Project Questions March 22, 2017

Cold Brook Ecological Restoration Project in Harwich Port MA

1. *Why are natural wetlands so important?*

    - Wetlands are complex ecosystems that provide valuable services to humans and animals alike.
    - Wetlands protect our water supplies by recharging ground and surface waters and filtering contaminants.
    - Wetlands help control flooding by storing water during storm events and slowly releasing it into surface and ground waters.
    - Wetlands protect people and property from storm damage by serving as natural buffers.
    - Wetlands improve the quality of our rivers, streams and lakes by filtering and reducing pollutants before reaching these water bodies
    - Wetlands provide a place for fish and shellfish to spawn and grow, preserving our key fisheries and supporting ecosystems.
    - Wetlands are important wildlife habitat that provides food, shelter, breeding areas, and migration corridors for both wetlands and uplands wildlife.
    - Wetlands are beautiful areas of open space that provide enjoyment and increase property values.

    (Source: http://www.mass.gov/eea/agencies/massdep/water/watersheds/wetlands-loss-maps-qa.html)

2. *How many acres of natural wetlands are there in Massachusetts now? How many acres has the state lost?*

    Currently, there are over 48,000 acres of wetlands in Massachusetts. From 1991 to 2001, 800 acres of wetlands were lost or altered in the state. An additional 450 acres were either lost or altered in the state from 2001 to 2005. With recent cuts to the agencies that regulate these critical areas, we expect that additional loss of wetlands will occur due to lack of oversight and enforcement.

    (Source: http://www.mass.gov/eea/agencies/massdep/water/watersheds/wetlands-loss-maps-qa.html)

3. *What kinds of land development impact wetlands the most?*

    The Massachusetts Department of Environmental Protection (MA DEP) has identified four major types of land development that have the greatest impact on wetlands: cranberry bogs, residential development, commercial development, and gravel

operations. These identified uses account for most of the changes found in wetland resource areas to date.

(Source: http://www.mass.gov/eea/agencies/massdep/water/watersheds/wetlands-loss-maps-qa.html)

In the 1600s, more than 220 million acres of wetlands are thought to have existed in the lower 48 states. Since then, extensive losses have occurred, and over half of these wetlands have been drained and converted to other uses. The years from the mid-1950s to the mid-1970s were a time of major wetland loss, but since then the rate of loss has decreased significantly.

In addition to these losses, many other wetlands have been degraded, although assessing the magnitude of the degradation is difficult. These losses, as well as degradation, have greatly diminished U.S. wetlands resources, resulting in significant impacts to the benefits they provided. Recent increases in flood damages, drought damages, declining water quality, and decreasing fish and bird populations are, in part, the result of wetlands degradation and destruction.

Wetland biology has been degraded in ways that are not as obvious as direct physical destruction or alteration. Threats include chemical contamination, increased nutrient inputs and eutrophication (nutrient over-enrichment), hydrologic modification, and sediment deposition from air- and water-borne sources. Global climate change may be affecting wetlands through increased air temperature; shifts in precipitation distribution and quantity; increased frequency of storms, droughts, and floods; increased atmospheric carbon dioxide concentration; and sea level rise. All of these impacts can affect species composition and wetland functions.

(Source: http://www.mass.gov/eea/agencies/czm/program-areas/coastal-habitat/coastal-wetlands/massachusetts-wetlands.html)

4. *The Cold Brook site on Bank Street looks rather natural right now, but could it be changed back to a cranberry bog?*

The short answer is no. Cranberry bogs have been and continue to be an important part of Cape history and current culture. Over the past two decades in particular, an over-supply of cranberries from the Midwest and Canada has pushed down prices and led some local growers to seek alternatives for their bog properties like selling for conservation to local land trusts or towns.

In 2001, the prior owner of the land was looking to transition out of the cranberry business and sold the land to Harwich Conservation Trust (HCT). Much of the site had not been recently harvested and the site's bog infrastructure including sprinkler heads,

irrigation lines, pump houses, and flumes had deteriorated. HCT began to research the possibility of revitalizing cranberry operations at the site, and sought farming proposals from bog farmers across southeastern Massachusetts, but the depressed and volatile cranberry market resulted in very little interest. HCT researched investing in re-farming the site, but the costs were too high. Therefore, HCT started down the path of planning to enhance the ecological function and biodiversity of the property by remediating the impacts of past agriculture practices.

It should be noted that HCT has been involved with other bog acquisitions, and the future disposition of each bog is made on a case-by-case basis. For example, HCT actually acquired an active bog in 2014 that was in excellent farming condition in North Harwich and that is currently leased to an Ocean Spray grower. Acquiring this other site also resulted in extinguishing a building lot right across from the Town swimming beach on Sand Pond, thereby preserving the public view. HCT continues to be interested in acquiring cranberry bog properties in varying conditions.

5. *How does the Cold Brook Eco-Restoration Project relate to biological conservation? Left alone, won't this site develop into a diverse area of swamp or forest?*

The formation and maintenance of aquatic/wetland ecosystem structure and function over time is driven by the movement and storage of water. Other key ecological processes are linked (i.e. the movement and storage of sediment, organic matter, nutrients, organisms, etc.), but it's mostly about the hydrology. This is the simple basis for how we think about ecological restoration in this type of environment. Cranberry farming typically leaves agricultural impacts that fundamentally alter the movement and storage of water. For example:

- Perimeter and lateral ditches that drain the land;
- An anthropogenic (i.e. human-created) sand layer that separates the ground surface from the water table below;
- A heavy, dense cranberry mat the compacts underlying soil and prevents natural spring upwelling; and,
- Simplified physical structure of stream channels that rapidly moves water off site and provides limited habitat for organisms.

Together, these leftover agricultural impacts tend to (in most cases) dry out the site and make it less likely that a wetland may persist over time. In many cases, whole landscapes or large swaths can convert to upland plant communities.

Targeted restoration interventions seek to address these agricultural impacts. The primary goals are: (1) Increase hydrologic residence time (i.e., hold water on site within reason relative to surrounding development), and (2) re-establish habitat connectivity.

Restoration actions to achieve this typically involve using heavy equipment to break up the soil surface, plug ditches, remove pockets of sand, reconfigure stream meander patterns, and add lots of wood (i.e. logs, stumps). These actions result in a disturbance event. The intention is for the disturbance to promote rejuvenation as soils are un-compacted, peat is brought to the surface and mixed with the sand, springs emerge, dry surfaces become wet, the dormant seed bank is stimulated, naturalized roughness is added, and water moves more slowly and stays on site longer. The placement of large wood kick starts habitat formation, providing foraging, sheltering and nesting opportunities for wildlife that would take decades or more to develop.

HCT believes that this eco-restoration direction provides a more sustainable, biodiverse, and climate-change resilient future for the site. With its partners, the Massachusetts Division of Ecological Restoration and U.S. Fish & Wildlife Service, HCT has the opportunity to restore the natural processes to the site, resulting in what we hope will become a more self-sustainable, biodiverse natural wetland and stream community.

6. *Will the view stay the same from Bank Street?*

   The view will remain mostly the same in the short-term (estimate: 10-20 years). An open view from Bank Street across the property may remain for some time on the north side of Cold Brook considering the contemplated native, wetland plant communities and perhaps open water features. On the south side of Cold Brook, trees will begin to mature and create shade for Cold Brook, which benefits stream health.

7. *What type of plant communities will change/ stay the same?*

   Once construction is complete, we expect that the majority of the plant communities within the retired bog areas will be dominated by wetland species, whereas currently there is a greater mix of wetland and upland species. Many of the current wetland species will come to dominate the site as natural succession progresses. Upland areas will also re-vegetate with many of the species growing along the margins of the property. There is expected to be an expanding salt marsh community in the southernmost portion of the site as sea level rise begins to exert greater influence.

8. *Will there still be walking trails?*

   The layout of the walking trails will generally remain the same, although there may be some alterations (example: pedestrian footbridges) to promote fish passage and other animal movement. There may be slight changes to some of the trails to allow for wheelchair accessibility on one loop, and we may be expanding the trail system.

9. *How long will this project take?*

   We hope that permitting and design will be completed by early 2018. Construction should begin early-to-mid 2018. We anticipate that the trails will be re-opened in the spring of 2019.

10. *How much will this cost?*

    The total estimated cost of planning, permitting, and construction is between $1.25 - $1.5 million, but these are estimates based on the conceptual design. This figure will be refined as we move through the design process.

11. *Where will the parking area be now that the Town is looking to sell the Harbormaster's lot?*

    HCT is actually seeking to acquire the Town-owned Harbormaster's Workshop property. Owning this property would allow for long-term use and increased parking for the Cold Brook Preserve. If HCT does not end up acquiring the property, then it is hoped that HCT can negotiate parking on a portion of the site. There is another part of the Cold Brook Preserve off Bank Street that could provide a few spaces, but it would require some substantial re-grading.

12. *Will the initial disturbance created by the ecological restoration be a trigger for invasive plants?*

    Invasive plants are non-native species that proliferate due to their ability to out-compete native species. In doing so, these plants create self-sustaining populations that can dominate the ecosystems in which they establish and be disruptive/damaging to those systems by reducing biodiversity (among other things). These species can spread under both normal circumstances and disturbance events. The Cold Brook Preserve does contain small populations of certain invasive species, and the HCT Stewardship team has an existing management plan in place to control those that are the most disruptive.

    The proposed restoration project will result in significant ground disturbance, which has the potential to serve as a medium for invasive species establishment. However, there are a number of strategies we can take to minimize this potential:

    - **Pre-restoration invasive plant control.** Targeted control of existing invasive species populations will help limit the potential for spread during implementation of the restoration. This is already underway through the HCT Stewardship team's existing efforts.

- **Construction best practices**. Construction equipment brought to the site can be a source of new invasive plants. To address this risk, best practices will be implemented by the contractor, including thorough equipment cleaning prior to entering the site.
- **Exposure and activation of native seed bank.** The native soils underlying the surface sand layer contain a dormant seed bank, which, once exposed to the surface, will activate. Previous cranberry bog restoration projects have seen re-establishment of dense groundcover of native plants within 3-4 months after exposure. Quick establishment of native plants is key to preventing invasive colonization. The two cranberry projects completed to date, have seen great success using this method.
- **Seeding.** In areas where we cannot leverage the existing seedbank, quick establishment of groundcover will be achieved through seeding.
- **On-going post-implementation monitoring and management.** This will identify invasive species which may have established, and quickly respond with appropriate control actions.

Specific strategies will be outlined in an invasive species management plan, which will be developed concurrently with the design plans. We do not expect that this project will result in a greater abundance of invasive species than currently exists. The two completed eco-restoration projects on retired cranberry bog systems in Plymouth, Massachusetts are largely invasive free, and, as conservation property, will continue to be monitored and managed.

13. *How will the project be paid for?*

To date, project funding has consisted of a series of federal and state grants, as well as direct funding from the Massachusetts Division of Ecological Restoration. Grants usually represent the bulk of the funds used to pay for these projects. However, many projects use other sources of funding as well, including private and public monies.

14. *Are there contaminants present on site? Will restoration actions mobilize these contaminants and contaminate additional areas.*

Soil sampling was performed on the site in 2012 to help the project team consider potential pollution-based risks and limitations to restoration activities. In summary, only very low concentrations of common pollutants were found. For example, heavy metals and petroleum type pollutants were generally found at concentrations at or below the laboratory detection limit. There is no evidence of a spill or release that would require

notification or cleanup under the Commonwealth's rigorous regulations for soil and groundwater (Massachusetts Contingency Plan or "MCP"; 310 CMR 40.0000).

The 2012 testing also included an investigation of legacy pesticides, particularly those banned in the 1970s and 1980s. The presence of legacy pesticides is common on cranberry farms, and can include chemicals such as DDT, Aldrin, Dieldrin, Chlordane, and others that are known to persist over time in the environment and pose potential risks. Sampling conducted during restoration planning at other retired cranberry farms in the state often identifies elevated concentrations of such pollutants, so extra attention is given to identify such risks. At the Cold Brook Preserve, only very low concentrations of such pesticides were observed. In fact, every sample analyzed in the laboratory was found to contain concentrations well below even the most stringent human health standards. It should also be noted that the risk of pesticides mobilizing and spreading to additional areas is extremely low. These long-banned substances are insoluble and bind strongly to soil particles.

This project will involve excavation and movement of material within wetlands and waterways (what the State refers to as "dredging"). State authorization is required for dredging and accomplished via the 401 Water Quality Certification process through MassDEP. This process will require that sampling data be submitted for review, and these data must be recent. As such, confirmatory sampling will be performed as we get closer to permitting. Given the 2012 findings, the project team does not anticipate any pollution related concerns or limitations on site activities, including on-site or off-site reuse of the soils.

15. *Where will the species that currently reside in the bog complex go during implementation of the restoration plan? Will some species die?*

Like any disturbance event (e.g., fire, hurricane, etc.) this project will have varying effects on the species that reside in or use portions of the bog. Species that are highly mobile (e.g., birds, fish, larger mammals, etc.) will move to portions of the site that are undisturbed, or other nearby habitat, and may return immediately after restoration is complete, or after a period of natural succession occurs. Of greater concern are those animals with limited mobility (e.g., reptiles, amphibians), and particularly those who do not respond well to disturbance. It is expected that there will be a certain degree of mortality amongst these smaller, less mobile species. However, based on previous experience working on similar projects, we do not expect this to be significant, and work will result in a condition that ultimately benefits these species. In many cases, surrounding wetlands outside of the proposed work area can serve as source populations for species that might be impacted. That being said, there are actions we can take to minimize mortality during construction, including (but not limited to) the following:

- Timing our work to avoid the breeding season of those species of concern;
- Creating exclusion zones during work; and
- Conducting sweeps in active work areas and relocating identified species to protected areas of the site.

Some of these strategies will be developed during the design process, while others may be dictated through the permitting process based on specific species of concern. We will update our response as we move forward with design and permitting and can provide greater detail.

16. *Will my basement be flooded? What will happen if my basement floods after construction is complete?*

    It is our clear intention to avoid any design that has the potential to flood basements or low-lying neighboring properties. Based upon what we know now, we have no reason to believe that the proposed restoration actions will increase basement flooding. To help assess that issue, in 2012 the project team installed monitoring wells within the bog itself and several neighboring properties to understand how groundwater fluctuates and moves. Initial observations suggest that flooding will not be an issue. As we move through the design process, we will continue to explore the potential for flooding within basements and low-lying areas adjacent to the preserve, and will adjust the design as necessary to avoid such an occurrence. Keep in mind, while the design intends to liberate groundwater, the water surface elevation will, in most, cases, remain the same. We are simply allowing groundwater to express itself at or near the surface.

    The project team invites input from adjacent property owners. If you are currently having basement flooding issues, or have had flooding issues in the past, please bring that information forward to our attention so we can assess your situation and plan accordingly.

17. *Why is vehicular access being maintained for authorized HCT vehicles?*

    HCT needs to maintain vehicular access for a variety of reasons. Being a conservation property that allows public recreation, there are situations that may require emergency personnel (e.g., police/fire/EMS) and their equipment to enter the property. In addition, our land stewardship team needs access to haul equipment needed to perform various maintenance activities (e.g., mowing, invasive species management, etc.). Lastly, we require access for setup and breakdown of various events, such as the “Wildlands Music and Art Stroll”.

18. *Will there be significant disruption to the surrounding neighborhood during implementation of the restoration plan (e.g., noise, traffic, etc.)?*

    As with most projects that require significant earthwork, there is the potential for short-term increases in daytime disruption. This project will require the use of heavy equipment (e.g., dump trucks, excavators, bulldozers, etc.), pumps, generators, and various power tools. However, work will generally occur during the day and will be confined to the site. We do not anticipate much, if any, increase in traffic on Bank Street; once equipment is delivered it will generally stay on site for the duration of the project. We also do not foresee the need for "off-hours" work, although there may be rare instances where a pump or generator must run overnight. That being said, we cannot anticipate every issue that may arise during construction. As such, regular communication between the contractor, project partners, and the community before and during construction is of the utmost importance. As we move closer to implementation, we will have a clearer picture of what disruption may occur, and will communicate those issues to the public and how we plan to mitigate for them. During implementation, we will work with the contractor to ensure that any activities that may affect our neighbors will be rapidly identified and communicated to us. We will then post that information on our website on the same resource webpage where these questions are found.

19. *Don't mosquitos breed in wetlands? Will there be an increase in mosquitos after restoration is complete?*

    Like many insects, mosquitos require water to complete their life cycle. Any body of water that is stagnant (or very slow moving) and persists for a week or more can be utilized by mosquitos. As such, most wetlands have the potential to host breeding populations of mosquitos. However, anecdotal observations at the Eel River Preserve in Plymouth, MA (the first cranberry bog restoration project completed in Massachusetts) suggest that increased populations of certain predatory species (e.g., dragonflies, damselflies and others) have largely kept mosquito populations in check. We recognize the need to be thoughtful about this topic, particularly in the context of vector-borne diseases. As we continue to work through the design process, we will consider ways to minimize mosquito populations at the site.