

Summer 2018

Dear friends and colleagues,

Across the Commonwealth, DER, communities, agencies, and non-profit organizations are working together to adapt to climate change while also helping rivers and wetlands heal from past damage. These restoration / adaptation projects bring tangible benefits: reduced flooding in a commercial corridor; observed increases in river herring; rapidly-growing wetland plants; and new foot paths and bridges. The projects also bring an intangible but very real sense of hope and optimism to those involved. You'll read about many of those projects in this issue of *Ebb&Flow*.

The Shawsheen River Restoration Project, described in this issue, is an excellent example of a project that combines the ecological benefits of dam removal with climate change adaptation and flood resilience. Please join DER's Nick Wildman and Kris Houle as they speak about the Shawsheen River Restoration Project in a free webinar sponsored by the US Fish and Wildlife Service and NOAA. Details are below.

See you on the river!

-Beth Lambert, *Director*

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## DER's New Cranberry Bog Program



*Photos are from two restored sites – Tidmarsh Sanctuary and the Eel River Headwaters*

Culturally iconic and economically important, cranberry farming has been part of the Massachusetts landscape for over 200 years (*Cranberry Harvest: A History of Cranberry Growing in Massachusetts*, Spinner Publications, 1990). Today, there are approximately 13,250 acres of cranberry farmland (Cape Cod Cranberry Growers Association) within the Commonwealth. Unfortunately, many farmers are facing severe economic challenges due to falling prices, market shifts, and other factors. These issues were well documented by the Massachusetts Legislature's Cranberry Bog Revitalization Taskforce (see [the 2016 final report](#)). The Taskforce suggested the need for "exit strategies" for interested farmers, including one which involves land conservation and wetland restoration.

Over the past 10 years, DER has worked with local, state, and federal partners to restore wetlands and streams across approximately 300 acres of retired cranberry farmland. On many former farms, such work is needed to address legacy impacts (e.g. sand fill, ditches, water controls) and restore healthy wetlands. Building on this past experience, and in response to the current context and need, we are excited to announce our new **Cranberry Bog Program**. Under this new Program, DER will work with interested landowners to complete on-the-ground wetland restoration projects on retired cranberry farms. By partnering with the USDA Natural Resources Conservation Service, Cape Cod Cranberry Growers Association, Towns, and local land trusts, we hope to make options for "green exit strategies" more available. The Cranberry Bog Program has a strong learning component as well, intended to document the effects of restoration and improve practice over time. Groups such as [Living Observatory](#), UMass Amherst, Mount Holyoke College, Wood Hole Research Center, and others are already working together and with DER to find these answers.

With a short walk at Mass Audubon's new [Tidmarsh Wildlife Sanctuary](#) - previously a commercial cranberry farm (Tidmarsh Farms) restored to wetlands with DER's assistance - one can see the benefits of restoring wetlands on these lands. Such projects can help improve water quality, expand

biological diversity (already more birds and plants are making Tidmarsh their home), protect low lying coastal areas from future storm damage, and provide access to recreational opportunities on beautiful protected open space.

For more information, please contact Alex Hackman, Cranberry Bog Program Manager, at 617-626-1548 or [alex.hackman@state.ma.us](mailto:alex.hackman@state.ma.us). Stay tuned for future updates, including about our new and on-going restoration projects in Freetown, Harwich, Falmouth, Plymouth, and more.

### **DER Announces Year Four of the UMass Dam Removal Practicum**

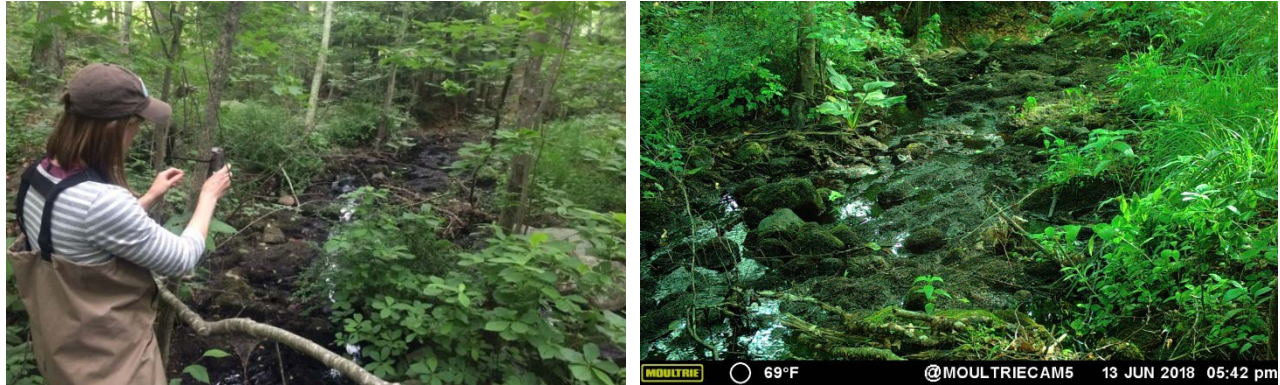


*Dam practicum held at Rattlesnake Brook Restoration. Photo Courtesy of Patricia J. Murphy.*

This fall, DER and the University of Massachusetts Amherst will partner for the fourth consecutive year to offer an independent study for graduate and undergraduate students interested in learning about dam removal and river restoration efforts in Massachusetts. The Dam Removal Practicum (as it is known at UMass) exposes and integrates students into the project management teams that are working to advance various dam removals throughout the Commonwealth. In each of the previous academic years, students from the Civil Engineering and Environmental Conservation Departments at UMass have been selected to participate in the course. Students attend dam removal public meetings, participate in project team meetings, review technical deliverables such as engineering plans, hydraulic studies, or permit applications, and witness dam deconstruction in progress. DER's primary goal for the course is to educate and cultivate future ecological restoration practitioners and assist students with making professional connections for possible career opportunities. The Dam Removal Practicum is funded in part by the National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grant Program.



## Streamflow Release Prioritization Tool and Pilot Project



*Left: DER staff set up time-lapse camera at stream site downstream of managed lake. Right: Image captured by time-lapse camera at site downstream of managed lake.*

Many lakes and impoundments in Massachusetts have dams at their outlets that can be used to manage lake levels for a variety of reasons, including winter water level drawdowns to control aquatic invasive species and protect infrastructure. Dam management can have varying hydrological, thermal, and biological effects on downstream ecosystems. When lakes are drawn down in the fall, higher sustained flows than normally occur in fall are observed downstream. Conversely, when lakes are refilled in the spring, the high flows that would normally occur in rivers downstream are reduced. Additionally, lack of dam management in the summer months can result in low- and no-flow periods, causing stress to aquatic organisms. DER is working to identify and prioritize lakes and impoundments where dam management can be altered to provide ecological benefit to downstream ecosystems, while balancing in-lake needs.

For the first phase of the project, we conducted a GIS-based prioritization of potential sites. We used the 2921 dams mapped in the DER Restoration Potential Model as the basis for analysis. We narrowed these to a subset of 104 dams that have a history of winter drawdowns. We then assessed sites for potential downstream ecological benefit based on distance to nearest downstream impoundment, BioMap2 Aquatic Core or Buffer habitat, and Coldwater Fish Resources. We eliminated sites with stressors that would conflict with a streamflow release program, such as a lake impaired by poor water quality or an excess of water discharged to the stream system. After these screening steps, we identified and ranked 16 sites as potential candidates for flow releases from managed dams.

In the second phase, we are evaluating and documenting existing flow conditions at selected sites. To do this, we deployed time-lapse cameras at 4 of the highest ranked sites this June and will be monitoring the sites as the summer and fall progress. Using time-lapse cameras to document low-flow conditions is already done by the Connecticut Department of Energy and Environmental Protection. This novel approach is less time and resource intensive than installing a staff gage and provides additional visual information to assess flows. Based on the assessed conditions, we will conduct further evaluation and modeling in order to pilot changes to dam management at selected sites.

## Flood Protection and Tidal Restoration –Finding Balance at Town Creek (Salisbury)



*Left: Location of tidal monitoring equipment at Town Creek. Middle and Right: Measuring opening size and elevation at the Town Creek Tide Gate (Figure and photos by Woods Hole Group, Inc.).*

The use of structures such as seawalls, dikes and dams to protect homes and business from the effects of flooding is certainly not a new concept. For example, historians point back to the Byzantium seawalls, built primarily for protection but maintained and expanded on the seaward side according to early written records almost 400 years after initial construction attributed to Constanine I. Other well-known examples include The Dutch windmills, pumps and dikes to control coastal flooding for lands below sea level and the levees and dikes in Louisiana, brought to national attention more recently after Hurricane Katrina.

Massachusetts has its own rich history and relationship with flood protection measures such as the New Bedford Hurricane Barrier. However, there are many examples across Massachusetts that are smaller in size and scale, such as Town Creek in Salisbury. Dating back to the late 1800's, a rail line was constructed across the marsh and creek system, effectively creating a dike. Where the rail line crossed the creek, a granite culvert with a wooden flap-style tide gate was installed in the rail bed to help protect upstream areas against flooding from the Merrimack River and from storm tides. However, the tide gate also prevented salt water from entering upstream tidal wetlands which resulted in severe impairment of this coastal habitat. The prolonged restriction of tidal flow to the salt marsh upstream was akin to cutting off the circulatory system of this complex habitat, impeding freshwater drainage and “clogging” the upstream marsh with impounded waters that also reduced storage capacity that can aid in reducing flooding in the event of storms. The impaired hydrology also facilitated the decline of native salt marsh grasses, and the spread of invasive *Phragmites*, and cut off access to nursery and feeding grounds for important commercial fisheries.

After major flood events in 2005, 2006, and 2007 overtopped the rail bed, flooded out several business and closed Route 1, a major thoroughfare, for days, the Town responded by implementing the Town Creek Flood Hazard Mitigation & Wetland Restoration Project. Completed and initially opened in 2014, the new culverts and tide gates were designed to improve flood control while also allowing reintroduction of more natural tides that had been blocked from the system for more than 150 years. The approach, developed through partnership with the Town, State and Federal agencies, was designed with joint goals of flood protection and habitat restoration, relying on management of the tide gates to achieve a delicate balance.



It is imperative to recognize that while the project was completed in 2014, the work does not end with installing the tide gates and setting an opening. Tide gates and other control structures require continued attention. The benefits of habitat restoration and flood protection can be significant, but these structures cannot be managed with a set-it and forget-it approach, instead they require diligent observation, monitoring and management. The removal of restrictions and tide gates is the most preferred option for restoration of ecological processes and habitat but full removal may not always be practicable due to constraints created by pre-existing low lying infrastructure. Such is the case at Town Creek, where pre-existing upstream development required a balanced management approach.

The Town of Salisbury continues to monitor response upstream and DER is supporting the Town in its efforts to find balance and restore this system. This Spring, DER, through a consulting contract with the Woods Hole Group, assisted the town with hydrology study of Town Creek, including comprehensive tidal monitoring, comparing the upstream response of tides and performance of the tide gates with downstream tidal conditions. Initial results suggest that while a natural tidal flow pattern has been reestablished, there may be room for additional adjustment of the gates. Pending completion of the Town Creek hydrology study, the Town, DER, and partners will review findings and assist the Town in developing management actions going forward.

## Division of Ecological Restoration Project Updates

### Fearing Brook, Amherst Update - Exciting Times



*Highly incised channel of Fearing Brook off College Street (Photo by Horsley Witten Group).*

There is no denying Fearing Brook's pedigree as an urban stream. Perusing the earliest available topographic maps, from the late 1800's, shows the brook already manipulated, buried and straightened. Concerned about the condition of Fearing Brook, the town of Amherst applied to DER for Priority Project status. DER granted provisional status for this project and is working with the town to identify ways to revitalize their overlooked downtown stream. While it is unrealistic to aim for a complete restoration of Fearing Brook to reflect its pre-Colonial condition, DER worked with the town to identify priorities for the community and a path forward. Initial steps included review of past investigations by students at nearby Hampshire College and UMass Amherst and a

town-commissioned study funded through MA Environmental Trust. This foundation work was followed by an overarching assessment of the stream to identify major stressors and potential restoration projects. The focus was to identify actions with the real potential to improve water quality, stream stability and riverine function. The field assessment coupled with previous investigations provided the information needed to develop a list of recommended river enhancement projects, which the town of Amherst then ranked.

DER was able to work with consultants to advance the three top projects to concept plan level. Two projects are located at nearly the first visible upstream section of Fearing Brook - near College Street and downtown Amherst. The stream is mostly buried above this section, running through stormwater pipes before daylighting into a deep channel scoured by years of stormwater flows. To help mediate the situation two complementary concepts were developed. One project will work to capture and infiltrate stormwater runoff from a large parking area and buildings to the west of the brook. The second, more challenging, project will work to rectify the deeply incised channel shown in the image above. The concept developed includes reworking the channel to raise the stream bottom and creating a lower flow channel, stabilize the banks using bioengineering methods and create a modest terrace below the top of bank that will function as a floodplain. Both of these projects will help improve water quality and stream stability.

The third concept design is at the other end of Fearing Brook as it enters Fort River and also involves floodplain. In this stretch of river Fearing Brook flows through a confined channel bookended by high earthen banks. The proposed design would eliminate the berm on one side of the stream to allow Fearing Brook to reconnect with its historic floodplain. The project was carefully designed to avoid increasing the height of flood waters while maximizing water quality benefits. DER will continue to work with the Town of Amherst to refine the concepts, engage the community and eventually implement the projects. There is great potential for Fearing Brook to become a rediscovered asset for the town and a classroom for students of the nearby colleges interested in restoration practice.

### **High Street Dam Removal Feasibility Study (Bridgewater)**

The Nature Conservancy, in partnership with the DER and the Division of Marine Fisheries, completed an engineering feasibility study to investigate the removal of the High Street Dam (a.k.a. Jenkins Pond Dam) on the Town River in Bridgewater. The dam serves no purpose for its private owner, is rated as “Unsafe” and a “Significant Hazard” by the MA Office of Dam Safety, and jeopardizes the 170-year-old High Street Bridge.



The dam and bridge impede migratory fish passage, interrupts natural river processes, and contribute to local flooding. The Nature Conservancy, DER, and Division of Marine Fisheries held a public meeting in April 2018 to discuss the results of the feasibility study, explain possible future

restoration designs, and solicit public comment. The project team, which includes the Town of Bridgewater, is currently seeking state and federal funding to advance preliminary designs for the dam removal and bridge replacement. The next phase of the project is anticipated to begin in the fall of 2018.

### Coonamesett River Restoration (Falmouth)



*Left: DER's Beth Lambert and partners at May 6 celebration, photo courtesy of Christopher Neill. Middle and right: The site after completion of Phase 1 of the Coonamesett River Restoration Project.*

On May 6, DER, NOAA, the Town of Falmouth, Coonamesett River Trust, and over 100 individuals representing project partners, family, friends and members of the community celebrated the completion of Phase 1 of the Coonamesett River Restoration Project. This phase, which kicked off in October 2017, included removal of the first dam from the ocean on the Coonamesett River, as well as restoration of wetlands and riverine habitat in an 11-acre former cranberry bog just upstream of the dam. Speakers included Susan Moran, Chairman of the Falmouth Board of Selectman, Rep. David Vieira, Troy Clarkson, District Liaison for the Office of Viriato DeMacedo, Jim Turek of the NOAA Restoration Center, Jessica Whritenour of the 300 Committee Land Trust, Wendi Buessler of the Coonamesett River Trust, and DER's own Director, Beth Lambert. Other activities included a formal ribbon cutting ceremony, site tours, and a PIT tagging demonstration (Passive Integrated Transponder tagging is a means of tracking the migratory habits of fish, in this case, herring.)

Phase 2 is currently in the design and permitting phase, and will include removal of the next dam upstream, replacement of a failing culvert carrying John Parker Road over the Coonamesett River and restoration of wetlands and riverine habitat within the remaining 26 acres of the former cranberry bog held by the Town. Construction is anticipated to kick off in the fourth quarter of this year. This project will improve in-stream and riparian habitat, providing significant benefits to fish (particularly river herring) and other wildlife, as well as provide improved access for passive recreation and year-round programming.



## Dam Removal Underway at Upper Roberts Brook (Northampton)



*Left to Right: Dam removal well underway; channel forming about midway through previous impoundment; channel forming through the upper section of former impoundment.*

After many years of design, permitting, and public engagement, removal of the Upper Roberts Meadow Reservoir Dam began in June. Work is being performed by SumCo-Eco Contracting with demolition oversight provided by project engineer GZA GeoEnvironmental, Inc. Funding from the state to support project implementation includes a \$634,000 grant from the Dam and Seawall Repair and Removal Fund, as well as a \$25,000 grant from DER. The project allowed the City to decommission an obsolete and unsafe structure, and to promote restoration of this coldwater stream. DER staff has provided several years of technical support to City of Northampton, focusing primarily on sediment management. The project involves a staged removal and downstream monitoring to help assess and address any risks posed by the downstream release of sediment from the former impoundment.

Downstream ecological impacts are expected to be short-lived, and then transition to permanent benefits as the degraded channel receives inputs of habitat-forming sediment and organic matter. By mid-July, the contractors had removed enough of the dam to fully drain the former impoundment and initiate the upstream channel restoration processes. MassWildlife and local universities are assisting with biological and water quality monitoring. As shown in these photos, the restored channel in the former impoundment is already looking good, with a gravel bottom quickly reforming. More physical adjustment will occur in the months ahead, along with revegetation in the former impoundment. All of this is good news for the local trout population, who now have access restored to approximately 4 miles of clean, coldwater habitat in the upper watershed. DER looks forward to more coordination with the City of Northampton in the months ahead as the project wraps up.

## After Restoration, Rivers Flow Freely (Andover, Scituate, East Bridgewater)



*Left to Right: Shawsheen River, Bound Brook, and Satucket River.*

In 2017 DER and partners removed the Balmoral and Marland Place Dams on the Shawsheen River in Andover, the Hunters Pond Dam on Bound Brook in Scituate and the Cotton Gin Dam on the Satucket River in East Bridgewater. The dam removals opened up 23 miles and improved access for river herring to 900 acres of spawning habitat. This past spring DER and partners monitored the sites for herring. While no fish were sighted at the former dam sites of Cotton Gin or Bound Brook during monitoring this spring, local residents have observed river herring upstream of both sites. MassBays National Estuary Program will continue to lead fish counts at Bound Brook and DER will continue to monitor at Satucket River. At the Shawsheen site in Andover, just over one year since the completion of two dam removal, local observers continue to monitor encouraging numbers of river herring migrating past the sites to spawn upstream.

## South River Restoration Project Advances (Duxbury and Marshfield)



*Impounded waters behind the Temple Street Dam in Duxbury.*

The South River originates in the red maple swamps of Duxbury and flows to Massachusetts Bay in Marshfield. In 2016, DER awarded Priority Project status to the restoration of the South River. The project involves restoration actions in both Marshfield and Duxbury. Partners on the project include



the North and South Rivers Watershed Association, Mass Bays and the towns of Duxbury and Marshfield. The River is home to alewife, blueback herring, American eel, and sea lamprey. American shad spawn at the head of tide and its tributaries have isolated populations of wild eastern brook trout. The mainstem of the South River has three dams and multiple cranberry bogs.

This spring, important advancements were made at two sites. First, in Marshfield, DER worked with town officials, the North and South Rivers Watershed Association, and the Marshfield Veterans of Foreign Wars to develop a concept for removing the Veterans Memorial Park Dam. This dam impairs fish passage and affects the hydrology of the river at the head of tide. The Town and the Veterans who maintain the park were interested in making improvements to the amenities there. With help from DER and consultants Fuss & O'Neil, Inc. the project partners developed a concept plan that would enhance the park and restore the river's ecological functions by removing the dam. In the coming year the project team will collaborate to develop engineering design plans to further hone the project details.

Upstream in Duxbury, DER supported the Town with a grant to investigate potential hydraulic changes that might result from removing the Temple Street Dam. This small dam blocks all fish migration upstream and is a maintenance burden for the Town. Removal of the dam would benefit wild brook trout populations and allow migratory species to move further up into the watershed. The hydraulic analysis was also supported by a grant from the Massachusetts Environmental Trust. In the coming year, the engineering analysis will continue and those results will be shared with the community.

### **DER Awards Funding to Three Priority Projects (Truro, Wellfleet, Marshfield, Duxbury, Chilmark)**

In July, DER awarded grants totaling \$727,000 to river and wetland restoration projects in Truro and Wellfleet, Chilmark, and Duxbury and Marshfield through our Priority Projects Program. You can read the [full press release for more information](#). Projects receiving program funds are:

#### **Herring River Estuary Restoration, Truro and Wellfleet**

- One of the largest ecological restoration projects in the Northeast, this project will rebuild the main dike at the river's mouth, install new structures with the ability to increase tidal flow, and make other improvements across the estuary, allowing carefully controlled restoration of tidal flow to the ecosystem while protecting low-lying roads and other structures from flooding. Reconnecting the estuary to the ocean will improve water quality, increase habitat productivity for fisheries and other wildlife, restore large areas of shellfish beds, and enhance boating, fishing, and other commercial and recreational opportunities.



*State, federal and local partners gather at the Herring River Estuary Restoration site to announce grants. Photo Courtesy of Laurie Warner.*

**Mill Brook Headwaters Restoration, Chilmark** - The upper portions of Mill Brook support wild brook trout as well as American brook lamprey, a rare species that has been designated Threatened by the Massachusetts Natural Heritage and Endangered Species Program. The Sheriff's Meadow Foundation will replace two undersized culverts that block fish passage and impair water quality with a larger structure that provides passage for fish and wildlife and contributes to a safer road.

**South River Restoration, Duxbury and Marshfield** - The Towns of Duxbury and Marshfield are working with the North and South Rivers Watershed Association and DER on design and permitting to remove two river barriers: Veteran's Pond Dam, located at the mouth of the river, and owned by the Town of Marshfield, and Temple Street Dam, owned by the Town of Duxbury. Both dam removal projects will increase municipal resilience to climate change, improve water quality, and benefit migratory fish such as river herring and American eel.

## Restoration Resources

### New RIFLS Website

The Streamflow Restoration program works with watershed associations and volunteers across the state to collect high quality streamflow data through its River Instream Flow Stewards (RIFLS) program. The RIFLS program has a new and greatly improved website that helps track this collected data. With this updated site volunteers can more easily enter the data and photos they collect. The data can then be viewed, graphed and downloaded.

## Events

### Northeastern Transportation & Wildlife Conference

The 2018 Northeastern Transportation & Wildlife Conference is being co-hosted by the Massachusetts Department of Transportation and the Massachusetts Department of Fish & Game. The conference will be held September 9-12, 2018 at UMass Amherst in Amherst, MA. This year's theme is "Partnering for Resilient Infrastructure and Ecosystems." You can now view an initial schedule including abstracts and register. Early bird registration ends August 29. Please join DER Stream Continuity Program staff at this meeting, and learn more about what DER is doing to help communities upgrade and replace road-stream crossings.

### **Urban River Restoration – The Shawsheen River Dam Removals**

Join DER's Nick Wildman and Kristopher Houle as they present in a webinar on the multi-dam removal project that took place on the Shawsheen River -an urban, flood-prone river in Massachusetts. Webinars are hosted by the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service. The webinar is August 9, 2018 (2-3 pm ET). Registration is now open.

### Environmental License Plates

The Massachusetts Environmental Trust (MET) provides funding to many river, wetland and other



water resources protection and restoration projects throughout the Commonwealth. A major source of MET's funding comes from the sale of environmental license plates. Getting an environmental plate is easy and can be done on-line, or in person at your local Registry of Motor Vehicles office.

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