



CHILDS RIVER RESTORATION REPORT

EXECUTIVE SUMMARY - JULY 2023



The goal of this project was to restore the upper Childs River. Short-term objectives included: removing an earthen berm, removing impounded sediment and ponds from behind the berm, replacing an undersized road crossing culvert, reconstructing the river channel through former cranberry bogs, and restoring the adjacent river channel floodplains and wetlands for a variety of ecosystem types. The long-term objectives are to improve aquatic organism passage, increase aquatic and riparian habitat including cold water habitat for Brook Trout, improve water quality, and increase community resilience by addressing stressors and impacts throughout the watershed.

Massachusetts has lost more than 28% of its wetlands between the 1780s and 1980s,¹ and continues to lose wetlands every year.² Cranberry bogs are low-lying areas where natural rivers or wetlands previously existed but were manipulated by humans to cultivate cranberries on a large scale. Because they are actively fertilized and the water levels are carefully controlled by farmers, cranberry bogs are typically sources of nitrogen (releasing nitrogen into the surface waters downstream) contrasting with natural wetlands which act as nitrogen sinks (areas where nitrogen is released to the atmosphere through denitrification or stored in plants and soils).^{3,4} There are currently over 48,000 acres of wetlands in the state and nearly 14,000 acres of cranberry bog, most of which are in southeastern MA in watersheds draining to Cape Cod Bay, Nantucket Sound, Narragansett Bay, or Buzzards Bay.⁵

The Massachusetts Division of Ecological Restoration (DER) estimates that more than 3000 dams are currently located in the state. These dams are a liability due to their age and the general trend of increased hydrology in the region, are a barrier to the movement of diadromous fish and other aquatic organisms and are a disruption to the natural movement of sediment critical to the development of floodplains and coastal estuaries and salt marshes which help protect our shorelines and infrastructure.

The Childs River flows south from Johns Pond through the US Fish and Wildlife Service (USFWS) Mashpee National Wildlife Refuge (MNWR) across the property of the Falmouth Rod and Gun Club (Club/FRGC) and discharges into Eel Pond which is connected to Waquoit Bay on the Nantucket/Vineyard Sound (Figure 1). The Childs River is about 2 miles long from Johns Pond to Eel Pond and passes through the towns of Mashpee and Falmouth eventually discharging into Waquoit Bay. The natural origin of the river is in springs in the vicinity of what is now the abandoned Garner Bogs south of Old Barnstable Road but it was connected with an artificial ditch to Johns Pond in the mid-1800s to create a herring fishery. This connection was later used to supply additional water for the cranberry bogs. Water no longer flows continuously from the pond to the Childs River and the original herring run to Johns Pond along the neighboring Quashnet River is being actively maintained and has been restored. However, due to the natural springs located at the Garner Bog, water flow south of the bogs is fairly steady, which supported

¹ Dahl, T.E. 1990. Wetlands Losses in the United States 1780s to 1980s. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 13pp.

² Harris, S.L. National Water Summary: Massachusetts Wetland Resources. U.S. Geological Survey.

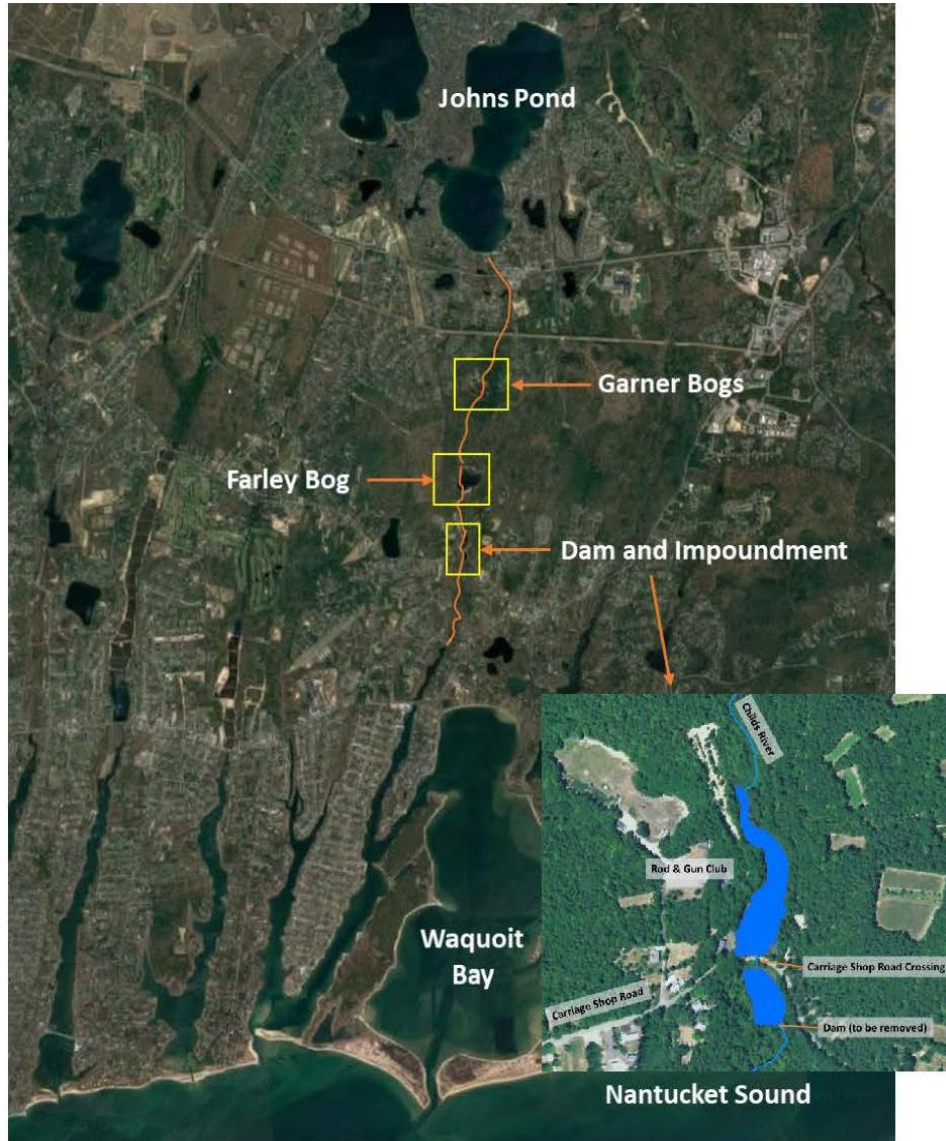
³ Teal, J.M. and B.L.Howes. 1995. Nitrogen balance in a Massachusetts cranberry bog and relationships to coastal eutrophication. *Environmental Science and Technology* 29:960-974.

⁴ Leonardson, L, L Bengtsson, T Davidsson, T Persson and U. Emanuelsson. 1994. Nitrogen retention in artificially flooded meadows. *Ambio* 23: 332-341.

⁵ Cape Cod Cranberry Growers Association. 2003-2023. How Cranberries Grow. <https://www.cranberries.org/how-cranberries-grow> [2/16/2023]

plans to restore this area as habitat for Brook Trout and other fish and wildlife. Figures 2 and 3 provide detailed summary of the Childs River site history as documented for this project.

Figure 1. Map of the Childs River and project restoration area including the former dam and impoundments at Carriage Shop Road and former Farley and Garner cranberry bogs.



Since the mid-1800s, mill dams and cranberry farming have severely impacted the hydrology, water quality, aquatic habitat, terrestrial habitat, and fish passage throughout the river's length. In addition to the overall health of the watershed, native sea-run Brook Trout populations have been greatly reduced in the Upper Childs River. Due to these impacts no Brook Trout had been detected north of Carriage Shop Road since 2012 (with the exception of spring of 2019 during a period of higher stream flow due to precipitation).

The Childs River restoration was a six year (2017-2023), \$2.9 million project. This project constructed in 2021 removed one earthen dam, a failed fish ladder and four additional fish

passage barriers, improved the stream crossing at Carriage Shop Road for added freshwater and terrestrial organism passage, improved water quality, and restored 15.1 acres of retired cranberry bog to more natural stream and wetland habitat.



Restoration planning site visit September 2016 with project team members (pictured left to right) Mark Kasprzyk (town of Falmouth), April Wobst (APCC) Dan Murphy, Gary Anderson, and Fran Smith (FRGC), Alex Hackman (formerly DER), and Betsy Gladfelter (FA). Photo credit: APCC.

Discussion of the Childs River Restoration began in 2014 with a team kickoff meeting held in 2017. The project was completed as a private-public partnership involving the towns of Falmouth and Mashpee as well as local, state and federal partners. However, the Falmouth Rod and Gun Club took the lead managing the project and partnerships through planning, design, permitting and construction. In 2017, the Club and their 501c3 partner the Sporting Safety, Conservation and Education Fund (SSCEF) funded the initial feasibility study and concept designs developed by the contracted engineer, Inter-Fluve Inc. Design work began in 2018 with 100% design plans completed in May of 2020. Final permits were approved in August of 2020 and construction began on August 26, 2020. Construction was completed a year later in September of 2021. Monitoring,

evaluation and maintenance of the site is ongoing (Figure 4).

State Fish Biologist Steve Hurley did an electroshock census of the Childs River in May of 2022 following completion of restoration in 2021. A total of 19 Brook Trout were captured in the former impoundment areas including five young of the year (YOY) and 17 were captured below and in the lower half of Farley bog including four YOY. These results show great success in rehabilitating the river for Brook Trout habitat as there was a substantial increase in the number of fish in the restored areas. Also, the capture of YOY Brook Trout in both the Farley Bog and the newly constructed stream channels through the former Carriage Shop Road ponds indicates successful spawning in the restored areas! With the return of Brook Trout back to the upper Childs River, a major objective of the project has been achieved. After the removal of the Carriage Shop Road ponds, average temperatures below the former pond/impoundments were significantly lower in the summer and warmer in the winter than they were prior to the dam removal and river restoration. Temperature conditions in the former pond area are now within suitable ranges for Brook Trout throughout the year. Additional improvements (decline) to temperature were measured below Farley Bog and in the Garner Bog. Likewise, summer dissolved oxygen levels measured within one-year of restoration also showed improved fish habitat with reduced daily range fluctuations and levels at or just below 6 mg/L, the optimum level for fish survival. Vegetation monitoring has also demonstrated a marked increase in the number and percent cover of wetland species in the restored area. In the former Farley Bog, plant species increased in number from 49 to 82 between 2019 and 2021; and in the former Garner Bogs, plant species increased in number from 60 to 94 between 2019 and 2021.

Figure 2. Historic and archaeological summary of the Childs River site provided by the Public Archaeological Laboratory (PAL).

Historic and Archaeological Investigations

In 2019–2021, architectural historians documented the historic Waquoit River Herring Company mill pond, earthen dam, and fish ladder associated with the milling and fishery activities at Carriage Shop Road in the 19th to mid-20th centuries. In 2020, archaeologists studied the belowground remains of the historic mill buildings and water-power structures before the dam and fish ladder were removed and the pond drained as part of the river restoration work. (To learn more, read about the [Site History](#)).

Mill Pond

The mill pond was created in the early 19th century by building a dam on the Childs River near Carriage Shop Road. The dam was added to provide water power for Alexander Clark's woolen mill. It later powered the Waquoit Company carriage works and blacksmith shop owned by Alexander Crocker and Josiah Burgess. In the late 19th century, the town road by the mill (originally known as Meeting House Road) was moved to the north, where it crossed the mill pond and was renamed Carriage Shop Road.



Former mill pond on the north side of Carriage Shop Road, view north from the road.



Former mill pond on the south side of Carriage Shop Road, view west from the road.

Dam

The dam was at the south end of the mill pond near the original town road. It had a 200-foot-long east-west (primary) earthen berm that was 10 feet high at its crest. A 100-foot-long secondary (north-south or lateral) berm extended along the pond shoreline from the east end of the primary berm. The dam's outlet was a short, 3-foot-deep concrete spillway channel with 7-foot-long and 10-foot-long concrete sidewalls. Wooden boards in the channel were used to regulate the water level in the pond. A second overflow channel was created near the primary dam's western end, and a third outlet contained a fish ladder. The dam structure removed in 2020 was probably the original 19th-century mill dam that was rebuilt or changed to provide water for the 20th-century cranberry bogs.



At right, view of the top of the earthen (primary) dam, looking east.



Downstream side of the dam's concrete spillway channel, view northwest.

Falmouth Rod & Gun Club Fish Ladder



In 1968, the Falmouth Rod & Gun Club bought the land containing the dilapidated fishway next to the former mill pond and spillway channel. About the same time, the club replaced the then 50-foot-long fish ladder built in the 19th century by the Waquoit River Herring Company. The club also removed debris from the river channel to increase the number of herring during the spring runs up the river.

The 1968 fish ladder was a concrete and cinder block structure built on the east side of the pond at the east end of the dam. The fish ladder formed a low-gradient earthen channel approximately 95 feet long with a total drop of 3 feet. The structure had a series of low concrete walls with 10 inch-wide slots creating five pools to help the fish passage. By 2004 the fish ladder was reported to be poor/nonpassable.

Below, 1968–2020 fish ladder, looking south from north end of the lateral section of the historic dam.



Archaeological Finds

Archaeologists found the probable location of the mill's undershot waterwheel, which was covered with pond sediment since the 1940s. It appeared as a square depression in the low-lying area on the southwest side of the dam. No buried remains of the mill buildings or the historic waterwheel were found. However, hand excavations in this area recovered 19th-century window glass and machine-cut nails from the former Waquoit Company Shop buildings.

During the river restoration work, three wheel rim parts were found inside the culvert under Carriage Shop Road. The parts are most likely from the wagon or carriage wheels made at the mill in the 19th century. One of the metal rim parts has some inner wood still attached where machine-cut nails were set for the wheel's radiating spokes. The whole wheels reconstructed from these metal rim parts would have been about 39 to 44 inches across.



At right, 19th-century metal and wood rim parts from three wagon or carriage wheels.




At left, 19th-century wheel rim parts found inside the concrete portion of culvert under Carriage Shop Road, view north.

Figure 3. Summary of the Childs River site history including historic milling, river herring harvest, and cranberry bog farming.

Site History: Housewrights, Wheelwrights, and Damming Fish

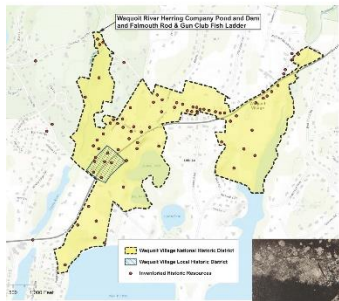
The Childs River crossing at Carriage Shop Road is the site of the former mill pond, earthen dam, and fish ladder in the northwest section of the Waquoit Village National Historic District. They were used by local manufacturers, cranberry farmers, and the herring fishery from the early 19th to mid-20th centuries. None of these resources survive but they have been inventoried and the historical documentation records are maintained by the Falmouth Historical Commission.

Ca. 2013–2014 aerial image showing the historic mill pond, dam, and fish ladder before the Childs River Restoration Project. (Credit: The Public Archaeology Laboratory, Inc. 2022)



Waquoit Village Historic District

The Waquoit Village Historic District encompasses 170 acres on both sides of Waquoit Highway (Route 28) through the historic village center of Waquoit. The district is listed in the National Register of Historic Places. Most of the district's 66 residential buildings were constructed in the mid-19th century when the village was a thriving community. Residents worked in farming and the fisheries in two small industrial areas on the Childs and Quashnet (Moonakis) rivers.



At left: Waquoit River Historic District boundaries. (Credit: Massachusetts Historical Commission 2020)

Milling along the Childs River

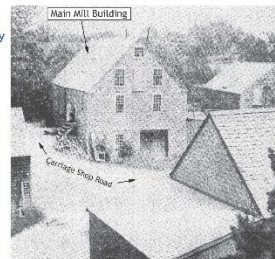
In the early 19th century, a water-powered woolen mill was built at the Childs River for Alexander Clark, a Falmouth resident. By 1831, he moved his business farther east to a mill site on the Quashnet (Moonakis) River. In the 1840s, Seth Benson, a local wheelwright (maker of wooden wheels), used Clark's former mill on the Childs River for his blacksmith shop. The 1850 federal census of manufacturers lists Benson as a carriage maker and wheelwright. That year his business used two tons of iron worth \$500; 3,000 feet of wood planks worth \$100; and 30 gallons of linseed oil worth \$30. These materials were used to make 12 carriages with a total value of \$900 (worth \$32,000 today).

In June 1855, Alexander Crocker and partners bought Benson's business. Their new Waquoit Company Shop made farm wagons, two-wheeled dump trucks, carriages, and wood framing for local buildings. As housewrights, the shop owners built and repaired wooden houses. They enlarged the old mill and built a separate blacksmith shop to prevent fire from reaching the mill. The shop's wagons were known for their blue and green colors, applied in the mill's second-floor paint shop. A wooden ramp was used to bring the painted wagons outside.

The dam at the south end of the mill pond was the site of an undershot wooden waterwheel that sat next to the former mill building. The wheel sat in a stone-lined pit that filled with water through a gate in the dam; the water rushed along the bottom of the pit to spin the wheel's paddle-like boards backwards. The spinning wheel turned vertical and horizontal shafting, gears, and pulleys connected to power the mill's machinery, which included an up-and-down saw, grindstone, and turning lathe.

From 1869 to 1900, the renamed Waquoit Manufacturing Company made mostly carriages and wagons under the direction of Alexander Crocker and Josiah Burgess. Crocker oversaw the wheelwright operations. Burgess ran the blacksmith shop that made all the metal parts except the axles. Crocker died about 1900; Burgess was in "failing health" and closed the business that same year.

At right, ca. 1880s photograph of Waquoit Manufacturing Company mill buildings. (Credit: Falmouth Historical Society)



At left: Ca. 1930s photograph of the ruins of the mill's wooden waterwheel in its stone-lined pit. A part of the gear assembly used to turn the mill's machinery is on the left. (Credit: Falmouth Historical Society)

Waquoit River Herring Company

The Waquoit River Herring Company was formed in the mid-19th century to harvest river herring during their spring run up the Childs River from Waquoit Bay. The company constructed a fishway around the southeast side of the mill's dam. It also dug a canal northward to the herring's natural spawning ground at Johns Pond in Mashpee. The herring company caught an average of 80 to 100 barrels of herring each year, with the biggest catch of 180 barrels in 1872. The company still operated the fish ladder as late as 1919.

Cranberry Cultivation and Bogs

By the early-20th century, cranberry growing had replaced the carriage shop and fisheries as the main businesses along the Childs River. By 1920, there were nine cranberry bogs from Johns Pond south to where the river joined Waquoit Bay. Eight of the bogs were equipped with wooden chutes to allow for fish passage. The former mill pond and dam at Carriage Shop Road were modified with dikes and drainage channels to provide water for the bogs to the south. The river north of the dam became "little more than an artificial ditch lined with cranberry bogs."



At right: Ca. 1860 tintype showing the two-story mill with a ramp from the second story and the separate blacksmith shop to the right. (Credit: Falmouth Historical Society)



Figure 4. Upper Childs River restoration project summary and timeline.



Project Managed By:
Falmouth Rod & Gun Club

Upper Childs River Restoration

Cape Cod – Falmouth and Mashpee, Massachusetts
Author: Dennis Martin

29 Private and Public Partners



Project Objectives:

- **Re-establish a coldwater fishery for sea run brook trout**
- **Convert established cranberry bogs to wetlands**
- **Improve water quality of the watershed and at the estuary**
- **Preserve the project area**
- **Enable access for the public to enjoy nature**

Remove barriers to fish passage – by eliminating earthen dam, spillway, non-functional fish ladder at the southern mill pond, and water control structures in the bogs. **Replace the clogged / deteriorated culvert. Re-channel the river** - to enable the groundwater-fed system to flow freely. **Create the proper environment for propagation and survival** – ensure colder water temperature, highly oxygenated clean water.

Enhance habitat for migratory birds and other wildlife - wetlands improve biodiversity by providing critical habitat, breeding grounds, and sources of food for wildlife. **Prevent flooding and excessive run-off** - the sponge-like nature of wetland plants and soils help control water flow allowing slow release into the river. **Help moderate global climate conditions** – through storage of large amounts of water and carbon.

Reduce sediment and pollutants - the unique plants and soils of wetlands filter, absorb and remove undesirable materials. **Eliminate stagnant pooling** - by removing the earthen dam, bog ditches, and water control structures, the clean groundwater flows uninhibited.

Establish conservation restrictions – situated within the Mashpee National Wildlife Refuge, the restored area will remain undeveloped.

Create a pedestrian trail along the project corridor - provides an excellent opportunity to learn how nature functions, and enables hiking, animal / birdwatching, and photography within a relaxing atmosphere.

5 Areas of Transformation

	Southern Mill Pond	Clogged / Deteriorated Culvert	Northern Mill Pond	Farley Bog (12.5 Acres)	Garner Bogs (24.7 Acres)		
Before - 2018							
After - 2021							
	Research, Model, Assess, Communicate		Plan, Design, Fund, Acquire,	Permits	Implement	Monitor, Evaluate, Adjust	
2014 Discussion Begins	5/8/17 Team Kick-off	7/19/17 Concept Plan	5/14/20 100% Design Plan	8/20/20 Final Permitting	8/26/20 Construction Begins	Sept 2021 Construction Complete	2026 5-Year Report

The initial cash investment by the Club to support feasibility studies was used to leverage additional support from local, state and federal funding sources for implementation including grants from the Falmouth Fund of the Cape Cod Foundation (CCF) in 2018, Trout Unlimited Cape Cod Chapter and Embrace a Stream Program, the Massachusetts Environmental Trust (MET) in 2018, the EPA Southeast New England Program (SNEP) Watershed Grants through collaboration with Restore America’s Estuaries in 2018 and 2019, the Falmouth Community Preservation Committee (CPC) in 2018 and 2019, the Mashpee Community Preservation Committee (CPC) in 2019, Ducks Unlimited in 2019, DER through their priority project program, the USFWS National Coastal Wetland Conservation Grant (NCWCG) in 2020, and the USFWS and town of Falmouth for replacement of the Carriage Shop Road culvert in 2022.

The total project cost is equal to \$2,929,727 including \$2,775,442 in expense and an additional \$154,285 in tracked match (primarily FRGC and SSCEF in-kind contributions). A summary of this match is provided in Table 1. Included in this \$2.7 million expense was \$2.1 million devoted to construction activities for the river, bogs and culvert replacement. A summary of all funding for the Childs River restoration from feasibility studies through construction along with ongoing monitoring, education, APCC project management/technical support and FRGC expense can be found in Table 2. A detailed breakdown of construction expense by grant and project area specific to the river and bog restoration (excluding the culvert replacement work managed by the town of Falmouth) is provided in Table 3. The original contracted scope for construction of the river and bogs was \$856,075. The final contract amount including all changes orders was \$1,186,722.31 with an additional \$600 for delivery of wood to the site. With the award of \$819,000 from the USFWS NCWCG to DER to support construction and construction oversight, a portion of SNEP grant funds proposed for construction were reallocated to cover other expenses. With the culvert fully funded by the town of Falmouth and USFWS, NCWCG grant funds were able to be allocated to cover change orders for additional work to expand the area of sediment removal, size of ponds, and plantings to improve the overall impact of the restoration. Likewise, the Falmouth CPC 2019 grant award totaling \$151,498 for construction was not needed due to this additional grant award and low bid received for construction. Thus, the Club ultimately reported back to the Falmouth CPC in 2022 that these funds would not be spent and could be allocated for other projects.

Table 1. Estimated value of in-kind and cash contributions providing match for the Childs River restoration from 2014 through 2023.

Match In-Kind and Cash	Estimated Value
FRGC 2014-2017 Project Planning	\$16,950
FRGC 2018 Sale and Purchase (cash)	\$1,500
APCC 2016-2017 Early Planning	\$2,836
FRGC and SSCEF 2018-2019 Planning, Design, and Permitting (MET grant)	\$30,749
APCC staff time and permit print supplies (MET grant)	\$4,091
FRGC and SSCEF 2018-2023 Design through Post-Construction (SNEP18/19 grants)	\$98,158.89
Project Team and Partner Time	not tracked
TOTAL	\$154,285

Table 2. Summary of Childs River restoration project expense by funding source and project activity.

Funding Source	Feasibility	Design	Permitting	Construction	Monitoring	Education	APCC	FRGC	TOTAL Amount
FRGC	\$68,000.00								\$68,000.00
SSCEF	\$3,200.00						\$10,000.00		\$13,200.00
CCF (2018)		\$7,000.00					\$1,000.00		\$8,000.00
CCF (2023)					\$223.50		\$4,776.50		\$5,000.00
Trout Unlimited					\$2,500.00				\$2,500.00
Embrace a Stream					\$3,825.00				\$3,825.00
MET (2018-2019)		\$31,000.00	\$23,600.00				\$5,210.00		\$59,810.00
Falmouth CPC (2018)		\$57,000.00		\$93,000.00					\$150,000.00
SNEP (2018)		\$18,833.17	\$24,048.83	\$191,058.40	\$112,005.41	\$19,572.73	\$78,685.90	\$5,795.56	\$450,000.00
SNEP (2019)			\$13,053.00	\$201,026.46	\$16,111.04	\$14,809.50			\$245,000.00
Masphee CPC (2019)				\$240,510.00					\$240,510.00
Ducks Unlimited					\$5,000.00				\$5,000.00
USFWS and Town of FA*		\$50,600.00	\$50,600.00	\$526,575.00					\$627,775.00
DER			\$39,129.00	\$28,693.00			\$10,000.00		\$77,822.00
DER NCWCG (2020)				\$819,000.00					\$819,000.00
TOTALS	\$71,200.00	\$164,433.17	\$150,430.83	\$2,099,862.86	\$139,664.95	\$34,382.23	\$109,672.40	\$5,795.56	\$2,775,442.00
<i>Falmouth CPC (2019)</i>				<i>\$0.00</i>					<i>\$151,498.00</i>

*Note: Tighe & Bond contractual expense for design, permitting and construction oversight for replacement of the culvert under Carriage Shop Road as provided to the river restoration project team was not broken down by task so cost breakdown provided here is an estimate based on 1/3 of total contract for each of these tasks.

Table 3. Summary of Childs River restoration construction expense for work around the former dam and impoundments, and in the Farley and Garner bogs. This breakdown of construction expense by area of the site and funding source does not include expense for the culvert replacement at Carriage Shop Road managed by the town of Falmouth shown in Table 2. Note final contracted expense for Lucianos Excavation totaled \$1,186,722.31 with an additional expense of \$600 for transport of logs to the site by Forest Keepers Tree Care.

Area of Site	FA CPC18	MA CPC	SNEP18	SNEP19	NCWCG	TOTALS
Dam and Impoundments	\$93,017.11	\$0.00	\$95,878.82	\$30,626.64	\$361,698.78	\$581,221.35
Farley Bog	-	-	\$95,179.59	\$10,637.80	\$227,091.89	\$332,909.28
Garner Bogs	\$0.00	\$240,510.00	\$0.00	\$30,063.40	\$2,618.33	\$273,191.73
Construction Total	\$93,017.11	\$240,510.00	\$191,058.41	\$71,327.84	\$591,409.00	\$1,187,322.36
IF Construction Oversight				\$129,698.62	\$227,591.00	\$357,289.62
TOTALS	\$93,017.11	\$240,510.00	\$191,058.41	\$201,026.46	\$819,000.00	\$1,544,611.98

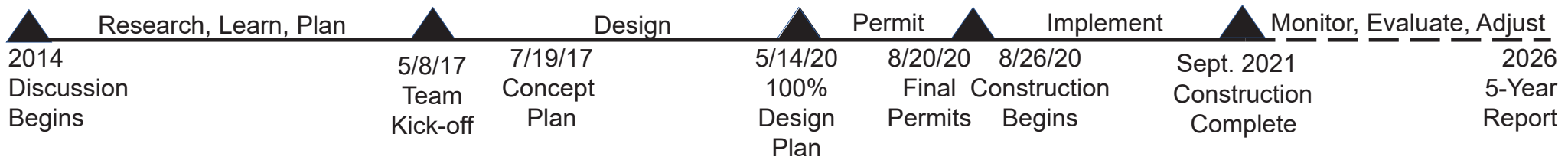


Upper Childs River Restoration Project

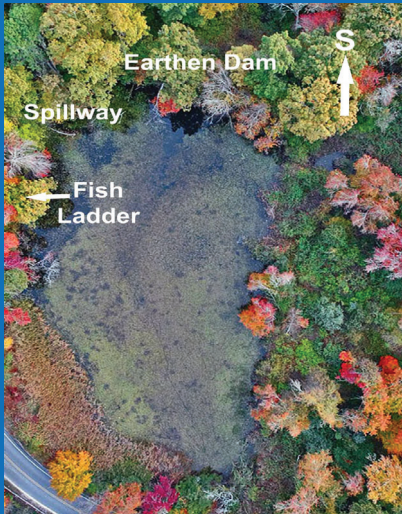


DID YOU KNOW?

- In the 1800's, the Childs River was known as a world-class salter brook trout river
- It was a local sportsman's club that initiated and managed the transformation that took place over the last 8 years – The Falmouth Rod & Gun Club
- The resultant private-public partnership involved the towns of Falmouth and Mashpee as well as local, state, and federal organizations / agencies
- With a focus on the environment and conservation, the partnership rechanneled the river for trout propagation and survival, and converted abandoned cranberry bogs to wetlands for other wildlife to thrive
- The river once again has become a Coldwater fishery, a wildlife sanctuary, and a site for recreational viewing and environmental education



Upper Childs River Restoration Project



November 2018 - Southern Pond



December 2018 – Old Spillway



September 2018 – Bog Water Control Device Blocking Fish Passage

Objectives:

- **Restore a major portion of the Upper Childs River**
 - **Remove the physical and environmental barriers to fish passage**
 - **Re-establish a coldwater fishery to foster the return of brook trout and other aquatic wildlife**
- **Convert established cranberry bogs into wetlands to create habitat for migratory birds, and other wildlife**
- **Improve water quality as the wetlands will act as a filtration system for water resources**
- **Protect the land through conservation restrictions to ensure proposed area will remain undeveloped**
- **Improve access for the public to enjoy nature and its preservation**



August 2020
Non-functional Fish Ladder



February 2021 – Deteriorated, Blocked Culvert



October 2018 – Overgrown Bogs

Southern Pond Area

Site of Earthen Dam, Spillway, Fish Ladder, Warm Shallowing Pond



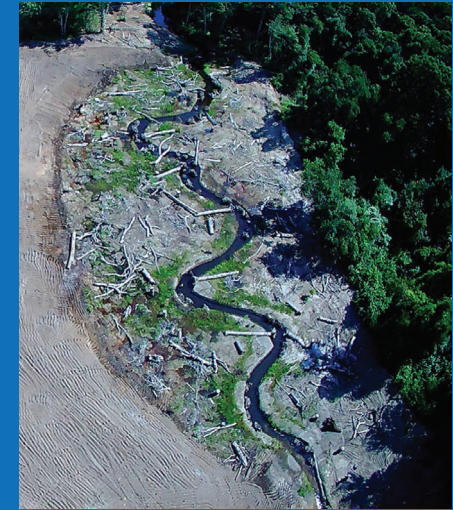
Google Map



January 2021 – Dam Removal



April 2021



July 2021



November 2018



March 2021 – New River Channel Created

With an earthen dam at the south end of the pond, water was blocked from freely exiting the Upper Childs. This inhibited fish passage and created an unhealthy environment for aquatic life. The pond area water was temporarily diverted to enable sediment removal and channel construction. The dam and old spillway were removed, the fish ladder buried, and the winding river was channeled along the western tree line to mitigate late afternoon heat and to provide a coldwater habitat for brook trout.



Northern Pond Area

Large Deposits of Sediment, Warm Shallowing Pond



Google Map



November 2018

A diversionary channel was dug to drain the impounded water and direct water away from where the new river channel was to go. In addition to the diversion, water had to be pumped to a distant drainage basin so that sediment could be removed and the new river constructed.



Early April 2021 – Things are Drying Out



April 2021 – New River Channel & Floodplain



June 2021 – Culvert in Place



July 2021 – River Turned On

Like the south pond area, the river was positioned along the tree line on the western side to protect the water from the summer afternoon sun as much as possible. Aided by plantings, it did not take long for the vegetation to take hold and the area to green up.

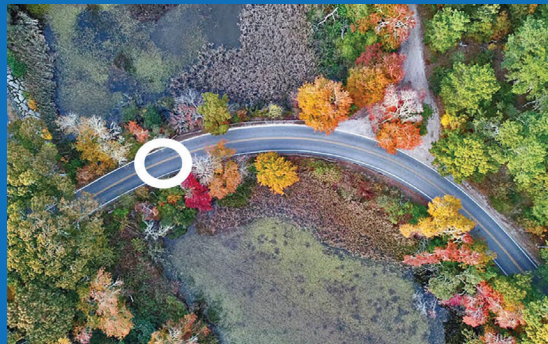


Culvert at Carriage Shop Road

Deteriorated and Undersized Culvert Removed and Replaced



Google Map



November 2018 – Carriage Shop Road



Early February 2021 – Deteriorated Culvert



Late February 2021

With the former ponds north and south of Carriage Shop Road eliminated, construction complete and the river now free-flowing, average water temperatures in July have dropped from 70 degrees to 58 degrees. This dramatic change will create a thriving habitat for the return of brook trout and other aquatic life.



June 2021 – New Culvert in Place



June 2021 – Construction of New Road

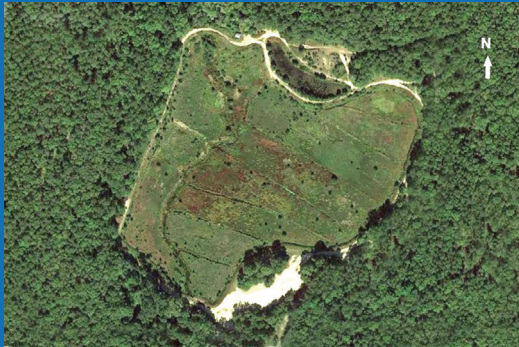


August 2021 – Road Paved



Farley Bog

12.5 Acre Abandoned Cranberry Bog Converted to Wetlands and Wildlife Habitat



Google Map



November 2018 – Bog Overgrowth

With abandonment of the bogs in 2014, invasive plants, shrubs and small trees began to overgrow the area where cranberries once thrived. At the beginning of the restoration, a diversion channel was dug to direct water away from targeted construction areas.



September 2020 – Diversion Channel



January 2021 – Logs & Root Wads Protect the River and Aquatic Life



June 2021 – Microtopography – Plant Life



June 2021 – With Enlarged Duck Pond

Excess sand from farming was removed. The bog holding pond was expanded to provide diving and dabbling duck habitat. Microtopography work was done to turn over the bog surface allowing dormant wetland seedlings to sprout. Ditches were filled and a new river channel created.



Garner Bogs

24.7 Acres of Bogs Converted to Wetlands, Ponds and Wildlife Habitat



Google Map



November 2018 – Garner Bogs, Holding Pond

It is difficult to imagine how two cranberry bogs and a holding pond could be transformed into a coldwater fishery and wetland area for wildlife habitat. The groundwater fed river will bring brook trout upstream once again. The three discrete ponds will attract waterfowl and other aquatic wildlife to this haven. Restoration efforts have benefited the environment.



October 2020 – Eastern Bog, River Channel



October 2020 – Diving Duck Pond



November 2020 – Ponds Completed



June 2021 – Forever Wetlands

It takes many years of dedication, planning and execution to complete such a project. The Falmouth Rod & Gun Club wishes to congratulate and thank all of the partners who made this total effort possible.

