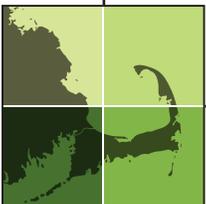


LAND MANAGEMENT PLAN

PREPARED FOR: 41 Mill Pond Lane
Chatham, MA

January 29th, 2018



CRAWFORD LAND MANAGEMENT

Ecological Restoration + Conservation Permitting

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PROJECT INTRODUCTION & GOALS

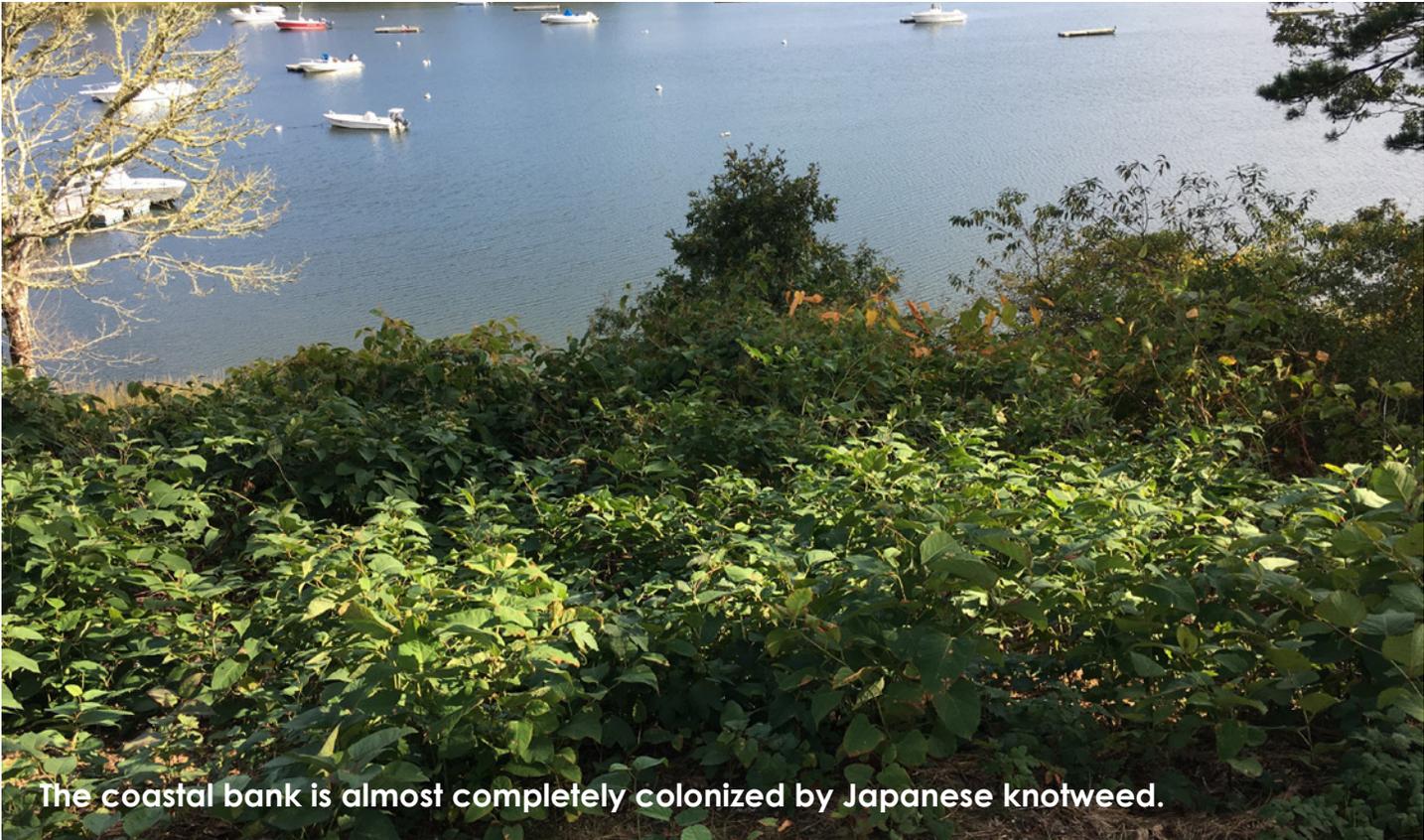
The residents at 41 Mill Pond Lane in Chatham, MA currently access Little Mill Pond via a footpath down to the waterfront across the adjacent property and neighboring dock at 57 Mill Pond Lane. To access their own dock they must cross approximately 80' of salt marsh or beach, depending on the tide. Though these neighbors are amenable to continuing the arrangement, questions of liability and the overall sustainability of the situation have led the owners at number 41 to pursue installation of their own set of stairs which would allow direct access to the water and dock on their own property. The property contains a heavily invaded coastal bank and coastal conservancy district with associated 50' and 100' buffers, a flood zone A, and a salt marsh. Despite its name, Little Mill Pond is, in reality, an inlet off Stage Harbor, and the pond is designated as Estimated and Priority habitat according to the Natural Heritage and Endangered Species Program (NHESP).

This Land Management Plan (LMP) proposes the restoration of native plant communities on the coastal bank as mitigation for the construction of a stairway leading down to the water's edge. Included within the scope of this undertaking are protocols for the removal of non-native, invasive, and aggressive vegetation on the coastal bank (including dense infestations of Japanese knotweed (*Fallopia japonica*), stabilization of soils on the coastal bank, and the re-vegetation of native plant communities. Crawford Land Management (CLM) asserts that these changes will result in increased habitat viability, biodiversity, and ecological function and therefore mitigate for the addition of the stairway to the coastal bank.





The understory of the wooded area is dominated by state listed invasive species.



The coastal bank is almost completely colonized by Japanese knotweed.



The knotweed extends all the way to the water's edge.

EXISTING CONDITIONS

The project area consists of approximately 11,800 square feet of naturalized area between the lawn and the water's edge; the vast majority falls within the coastal bank zone or the No Disturb Zone (NDZ).

Within the project area, native plant communities have been heavily invaded and degraded by invasive, non-native and aggressive species. The over-story woodland species are comprised of Black cherries (*Prunus serotina*), Black/Scarlet and White oaks (*Quercus velutina/coccinea* and *alba*, respectively), and Pitch pines (*Pinus rigida*). The understory is composed largely of Shrub and Vine honeysuckle (*Lonicera morrowii/bella* and *japonica*, respectively), with scattered Bayberry (*Morella pensylvanica*), Serviceberry (*Amelanchier canadensis*), and juvenile oak and pine. A large portion of the naturalized area is Japanese knotweed with sporadic Porcelain-berry (*Ampelopsis brevipedunculata*). The most significant patch of Japanese knotweed covers approximately 4,500 square feet of the coastal bank, directly between the edge of the lawn and the pond's edge. In this area the Japanese knotweed grows so thick that there is no vegetative ground cover, leaving the soil exposed and prone to erosion/run-off and sedimentation into Little Mill Pond. Outside of the Japanese knotweed area, the woodland understory of the NDZ is comprised mainly of Shrub honeysuckle and Border privet. Bayberry and black cherry persist but are almost outcompeted by knotweed. Sea-lavender (*Limonium carolinianum*) and marsh grasses (*Spartina spp.*) grow in the respective saltmarsh below.



PROPOSED ACTIVITIES

As mitigation for the stair access, this plan proposes to manage and remove invasive species and restore native plant communities in approximately 10,500 square feet of naturalized areas within the 100' Buffer. Approximately 1,300 square feet of naturalized area is proposed for invasive species management as an optional phase two if budget allows.

Area 1 Dense Japanese Knotweed (4,500 sf)

In the area that contains Japanese knotweed all old dead Japanese knotweed stalks will be removed while it is dormant in winter or early spring. The area will then be raked clean to expose bare mineral soil in order to prepare the soils for the custom native seed mix. Once the area has been seeded it will be stabilized with 100% biodegradable 15 month erosion control blankets, and staked in place with 12" hardwood stakes. During the first growing season after the initial restoration/removal is completed the Japanese knotweed will be allowed to grow to its full potential and treated in the late summer, or early fall depending on environmental conditions (refer Japanese Knotweed Treatment Protocol). Once the Japanese knotweed has been approximately 90% controlled the area will be re-vegetated (refer to Restoration Plan). All existing native shrubs in this area will be left in place. Where the presence of invasive species has caused structural deficiencies and poor growth patterns, regenerative pruning may be necessary to encourage new vigorous growth.

Area 2 Woodland Understory (4,340 sf plus 1,300 sf optional phase two)

The woodland understory area will also be restored. All invasive, non-native, and aggressive vegetation will be removed. If these species occur on a bank or slope they will be treated with a cut-and-wipe treatment method to leave the existing root systems in place to maintain soil stability. Species that are on relative flat terrain will be mechanically removed if feasible. Restored areas will then be raked clean to expose bare mineral soil in order to prepare the soils for the custom native seed mix. Once the area has been seeded it will either be stabilized with 100% biodegradable 15 month erosion control blankets and staked in place with 12" hardwood stakes, or covered with sterilized chopped straw. The portion of this area to the right of the path (if you are walking towards the water) is optional, and dependent on budget. All existing native shrubs in this area will be left in place. Where the presence of invasive species has caused structural deficiencies and poor growth patterns regenerative pruning may be necessary to encourage vigorous new growth.

Area 3 Norway Maple and English Ivy (1,300 sf)

This land management plan also calls for the removal of several invasive Norway maples (*Acer platanoides*), and the removal of a small area of aggressive, non-native English ivy (*Hedera helix*). The Norway maples will be treated with a cut-and-wipe treatment leaving the roots in place. The English ivy will be pre-treated with a low-volume foliar method, and then mechanically removed.

New Path to Proposed Stairs (80' lf)

In addition to the restoration work on the property, the first part of the footpath through the woodland to the water will remain and still be utilized. The remaining portion of the path will be closed and restored. A new section of footpath (approximately 80' long) will be established to lead you to the beginning of the proposed staircase to the water/dock. The footpath location was selected to work with native vegetation as well as with existing grades. No native vegetation will need to be removed to establish the footpath to the stairs. After the new

section of path is created the old section of trail that led to the neighboring property will be stabilized, re-vegetated, and closed off with one section of untreated split rail fencing.

MANAGEMENT ACTIVITY TIMELINE

INITIAL MANAGEMENT - WINTER | SPRING 2018

1. Pre-treat select target species with a low-volume foliar method.
2. Treat and remove all invasive, non-native species using an appropriate herbicide (Glyphosate-based or Triclopyr-based) using a cut and wipe treatment method, leaving existing root systems in place and maintaining soil stability.
3. Where feasible and when species appropriate mechanically remove invasive, non-native, and aggressive vegetation.
4. Rake restoration areas clean to expose bare mineral soil in preparation for custom native seed mix.
5. Seed all exposed soils in restoration areas to establish native vegetative groundcover.
6. Cover any sloping seeded areas with 100% biodegradable 15 month erosion control blankets, and stake in place with 100% biodegradable 12" hardwoods stakes.
7. Flat areas will be covered in a layer of sterilized chopped straw. These erosion measures will increase seed soil contact, improve germination, and reduce potential for erosion and runoff.
8. Rejuvenate any native shrub species uncovered in restoration area, if needed, with regenerative pruning techniques.

INITIAL JAPANESE KNOTWEED TREATMENT & PROTOCOL - SUMMER 2018

1. While dormant, mow previous years' dead stalks before current season of growth begins.
2. Allow Japanese knotweed to grow the entire growing season, undisturbed, to reach its full size and obtain as large stalk diameter as possible for stem injection. The larger the stems, the better the treatments' effectiveness.
3. Observe Japanese knotweed starting in late summer (usually the end of August) to ensure timing of stem injection is optimal. Typically, this is shortly after flowering.
4. Once the Japanese knotweed begins to flower, cut a test stem and make sure water in the plant does not well-up into the stem. When the stems can be cut and they do not well-up with water, it is an indication the plant is transferring above ground energy stores into the roots and an optimal time to stem inject.
5. When it has been established that timing is correct, cut the stems one-by-one and pierce the membrane between the nodes inside the stem. Inject the stems within 30 seconds of cutting with a concentrated Glyphosate product, per label rate. Typically the product is amended with the addition of a non-ionic surfactant to aid absorption into the plant's system for a more effective/efficient treatment.
6. Repeat and continue treatments in following years at the same time. Treatments can take several growing seasons to achieve complete eradication. Some Japanese knotweed may grow back in a witch-broom-like manner. These stems should be treated with a foliar

method on an as needed basis with Glyphosate any time during the season (although late summer/early fall is best). The foliar method's concentration should be in compliance with the label rate of the product.

MAINTENANCE - 2018-2021

1. Monitor restoration area and perform maintenance treatments or hand weed invasive, non-native, aggressive species that have germinated from existing seed bank, or re-sprouted from roots after removal. Site will be monitored and maintained throughout the year for both cool season and warm season invasive, non-native, and aggressive species.
2. Mow/ cut cool season grasses in June to encourage establishment of warm-season grasses, if necessary.
3. Prune dead, diseased, broken or interfering limbs to maintain health of overstory on site.

RESTORATION PLANTING

To be installed when invasive species have reached 90% eradication.

ONGOING MAINTENANCE

1. Property will remain under active management to eradicate invasive & non-native species through hand weeding, low-volume foliar herbicide applications, and/or cut & wipe treatments as necessary.

HERBICIDE APPLICATION INFORMATION

All herbicide applications will be performed by a Massachusetts State-Licensed and insured pesticide applicator proficient in plant identification, both in leaf and dormant. Herbicide applications will be either selective spot treatments (low-volume foliar when wind conditions are below 5 knots) or direct stem applications (cut and wipe). Using these methods of application safeguards native and desired species from over-spray and minimizes the total volume of herbicide needed to effectively manage the targeted invasive, non-native, and aggressive species. Herbicides used will contain Triclopyr or Glyphosate as their active ingredient.

Triclopyr is a selective herbicide and will be utilized for most invasive and aggressive broad leaved target species to ensure that native grasses are not damaged. Glyphosate will be used to manage vine and shrub honeysuckle as Triclopyr has been observed to have little or no effect. The highly selective herbicide applications will neutralize root materials left in the soil and inhibit new growth. Continual monitoring, maintenance treatments, and hand weeding will be ongoing.

MATERIALS

1. Heat-treated chopped straw (sterile)
2. 12-18 month erosion control blankets (100% biodegradable)
3. Hardwood stakes (100% biodegradable)
4. Garlon 4 Ultra - EPA Reg No 62719-527
5. RoundUp PROMAX - EPA Reg No 524-579
6. Native seed mixes custom blended by Ernst Conservation Seeds or provided by Colonial Seed Company