BBEMA

This management plan will detail work being done to assist Atlantic salmon within the Bedeque Bay Watershed and focus on outcomes for the future

Bedeque Bay Atlantic Salmon Management Plan

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Foreword

In recent years BBEMA has been taking additional action to enhance and restore fish habitat within the Bedeque Bay Watershed with a focus on the Dunk river, the Wilmot river and the Bradshaw river. It has been suggested by funders that we write a comprehensive management plan outlining the work that has been completed and selecting goals to work toward in the future. In this management plan we will create outlooks for the three main rivers in the Bedeque Bay Watershed mentioned above, creating actionable items for each as well as highlighting provincial policies that we as a group might be able to influence for the protection of these unique habitats. The decline in Atlantic salmon populations worldwide is not fully understood but many believe that it is linked to climate change and that there is an issue with Atlantic salmon not returning from overwinter when they are at sea. This management manual will allow future BBEMA staff review that work that has been completed by BBEMA as to ensure that the organization has consistency even in the event of staff turnover.

History of Atlantic Salmon in the Bedeque Bay

Atlantic Salmon were once found in most streams on Prince Edward Island but in recent decades they have been relegated to only a few streams in which they are naturally supported. The three main streams in the Bedeque Bay Watershed have been identified as having naturally occurring Atlantic salmon spawning rivers and as such they contain the ability to support Atlantic salmon. Since 2016 BBEMA staff have been conducting annual Redd surveys in the fall to determine spawning locations and spawning times for Atlantic salmon. In addition to this staff maintain a fish trap in the Scales Pond fish ladder to monitor fish movement upstream throughout the year. Through this we have found evidence of natural spawning on the Dunk and Wilmot rivers, which seems to fluctuate little between years. Although the number of spawning locations of Atlantic salmon are low and localized, we believe that the population is maintaining itself and through additional restoration and protecting efforts the population can be increased overtime.

Since 2016 BBEMA staff have been clearing stream obstructions, installing in stream structures, reducing the amount of sedimentation in-stream and reducing the level of sediment entering the stream through riparian enhancement and restoration efforts. All the rivers have been monitored for water quality, first through our science linkage program in 2012 and then through a more comprehensive water quality monitoring program in 2015 onward, focusing on temp and using a multi parameter YSI to gain insight of where the watersheds water quality stands. Additionally, seasonal E. coli and coliform samples are collected and monitored. BBEMA staff have conducted CABIN sampling on the Dunk, Wilmot and Bradshaw rivers to determine their composition and macroinvertebrate populations. Twenty-two HOBO dataloggers are deployed throughout the watershed annually for 7 - 9 months to gather temperature data every few hours in order to monitor “hotspots” in the watershed.

Dunk River

The Dunk river has been the center focus of BBEMA as it is not only the largest stream in the watershed but also because it has the highest capacity to support Atlantic salmon due to its high flow rate, low temperatures and abundant potential habitat. Historically there were Atlantic Salmon found in both the upper and lower sections of the river, but since 2017 we have found little evidence that Atlantic salmon are going past Scales Pond into the upper portions of the Dunk River to spawn. It is believed by BBEMA staff that there is only spawning below Scales pond on the main branch and some of the larger tributaries such as the South West Brook and North Brook. We are not discounting that Atlantic salmon could spawn in the headwaters of the Dunk river, but there is little evidence of this as we have yet to reach headwaters with redd survey efforts. Since 2016 BBEMA staff have cleared the main branch of the Dunk river from the estuary up to the Dixon road in Breadalbane roughly 25kms which is maintained for fish passage, as well as there have been 5 wing deflectors installed, 1 large stone triangle deflector installed, 3 wing deflectors repaired, and 2 deteriorated gabion deflectors removed. Staff have installed 50 in-stream cover structures underwater, 1 digger log, 1 extended bank cover, multiple pinch points, log jams and hundreds of brush-mats. Staff have also planted 20000 trees along the Dunk River in riparian and upland habitats to mitigate soil erosion and water runoff. Staff removed 15 beaver dams and installed one beaver baffler to allow fish passage while retaining the pool created by the beaver dam. BBEMA staff have also placed boulder clusters to alter water flow, shift sediment and provide natural fish cover.

Wilmot River

The Wilmot river is the second largest stream in the Bedeque Bay watershed, this stream has also been progressively cleared since 2017 from the estuary into the headwater areas. In 2019 hurricane Dorian undermined these efforts with major wind fell areas next to the stream, leading to large woody debris falling across the stream which may lead to new blockages forming. The estuary of the Wilmot river has been severely degraded in the past four decades leading to reduced flushing capacity and infilling/shallowing. Staff have placed a hundred brush-mats along the rivers reach, planted 10000 trees in the riparian zone and upland habitat, completed shoreline armouring in the tidal region, placed a digger log, placed sunken cover in the river and in Arseneault's Pond and created pinch points using logs.

Bradshaw River

This is the smallest stream that will be addressed in this management plan. This system is the least impacted of the three but has major fish passage issues. There is also little data outside water quality monitoring, HOBO temperature monitoring and CABIN sampling that has been collected on this stream since 2010. The Bradshaw River has been cleared from the estuary to above Middleton road in 2017 but little more has been done on this system due to the bridge located at route 10. As of 2019 the province replaced the bridge due to safety concerns. A natural pool system was installed allowing access to the higher reaches of the stream for fish. In addition to this there was also a massive beaver dam located above Middleton road, but this failed over winter in 2018 and BBEMA staff cleared the stream directly below this site in the summer of 2018.

Redd Surveys

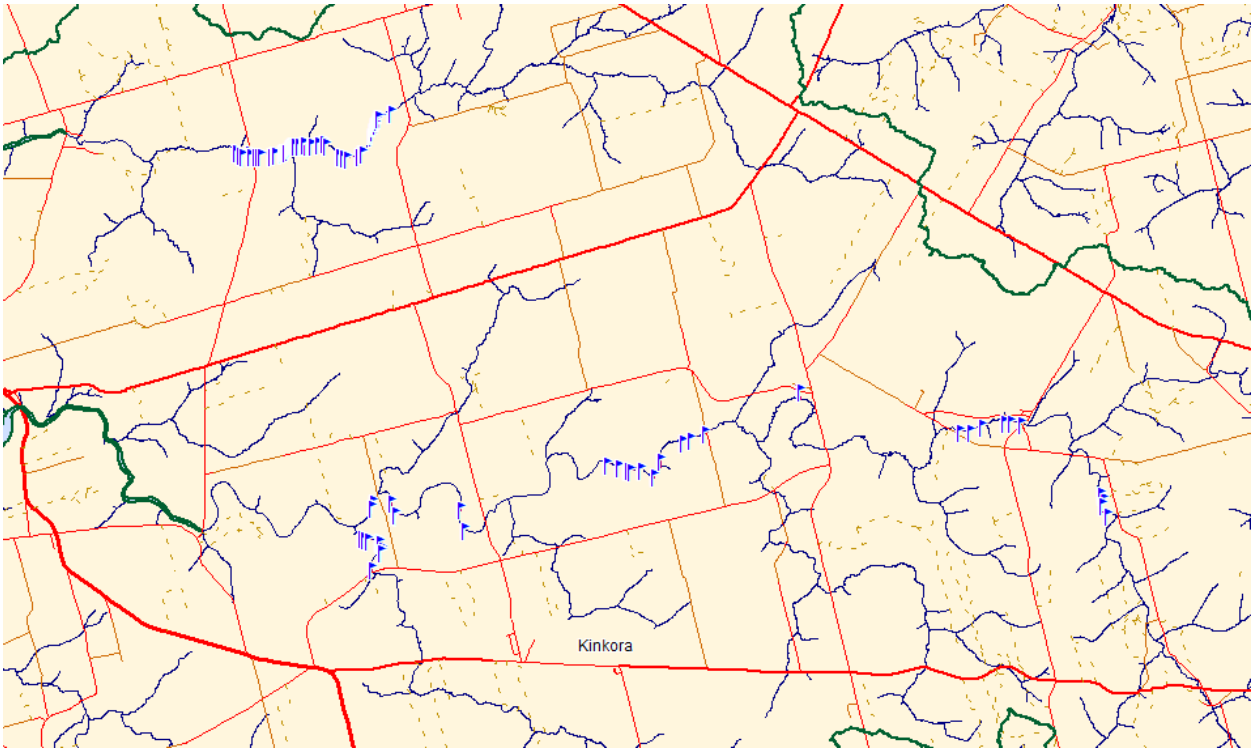

Figure 1: Redd survey counts from 2018

Figure 1 depicts the tallied count of up to 26 salmon redds on the Dunk River and 21 redds on the Wilmot. In 2017 counts were higher on the Dunk with 78 and lower on the Wilmot. There is no recent data on redds being found on the Bradshaw, assumedly due to the faulty bridge on Route 10 impeding passage to spawning grounds. It is believed that because the Bradshaw river shares the estuary with the Dunk river that there is still spawning activity, but staff have yet to locate the area in which it is taking place.

Long-Term Goal

In this section we will be outlining the long-term goals for Bedeque Bay Environmental Management Association to ensure continuity in the work that is being done, although this work is funding based it is important for BBEMA to pursue stream enhancement efforts and continually work towards these goals. After 5 years it is suggested that this management plan be reassessed and updated to reflect the work that has been completed and set new long-term goals, as well as provide new data on the state of Atlantic Salmon populations within the watershed. It is also strongly believed that other fish populations should be tracked to better understand the entire ecosystem and how these species are interacting with the Atlantic Salmon.

Stream enhancement will be done as per BBEMA guidelines, emphasising habitat creation and maintenance through stream clearing and structure building to best support all aquatic species. Clearing

will be done in such a way as not all material is removed but stream flow is maintained, large woody debris will be left in place and obstructions will only be removed if they are causing a complete blockage for fish passage. Riparian zone planting is important but many of the sediment inputs are coming from upland habitat and it is believed that planting should first be done to stop sedimentation at its source rather than in the riparian zone.

Many believe that there should be no sediment in the stream, however, BBEMA staff believe that this provides vital habitat for some aquatic species, including American eels, so some areas will be maintained at a slower flow rate to ensure viable habitat through sedimentation. This should have little to no effect on the Atlantic salmon population or their habitat. It is also believed that stronger provincial regulations are required on land use, the water act, and enforcement if we are to best repair and restore the streams in the Bedeque Bay area back to a semi-natural state. In the document "A Renewed Conservation Strategy for Atlantic Salmon in Prince Edward Island" by Daryl Guignion et al. it was suggested that "Riparian areas need be considered high priority for conservation and protection. There are various tools for protecting riparian areas, but a protected 60 metre zone should be the established target" [1] which we believe would be more then sufficient, but without provincial regulations stating a minimum of 60M we will not be able to enhance beyond the current 15M buffer as it would greatly impact landowners and agriculture in the area.

Dunk River

In 2019 BBEMA staff planted 3600 trees and shrubs, cleared 4.3km of stream on the Dunk River (and re-cleared this section after Hurricane Dorian) as well as installed two 90ft single wing deflectors in the estuary below the Steel Bridge (Mill Rd/Dunk River Rd) one upstream and one downstream of a similar structure that was installed in 2017. These new deflectors (indicated in Figure 2) were built to be comparable to the current single wing deflector in the lower Dunk River.

Figure 2: Deflector sites on the lower Dunk River

The purpose of these deflectors will be to redirect water back to the main channel and helping create depth within the channel and creating pool habitat at the head of tide for fish migrating upstream.

Although not directly involved BBEMA staff will be assisting the Department of Transport in the replacement of the bridge located at the intersection of the Drummond Rd. and Scales Pond Rd. as well as the remediation work taking place in the Scales Pond Roundabout to ensure precautions are taken as to not overly impact the stream. In the spring of 2019, the Scales Pond Road Roundabout caused significant erosion and sedimentation into the Dunk River as water flow was improperly modified around the site and few precautions were taken to prevent runoff. This issue was addressed with the Department of Transportation and was addressed during the summer of 2019.

BBEMA also plans to maintain a canoeable stream, from Scales Pond to the estuary, to allow for more recreational use year-round. This will require the removal of large debris that has completely blocked the stream. This debris will be removed to allow access, however, most large woody debris which does not completely impede the stream will be left in place for cover habitat.

Water quality and temperature monitoring will be continued to ensure that enhancement activities are not having any negative impacts on the stream and to monitor for detrimental land use activities which may require staff attention. Populations densities should be completed annually as well as redd surveys in order to determine fish populations and high value habitat. This information can then be used to target areas for enhancement activities to improve spawning activity, juvenile rearing habitat, feeding habitat and cover/hiding habitat. A major part of this will need to include addressing stream bottom embeddedness in the Dunk river.

The fish trap located at Scales pond should continue to be monitored for fish movement from the lower Dunk river into the Upper River systems. This will allow for more comprehensive information on the movement of fish throughout the system. Fish tagging systems should be considered for the Scales pond fish ladder as it provides an ideal area to monitor fish movement through the choke point of the fish ladder.

By 2025 BBEMA staff feel it necessary to build additional spawning areas for Atlantic salmon in order to expand the natural spawning areas and range of spawning within the Dunk River. This can be done through the installation of spawning beds. BBEMA staff also plan to clear the main branches of the Dunk river up to the headlands and the primary tributaries which have shown high value spawning habitat.

BBEMA staff will also look to install structures designed to maintain the stream and restore natural pool, riffle, run habitat. This work will also look to address issues with hung culverts that impede fish passage into suitable spawning habitat. Enhancements will be completed on slower tributaries for baitfish species such as smelt and gaspereau which are viewed as important prey cover and a feeding species for the Atlantic salmon. Tagging of fish should be completed to see how they are moving through the system; this will help to build a better understanding of preferred habitat within the watershed.

Over the next 10 years BBEMA staff will work to convert conventional grass headlands and grass waterways into pollinator areas. This will allow for greater sediment capture capacity on agriculture sites. Large artificial log jams will be installed to provide cover habitat and the staff will begin to look at re-establishing the estuary to better facilitate fish movement and provide cover and feeding habitat in brackish waters. Headwaters will be assessed via spring surveys.

Over the next 50 years BBEMA will work toward a 60M buffer zone along the entirety of the Dunk River. BBEMA will also have the entire Dunk river cleared and returned to a semi-natural state. The former dam site in Breadalbane will be restored to better allow fish passage to all areas of the stream system.

Wilmot River

Only maintenance was completed on the Wilmot River in 2019 as more focus was placed on the Dunk river. Water quality monitoring, temperature monitoring and Redd surveys were completed.

Over the next 5 years the main branch will be cleared to the headlands and the main tributaries will be cleared of obstructions. Pinch points and structures will be placed where needed. Spawning beds will be installed, and embedded natural spawning sites will be enhanced.

Over the next 10 years erosion issues from Arsenault's pond will be addressed by moving the outlet and better fish access will be created at the outlet of Marchbank's pond. Sediment in springs will be cleared to providing better ground water flow and more consistent temperatures. Headwaters will be assessed. Work will be done in the estuary to address the shallowing of the Wilmot river basin and to restore the salt marsh, so it once again works to help buffer the rest of the stream.

Over the next 50 years BBEMA will work toward a 60M buffer zone along the entirety of the Wilmot River. BBEMA will also have the entire Wilmot river cleared and returned to a semi-natural state. Sediment within the systems ponds will be reduced and the estuary/salt marsh will be restored.

Bradshaw River

No maintenance was completed on the Bradshaw River in 2019. After the bridge replacement was completed the stream will be reassessed in 2020 and stream enhancement activities and maintenance will be completed. The Bradshaw river does have an abundance of beavers and the current Atlantic salmon population is unknown as little redd/density monitoring has been completed on this stream. Water quality monitoring and temperature monitoring was completed on this stream in 2019.

Over the next 5 years the main branch will be completely cleared as well as the primary tributaries. Redd surveys and density surveys will take place to determine fish populations in the Bradshaw River.

Over the next 10 years BBEMA will begin monitoring fish movement through the fish ladder at Affleck's pond using fish tagging equipment. Work will be done to remove the over abundance of sediment in Leard's Pond off Route 10. More complex structures will be installed where needed to create and maintain habitat, this includes cover structures. Headwaters will be assessed.

Over the next 50 years BBEMA will work toward a 60M buffer zone along the entirety of the Bradshaw River. BBEMA will restore Atlantic salmon into the Bradshaw through work to improve spawning, feeding and hiding habitat. Work will be done to repair damage to the Salt Marsh and estuary of the Bradshaw River.

Community Outreach and Education

BBEMA believes that community outreach and education are of vital importance for the survival of our organization as well as the health of the Bedeque Bay ecosystem. Our staff can change all they desire within their lifetime, but if there are not younger people to take up the mantle there will be no assurances that what is being done today will survive tomorrow. The following goals are not going to be given a timeline as they should be ongoing and always at the forefront of the organization.

As of 2019 BBEMA's board of directors are updating our central management plan, as part of this plan it is their intent to include the general public. Our organization will look to build projects that involve the angling community, this will ensure that those who have firsthand knowledge of the stream systems and how they are changing will be able to have their input heard and incorporated into future restoration and enhancement efforts by BBEMA.

BBEMA will continue to work with the Province of PEI, landowners and agricultural businesses to implement and further establish reasonable environmental and land use changes which will help to protect the Bedeque Bay watershed ecosystem as a whole; while not hindering local business to an extreme degree. This will include increasing the Buffer/Riparian Zone size, addressing hung culverts, reinforcing the water act, preventing excessive sedimentation from field runoff, improving drainage and runoff capture from roads, and creating better sediment capture systems for clay roads.

BBEMA staff will work to inform watershed residents, visitors and students island wide on the importance of healthy water, flourishing macroinvertebrate habitats and aquatic species health by working to provide education on environmental issues and problems facing Atlantic salmon.

BBEMA will strive to work with universities to further the research of environmental fields and seek to complete more self-published research on the Bedeque Bay Watershed with data that has been collected over time.

This document has been reviewed and approved by the Bedeque Bay Environmental Management Associations Executive Director and Board of Directors.

References

1. Daryl Guignion Connie Gaudet Rosanne MacFarlane, (2019) A Renewed Conservation Strategy for Atlantic Salmon in Prince Edward Island http://www.salmonconservation.ca/wp-content/uploads/2019/04/Atlantic-Salmon-Strategy-April-2019.pdf