



KENNEBECASIS WATERSHED RESTORATION COMMITTEE

Restoration Site Portfolio

1995-2020





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Trout Creek Restoration Site Bio

1. DeForest Reach - Lanigan Site (45.68263, -65.37463)

In 2013, Chris Lanigan approached the KWRC after purchasing property along Trout Creek with concerns about his access point to the property. In 2014, landowners from DeForest Road had similar concerns and the KWRC hosted a meeting of landowners along the reach, and 3 sites were identified as concerns for aquatic habitat and sustainable land use. The Lanigan site possessed a 45-metre long bank ranging from 1.5-2 metres high that was severely eroding and introducing sediments into the river. The KWRC proposed a rip rap approach due to limited available space; this approach was completed in conjunction with rock kickers to maintain habitat function and protect a deep pool at the site.

Funding for the project came from the Atlantic Salmon Conservation Foundation, Recreational Fisheries Conservation Program, NB Wildlife Trust Fund, CN EcoConnexions, and Tree Canada.



The Lanigan site as it looked in the spring of 2015.



During the summer of 2015, rock was placed by an excavator.



Trout Creek Restoration Site Bio

2. DeForest Reach – Robert Smith Site (45.68386, -65.37893)

From a planning perspective, this site was challenging due to the presence of a wetland adjacent to the site. This required the KWRC to amend the restoration site plan to attain proper permitting and landowner support. It should be noted that the KWRC is also trying to facilitate the relocation of a public – non-maintained road that is adjacent to the site so that it is out of the flood plain.

Rock toe armoring, fascine bundles, and geo-roll installation were utilized to stabilize the degrading stream bank while also protecting the integrity of the wetland. This effort will reduce the chance that the river will flow onto the road creating land-use conflicts. KWRC staff also performed some willow staking along the gravel bar below the main site to further separate the creek channel from the roadway. Funding for the project came from the Atlantic Salmon Conservation Foundation, Recreational Fisheries Conservation Program, NB Wildlife Trust Fund, CN EcoConnexions, and Tree Canada.





Trout Creek Restoration Site Bio

3. DeForest Reach – Gary Erb & Hugh Doherty Site (45.68324, -65.38275')

This site possessed a long and extremely high bank. The Trout Creek was threatening two septic systems and thus the bank had to be stabilized. By using rock armoring the slope could be adjusted to 2:1 and thus provide enough room for the septic systems in question. The armoring will also result in a reduction of sediment transfer into the water and this will serve to enhance breeding habitat for salmonids in the system. The eroding bank was over 3 metres high in some spots which meant large rock material was needed. The work took approximately 3 days from the first rock delivery to when grass seed was spread. Tree planting took place in the fall of 2015 when caliper trees were planted.

Funding for the project came from the Atlantic Salmon Conservation Foundation, Recreational Fisheries Conservation Program, NB Wildlife Trust Fund, CN EcoConnexions, and Tree Canada.

Before



After





Trout Creek Restoration Site Bio

4. Trout Creek Planting Site – Lisa McLean (45.66693, -65.34685)

The landowner at this property reached out to the KWRC in 2017, concerned about the severe bank erosion they were encountering on their property. The Bank is extremely high and steep along their stretch of Trout Creek. We completed a site assessment and determined that planting willow would be our best option. Our field crew staked a total of 537 willow stakes along the toe of the 80-metre-long streambank. We plan to revisit the site in the years to come to spot plant as needed until the vegetation takes.





Trout Creek Restoration Site Bio

5. Maxwell Drive Riparian Enhancement Site (45.72755, -65.51154)

As part of our 2015 *Connecting Riparian Communities Project*, funded in part by CN EcoConnexions, the KWRC planted trees on property of the Town of Sussex. The property along Trout Creek also borders houses and thus caliper and potted stock trees were planted; this will reduce the likelihood of them being mowed over. All landowners were notified of the plan and no letters of concern were received.

Students from Sussex Middle School assisted in the planting effort and we hosted an education event at the site to kick off our 2015 restoration season. In total, there were 84 trees planted at the site which is approximately 145 metres long. A setback of 8 metres was established and this should serve to establish the needed vegetated riparian area and protect homes from future flooding impacts.



CN EcoConnexions and Sussex Middle School representatives dig in.



By August of 2015, the riparian setback had improved and most of the trees were growing successfully.



Trout Creek Restoration Site Bio

6. Walkerville Farms Restoration Site (45.6497, -65.49863)

The Kennebecasis Watershed Restoration Committee commenced this project in 2009 intending to restore the aquatic and riparian habitat for 1.4 kilometres of stream on a farm operated by Jim and Paul Walker. With funding from Potash Corp, we were able to plant over 8500 trees along the degraded riparian area, stabilize more than 200 metres of eroding stream bank, install more than 12 rock groynes to improve fish habitat, install 5 stabilized fording sites, and erect more than 2 kilometres of 3-strand barbed wire fencing.

The final tree for this site was planted on October 5, 2011, during an open house event that acknowledged the partners involved in this large undertaking. Ongoing stream temperature monitoring is taking place to evaluate the success of the site.

Before



After





Trout Creek Restoration Site Bio

7. Lower Ward's Creek - Magnolia Avenue Restoration Site (45.71101, -65.50474)

This project was carried out through the summer of 2011 with the final touches being done that same fall. The objective of this project was to stabilize a severely eroding bank in order to protect the infrastructure within the Town of Sussex, including Magnolia Avenue. Approximately 80 metres of stream bank was stabilized which will reduce sediment input from erosion, as well as chemical input from the roadway. Six rock groynes were installed to improve fish habitat and slow the stream flow during high water events. To further enhance the site, a number of willows, oak, cherry, maple, and pine trees were planted. To prevent negative impacts to the stream during the project, our team used a handmade floating silt curtain, which was both cost-effective and effective at containing the sediment.





Trout Creek Restoration Site Bio

8. Lower Ward's Creek - McGibbon Farm Restoration Site (45.71341, -65.5008)

With work previously being completed upstream of this farm site, it was important that the KWRC also work to protect and enhance this farm site. With a long and severely eroding stream bank that has been on our priority list for some time, it was rewarding to complete this site in 2011. The farmer had already been fencing his cattle away from this stream bank but with available resources, the KWRC stabilized a 95m section of stream bank, installed 5 rock groynes to improve fish habitat, and planted several trees to improve site biodiversity and improve riparian zone health. During our fish rescue efforts, before construction, staff discovered a burbot. This was the first time it had been seen in Ward's Creek.





Trout Creek Restoration Site Bio

9. Baird's Plaza Restoration Site (45.7243, -65.50636)

In 2008, the KWRC partnered with the NB Department of Transportation stabilized the stream bank and installed a rock sill. It was also decided that caliper trees would be planted along with some one-gallon potted stock, due to the high visibility of the site and the adjacent land-use. Maple, ash, and pine have been planted here. One year after the work was completed, the very mobile Trout Creek shifted an entire gravel bar, so future projects may be planned for this site.





Trout Creek Restoration Site Bio

10. Bioengineering on Wards Creek: Celeste Site (45.68283, -65.37426)

This site was facing erosion issues and the landowner was concerned with loss of topsoil into Wards Creek. The bank was planted with willow seedlings and stakes in the summer of 2013 to decrease erosion. Beginning on September 16th 2013 the KWRC excavated the bank back to add rock armouring and willow stakes to the bank. A trench was dug in order to bury willow whips within placed rock and soil. The riparian area was then planted with a variety of tree species in order to establish some shade cover over the stream.

Before



During



After





Trout Creek Restoration Site Bio

11. Trout Creek Brownfield Floodplain Restoration Site (45.73303, -65.50894)

Originally a sewage treatment facility and aeration pond, this site was later then filled with scrap rock, asphalt, and concrete. To restore the site, the area had to be leveled and sloped to allow rainwater to run off smoothly into Trout Creek. Large rocks were placed at the toe of the slope in hope that this would create a drainage channel into Trout Creek. A variety of tree species were planted and a mulch trail and raised flower bed were added to the site to create a recreational area for residents. Many groups have volunteered their time to improve the quality of this site including Sussex Middle School, the University of New Brunswick's Environment and Natural Resources graduating class, and local Scouts groups.

Before



After





Trout Creek Restoration Site Bio

12. Shannon Farm Riparian Restoration & Ruffed Grouse Habitat Project (45.70688, -65.37868)

In 2013, a section of riparian zone along Shannon Brook was restored on Sam Shannon's farm in Waterford. Two kilometres of livestock fencing was installed and a variety of tree species were planted in the riparian area. Nose pumps were installed to give cattle access to drinking water from the stream. As part of our *Ruffed Grouse Habitat Project*, trembling aspen (*Populus tremuloides*) were planted and drumming logs were installed. Trembling aspen provide habitat and food for ruffed grouse. Drumming logs give ruffed grouse an area to attract a mate and mark their territory by drumming their wings on their breast.





Trout Creek Restoration Site Bio

13. Turkey Hollow ATV and Riparian Corridor Enhancement Site (45.65158, -65.29216)

In 2013, an ATV trail in Turkey Hollow was having flooding issues due to an ephemeral stream crossing the trail. Instead of the stream remaining in its channel, the water flowed down the trail. The stream was channelized and logs were placed to provide a barrier between the two. Bridges were built in three areas where the stream crosses the trail so that the channel can be re-established.

Before



After





Trout Creek Restoration Site Bio

14. Improving Industrial Riparian Areas: Brown's Paving (45.71653, -65.47936)

In 2014, the KWRC undertook this project in partnership with Brown's Paving to improve industrial riparian areas along the Trout Creek. The KWRC also hosted a workshop for the Brown's Paving employees about working responsibly near watercourses. Rock armouring was installed, and trees were re-planted to help stabilize the bank on their property which was being heavily eroded.





Trout Creek Restoration Site Bio

15. Improving Riparian Habitat Connectivity at Bluffhaven Farms (45.6927, -65.43015)

The KWRC began consultation with the landowner in 2013 regarding the restoration of an eroded bank. After the spring of 2014, the landowner lost a considerable amount of land when the stream broke its right bank and formed a new channel into an adjacent field. The KWRC decided to use rock armour to stabilize the 70-metre long bank and, instead of fixing the channel, let the stream run its new course, restoring the surrounding land. Staff planted 570 trees, 6 of which were caliper trees, as well as willow stakes. The design of the site has been created so that if there are any major floods, the water will come up and be negated by the slope of the bank.

Before



After





Trout Creek Restoration Site Bio

16. Chambers Settlement Rock Weir (45.6739, -65.32665')

This rock weir is located on a tributary to Trout Creek and was installed as part of our *Fish Passage Barrier Removal Project* in 2016. Before installation, the culvert had a perch of 22 centimetres which was restricting fish passage to viable habitat upstream of the culvert. After the rock weir was installed the perch was less than 8 centimetres. Fish passage was successfully improved through this effort and now an additional 950 metres of viable fish habitat is accessible to fish species.

Before



After





Trout Creek Restoration Site Bio

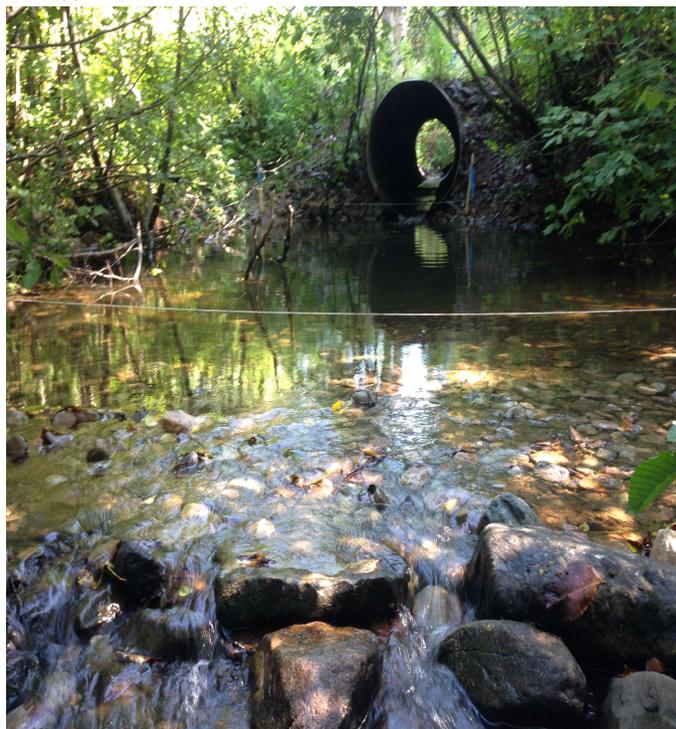
17. Carten Road Rock Weir (45.69267, -65.33689)

This rock weir is located on an un-named tributary to Cedar Camp Brook, which flows into Trout Creek in Waterford. This culvert was re-assessed on June 14th, 2017 and the perch on that day was 15 centimetres; although this is less than what was originally recorded in 2010, it still exceeds the recommended maximum perch of 10 centimetres. The rock weir was installed on August 11th, 2017; on that day the perch was at 18 centimetres. KWRC staff were able to decrease that perch to 6.5 centimetres and fish species will now be able to access an additional 2.7 kilometres of stream habitat year-round.

Before



After





Trout Creek Restoration Site Bio

18. Lower Ward's Creek - Bioengineering Restoration McGibbon Farm (45.71454, -65.50109)

In 2014, this site served as one of the locations of a pilot project using biodegradable geotextile products in our bank stabilization efforts. The streambank and farmland were eroding prior to restoration efforts. The geo-textile products allowed us to stabilize the stream bank while establishing a setback of just 7 – 8 metres; this was beneficial as the farmer wanted to maintain as much of his use as possible. Trees and shrubs were planted following the stabilization work. The total length of the restored streambank was 54 metres.

Funding was provided by ASCF, WTF, RFCPP, ETF, Walmart-Evergreen, and student subsidy programs.

Before



After





Trout Creek Restoration Site Bio

19. Lower Ward's Creek - Lower McGibbon Farm Restoration Site (45.71578, -65.50205 & 45.71599, -65.50261)

In 2017, Mr. John McGibbon approached the KWRC and proposed we establish another restoration site on his farm property. The section of streambank below our past bioengineering site on his property was experiencing a change in stream hydraulics, causing some erosion as the channel had split and created a new channel. We began tackling the erosion by planting a number of willow stakes near the toe of the bank. We installed a rock toe along the 35-metre-long bank, two geo-roll steps, and created brush layers using willow whips. On the upper and lower end of this bank, the banks were rock armoured as well. As the vegetation at this site matures it will serve to protect the bank as well. Through this stretch of Ward's Creek, the KWRC planted a total of 5013 willow (233 seedlings, 3780 stakes, 1000 whips), and 55 trees (18 red osier dogwood, 30 sugar maple, 2 balsam fir, 2 black spruce, 1 serviceberry, 2 red oak).

Below the newly stabilized bank, we created a 20-metre-long tree revetment, using wood from the site. Some of the wood was lying horizontal to the flow of the creek, impeding flow and/or directing flow towards an already eroding stream bank; others had to be removed to install the rock and bioengineering. The tree revetments will help protect and build-up the bank by catching sediments and other debris during high water events. This effort was done to protect the properties behind the revetment.

Bioengineering Work



Tree Revetment





Trout Creek Restoration Site Bio

20. Lower Ward's Creek – Trent White Rock Armour Restoration Site (45.71295, -65.50289)

The landowner at this location was continuously losing parts of his property to erosion each year during the spring freshet. This 22-metre-long bank was back-sloped to improve floodplain connectivity and rock armoured to prevent further erosion. Rock kickers were installed on the upper and lower end of the bank to mitigate possible changes in hydraulic flow. Trees and shrubs were planted within a 5 metre buffer zone along the bank; this included 6 serviceberry shrubs and 4 caliper stock red oak. 34 willow stakes were also planted along the toe of the bank.

Before



After





Trout Creek Restoration Site Bio

21. Lower Ward's Creek - John Malone Property (45.71005 -65.50468)

This restoration site began in 2014 with funding from Wal-Mart Evergreen, ASCF, RFCPP, and student subsidy programs. In cooperation with John Malone who built an access road into the site, the KWRC established a 30-metre riparian setback and utilize geo-rolls to stabilize a 90-metre-long eroding streambank and enhance an existing fording site. Many trees and shrubs were planted and bird habitat structures and a bee box were installed as well. The geo-rolls were utilized because access to the site for dump trucks was not feasible and we wanted to compare the installation methods at this site to the site on the McGibbon Farm.

Before



During



After





Trout Creek Restoration Site Bio

22. Lower Ward's Creek Fowler Avenue Restoration Site (45.71591, -65.50135)

This project was part of our 2014 *Habitat Connectivity Project* and the *Industrial Riparian Zone project*. The KWRC removed 3 dump truck loads of junk cars, scrap metal, etc. from the site, stabilized a degraded stream bank, installed bird boxes, and planted native trees and shrubs along the disturbed area.





Trout Creek Restoration Site Bio

23. Riparian Enhancement at McFarlane Road (45.69307, -65.39611)

The *Riparian Enhancement at McFarlane Road* project was completed in 2020 and was focused on stabilizing a stream bank along Shannon Brook, a tributary within the Trout Creek sub-watershed. The KWRC installed a rock toe and back-sloped the bank using an excavator, then used willow brush layers and erosion control blankets to prevent future erosion. Finally, our team planted approximately 50 willow stakes and four caliper stock trees at the site, to provide shade to the stream once the vegetation matures. This project stabilized 30 metres of previously eroding stream bank and enhanced an estimated 300 square metres of riparian zone.

Before



After





Smith's Creek Restoration Site Bio

24. McDermott Farm Riparian Zone Restoration Through Bioengineering (45.78668, -65.47771)

This site was first established in 2011 with a great deal of work being completed in the summer of 2012. Following up on previous work completed in the area, which included riparian planting and a stabilized fording site, the KWRC wanted to utilize bioengineering techniques to stabilize an eroding bank. The prescription for this site was wattle fencing along with planting the upper banks with various tree species. The wattle fencing was built using willows harvested from near the site. The length of the bank stabilized was 90 metres with an average bank height of 1.25 metres. In 2013, trees were planted on the top bank to establish a riparian area around the stream.

Before



After



**Close-up of
Wattle Fencing**





Smith's Creek Restoration Site Bio

25. Culvert and Alternate Watering System Installation and Riparian Zone Enhancement: Keohanlane Farms (45.79774, -65.47376)

A small tributary to the Smith's Creek was experiencing high levels of sediment deposition and lacked the natural habitat functions of a healthy stream. To improve grazing and farming conditions on this property, and to enhance riparian and aquatic habitat, the KWRC suggested several tasks be undertaken. Cattle fencing was installed to protect the riparian zone along the entire field and six nose pumps were installed to provide water access to the cattle. A degraded culvert was replaced to improve stream hydraulics and various trees were planted along the stream to improve bank stability and add site biodiversity. Future work on this site may be needed to improve natural flow conditions which are being hampered by high sediment deposition along this low gradient stream section.





Smith's Creek Restoration Site Bio

26. Kurihipi Station Crossing Enhancement Project (45.80088, -65.48108)

Poorly designed fording sites and crossings contribute greatly to habitat disruption across our watershed. When a landowner in the Upper Smith's Creek sub-watershed asked if the KWRC could aid in improving the conditions of his fording sites we agreed. A new culvert was installed on a first-order stream and a bridge was replaced on a second-order stream located on the farm. Partnering with Agriculture and Agri-Foods Canada allowed us to purchase the culvert and timber materials. The KWRC also worked with the Southern NB Wood Co-op allowing us to determine the requirements for the bridge.





Smith's Creek Restoration Site Bio

27. Smith's Creek Headwaters Enhancement Project – Justin Carll (45.86668, -65.35701)

A 1.8 kilometre stretch of eroding stream bank on two tributaries in the Smith's Creek Headwaters was identified on Justin Carll's property, during habitat assessment efforts in 2015. The stream flows from the road down through the cattle pasture and connects to the second tributary at the bottom of the pasture. The channel was deepening, causing the banks to steepen and prevent floodplain connectivity. There was a lack of vegetation and the lack of cattle restrictions to both tributaries, paired with high volumes of water during the spring runoff, was causing heavy erosion.

Fencing was erected along 1.1 kilometres of the tributaries, which established a 5-metre buffer on both banks of the tributaries through Carll's pasture. Rock armouring and rock toeing were installed throughout several locations along the stream through the pasture. Where rock toeing was installed, geo-rolls and fascine bundles were also used, and 5800 willow stakes were planted. In the future, we hope to see decreased stream temperatures as the shade cover increases with the growth of the newly planted vegetation. Vegetation planted along the 1.8 kilometre stretch included 894 willow seedlings, 827 tree seedlings, 175 potted stock trees, and 22 caliper stock trees. Four nose pumps were also installed to ensure cattle still had access to water.

Before



After



Nose Pumps





Smith's Creek Restoration Site Bio

28. Smith's Creek Headwaters Enhancement Project – Ken Carll (45.86233, -65.37026)

The tributary running through Ken Carll's property is one of the main tributaries that flow into Smith's Creek from Knightville. Many tributaries flow into this one, including the tributaries we previously restored, on his son Justin Carll's property. The 257-metre stretch that flows through Ken's property was badly eroded. The substrate is composed of mostly fine sediments and sand, which can cause problems for aquatic species when disturbed by cattle and high water events. The banks are low and the floodplain connectivity was sufficient, but the lack of vegetation and lack of cattle restriction to the stream was negatively impacting water quality.

The KWRC erected 514 metres of fencing to create a 5 metre buffer around the tributary on the property. Four nose pumps were installed to allow cattle to access water. The area was also heavily planted, which will aid in decreasing stream temperatures and filtering out fine sediments during high water events in the future. 939 willow seedlings were planted along the tributary, as well as 69 potted stock and 6 caliper stock trees.

Before



After



Nose Pumps





Smith's Creek Restoration Site Bio

29. McGregor Brook Rock Weir (45.77439, -65.53917)

This rock weir was installed as part of our *Fish Passage Barrier Removal Project* in 2017. It is located on the McGregor Brook, a main tributary to Smith's Creek. This perched culvert was identified in our 2010 culvert assessment effort and had a perch of 22 centimetres, restricting fish passage to viable habitat upstream of the culvert. After the rock weir was installed the perch was 3.5 centimetres. Fish passage was successfully improved through this effort and now an additional 1.7 kilometres of viable fish habitat is accessible to fish species.

Before



After





Smith's Creek Restoration Site Bio

30. Schiedel Farms Site (45.83583, -65.43089)

Rock sills aid in narrowing the stream and re-establishing the hydrology. The water flowing over the structure creates a waterfall effect, increasing the dissolved oxygen content of the water, creating pools, and helping to remove fine sediments that have been impacted into the stream's substrate. The KWRC installed rock sills on Schiedel Farms; these will contribute to the restoration of Smith Creek's natural habitat and hydrological pattern, while also increasing the dissolved oxygen in the water and reducing damage due to ice.





Smith's Creek Restoration Site Bio

31. Anderson Farm Site (45.82723, -65.44761)

Some of the banks on Smith's Creek needed fast action due to excessive erosion. Planting trees and fencing cattle out would not have helped these actively eroding sites. More direct actions such as installing riprap and back-sloping were necessary to stabilize the banks. Riprap is the armoring of a bank with blasted rock. The stream banks are back-sloped and blasted rock is placed with an excavator to create protection for the bank against water and ice. Riprap was installed at eight locations on Smith's Creek, protecting a total of 782 metres of streambank from further erosion, including at the Anderson Farm in 2000.





Smith's Creek Restoration Site Bio

32. Kuin Farm Site (45.84021, -65.42678)

Beginning in 2000, Kuin Farms was restored through tree planting and back-sloping. First, fencing was installed to protect the riparian zone from the impacts of livestock. The streambank was then back-sloped and a rock toe was placed at the bottom of the slope for added protection. Finally, the streambank was seeded to accelerate re-growth and trees were planted to offer future protection with their root systems. Re-establishing riparian vegetation helps to provide shade to the stream and to filter out sediments and excess nutrients.

A total of 5,500 seedlings and 450 large stock trees were planted, thanks to generous donations from J.D. Irving, Limited, Woodlands Division and the Department of Natural Resources and Energy. Approximately 63 metres of streambank was stabilized on the Kuin Farm.





Millstream River Restoration Site Bio

33. David Hayes Tree Revetment Site (45.75538, -65.6124)

Partnering with Mr. David Hayes, the KWRC re-assessed and created a restoration plan for this section of the Millstream River. The trees for the tree revetments came from non-merchantable stock being harvested by the Town of Sussex off O'Connell Hill. The goal of our restoration efforts was to encourage the formation of a more stable streambank while continuing to maintain the river's connection to the floodplain. This will reduce gravel depositing on the farm field while also minimizing the impact from sediments and nutrients flowing into the river from the crop fields.



This site resulted from a flood event beginning to form a flood channel and deposition area in the field. We re-shaped and stabilized the bank using tree revetments.



Millstream River Restoration Site Bio

34. Pleasant Ridge Demonstration Site (45.80716, -65.59455)

The KWRC has been working with the landowners to restore and maintain our Pleasant Ridge Demonstration Site since 2000. This stretch of the Millstream River is approximately 400 metres in length and once suffered from eroding stream banks and possessed no riparian vegetation. The fields on this property are used as pasture ground for approximately 15-40 heifers each year.

Restoring the health of the river on this property involved several methods. The KWRC stabilized a fording site, creating a safe area for livestock and machinery to cross without negatively impacting the river, and six rock sills were placed in various locations throughout the stream. Staff also installed a two-strand, solar-powered, electric fence to restrict cattle access to the ford; this fence is removed each winter and re-installed in the spring to prevent damage from winter conditions. There have been more than 3200 trees planted at this site, including willow, pine, and spruce; staff members return each year to spot-plant as necessary. Finally, staff installed six bird boxes, two duck boxes, and one bee box on the property to enhance habitat for wildlife.

Past Photos of the Demonstration Site:

Before restoration.



After bank stabilization and tree planting.



Recent Site Photos:

A cow crossing the ford in the fall of 2020.



Mature trees at the site in the winter of 2021.



Staff spot-planting and maintaining habitat structures in the fall of 2020.





Millstream Restoration Site Bio

35. Apohaqui/Lower Millstream Recreation Council Boat Launch Enhancement Project (45.70306, -65.59923)

A long-established boat launch at Jones Memorial Park at the mouth of the Millstream River was becoming degraded and vehicles were eroding the streambank and park grounds when launching small boats. To improve these conditions, the KWRC, in partnership with the Apohaqui/Lower Millstream Recreation Council Inc., enhanced the access road and the launch site by decreasing the slope of the access road and using large boulders. These efforts will help to prevent future erosion while maintaining the natural look and feel of the site.





Millstream River Restoration Site Bio

36. McNair Brook Restoration Project – Moffett Site (45.765, -65.61979)

McNair Brook is a relatively healthy stream until you near its confluence with the Millstream River. Three eroding streambanks and an over-widened stream channel were concerning the Moffet family, who had been working hard to improve stream conditions and wildlife habitat. With funds from the Growing Forward program and the EcoAction Community Funding program, the KWRC was able to partner with the landowners to stabilize these banks and improve channel conditions with rock groynes.

One of the improved banks.



An installed rock groyne.



Lower bank under high water conditions.





Millstream River Restoration Site Bio

37. Bioengineering Restoration Project – Don Folkins Site (45.79308, -65.59964)

This site is situated along the main stem of the Millstream River. Completed in 2012, the project allowed us to build-upon work completed upstream around 1999-2002. The landowner, Don Folkins, approached us through the Kings County Agri-Conservation Club to restore a severely eroding bank.

The KWRC used fascine bundles to stabilize the eroding stream bank and improve the health of the riparian zone. Volunteers helped to complete the first 50 metres of bank stabilization work as part of our “2012 Water and Willows” event.

Before



After





Millstream River Restoration Site Bio

38. Sheck Brook Riparian Enhancement Project – Millstream Farm (45.8908, -65.5308)

With funding from Cargill Ltd. and the NB WTF, the KWRC was able to install fencing and enhance 2 kilometres of this important headwater tributary to the Millstream River. A strong partnership was also formed with Crosswinds Occupational Activity Center Inc., as their clients helped us to plant trees and pollinator-friendly shrubs at this site in 2012. The site was revisited in 2013 to finish installing the fencing and to spot-plant as needed. This effort will work to restore the site's biodiversity, provide shade to the stream to buffer stream temperatures, and improve the pollination of farm crops.

Preparing for planting!



Volunteers helping to plant trees!



Looking upstream across the lower reach of Sheck Brook in the fall of 2012.



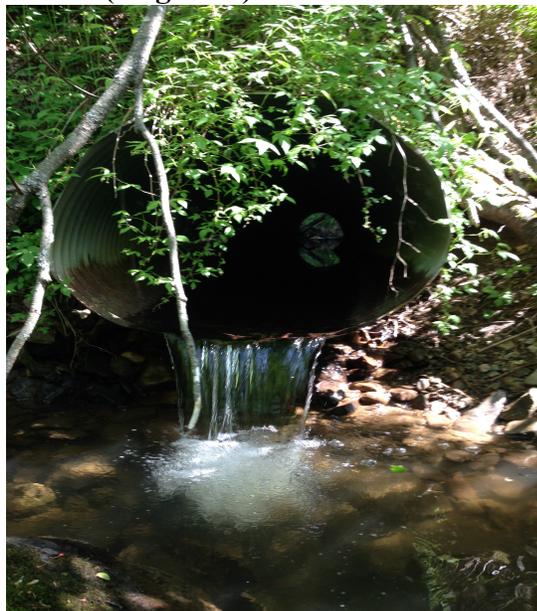
Millstream River Restoration Site Bio

39. Sheck Brook Rock Weir (45.90041, -65.54223)

This rock weir was installed as part of our *Fish Passage Barrier Removal Project* in 2017 and is located on Sheck Brook, a main tributary to the Millstream River. The perched culvert was identified in our 2010 culvert assessment effort and had a perch of 28 centimetres at the time. In 2017, when the KWRC re-assessed the culvert, the perch was 34 centimetres, therefore restricting fish passage to viable habitat upstream.

On August 10th, 2017, a rock weir was installed on this brook, but due to the low flow and the fact that the majority of the water was flowing underneath the culvert, rather than through it, KWRC staff were not successful in decreasing the perch to <10 centimetres. Staff were able to decrease the perch to 24 centimetres and did not want to disturb the pool habitat or cause additional stress to the fish species using it by attempting to raise it any further. The KWRC intends to re-visit this site during higher flow and assess whether further work can be done to increase fish passage or if this site is a better candidate for a culvert replacement. Fish passage may now occur beneath the culvert but that is difficult to determine.

Before (Aug 2017)



After (May 2018)





Millstream River Restoration Site Bio

40. Berwick Corner Restoration Site – Roy Pope and Sons/ Ron Davis (45.77975, -65.59856)

This site is one of our more mature willow planting sites and we now harvest stock from this site to propagate willow for other restoration efforts. At the site, the KWRC had installed rock sills and planted the riparian zone both above and below the bridge on Highway 10. The restoration efforts here have stabilized the streambanks and will help to improve water quality, reduce stream temperatures, and reduce excess nutrients entering the waterway. The landowners have provided a larger setback than required by New Brunswick's Clean Water Act.



The Berwick Corner site circa 1999.

The Berwick Corner site in 2010.



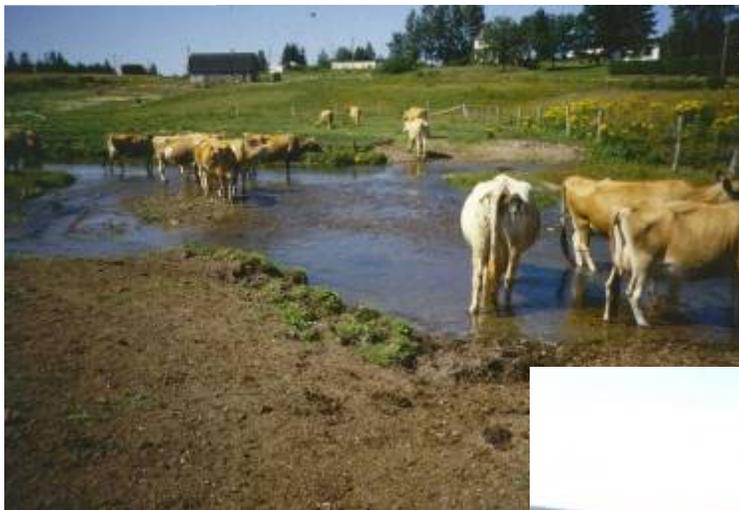


Upper Kennebecasis River Restoration Site Bio

41. McLeod Brook Restoration Project (45.77293, -65.38918)

This site is one of our oldest restoration projects and was originally completed in 1996. As a cold-water stream, McLeod Brook is an important component of the overall health of the Upper Kennebecasis sub-watershed. To restore the stream health and riparian zone at the site the KWRC installed more than 30 digger logs, created fording sites, erected livestock fencing, and planted trees. The pictures below indicate the site has become a large success. The digger logs have stabilized the stream and created deep pools for salmonid refuge. The livestock fencing has helped to protect the trees that were planted, giving them a chance to grow and re-establish the previously degraded riparian ecosystem.

Site in 1996.



Site in 2010.





Upper Kennebecasis River Restoration Site Bio

42. McLeod Brook Rock Weir (45.72036, -65.35543)

This rock weir was installed as part of our *Fish Passage Barrier Removal Project* in 2016 and is located on McLeod Brook, a cold-water tributary to the Upper Kennebecasis River. Before installation, the culvert had a perch of 22 centimetres which was restricting fish passage. After the rock weir was installed the perch was less than 8 centimetres, successfully improving fish passage. Thanks to this project, an additional 1.5 kilometres of viable habitat is now accessible to fish species.

Before



After





Upper Kennebecasis River Restoration Site Bio

43. Upper Kennebecasis Triage – Kingsco Transport Ltd. (45.74404, -65.49699)

As part of our *Upper Kennebecasis Triage Project* in 2017, this site was identified as a degraded riparian zone using aerial imagery. After site identification, our field crew performed a thorough assessment to determine which restoration efforts would benefit the site. The landowner, Kingsco Transport Ltd., was approached and approved the restoration efforts we had outlined for this location. The streambank was severely eroded and composed of fine sediments. The KWRC decided the site would benefit greatly from improved vegetative cover. A total of 1142 willow (450 willow seedlings, 692 willow stakes) were planted along the toe of this site. A 5 metre setback was also established along the 50-metre-long bank. Within the newly established riparian setback, we planted 28 potted stock trees (26 balsam fir and 2 Eastern hemlock). We also installed a duck box on the property to enhance wildlife habitat.

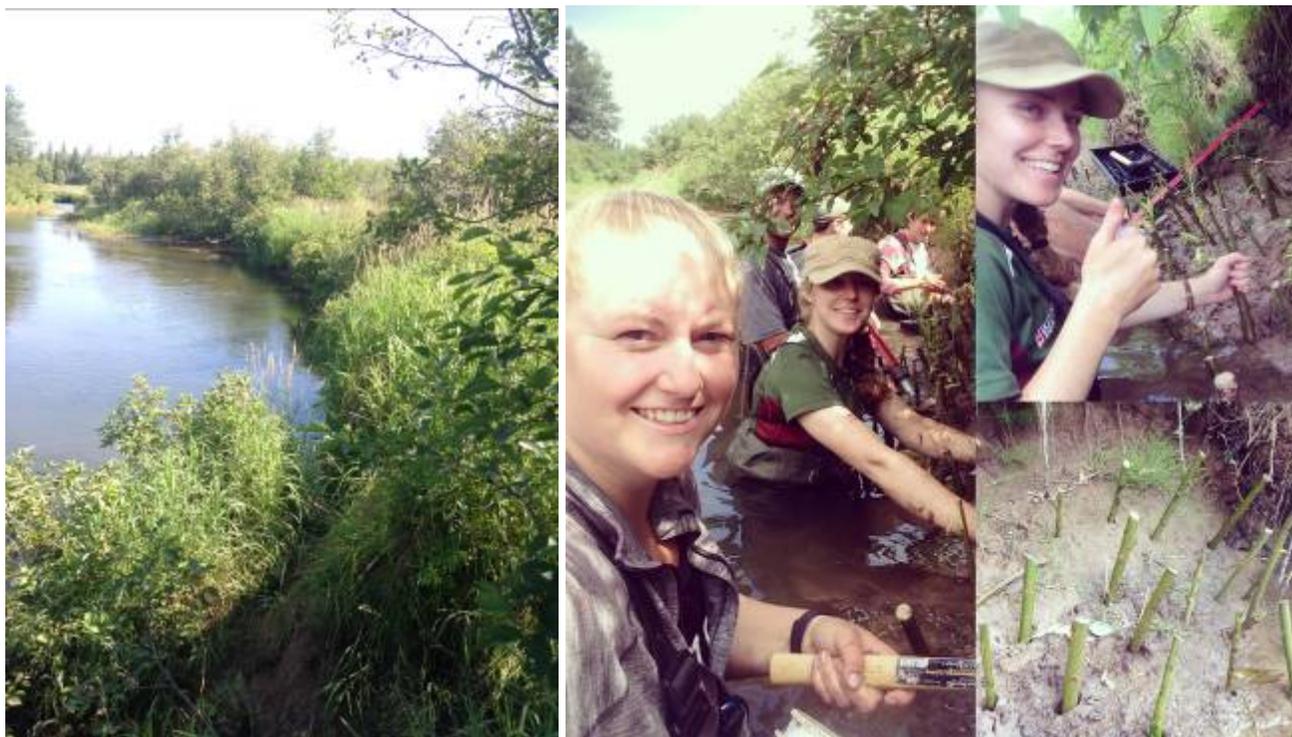




Upper Kennebecasis River Restoration Site Bio

44. Upper Kennebecasis Triage – Sussex Fish and Game Association (45.7416, -65.44532)

This site was identified for our *Upper Kennebecasis Triage Project* in 2017. After completing a site assessment, the KWRC approached the Sussex Fish and Game Association and they approved our restoration plan. The bank in this location was severely eroded, so we decided the site would benefit from improved vegetative cover. A total of 1044 willow (660 willow seedlings, 384 willow stakes) were planted along the toe of the streambank. A 5 metre setback was established along the 108-metre-long bank we stabilized. Within that newly established setback, we planted 28 potted stock trees (9 balsam fir, 3 Eastern hemlock, 8 black spruce, and 8 white spruce). We also installed a duck box on the property.





Upper Kennebecasis River Restoration Site Bio

45. Upper Kennebecasis Triage – Sandra & Bob Allaby (45.79468, -65.32643)

This site was first identified in 2016 during our Upper Kennebecasis Habitat Assessments. The KWRC restored this site in 2017, as part of our *Upper Kennebecasis Triage Project*. This site was lacking vegetation and experiencing severe erosion. The streambank is 81 metres long and the landowner agreed with our restoration plan. The KWRC planted 1556 willow stakes along the toe of the streambank. As the willow mature, we hope they will stabilize the bank and prevent future erosion. We also planted 12 shrubs, 5 red osier dogwood, and 7 serviceberry, as well as 6 large caliber stock trees, including 2 red oak, 2 serviceberry, and 2 red pine. If the planting doesn't help, we may re-assess this site for more substantial stabilization techniques as there is room for back-sloping at this location.





Upper Kennebecasis River Restoration Site Bio

46. Upper Kennebecasis Triage – Wayne & Mary Snyder (45.8042, -65.30861)

This site was restored in 2017 as part of our *Upper Kennebecasis Triage Project*. While the site was not eroding, it was lacking vegetative cover. Although the landowner was not interested in planting the entire streambank due to maintaining sightlines to the river open, they did however agree to plant on a 10 metre portion of the bank. Our field crew planted 20 willow seedlings and 2 white spruce.



Upper Kennebecasis River Restoration Site Bio

47. Upper Kennebecasis Triage – Ryan MacEachern (45.80462, -65.30717)

This site was first identified in 2016 during our Upper Kennebecasis Habitat Assessments, then was restored during our *Upper Kennebecasis Triage Project* in 2017. This site is 48 metres in length and suffers from heavy erosion and lack of vegetative cover. We installed a rock toe along the streambank, two geo-roll steps, and a brush layer of 300 willow whips. Tree stock was also planted throughout the newly established riparian area. As the landowner wanted to maintain access to the river, staff planted willow stakes on the geo-roll steps but left 20 metres open. This approach was used when planting trees and shrubs as well. The KWRC planted 6 red osier dogwood shrubs and 4 silver maple and 2 serviceberry caliper stock trees. The area was re-seeded and watered weekly to remediate the site back to its prior visual appeal. As the vegetation matures it will protect the bank from erosion, create shade cover, and mitigate impacts from high water events.





Upper Kennebecasis River Restoration Site Bio

48. Upper Kennebecasis Triage – Ron Demille (45.80248, -65.16886)

This site was identified and restored as part of our *Upper Kennebecasis Triage Project* in 2017. On the property, there was a 90-metre-long portion of streambank that was severely eroded. The stream channel had split and washed away a large portion of the landowner's farm field. The KWRC suggested heavily staking the newly formed streambank with willow and planting vegetation within a 5 metre riparian setback above the bank. We planted a total of 2039 willow stakes along the 90 metre bank as well as 26 potted stock softwoods in the riparian zone (24 balsam fir & 2 white spruce). The roots of this newly established vegetation will help stabilize the bank and provide shade to the stream as it matures. Two bird boxes were also installed at this location as well.

Before



After





Upper Kennebecasis River Restoration Site Bio

49. Upper Kennebecasis Triage – Bob Missen (45.81174, -65.29356)

This location was established during our *Upper Kennebecasis Triage Project* in 2017. Bob Missen was a new landowner on the Upper Kennebecasis and in the years since acquiring his property, he found that he had lost a significant portion of his land due to erosion. The area of concern is 63 metres in length and it lacks significant vegetation as it was being mowed to the top of the bank. Although it was late in the field season when this property was brought to our attention, we decided to plant the streambank and hope that enough vegetation was established to withstand the spring freshet in the following year. We staked 1084 willows along this streambank.





Upper Kennebecasis River Restoration Site Bio

50. Upper Kennebecasis Triage – Stephen Moffett (45.80441, -65.38067; 45.7786, -65.37359; 45.77773, -65.37312)

As part of our *Upper Kennebecasis Triage Project* in 2017, we established three planting sites on Stephen Moffett's properties. The first site on the Upper Kennebecasis spanned 20 metres and suffered from severe erosion. We planted 99 willow seedlings here and placed hay to mitigate erosion and establish a 5 metre setback.



The second and third sites are located on the Upper Kennebecasis downstream from the first site. The site on the right bank is 75 metres in length and is next to a hayfield. Downstream, on the left bank, is an additional 87 metres of eroding streambank next to a cattle-grazing field. Fencing is in place and a 5 metre setback has been established. Between these two sites, 773 willow seedlings were planted, 139 willow stakes, and 20 trees (16 balsam fir & 4 white spruce).





Lower Kennebecasis River Restoration Site Bio

51. Lissondale Farm - Musquash Brook Restoration Project (45.70786, -65.56783)

In 2008, this project stabilized an eroding streambank while also improving riparian zone health on Musquash Brook. Just over 45 metres of eroding stream bank was stabilized using rock armouring and rock kickers to slow water flow. Livestock fencing was erected to protect the riparian zone while still providing a restricted area for watering. The farmer also agreed to alter his practice of grazing both sides of the stream and changed one pasture into a crop field. The following year two other eroding banks were stabilized and the riparian zones were enhanced through tree planting further down the stream.



The site in fall 2007.

The site during work in 2008.



The site in 2010.





Lower Kennebecasis River Restoration Site Bio

52. Derm and Mary-Claire Murphy – Planting Based Restoration Site (45.70287, -65.59143)

The KWRC approached Derm and Mary-Claire Murphy in June of 2017 after identifying their property online. It appeared online that the property lacked vegetation along its riparian area. Our restoration team assessed the site and decided to heavily plant the streambank with willow stakes and seedlings. A total of 900 willow seedlings and 2328 willow stakes were planted along the 90-metre-long bank. The roots of the willow will stabilize the bank as they grow. Above the bank, the KWRC established a 5-metre setback by planting 3 red osier dogwood, 16 balsam fir, and 3 red oak. These species will also help stabilize the bank, and provide shade cover to the river as they mature. This effort will help in decreasing future stream temperatures, improving aquatic habitat.

Before



After





Lower Kennebecasis River Restoration Site Bio

53. Jeff Floyd – Thompson Brook Restoration Site (45.70282, -65.582222)

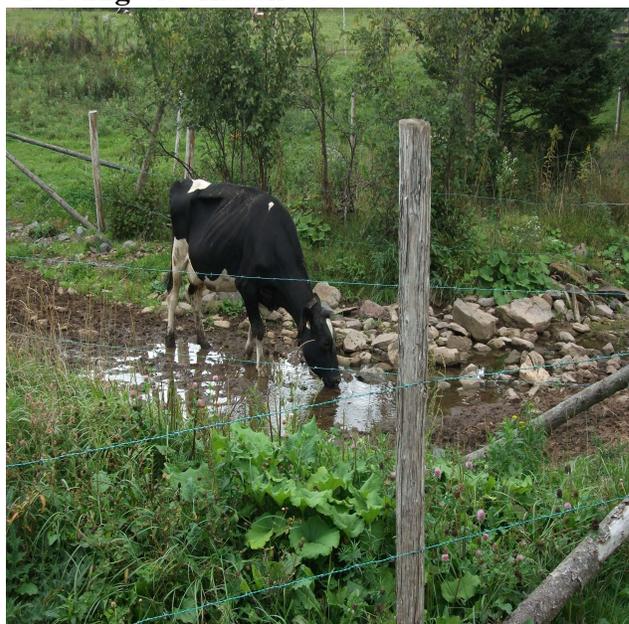
In 2009, the KWRC worked with Jeff Floyd to restore a streambank along Thompson Brook in the Lower Kennebecasis sub-watershed. Staff erected 516 metres of barbed wire fencing which will protect 2575 square metres of riparian zone. With the fence in place vegetation in the riparian zone will be allowed to establish and mature.

To further improve site conditions, the KWRC worked with the landowner to provide a stable agriculture ford. Prior to this project, the farmer was utilizing an equipment crossing area that impacted over 30 metres of stream length. The KWRC was able to improve the approach and crossing of the ford so that now only 5 metres of stream length is impacted. This crossing provides water access for cattle and allows the farmer to safely cross with machinery.

Fencing Installed



Fording Site Installed





Lower Kennebecasis River Restoration Site Bio

54. Moosehorn Creek Enhancement Project – Bill Rodgers (45.60377, -65.66137)

In 2019, the KWRC partnered with Bill Rodgers to complete a riparian restoration project on a 900-metre long section of Moosehorn Creek. The restoration of this property focused on stabilizing three sections of streambank, while also enhancing the riparian area along the entire stretch.

The *Moosehorn Creek Enhancement Project* included installing approximately 1650 metres of electric fencing, planting 295 trees and 1775 willow, stabilizing over 90 metres of eroding stream bank, installing four bird boxes and two duck boxes, and improving a fording site so that the entire site could be safely accessed. This work will help to decrease stream temperatures, enhance habitat for wildlife, and prevent future erosion and sediment loading.



A section of the streambank before restoration efforts.

The same section of streambank after restoration efforts.





Kennebecasis Bay Restoration Site Bio

55. Hampton Bible Camp Riparian Restoration Project (45.49735, -65.8318)

The board of the Hampton Bible Camp approached the KWRC to request we work with them to improve the conditions of the stream running through their property and pond. The pond is used for swimming and boating by campers and the stream is a trout-bearing tributary to Grooms Brook. Before restoration took place the stream was over-widened and horses from the camp's stables had free access to the stream. The riparian zone was degraded and nutrients and bacteria issues were arising in the pond. The KWRC installed fencing to restrict livestock access and planted the riparian zone with cedar, willow, spruce, and maple.



Crews planted seedlings and spread triple mix grass seed to enhance the site.

Through one season, the difference in site aesthetics and ecological integrity is astounding.





Kennebecasis Bay Restoration Site Bio

56. Passekeag Creek Enhancement Project (45.55446, -65.76189)

The *Passekeag Creek Enhancement Project* was focused on engaging landowners within the Passekeag Creek drainage basin to restore riparian zones. The KWRC engaged with several landowners but partnered with Mr. Paul Gaunce to stabilize and enhance the riparian zone on his agricultural field.

We focused on stabilizing three sections of the stream bank; the work at each section included back-sloping the bank, then installing a rock-toe, willow brush layer, and three geo-rolls. To enhance the riparian zone, our staff planted approximately 1200 willow stakes and whips, and 200 trees; this planting occurred within the agreed-upon 5-metre riparian setback. As this site is located on agricultural land, we used a solar-powered electric fence to protect the banks and vegetation. In total, 106.5 meters of stream bank was stabilized and 5600 square meters of riparian zone was enhanced on this property.

Bank 1 before restoration efforts.



Bank 1 after restoration efforts.

