than 63 cm is permitted per person and day.

³⁹ Estimated total Atlantic catches in 2008: 83 t recreational, 62 t Aboriginal (DFO & MRNF 2009:3), which does not include delayed catch-and-release mortality in recreational fishing

⁴⁰ e.g.: both the St. Mary's and LaHave rivers were closed to all forms of angling from June-Oct. 2011

⁴¹ Casselman 2005:3, Bartholomew & Bohnsack 2005:130

Regional sport fishing organizations⁴² and some environmental organisations or research institutes⁴³ have for years now made very laudable efforts in trying to support and revive salmon runs in many Nova Scotia rivers through habitat restoration and monitoring as well as stocking with hatchery-raised young salmon.

On the basis of our common concern about the welfare of our salmon, MAPS has joined forces with the Bluenose Coastal Action Committee and the Medway River Salmon Association in efforts to revitalize salmon habitat and migrations on the Gold and Medway rivers and foster stewardship and Netukulimk ethics among local Mi'kmaw youths.

4.) Salmon ATK as Collected from Mi'kmaw Knowledge Holders in Mainland Nova Scotia

4.1.) Traditional Mi'kmaw Relationship with the Atlantic Salmon

In the pre-contact period, as indicated above, virtually all major Nova Scotia rivers supported Atlantic salmon, called *plamu* in Mi'kmaw, and this resource represented one of the key food species of the Mi'kmaw population of Nova Scotia.

Within the wide spectrum of fluctuating Mi'kmaw food resources none were as reliable and seasonally abundant as the Atlantic salmon and the American eel. During their migration both salmon and eels could be harvested in great numbers at known locations – as long as their populations remained healthy and stable.

The salmon cycle played a significant role in shaping the seasonal movements of Mi'kmaw groups.

It also served to foster and stabilize social cohesion within Mi'kmaw groups or bands through the benefits of cooperative harvesting and the redistribution of yields between the households and individuals of the group.

Consequently, the salmon figures prominently in Mi'kmaw stories and legends.

The combined experiences of many life-times of personal observations of salmon behaviour, physical characteristics and responses to environmental cues or changes accumulated to a rich store of traditional knowledge among Mi'kmaw fishers.

Red maple buds falling off the trees in the spring are signalling the beginning of the salmon migration and fishing season.

The first salmon to be seen were usually slinks⁴⁴ heading downstream. After overwintering in freshwater they are, as their name suggests, generally skinnier and lighter in the colour of their flesh than their counterparts arriving from the ocean.

⁴² e.g. Atlantic Salmon Federation, Nova Scotia Salmon Association, Medway River Salmon Association

⁴³ e.g. Bluenose Coastal Action Foundation, Mersey Tobetic Research Institute

⁴⁴ Adult salmon that had chosen not to return to the sea the previous year, but remained in freshwater over the winter.

The new generation of smolt (*plamuji*) are also out-migrating during the spring, usually between April to June.

The upstream migration (*bisguedajig*) occurs usually from April to November with grilse and young⁴⁵ adults and larger females arriving first. The large adult males tend to appear later in the migrating season. A fairly reliable indicator of the arrival of mature salmon is a fall gathering of eagles in the estuaries.

Females return soon after spawning⁴⁶, weakened and hungry, and therefore relatively easy to catch.

Males generally stay in freshwater longer and migrate back downstream (*bidaidajig* or *soquedajig*) later in the migrating season. While both sexes are colourful during their freshwater migration, their scales turn silver-grey again before re-entering the sea.

Spawning (*sigal'at*) occurs in late autumn when the fallen leaves are beginning to sink into the water. The female build a redd (*uqtisiatuk*) in the gravel river bottom into which the eggs (*sigalaw*) are deposited, fertilized by the male, and covered for protection.

Some of the Mi'kmaw terms used in describing the anatomy of salmon are given in figure 3 below.

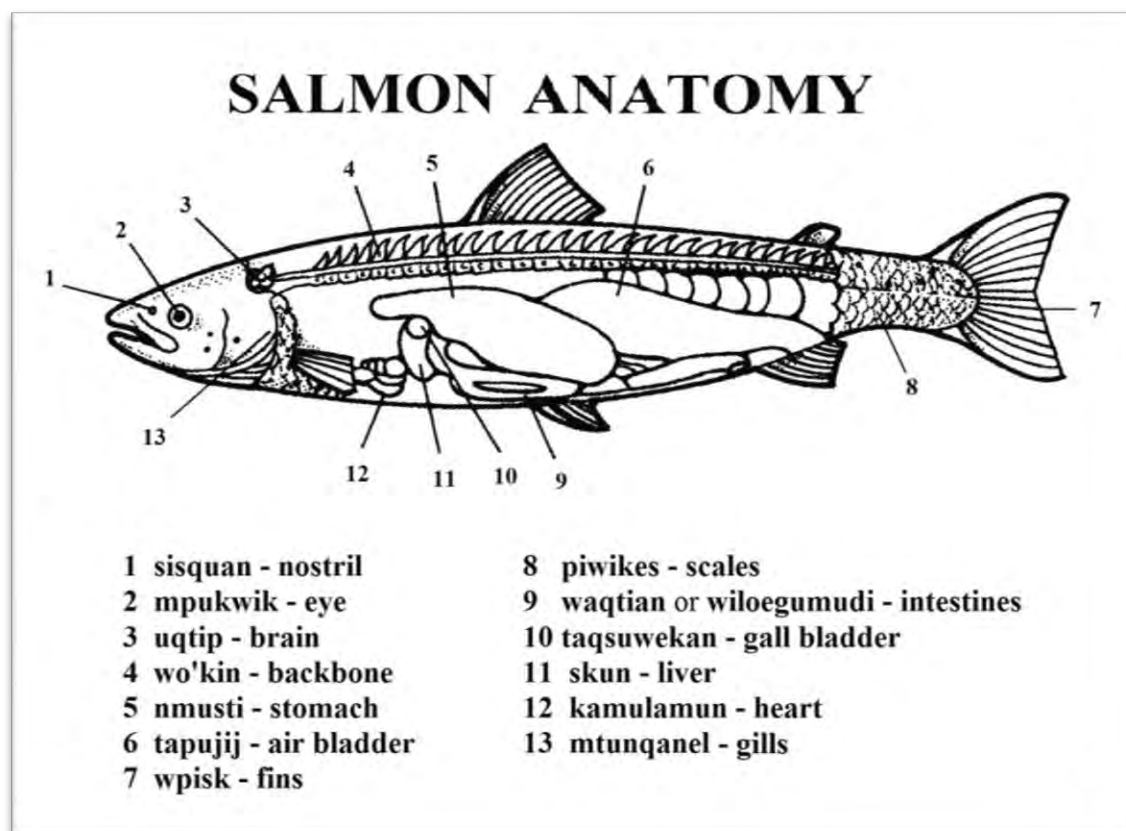


Fig 3: Salmon Anatomy⁴⁷

⁴⁵ With 2 winters at sea
⁴⁶ At which stage they are called 'kelt'

⁴⁷ Mi'kmaw terms by Becky Julian, Indian Brook, personal communication

4.1.1.) Economic Relationship

The salmon fishery traditionally represented a highlight in the seasonal cycle of Mi'kmaw harvesting activities. Even though salmon was a seasonally fluctuating resource, its availability was predictable with respect to locations and timing which made it one of the most reliable food sources. Until a few decades ago, the time of the salmon migrations was a season of plenty, and during these periods salmon fishing was the main harvesting activity involving in the past whole families.

With the resource becoming temporarily available in great concentrations at specific and well-known locations (pools and falls/rapids along salmon rivers, estuaries), these sites often became gathering places for several families working cooperatively in harvesting and processing.

Fishing techniques for salmon varied depending largely on the particular sites' specific environmental characteristics.

Fishing in the estuaries is primarily a spear fishery, but weirs or traps were used to some extent as well, especially around the Minas and Annapolis basins and on the rivers along the southern and eastern shore.

Spear fishing was done off a canoe during the night with the aid of a torch or lantern.

This spear fishing technique was also employed on larger bodies of freshwater. During daytime salmon spears were used for fishing below falls or rapids, at pools, and to retrieve fish from weirs.



Fig. 4: Mi'kmaw Salmon Fishing at Clam Harbour (re-enactment 1980)⁴⁸

⁴⁸

Nova Scotia Museum, Portraits Collection, N-9688/#35, source Learning Resources & Technology, <http://museum.gov.ns.ca/mikmaq/default.asp?section=image&id=554&page=27®ion=&period=&results=&keywords=>

Salmon weirs around the Minas and Annapolis basins were generally constructed with wooden stakes, while those along rocky rivers of the South Shore and Eastern Shore were built using the rocks found in the river bed. Fishers employed baskets, dip nets, or spears to land the salmon trapped by the weirs.

As a fish weir could yield a large number of salmon in a short time, it was advantageous to have many hands at work processing the harvest quickly, particularly during warm summer days.

Another very effective technique for catching salmon is snaring. It employs an alder pole (*tupi*) with an attached snare made of tree root at the end which is carefully slipped over a salmon as it rests in a pool or under an overhanging bank.



Fig. 5: Salmon Snares Made of Tree Root and Rabbit Wire⁴⁹

4.1.2.) Cultural Significance and Social Ramifications of the Salmon Fishery

Within Mi'kmaq communities the fishery has always represented an important source of, and support for, social, cultural and economic relationships.

In the days prior to the existence of fridges and freezers, salmon fishing and processing was an opportunity for social gatherings due to the facts that the presence of salmon at certain times and locations was predictable, the harvesting technique or process were less labour-intensive than those for other resources, the cooperation of a number of harvesters significantly increased yields, the cooperation of many was helpful in processing the potentially large and perishable catch during the warm summer weather and, of course, there were sufficient food resources available to sustain a larger congregation of people.

It is not surprising therefore that major pools, rapids/falls, or suitable weir sites along good salmon rivers have been used by Mi'kmaw since time immemorial and today are prime locations for archaeological sites. Recent archaeological surveys along the Mersey River, for example, have revealed an astonishing number of complex seasonal pre-contact fishing and habitation sites⁵⁰.

49

UINR 2012

50

Pentz 2008 & 2006, Soosaar 2005

The seasonal congregations of otherwise smaller, dispersed groups served important social functions such as the exchange of news concerning the ever-fluctuating food resources, the establishing of new family connections, and the maintenance and strengthening of customary sharing networks.

These sharing networks are a crucial element of Mi'kmaw social structure and culture, their traditional form of social insurance system.

4.1.3.) Spiritual Significance of the Salmon

The Atlantic salmon is one of the cultural icons of the Mi'kmaw, a significant element of their social and cultural identity as a people.

Mi'kmaw sustained and celebrated a close relationship with the salmon, which was honored through ceremony and daily practice.

Salmon play a role in the Mi'kmaq creation story coming to shore and giving up their lives to feed Glooscap⁵¹, his grandmother Nogami and his nephew Netoansom⁵².

4.2.) Contemporary Mi'kmaw Salmon Fishery

Despite the absence of commercial fishing for Atlantic salmon, the fishery remains a highly valued activity for Mi'kmaw and non-Mi'kmaw alike.

Today the fishery is accessed by Mi'kmaw for food, social and ceremonial purposes, as well as a large recreational sports fishing industry operating primarily on a catch-and-release basis. Other stakeholders in the fishery include the federal and provincial governments.

Within Mi'kmaq communities, the fishery, particularly for salmon, still represents an important pillar of social, cultural and economic relationships. The holistic and inclusive characteristics of the Mi'kmaq worldview expressed through the concept of Netukulimk are fundamentally different from the compartmentalized and reductionist approach adhered to in the western worldview and the state's practice of environmental management and stewardship.

The current fisheries management regime defines the fishery in narrow economic terms and aims at maximizing economic benefits at sustainable levels. This system is designed neither with the protection of the complex web of aquatic species interrelationships as its primary goal, nor to accommodate the social and cultural values of First Nations.⁵³

During the 1990s, landmark Supreme Court decisions confirmed Mi'kmaw have an Aboriginal right, as defined by the *Constitution Act 1982*, to fish for 'food, social and ceremonial purposes'⁵⁴ as well as a treaty right to fish commercially to earn a 'moderate living'⁵⁵. Aboriginal

51 Mi'kmaw 'cultural hero' who created some of the natural feature in NS and PEI and battled evil spirits and creatures

52 <http://www.glastonberrygrove.net/reference/history/micmac/mmcreate.html>

53 Daly 2012:23, Cooper & al. 2010

54 R. v. Sparrow 1990

fishing rights are afforded the highest priority, above the interests of commercial or recreational resource users and subject only to limitations based on conservation needs.

Recognizing on the one hand the responsibilities that are always associated with rights, and on the other the stewardship ethic that is an integral part of the Mi'kmaw principle of 'Netukulimk'⁵⁶, most Mi'kmaw fishers⁵⁷ agree to voluntarily refrain from exercising their right to a commercial salmon fishery for a 'moderate livelihood' and promote to even voluntarily limit catches in their FSC⁵⁸ fishing by avoiding rivers with critically low salmon returns, curtailing the use of nets, releasing mature female salmon and refraining from fishing during warm water periods. But at the same time, they insist that DFO demonstrate the same concern for the species and close down the recreational fishery in recognition of the Supreme Court-confirmed priority of Aboriginal harvesting over commercial and recreational uses⁵⁹.

On the Nova Scotia mainland, salmon fishing by Mi'kmaw in the South Shore rivers⁶⁰ has virtually ceased with the exception of occasional catches. The same may be said with respect to the rivers emptying into the Bay of Fundy⁶¹. Even within today's greatly reduced average volumes⁶² salmon returns may vary significantly from year to year and river system to river system. Gold River is reported to have seen a moderate salmon return in 2011, but hardly any migration in 2013 up to the end of June, and the situation is similar in other rivers along the South and Eastern shores that still show salmon migrations.

Inner Bay of Fundy rivers, the ones that still feature salmon runs, seem to have settled, at least for the time being, on a fairly persistent all-time low.

Populations in the Shubenacadie and Stewiacke Rivers⁶³ have declined to such an extent that most Mi'kmaw voluntarily refrain from salmon fishing there.

The lowest variance in salmon returns appears to be in the Northumberland Shore rivers and its estuaries. Today the River Philip, West (Antigonish) River, Pomquet River, Afton/Paqtnkek River, Barney's River, French River, James River, Monastery Brook, and others are still utilized extensively by Mi'kmaw fishers.

But numbers are dropping even in the salmon rivers entering St. George's Bay which used to be fairly productive until recently. One Paqtnkek First Nation fisherman reported seeing 60 salmon in a pool in the French River in 1991, 40-50 in one pool in the West River (Antigonish) in 1995 or 1996. Such congregations he has never encountered again since. In recent years salmon have been observed travelling and resting in much smaller schools.

55 R. v. Marshall 1999, based on Mi'kmaw treaties of 1760-61, see DFO at <http://www.dfo-mpo.gc.ca/fm-gp/aboriginal-autochtones/marshall/index-eng.htm>, retrieved Feb 2013

56 A culturally-specific way of sustainable living interweaving cultural integrity, spirituality, social responsibility and environmental stewardship, Prosper & al. 2011

57 and Mi'kmaw research institutions such as the UINR (UINR 2010)

58 constitutionally guaranteed right to fish for 'food, social and ceremonial purposes'

59 Kwilmu'kw Maw-klusuaqn 2009

60 Southern Upland salmon population

61 Inner Bay of Fundy population

62 as compared to the volume of historical salmon runs (see above)

63 by 99% since the early 1970s in the Stewiacke River (Lawlor & al. 2009:71, COSEWIC 2006)

Most of the salmon fishing is done during late summer/fall migration. Salmon slinks are also caught during the spring downstream migration, but are considered by many a by-catch while trout fishing and are often released again.

Mi'kmaw harvesting methods in the FSC fishery have remained very consistent, which is not surprising considering how closely they are tied to the concept of Netukulimk.

The traditional fishing methods of spearing, snaring, and weir or trap fishing are selective. It allows fishers to choose out of a school or group of fish those they wish to harvest and, for example, avoid taking large pre-spawning females.

Generally looked down upon by recreational fishers as primitive and 'unsporting', the use of traditional Mi'kmaw fishing methods therefore need to be recognized as more sustainable, as an important and effective conservation measure.

In contrast, the newer techniques and tools introduced since the arrival of Europeans of angling and jigging (both employing metal hooks) as well as netting, are indiscriminate in their catch.

Snaring still appears to be the most popular fishing method by fishers of the Paqtnkek First Nation, but is in use to some extent on Cape Breton Island as well⁶⁴. The snare of tree root has given way to one made of 'rabbit wire'. It is primarily employed in river fishing, while spearing is the primary method when fishing in the estuaries. Both methods ideally require a clear, calm day and clear water as they constitute an entirely visual fishery.

While the techniques of snaring and spearing have basically remained unchanged, modern auxiliary equipment is also employed such as waders (while fishing rivers), boats (while fishing estuaries) and flashlights or lanterns instead of torches (while fishing at night).

Jigging may be done when the river is too wide for snaring or spearing, too deep, or the water too dark.

Other active conservation measures, extensions of the preference for selective harvesting mentioned above, are the decisions by the Mi'kmaw to refrain from exercising their treaty right to a commercial fishery until the time the salmon stock are in recovery and the voluntary restraint in using nets.

There are other traditions related to salmon fishing that are aimed at building a special relationship between the harvester and the resource he/she depends on, fostering a sense of respect and responsibility towards the salmon.

The first salmon caught by a boy is considered a very special event, a rite of passage from childhood to manhood, similar to his first moose kill. The boy immediately dispatches and guts the freshly caught salmon under the watchful eye of his mentor (usually an uncle, father or grandfather) and possibly other family members and friends, and eats the fish's heart. This act creates a special bond between this individual and the salmon. It is said to help him, now a man, from that point on to find and catch the salmon he needs, and to provide for his family. Part of the traditional teachings passed from the mentor to the youngster is to try to avoid taking large females prior to spawning and not to keep the eggs. If such a female is landed it is proper to release it again unless it is too injured and unlikely to recover. In this case, some squeeze

64

out its roe and bury it in the gravel in the stream bed for upcoming males to find and fertilize. Similarly, they may squeeze out the sperm of a male into the water in the hope it will find a redd of eggs to fertilize as it drifts downstream.

The teaching of how to fish for salmon thus goes far beyond the mere technique of catching one. “It includes all the good stuff like traditions, what to do with the eggs, giving thanks, that’s all part of it”, as one young fisherman explained.

4.2.1.) Salmon as a Food Source

To all participants in this study, salmon represents an important source of high-quality food, consumed by themselves and their families on a regular basis. The frequency of salmon consumption, however, varies greatly. For many it is a seasonal fare enjoyed mostly in the fall and, thanks to freezers, for some time into the winter. Others may want to stretch their enjoyment of salmon until trout appear in the spring. While it is generally not year-round regular table fare, its importance should not be underestimated. Whenever it is eaten, it is received as a gift and consumed as a celebration.

4.2.2.) Salmon as a Commercial Resource

As mentioned earlier, a commercial salmon fishery will assume its rightful place in the economy of Mi’kmaw communities once salmon stocks have recovered to a level that they can sustain both FSC and commercial harvesting by Mi’kmaw. Until then, Mi’kmaw Chiefs have agreed to refrain from fishing salmon commercially.

4.2.3.) Social Functions of Salmon Fishery and Consumption

The social functions and significance of salmon fishing in Mi’kmaw society begin with the transmission of knowledge and skills to the young generation.

Children at a very young age may begin to accompany and watch adults when fishing for salmon, but it is usually boys between 10 and 16 years of age who find a mentor in an uncle, grandfather or father. He will instruct them in the various skills and methods of fishing salmon, but will also impart to them the cultural imperatives guiding this activity including the associated stewardship ethic.

On the social level, it is a bonding activity between a youngster and a close family member, something that has become extremely important as Mi’kmaw children spend ever more time outside their families (in schools, for example) in the company of people with different cultural values and lifestyles. From the viewpoint of the mentor, likely of the generation that has been affected directly or indirectly by the residential school experience, it is a rare opportunity to pass on treasured traditional knowledge and values that used to be dismissed during his own upbringing in a residential school or by parents deeply affected by it.

As the novice fisherman comes home with his catch he graduates to one of the providers in the family. Salmon fishing, as moose hunting, support a customary sharing network that reaches out to the entire extended family and beyond – the traditional Mi'kmaw social security system. Generally, the first fish is given to the mother or grandmother. Additional salmon are shared with the wider family, with Elders who do not have sons or sons who fish, with single parents in need, etc.

One of the participating fishermen revealed that he used to sell some of his surplus salmon when he was young and 'more interested in money' and being able to purchase things. Today, he considers salmon far too valuable to be sold.

The ties between the Mi'kmaw and the salmon thus extend far beyond the act of catching fish, embodying a source of knowledge, facilitating a network of social relations, representing a way of life, and a heritage as old as the human presence in Nova Scotia.

4.2.4.) Medicinal Uses of Salmon

Salmon is considered medicine in the sense that it is healthy food⁶⁵. Considering the high rate of diabetes and low average family incomes in Mi'kmaw and other Aboriginal communities, it plays an important role in helping to offset the need for low quality commercial foods.

It also serves to enhance social health and cultural integrity as salmon fishing and consumption affirm Mi'kmaw cultural traditions, represent a traditional, healthy way of life, embody the ideals of self-sufficiency and social responsibility (through sharing), strengthen family ties and provide links to the ancestors to whom it was a central part of their lives.

5.) Mi'kmaw Perspectives on Threats to Salmon Stocks and Fishery

5.1.) Observations by Mi'kmaw Salmon Fishers

Some of the observations by Mi'kmaw fishers, beyond the obvious fact that population figures have dropped drastically around the province (albeit to various extents), shall be listed here.

- In the river systems draining into the Northumberland Strait the salmon migration usually starts between middle and the end of October. A lot of rain during the weeks previous to that may trigger a migration as early as the end of September.
- For upland salmon populations the migration usually begins in late August to early September
- It appears that the onset of the migrations now tends to be later than in previous decades.

⁶⁵

A fact that the food/vitamin supplement industry has discovered and profits from handsomely through the sale of salmon-oil based capsules

- The condition and appearance of the salmon changes the longer they stay in fresh water. The coloration of their scales becomes more colourful as they enter the estuaries. As they travel upstream their texture becomes softer and they don't appear to fight as hard when caught. The colour of their scales return to silver as they re-enter the sea.
- During the daytime they tend to search out deep pools and overhanging banks to find shade and hide from predators such as eagles or bears.
- Salmon create resting places by clearing away gravel on the stream bottom. Several fish may congregate in such salmon beds.
- Migrating schools are getting smaller. Salmon used to travel in groups of 3-4 females followed by 8-9 males, now females are often observed migrating by themselves followed by 1-2 males.
- Scarred salmon are seen more and more often showing tattered caudal (tail) fins, hooks in their mouths, gills or guts, attached sea lice (when still near the river mouth), and even open sores.
- River habitat changes naturally somewhat from year to year due to spring ice flows scouring out river bottoms, changing the location and depth of pools, and causing overhanging banks to collapse.
- Water levels stay low longer into the fall. As some rivers may reach the minimum water level need for an unobstructed migration later, some salmon may not be afforded sufficient time to reach spawning grounds in the upper watershed.

5.2.) Current Threats to Salmon Stocks and the Salmon Fishery

The priority threats to Nova Scotia salmon stocks identified in our discussions with Mi'kmaw fishers are as follows:

The issue that seems to be in the forefront of everyone's mind are the impacts of **industrial logging**. The loss of the 'sponge function' of the forest through large-scale clear cutting leads to a fast run-off after precipitation, a dehydration of the soils during dry, warm or windy weather, and a shrinking of wetlands. This ultimately translates to flash floods in the streams of the affected watershed immediately after a significant precipitation event or fast snowmelt, and a general drop in water levels during the summer and early fall seasons.

This is aggravated still by the warming trend associated with global climatic change. As a result, the drop in water levels can create barriers to migration in the form of insurmountable ledges or simply nearly-dry stream sections, and the remaining flow may heat up to temperature levels approaching or surpassing the natural heat tolerance of salmon, even if the obligatory stream buffers are respected. This is especially the case in the rocky streams of the South Shore and Eastern Shore rivers.

In addition, the destruction of ground cover and the exposed and churned-over soil created by the ruts of the modern logging machinery causes considerable amounts of soil and silt to wash into the stream with every significant rainfall. This potentially eliminates many suitable spawning beds and chokes existing redds and fertilized eggs.

The **proliferation of beavers** since the winding down of the fur industry was also mentioned as a contributing factor impacting stream flow rates and temperatures. While on the one hand beaver dams have proven to usually not be an impassable obstacle to salmon, and large enough beaver ponds may provide suitable winter habitat, those ponds on the other hand slow down flow rates and releases warmed water downstream and thus may well adversely affect salmon habitat.

Hydro power dams still block many streams in Nova Scotia and wreak havoc with the downstream water flow pattern. The Bear River may serve as an example for such a scenario. The East Branch Bear River was once a productive salmon stream and Charlotte Lake, one of the lakes in its watershed, was once known as Salmon Lake. Around 1950, the Gulch Power Station and dam were constructed, without a suitable fish ladder. As the generators used to be shut down frequently, stopping the water flow, salmon that used to migrate up to the sluice gate were often left stranded in small pools. About 30-40 years ago salmon finally stopped coming altogether. The West Branch Bear River is very rocky and water levels have dropped over the years resulting in a stream which is now too shallow to allow salmon migration. Franklin Brook, one of the tributaries of the West Branch still supports a modest salmon run, thanks in large part to the restoration efforts by the Bear River First Nation. The surrounding area has also been impacted by heavy clear cutting. A salmon farm is located in the Bay nearby from which escapees have been found in the lower Bear River.

Salmon farms which surround the coast of Nova Scotia now, are another point of concern. Possible negative impacts on wild salmon have briefly been outlined above.

Invasive species such as smallmouth bass and pickerel are perceived to be lowering considerably the spawning success of salmon. Not only are they competitors feeding on the same types of water creatures as the salmon does, they also feed on salmon in their very vulnerable stages as alevins and fry.

In the Gold River system, for example, smallmouth bass can be found virtually anywhere, and pickerel have more recently been illegally introduced into the lakes around New Ross in the upper river basin as well as in lakes in the Chester Grant and Chester Basin area on the lower Gold River.

Many migrating salmon are lost every year, ending up as **by-catch in gaspereau and shad nets**. During the gaspereau and shad runs, commercial fishers on many rivers string series of nets across much of the width of the river, the Stewiacke being one example. As these seasons overlap with the salmon migration, it is virtually inevitable that salmon will end up being caught as well. The only suggested solution in reducing this loss lies in a restriction of the number of nets allowed and their maximum length relative to the width of the stream and an increase in the legal minimum distance between nets.

Illegal salmon netting by local poachers, ongoing since the 18th century, has still not vanished and is still not vigorously enough persecuted. Several reports of such events, personally

witnessed by some of the participants in this study, include threats to the personal safety of the Mi'kmaq fishermen upon discovery of these occurrences.

Along some rivers small **in-stream generators** are becoming popular among riverside cottagers. These generators tend to leak some amount of electric current into the stream. Salmon are said to be very sensitive to such disturbances, avoid such areas, and in smaller streams may even refuse to continue to travel further upstream.

Another factor for the gradual drop in salmon stocks appears to be the **depletion of their prey or food species**, a development observed by many Mi'kmaw fishers. The large schools of smelt or gaspereau that once made their way up the rivers have dwindled to a fraction of their former volume.

This corresponds to the observation by fisheries biologists of an increase in marine salmon mortality that may likely be traced to the overfishing of prey species the salmon depend on, such as shrimp, krill, herring, silversides and others. Increasing marine pollution may also be a limiting factor by increasing directly the mortality rate of salmon or indirectly that of their food species.

When discussing pressures on the Mi'kmaw salmon fishery, **societal and economic pressures** must not be overlooked.

The growing costs of fishing gear is one of those pressures considering the low average household income of many Mi'kmaw families.

Another certainly is access to fishing areas as waterfront residential or recreational development and pasture fence lines increasingly cut across customary foot paths to fishing spots or eliminate these places as suitable fishing sites altogether.

Public perception on part of the surrounding mainstream society is an intangible but strongly-felt pressure. A general lack of understanding of, and respect for, Aboriginal and treaty rights, aggravated by the sense of competition for a dwindling resource appear to generate significant animosity towards Mi'kmaw salmon fishers among some of the local non-Aboriginal fishers. As a result, the constant feeling of having to hide their activities, rightful as they may be, and highly respected within their own community, is a heavy psychological burden on many Mi'kmaw salmon fishers.

Such feelings of animosity seem to be less common among visiting sport anglers. In fact, instances were reported when sport anglers followed Mi'kmaw fishers they encountered knowing that they would be intimately familiar with the river and its most promising fishing spots. In doing this, however, they ended up crowding out those Mi'kmaw fishermen from their chosen fishing location.

6.) Mi'kmaq Responses

Salmon has remained a particularly important resource to the Mi'kmaq of Nova Scotia. While salmon fishing is still carried out many, if not the majority of Mi'kmaq fishers, have voluntarily self-imposed restrictions on personal harvest levels or avoid fishing rivers where salmon returns are known to have dropped dramatically. Similarly, some Band Councils or Mi'kmaq organizations have imposed to members of their respective communities harvest levels below government-suggested limits, even outright closures of certain rivers where the Dept. of Fisheries and Oceans still allows recreational fishing (e.g. Margaree River).

The Mi'kmaq leadership and most Mi'kmaq fishers are well aware of the precarious condition of salmon stocks, are very conservative in their catches and have taken measures to preserve salmon returns in rivers that still support regular runs.

The two initiatives suggested by the Mi'kmaq fishermen as promising to have the most positive impacts on salmon returns are:

- a) To limit or suspend the sport fishery until it is safe for the species to resume;
- b) Adjust the Nova Scotia's forestry practices to minimize impacts on watercourses, wetlands, and forest soil and groundcover destruction.

7.) Conclusion

The Mi'kmaq salmon fishery is undervalued since monetary value is the yard stick against which the importance of aquaculture, the commercial, recreational and aboriginal fisheries are measured by fisheries managers and administrators.

The intrinsic and intangible value of the aboriginal fishery is hereby entirely unrecognized or at least underappreciated⁶⁶. The real value of the Aboriginal fishery lies in its social and cultural importance. It is an integral and, in the minds of most Mi'kmaq, indispensable component of a distinct and ancient way of life.

This way of life has received constitutional protection, and both Marshall decisions need to be respected and implemented.

As one of the interviewees noted: "Salmon fishing for us is not a privilege, it is our right. But we can't eat our right. If the salmon is gone, that right is meaningless"

⁶⁶ Daly 2012:31-33

The loss of the relationship between the Mi'kmaw and the salmon would hurt everyone in their community. It would mean a loss of a high-quality food source, the collapse of an important sharing network, the loss of a way of life, and the severing of an important link between the younger and older generation.

An important component of Mi'kmaw culture would be pushed into history and memory. "It would mean a loss of a part of myself and my heritage" as one Mi'kmaq fisherman summed it up.

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