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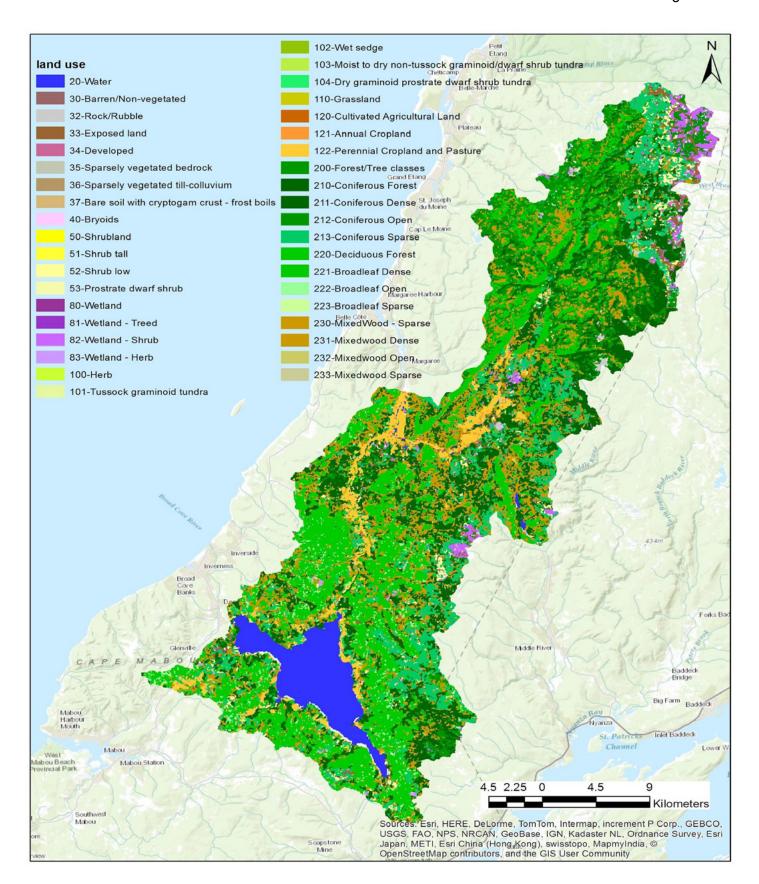
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# Acknowledgements

The board of the Margaree Salmon Association would like to give recognition to the many past and present members of the association, especially the founding members who started something that has continued for almost 40 years. There are too many to mention here, but each contributed to our success and have established a foundation that should stand for many years to come.

The work we've completed in the past has been supported by many Departments of Government both Provincially and Federally. In the recent past, the Nova Scotia Salmon Association has played a major role in our success and continues to do so.

Although it has been many years since we've pulled together a document of our achievements and plans for the future, it certainly will not be the last. With the very obvious impacts of climate change playing havoc within our watershed, we must continue to focus our attention on documenting our actions.



The Margaree River Watershed Area

# The Margaree River begins where the road ends. "In the wildest and most scenic portion of the mountain fastness is the source of the N.E. Margaree, principal tributary of the river system." James T. Grey

The history of the relationship between the Margaree River Watershed Area and the Atlantic Salmon fishery is as simple and as complex as the stories of origins of the river's name. As early as 1700, the river was known as the Salmon River, referring to the abundance of salmon thriving in its waters. Fur traders and early French settlers from the village of Magre, France called the river and surrounding area *Magre*. In time, with changes in spelling and pronunciation, *Magre* transformed to the more anglicized *Margrie* or *Margaree* as it is known today. Another possible name reference originates from a Mi'kmaq story of a young woman drowned in the river. Her distraught family walked along the banks calling her name "Marguerite, Marguerite", thus causing fur traders to refer to the river as the *Marguerite*. Some early maps do refer to the river as the Marguerite, which could easily come to be spelled and pronounced Margaree. Regardless of its origins, the river proudly claims the name Margaree and is well known throughout the world.

Recognizing that the Mi'kmag people inhabited this area since time immemorial, it is interesting to note that the Mi'kmaq word for the Margaree area is "Wiagajk" meaning the "mixing place." This name refers to both environmental features and the historical significance of the area. Rich in salmon, or "Plamu" in Mi'kmag, the river was an essential source of food supply for the Mi'kmag people. Parties travelled on foot from the Bras d'Or region to set up camp along the banks of the Margaree River for five to six weeks every fall to harvest salmon for their community. To the Mi'kmag people salmon represents strength, endurance and resilience. The life cycle of a salmon reflects all of those attributes. Harvested salmon would be shared with the elders and community members as in keeping with the tradition of "Netukulimk"--gathering from the land to provide for your well-being physically, spiritually and economically. Sharing is an important factor of Mi'kmaq tradition. The Mi'kmaq way of life is derived from centuries of interaction with, observation of and adaptation to the natural environment. The practice of taking only what is needed and wasting nothing is part of the Mi'kmag science of survival intertwined with a spirituality and culture unique to the Mi'kmaq people. The Mi'kmaq community of Wagmatcook includes a parcel of land on the Margaree River known as Margaree Reserve Number 25. This reserve is located just north of the juncture of the South West and North East branches of the river at Margaree Forks.

French, Scottish, Irish and English settlers began to populate the Margaree area in the 1700's. The Mi'kmaq people were here seasonally so these settlers saw the land as unoccupied and available. Homesteads were established along the fertile banks of the river valley and in the backlands at Margaree Harbour, Margaree Forks, South West Margaree, North East Margaree and the Big Intervale area. As well as a bountiful food source, fishing salmon soon became an economical tool for these settlers. Tanneries, saw and grist mills, and forestry met the changing cultural and economic needs. Such development played a major role in the way the people interacted with the river, the watershed and the salmon population. Legislation was passed in 1786 to reduce the exploitation of and introduce management practices concerning salmon resources. This was largely unsuccessful due to ineffective implementation and regulation.

Recreational angling became popular with the European elite around 1800, drawing people to the pristine Margaree region for many years. Before his death in 1929, the Gaelic Bard, Malcolm Gillis, of Upper Margaree penned his ode to the Margaree River that flowed along the banks of his family farm. "Am Braighe--The Braes of Margaree" acknowledges the visiting fishers to the Margaree River:

"Many a man fishes for salmon around your fair shores;

Gentlemen from England come over to pass summer near you"

This work speaks to the practice of the time that may have led to the establishment of hotels, boarding houses and eventually permanent dwellings for fishermen and their families from all parts of the world.

Anglers visiting the area were offered food and lodging at a variety of locations. For many years, the Normaway Inn catered to avid fishermen from all parts of the globe and it continues to do so today. Another notable inn, Heart of Hart's, was renowned for its warmth and hospitality catering to avid

fishermen and hunters for many years. There are still many cottages and rentals along the river valley frequented by salmon fishers. Many from that era have closed but it is safe to say that while in operation were appreciated by the fishermen who tried their luck along the banks of the Margaree River. Enthusiastic fishermen and their families return to the Margaree area for years. Some have even purchased plots of land and built cottages for their fishing adventures. The Margaree River Valley was once bustling with commercial activity, general stores, owned and operated by familiar family names like Laurence, Ross, Phillips, Burton, Ingraham and MacPherson dotted the river valley. As needs changed, the services offered changed. Gasoline service stations took the place of blacksmith and harness shops. Tanneries are gone and the number of sawmills along the river has dwindled. The store owned by Alvin Ingraham in Margaree Centre has evolved into a community hub offering mechanical services, gasoline, ice cream, convenience store fare and a post office. It is still owned by the Ingraham family. MacPherson's Store in Margaree Valley, also known as Frizzleton, has been in operation for many years. At least four generations of MacPhersons have owned and operated this general store. It is interesting to note that after the war, MacPherson's became a convenience store rather than a full service grocery store offering cigarettes, pop, candy and salmon fishing supplies. That salmon fishing supplies remained in the inventory speaks to the import of the salmon fishery in Margaree. The store remains open and is an active location in the Margaree Valley area. Those travelling to fish along the Margaree River undoubtedly added to the success of these businesses and the local economy. Therefore, it is understood that a season or two of poor fishing could be detrimental to the economic dynamics of the area. Modern issues that would never have been imagined at the turn of the century are now in the forefront. Internet service and reliable cell phone coverage is vital and many groups and individuals are working to enhance these services to our area. The Margaree was and is known to be one of the best salmon fishing locations in North America, a place where the fish swarm and a most popular fishing destination. It can be said with confidence that the Atlantic Salmon fishery is a significant component of the history and economy of the area.

Along the South West Margaree River, harvesting of the Gaspereau, or alewife, takes place every spring. In practice for well over one hundred years, this fishery has been a supplemental source of income for many families adding up to one million dollars to the economy annually. The fish swim upstream about 20 km to spawn in the south east corner of Lake Ainslie at Loch Ban. From dipping fish out of the river with a net to the tip trap used today, gaspereau fishing has become more modernized. Stephen Googoo, a Mi'kmaq fisherman from Waycobah First Nation, invented the tip trap which was adopted by all and is still used today. Salted and packed for shipment, these fish are mostly sold to buyers transporting them to Haiti. Fresh gaspereau are also sold as bait to local lobster fishermen. The Margaree Gaspereau Fisherman's Association was formed to protect the fishery. A rotating schedule for fishers on either side of the South West Margaree Bridge, trap size and placement regulations, and an established season have helped to maintain the fishery which is still active today. Generations of S. W. Margaree settler families like the Cameron, Peters, Chiasson, MacLellan, Stewart, Gillis, MacDonald, MacKinnon and MacFarlane families participate in the gaspereau fishery.

As sport or recreational fishing began to take a stronghold on the Margaree River, regulations were established to safeguard the salmon population for future generations. In the 1800's, regulations and restrictions were put in place; seasons and weekend closures were established. Fines were laid on those not following the new regulations. One can assume that an increased number of fishers and a decline in fish populations caused reason for concern and action.

The Margaree Fish Hatchery opened in 1902 and has played a significant role in maintaining the population of salmon and trout in the Margaree River. Millions of fish have been released into the Margaree-Lake Ainslie watershed during the spring and fall. Many dedicated community members have embraced the fish hatchery recognizing its importance.





(Left) Gathering broodstock from Margaree's Redbank Pool. MSA Directors Greg Lovely and Wendy MacEachern.(September 2020) (Right) Feeding time at the Margaree Fish Hatchery

For 94 years it was part of the federal hatchery system, however budget cuts in 1995 led to the closure of almost all federally run hatcheries on the east coast including Margaree. Responding to this closure in March of 1996, the Aquatic Development Association of Margaree was formed. ADAM was spearheaded by long time MSA member and director John Hart. The first president of the association was Carl Ross who served with a board of interested community members to support the hatchery in Margaree. This dedicated group of volunteers kept the hatchery open and productive until the provincial government of Nova Scotia took over the day today operation of the hatchery in 2008. A fount of knowledge, Leonard Forsyth, managed the hatchery for years and continues to be a champion of the aquatic health of the Margaree River. A properly run fish hatchery, like the Margaree Fish Hatchery, not only helps to sustain healthy salmon runs but also contributes to the recovery of rivers struggling to meet conservation escapement levels. We see this play out year after year. In 2020, as in many years past, the number of hatchery reared fish that were captured and documented during the broodstock collection process was an astounding 22%. Hatchery fish are identified by their absent adipose fin that is clipped off at the hatchery when the fish are young and prior to release back into the wild. Hatchery reared fish, although they come from wild salmon stocks, are never used for broodstock. This ensures that genetics remain diversified and each year new wild salmon are chosen for broodstock collection.

Without the hatchery, there would be several hundred fewer fish contributing to egg deposition in the Margaree River. The Margaree River is not the only river benefitting from stocking. In fact, several years ago, the Middle River was estimated to be reaching only 60% of its conservation requirements. Since the Margaree Hatchery began re-stocking the Middle River yearly with 25,000 juvenile salmon, data suggests that returns have almost recovered. As well, the Mabou, Baddeck and Graham's Rivers also receive a helping hand from the Margaree Fish Hatchery. It should be noted that brood stock is obtained from each of these rivers and the offspring grown are returned to the same river from which the adults were taken.

A great way anglers can help participate in data collection for not only the Fish Hatchery, but for many scientific research centres on the Atlantic Salmon, would be to photograph or otherwise record the tag numbers of any hatchery raised fish they catch. Photos can be forwarded with the tag number to the Margaree Fish Hatchery.

The Margaree Salmon Association has supported the Margaree Fish Hatchery and this iconic species for many decades. As a result, the Margaree River is the only river in Nova Scotia that consistently exceeds conservation requirement numbers of Atlantic Salmon. We will continue to provide volunteers to help with activities involving the Hatchery including broodstock collection, fin clipping, release of hatchery reared fish and all other activities requiring our assistance for years to come. The Margaree Fish Hatchery remains in operation to date.

Ron Haldeman, a dedicated angler and one of the founding fathers of the Margaree Salmon Association, was the driving force to establish the Margaree River as the first documented catch and release salmon river in the world in 1979.

After an initial meeting in July, 1981 led by Ron Haldeman, Claire Mitchell, Stan Burton, George Crowdis, Joe Schwerin, Ann Haldeman, Frank Theirkauf and John White, the Margaree Salmon Association was established by a group of dedicated anglers and friends of the river in 1982. Joined by Pat Wall and John MacLaren, this group followed the mandate to preserve, protect, conserve and promote salmon fishing on the Margaree River. Funding came from membership dues and generous donations. In the early years, the association received funding from the federal government to hire a crew to clean up branches and tree fall along the river and tributaries as well as do some restoration. This funding allowed the group to identify and remediate areas of concern along the river, monitor predators, monitor erosion and gather data. Over the years many initiatives have been undertaken by the association. Studies have been conducted with numerous partners like the socio-economic study completed by MSA in collaboration with St Francis Xavier University (1984). MSA has worked closely since its formation with the Department of Fisheries and Oceans (DFO) concerning River Surveillance (1984), to produce a Fishery Development Strategy for the Margaree River (ASE Consultants 1993), to purchase and install a Smolt Wheel (2001), to name a few. DFO has been an invaluable partner in the completion of armour stone placement along the Margaree River at many locations. Bank restoration and stabilisation projects have been completed at the Hart Pool, Lake O'Law Brook, Big Brook, Doyle's Bridge area and Ingraham Pool area and many other sites. Since April of 1985, a River Specific Management Plan has been discussed with MSA and DFO, hopefully the production of this watershed plan will help create momentum on this topic. Also in 1985 DFO ordered a complete ban on commercial salmon fishing in the maritime provinces, this life-line has allowed MSA to celebrate salmon presence in our river 40 years later. Habitat restoration through construction of digger logs, retaining walls, skyhooks, deflectors and bank stabilisation efforts take place annually. Multiple tree planting events have taken place over the years to enhance the environment for a healthy fish population. This endeavour was made possible by the generous donation of trees from our partners the Strathlorne Tree Nursery and Port Hawkesbury Paper and Nova Scotia Salmon Association (NSSA) staff. The Unama'ki Institute of Natural Resources (UNIR) has been a valued partner and collaborates on many projects with MSA. Reports concerning the first organised Native Food Fishery on the Margaree River (1993) and contributions by First Nations to the hatchery to help support stocking the river are appreciated. We are pleased to have members of the Mi'kmag community serve on our board of directors and value their input. The collaboration between the Mi'kmaq people and MSA plays an important role in maintaining the river's health. Recently MSA shared in a water healing ceremony with their First Nation partners and have examined the changes in the river with Mi'kmag harvesters. Events of note have been successfully sponsored and organised by MSA. Fishing Ladies Outdoor Weekend (FLOW) attracted female anglers from all areas to participate in a salmon fishing weekend on the Margaree and has been highly regarded over the years. The annual dinner and auction allows members to gather in an informal setting and share stories of their love of the sport and their admiration for the Margaree River and plans are underway to celebrate the 40th anniversary of the Margaree Salmon Association at that event in 2022. A wonderful full colour map of the pools of the Margaree River was produced in 2000. This map is still cherished today and considered an essential addition to any anglers tackle and gear.

To this day, habitat restoration and riparian enhancement are priorities of the Margaree Salmon Association. Recognizing that salmon thrive in cooler waters and prefer cold tributaries as ideal spawning grounds, the association will focus on maintaining these tributaries and invests manpower and funds annually to keep these nurseries healthy for fish.

The Margaree River is world renowned. That popularity is fostered by not only the natural elements of geography, geology and hydrology, but also the social environment of the area. Other than limited silviculture and agriculture, there has never been any great industrial development along the waterway. The river has a responsible First Nation fish harvest. The legislation banning fishing in the sanctuary area protects the fish population. The fact that an active fish hatchery has been in operation on the river for over one hundred years speaks for itself. As well, having an active group dedicated to investing in the restoration, rehabilitation and conservation of the Margaree River empowered by collaboration with many partner groups leads us to predict that the Margaree River will continue to thrive for future generations.

"If you see a salmon, you know there's clean, cold water. You know there's a healthy riverbed, deep pools and solid, stable banks. If you see a salmon, there are good people living on the river protecting it. It's a good place to raise a family, sustainably grow-there's a community."

~ Ron Haldeman



# **Our Planning Journey Begins: EXP**

In 2015 the board of the MSA was being challenged to identify a plan moving forward. We had an ongoing grant application to NSSA utilising the Adopt a Stream funds generated through fishing licence sales and the NS liquor Commission. MSA felt this was an important activity allowing us to hire local people to work with staff from NSSA to target our feeder stream(s) for habitat restoration work. The board of directors decided to employ the professional services of a consulting/engineering group to help us work towards a longer term plan for our association. EXP, a consulting firm with a mission to understand, innovate, partner and deliver engineering, architecture, design and consulting services to the world's built and natural environments, was hired and a collaborative meeting was planned. Twenty stakeholders were invited to participate in the July 9, 2016 meeting with EXP and about half of those parties attended. The EXP group included an expert in Geomatics(Bill Jones),a PHD in Ecology and Environmental Studies (Dr.Jim Foulds) and a hydrology expert (Fred Baechlor). A prioritized list of scientific studies we would like to undertake was developed as a result of this meeting.



Some of the stakeholders at the EXP planning session. July 9,2016. From left to right; Joel Robinson (MSA), Jack Aikens (MSA), Byron Fraser (Department of Natural Resources), Leonard Forsyth (MSA), Emma Garden, from the Unama'ki Institute of Natural Resources (UINR).

Missing from the picture, but also in attendance, Dr. Jim Foulds (Aquatic Ecologist), Bill Jones (Geomatics Analyst), Fred Baechlor (Chief Hydrologist), Greg Lovely (MSA), Nicholas Baker (MSA), Bert Hart (MSA), Lester Wood (MSA), Darryl Murrant (Department of Inland Fisheries and Aquaculture), Paul MacNeil (MSA).

From this one day planning session came a prioritised list of actions to help the Margaree Salmon Association understand the Margaree River watershed and help guide its work.

#### **Priority Issue #1** – Understanding The Active Channel:

The focus here is to understand the interaction between natural and man-made physical forces, which are controlling the highly active/mobile channel and what impact that has on salmon. The causes – prediction – impact on salmon. This would then form a base to understand where and when to undertake stream restoration works and why there was success and failures during previous efforts. It would also aid in being able to predict future changes and what impacts they may have. ( Active Channel, Degradation of Pools, Increased Summer Water Temperature, Loss of Fish Passage Zones to Facilitate Salmon Migration, Changes in River Flow, Groundwater Stream Interaction, Bed Sediment, Floods)

#### **Priority Issue#2** – Defining The "Health" Of The River:

The focus here is to define the "health" of the river in terms of suitable habitat for salmon and other species. This comprises issues such as; Health of the Salmon Population, Salmon Migration, Health (Physical and Chemical) of the River and its Tributaries.

#### **Priority Issue #3** – Lack of Monitoring:

The key is to enhance the level of monitoring of all facets of physical/chemical/biological aspects of ground and surface waters to track changes in the river system. This will be especially relevant with climate change and forestry operations in the headwaters. DFO has conducted many aspects of monitoring in the past (water temperature, swim throughs, electro-fishing, smolt wheels and trap nets).

**Priority** 

#### **Issue #4** – Central Repository and Library:

There is a definite need for a central repository of all relevant water resources and salmon/trout information. It should be developed primarily in digital format as reports, as well as the GIS mapping system. All research permits should be shared with MSA for those working within the watershed to ensure no overlap of work and ensure research is focused on the highest priority issues. MSA should work with all stakeholder groups to ensure results from any and all scientific work is provided and stored in a central library for all to view.

**Priority** 

# **Issue #5** – Changing Climate:

There is a critical need to understand what the impacts of changing climate will be on the Northeast Margaree River system and its impact on salmon populations. Only by having ongoing monitoring of all critical aspects of our watershed will we be able to accurately identify the potential impact of climate change.

A link to the entire EXP report is here:

https://www.margareesalmon.ca/wp-content/uploads/EXP River Management.pdf



Over the past 5 years MSA has been working hard to address the priorities pulled together at our stakeholder session. It has been our guide and will continue to be relevant to our 3-5 year plans.

#### **Hydrology and the Matrix Report**

Understanding the hydrology of the Margaree River was one of our top priorities, especially changes to the main channel. In 2016 MSA interviewed two companies that specialised in Fluvial Geomorphology: Parish (Fredericton) and Stantec (Dartmouth). We decided on Parish led by Ron Jenkins. This group then joined the Matrix engineering group from Calgary. Nigel and Amber were the specialists sent to complete the "Rapid Geomorphic Assessment" of 38 kms of the Margaree River's Northeast Branch.

A geomorphic assessment (the Matrix study) was completed in June of 2017. The river was broken into 28 reaches in four sections from Forest Glen Brook to Tidal Pool where flood events have caused many erosion problems. As a result of the study, a priority list has been created identifying the most critical reaches. Since many areas are in a "transitional" state, we have to be very careful where main channel remediation is done. Restoration should focus on reducing channel width and controlling sediment input and plans have to be drawn up by engineers qualified in hydrology. Understanding why most main channel remediation attempts for the Margaree River have failed is of vital importance so we don't repeat the same errors. Many major projects were completed with good intentions, only to have the river undo structures that had been placed. The Margaree River is not unique when it comes to these failures. Dr. Natalie Angelopolous's (Fisheries Scientist, Hull International Fisheries Institute) studies, from rivers around the world, show that the Margaree River is not unique since the majority of main-channel river alterations fail. Strict demands must be met before permits are obtained from the Department of the Environment to do any main channel work on any river, not just the Margaree River. Eleven reaches have a High Priority rating, three of which should be considered as areas to focus initial restoration activities. Moving forward, selecting sites for restoration based on priority, access, protection of infrastructure and cost/funding/value is required. Once sites have been selected, a geomorphic assessment and topographical survey should be completed and a design developed based on the survey and assessment data acquired.

Here is a link to the Matrix study of 38 kilometres of the Northeast Margaree River.. <a href="https://www.margareesalmon.ca/wp-content/uploads//Margaree River Geomorphic Assessment 2017.pdf">https://www.margareesalmon.ca/wp-content/uploads//Margaree River Geomorphic Assessment 2017.pdf</a>

Matrix Solutions' final report came with many cautions and some fundamental recommendations, one of which was to always look to do work near the top of the river due to the downstream effects caused by major projects.

One of the problem areas identified in the Margaree River Watershed was a major "rock berm" built in the 90's that is beginning to fail. MSA launched our first major project after the development of our priority list by addressing this issue. Advice from experts was gathered and engineering design was arranged. The Sanctuary Project from planning to completion and final inspection by the Department of Environment took 2 years.



Several salmon are holding in this pool, perhaps one of the best pools on the entire river. Located in the area designated as the Sanctuary of the Margaree Watershed, the salmon are safe, after swimming 35 kilometers up river.



Almost 1700 tons of huge rock was required for this repair.







The finishing touches of sowing indigenous grass seed and hay mulching were just completed by the MSA. provided by Port Hawkesbury Pulp and Paper



Breakwater pool Berm Repair completed Sept 27, 2019-aerial photo of completed project (by Paul MacNeil)

NEXT STEPS: High water events seem to be occurring more frequently, we have to continue to look to the science/experience being developed around the world on engineered solutions on how habitat can be protected/enhanced. We know our river is very much in flux as was identified by the Matrix Study, we must monitor and document all changes we identify annually.

# Assessing the Health of our Watershed: The CABIN Study

Resources (UINR), led by Emma Garden, assisted by Greg Lovely and Nicholas Baker of MSA. The Canadian Aquatic Biomonitoring Program (CABIN) study assessed stream health throughout the Margaree watershed specifically in the Northeast Branch in 2016. Juvenile salmon spend up to four years in the Margaree until they are ready to migrate to sea. It is during this phase where the river and its tributaries play a critical role in the life cycle of Atlantic salmon. Optimal stream quality is essential for the preservation of salmon and must be considered in order to fully understand salmon habitat in the Margaree for future protection efforts. CABIN utilises a group of organisms known as benthic macroinvertebrates as indicators to reflect the pollution 'history' of a river. The CABIN protocol incorporates water quality, substrate characteristics and channel dimensions making it an integrative method of ecological, chemical, and physical parameters for assessing streams for juvenile Atlantic salmon habitat. UINR and MSA have a mutual interest in protection of salmon and collaborated on this study. Sampling locations were selected with the goal of capturing stream health on a watershed scale while also targeting tributaries of interest to the MSA. Sites assessed in this report include the Northeast Branch at Big Intervale Lodge, Ingram's Brook, Lake O'Law Brook, Big Brook, Gallant's

River and the South West Branch at Mount Pleasant Brook. Overall, there was some indication of possible water quality and/or physical habitat stressors at all locations. However, presence of these indicators does not necessarily imply impairment or severe habitat degradation. Based on the integrated assessment of CABIN sampling presented in this report, stream health was determined to be very good to excellent with some indication of stressors at all sites. Every five years or so we should revisit our CABIN study to ensure these values are not increasing as they are a good indicator of pollution.



A link to the study results is here:

https://www.margareesalmon.ca/wp-content/uploads/margaree watershed stream health report.pdf

# **Eastern Pearl Mussel Study**

Another aspect of the health of our watershed dealt with a unique species of mussels. Mussels are an indicator species of water quality. They play an important role in rivers by filtering water constantly as they breathe and feed. They improve water quality by filtering out bacteria, algae and pollutants. A study of Eastern Pearl Mussels and their symbiotic relationship with salmon could prove the health of the river system. Kellie White of Cape Breton University (CBU) and MSA representatives Paul MacNeil, Greg Lovely and Leonard Forsyth, through such a study, have demonstrated that the Margaree is a healthy river system. These MSA representatives accompanied Kellie White to four different locations on the Margaree River to try to locate Pearl Mussels. Mussels were located at pools. The grid search began the next morning yielding an abundance of mussels in a short period of time. Kellie was satisfied and genetic samples were taken from the counted, measured and age determined mussels. Knowing that a healthy population of Eastern Pearl mussels usually goes hand in hand with a healthy salmon population, we were ecstatic to find out that the Margaree River has an extremely healthy population of Eastern Pearl mussels of all age groups. One feature of the pearl mussel life cycle is their reliance on salmon and/or trout parr for the first overwinter stage. In summer the adult mussels "spat" or release fertile larvae mussels into the water. These larvae have to attach to the gills of a salmon or trout almost

immediately. They become attached to the gills and in the spring/early summer of the following year can be seen by the naked eye. In the summer of that year the surviving glochidia drop off the fish gills and settle into the river substrate for the next stage of their life, thus enhancing the health of that river system. Other Universities around the world now want to come to the Margaree and see for themselves our robust population of Eastern Pearl mussels as most other rivers around the world have threatened or extinct populations of these special mussels.



Kellie White (CBU) displaying the many different age classes of Eastern Pearl Mussels found in the Margaree River

https://docs.google.com/document/d/1Px16RRthNL3O4eAuCk3zI7-tXLOR6R633bLKe\_6EBdw/edit?usp=sharing\_eil&ts=5be2d36a

**Next Steps:** Water quality will have to be managed locally and will require us to periodically revisit the studies completed.

# Monitoring

An additional task linked to our prioritised list was to monitor and quantify the numbers of adult and juvenile salmon and trout in the Margaree River. This is done in many forms: electrofishing par and fry in the tributaries of the Margaree River, trapnet and smolt wheel counting structures, marked kelt recapture, fishing licence stub reporting, log books and information gathered during Atlantic Salmon broodstock collection by the Margaree Fish Hatchery.



Annual DFO marked kelt recapture project: volunteers fish with floating lines and barbless hooks Pictured are Leonard Forsyth and Joel Robinson



A tagged fish caught by Alan Mills at the Dollar Pool on Sept 25, 2020. He describes it as "one of the most powerful fish he's ever hooked". He estimated its weight at 20 lbs. Jamie Vallis, manager of the Margaree Fish Hatchery, was sent the tag info and reports: "this female fish was tagged at the hatchery on Nov 1, 2018. She was 75 cm long and weighed 4.04 kg at that time. We spawned 8536 eggs from her."

Margaree River has been a key river for monitoring by DFO for many years, annual swim throughs, electro-fishing, trapnets, smolt wheels and kelp recovery have been tools used in our watershed for many years. Consistency has been especially difficult over the past few years due to COVID. Monitoring temperature in the Margaree River is another priority element to help protect salmon and

trout populations. Temperature monitoring has been most consistent but with only one remote station we are looking for better results covering more portions of the river. In the past few years the ever increasing summer water

temperature has caused concern to many members of the salmon fishing community, in other regions river closure is a normal occurrence each summer during the fishing season.

This led to the development of a Warm Water Protocol for the Margaree River, in the first four years of the protocol's existence, the river has been closed due to warm water twice. Some years there are approximately 40 temperature gauges in the Margaree watershed, along with a DFO remotely-accessed Vemco temperature monitor at the weather station beside the Big MacDaniel pool. For more information on the MSA Warm Water Protocol, please follow this link:

https://www.margareesalmon.ca/wp-content/uploads/2019 Margaree Warm Water Protocol.pdf

**Next steps:** We must continue to monitor water temperatures in our watershed. Development of a *PERMANENT* plan to be managed and monitored by MSA is critical. Sharing the data collected and posting for all to see will be our goal.

### **Central Repository and Library**

Since 2019 we have been supporting NSSA in gathering as much data as can be found from the many partners that have completed studies in the Margaree watershed. This information is being loaded in a database for all interested parties to acces s.We are committed to working with Atlantic Datastream whose mission is to "promote knowledge sharing across watersheds and advance collaborative decision making so our waters remain healthy for generations to come." Atlantic DataStream is an open access platform for sharing information on freshwater health. It currently allows users to access, visualise, and download full water quality datasets collected by monitoring groups from Newfoundland and Labrador, New Brunswick, Prince Edward Island and Nova Scotia.

Next Steps:Continue to actively participate with this data collection plan in collaboration with other interested parties.

## Impact of climate change

Water temperatures, high water events and ongoing monitoring of our water quality will help us identify what are the critical stressors on fish populations in our watershed.

Next Steps: We must partner with organisations/universities to promote scientific studies in our watershed to help us document what is happening.



#### Our Future Strategy

Where do we go from here? Our future will be based on our past successes and our partnerships with key stakeholders of the Margaree River. We are faced with many challenges as a volunteer organisation. We have managed to deliver some very valuable projects and studies over the past 5 years. We needed to pull together a more long term strategy and this is where it starts.

We plan to maintain and improve the following successful programs:

Habitat remediation and improvement in our tributaries:

This activity has been the backbone of our work for the past five to ten years. We hire local people to work with our partners (NSSA, Strathlorne Nursery and Port Hawkesbury Paper) and complete annual inspections of these "nurseries" to ensure habitat is conducive to maximum productivity for our salmon and trout species. In the last few years we've added "riparian planting" to our planned workload. Our strategy moving forward is to take "willow" cuttings twice a year and plant them in early summer and fall to help deter erosion along the river. This planting will be supplemented through the generosity of our partners at Port Hawkesbury Paper and Strathlorne Nursery.

We must ensure data is maintained and managed to better analyse this important portion of our strategy, we want to work with partners to develop and maintain a DATABASE for this critical activity. This data should capture and record the results of our annual inspections and repairs. By having a database that captures the effect of our habitat remediation actions we can clearly identify the effectiveness of our actions and help plan future projects.

**Hatchery Operations:** MSA has always been a great supporter of hatchery operations in Margaree, assisting with organising volunteers to help local and provincial management deliver the high quality results we've come to expect will be one of our priorities moving forward. We strongly believe that salmon stocks in our watershed would not be where they are today without the hatchery operations on the Margaree River.

**Supporting Science:** No matter where the idea comes from, MSA supports science conducted in our watershed. Whether it be Pearl Mussels, water quality, water temperature monitoring, spring kelt capture, tagging, electro-fishing, smolt wheel, salmon trap and CABIN, we want to be involved. Our partners include Cape Breton University, Dalhousie University, NSSA,DFO, UINR, UPEI and others.

Our priority to have all data from science located in a "library" for all to see is only going to happen if we are involved. We also have projects we feel must be addressed in the future and plan to gather support to allow us to tackle:

- 1) Smallmouth bass range in our watershed
- 2) Identification of "cool water" refuges along the Margaree River system.
- 3) Tagging of kelts captured to provide additional information about our salmon stocks

**Focus on "Engineered Solutions":** Our Berm project completed in 2018 demonstrated that if we followed proper process we can complete major restoration work in the watershed. These projects must be completed after thorough investigation and include recommendations from specialists and engineered design. In 2021, we initiated four assessments and completed a project on our most important tributary: Lake O'Law Brook. Moving forward our strategy will follow this process and in so doing further improve the relationships with critical partners to our watershed (NSSA, DFO, Dept of Transportation and Environment, Municipality of the County of Inverness and local landowners).

Collaboration with other river associations and groups engaged in helping maintain and improve habitat for the salmon and trout: We have had many opportunities to work with the Cheticamp River Association, Inverness South Anglers Association, Nova Scotia Salmon Association, Wild Salmon Unlimited, UINR, Margaree Lake Ainslie Heritage River Association and other similar

organisations and associations. We will help identify opportunities for the groups to cooperate and share best practises to better position all of us for success. Sharing information and resources is extremely important. Climate change will have a significant impact on *ALL* salmon populations. Working collaboratively will be critical to our success.

The Margaree Salmon Association strives to "Conserve, Protect and Enhance". As we move forward, we knowingly add "Educate and Collaborate" with humble respect to those that have established a foundation for us to build upon. Recognizing the value of our

partners, the Mi'kmaq community and the residents and landowners of the Margaree watershed--true stewards of the river--we endeavour to foster a healthy river system for generations.



As partners of previous and ongoing projects initiated by the Margaree Salmon Association, we proudly support the *Margaree River Collaborative Watershed Management Plan.* 

We are committed to continued collaboration with the Margaree Salmon Association to further conserve, protect and enhance the Margaree River

Watershed and look forward to future cooperative efforts to attain our common goals.

Strathlorne Forest Nursery
Municipality of the County of Inverness
Port Hawkesbury Paper
Nova Scotia Salmon Association
Unama'ki Institute of Natural Resources
Atlantic Salmon Conservation Foundation