

Newton Conservators

Cold Spring Park: Red Maple Wetland

More survey of this site is needed for native tree, shrub, and herbaceous ground cover identification and exotic invasive shrub and vine distribution.

Exotic Invasive Woody Plants (unseen pests)

The entire Cold Spring Park, excluding the grassed playing fields, is overrun with a shrub layer of exotic invasive woody plants. A few areas have small, but dense stands of the herbaceous shrub-like perennial called Japanese knotweed. Other areas are concentrated with Asiatic bittersweet vines that are growing up and over native trees and shrubs of all ages. The exotic invasive tree species present in sporadic stands are Norway maple and Tree of Heaven.

Most of the spread of these plants began to accelerate or spread uncontrollably into unmanaged city and town forests and other land managed by non-profit conservation organizations after World War II as urban and suburban sprawl increased and open space (natural areas) decreased. The suburban woodlands remaining today are considered to have a high *natural heritage value* to the local communities where they are located. Unfortunately, the remaining native plant populations are slowly being pushed out or overtaken by the more aggressive exotic invasive plants.

Exotic Invasive Woody Plants at Cold Spring Park

Almost all of the thirteen or more species of exotic invasive plants are from Asia and were introduced into the United States for various horticultural reasons, erosion control and/or wildlife enhancement programs. Some of these plants were introduced into the U.S. over 100 years ago. They are the following woody plants, except where noted.

1. Glossy buckthorn (*Frangula alnus* = *Rhamnus frangula*): **Shrub.**
2. Asiatic bittersweet (*Celastrus orbiculatus*): **Vine.**
3. Multiflora rose (*Rosa multiflora*): **Shrub.**
4. Garlic mustard (*Alliaria petiolata*): **Herbaceous ground cover.**
5. Bush honeysuckle (*Lonicera spp.*): **Shrub.**
6. Winged euonymus (*Euonymus alatus*): **Shrub.**
7. Japanese barberry (*Berberis thunbergii*): **Shrub.**
8. Tree of Heaven (*Ailanthus altissima*): **Tree.**
9. Norway maple (*Acer platanoides*): **Tree.**
10. Japanese knotweed (*Fallopia japonica*): **Herbaceous Shrub-like perennial.**
11. Common buckthorn (*Rhamnus carthartica*): **Shrub.**
12. Common barberry (*Berberis vulgaris*): **Shrub.**
13. Black swallow – wort (*Vincetoxicum nigrum*): **? Vine.** Do any of you know if this is in the park?

The Infestation of Cold Spring Park

Over the past 50 years or so, the uncontrolled spread of exotic invasive woody plants have done more long - term ecological damage to Cold Spring Park than all of the competing plant diseases and insect pests combined. The difference is that insect pests

and tree and shrub diseases are seasonal and cyclical and their native plant hosts, in time, mostly recover. Healthy survivors successfully reproduce and fill in the space once occupied by the dead native plant or plants that succumbed to the insect pest or disease.

What the Newton Conservators are trying to do: Current Public Attitude Needs to Change about the Definition of What is a Pest

Many people do not view exotic invasive plants as threatening pests to our park as they do for the commonly encountered high profile insect pests. However, invasive plants in the park are *actual pests* to the site and its native plant ecology, and due to their *invasive traits*, are causing a slow decline in native plant species' germination, establishment, continued growth and, therefore, sustainability.

For example, unlike the quicker-acting winter moth infestations that reduce specific tree species vigor over a 5-to-10 year period, the invasive glossy buckthorn shrub layer invades the ground and currently is so dense that it is interrupting normal native plant reproduction cycles by co-competing for water, nutrients and soil space, and most importantly, creating too much shade for the native overstory to successfully seed itself in and regenerate.

It takes two or more seasons of winter moth infestations to raise alarm from homeowners and municipalities that something destructive is happening to our native trees, but little concern is raised by those same people (or most anyone else) about exotic invasive plant infestations. Insect damage is noticeable because it is **short - term** damage involving leaf loss. Native tree weakening or vigor loss due to intense competition by exotic invasive shrubs is harder to notice because (1) the exotic invasive woody shrubs are green and are assumed to be native; (2) native tree and shrub reproduction cycles are slowed or completely stopped due to increased shade created by the exotics and this process is a gradual one unnoticed by many; (3) native plant competition for water, nutrients, space and sunlight is reduced by the ever increasing and competitive shade casting glossy buckthorn and other invasive plant populations. The resulting stress results in reducing native tree and shrub vigor; trees and shrubs get weaker and become more subjected to other environmental stresses, pathogens and insect pests. This ecological problem is a **long - term** event and plagues all city and town conservation lands in the Commonwealth and beyond.

Most people are not aware of this problem; exotic invasive plants are viewed as just "green plants in the woods". In addition, there is another misconception about exotic invasive woody shrubs. Many in the garden design and garden installation business have erroneously assumed, in the far distant past and even recent past of 20 years ago, that all of these non-native 'ornamental' shrubs have the same ecological shade tolerance ratings as native shrubs that are classified as 'pioneer species' (i.e., shade intolerant).

Only a few native shrubs used in garden design projects are shade tolerant, such as pepperbush (*Clethra alnifolia*), spicebush (*Lindera benzoin*) or shade intermediate (mid-tolerant) like, rhododendron, azalea, and Kalmia. Shade - tolerant plants also grow in sunny spots. They don't require shade; they tolerate shade.

Exotic invasive woody plants have been treated by early horticulturists as pioneer species because they produce colorful berries (i.e. the ornamental / wildlife appeal), grow fast,

have broad soil and site growing conditions (i.e. pioneer species characteristic), and can be pruned (good for home yards). Unless you are working in the horticulture industry or in ecology, you were not notified about the pest-like invasive traits of these exotic plants before the early 1990s. Many plant ID guides and nursery catalogs rarely mentioned that these particular plants were invasive. They used the term 'weedy'.

As we all know, people can see insect damage, but can not see a slow reduction in native plant growth and vigor (weakening) caused by exotic invasive ground inhabiting shrubs or vines in a tree until it dies. Most homeowners control the spread of invasive plants in their yards; however, unmanaged conservation lands express the characteristic invasive damage because there is no continued organized control efforts and educational programs teaching about the dangers of these new pests in most cities and towns in the Commonwealth.

Remember, most people cannot recognize poison ivy so without proper educational programs provided by garden clubs, non-profit conservation organizations, and the like, there is little exotic invasive plant information (as a demonstration woodland) available to the public. Cold Spring Park red maple / mixed hardwood wetland could serve this purpose as well as the proposed meadow. This could be why many people are unaware of the perils of exotic invasive plant infestations; they see the 'shrubby clutter' in the woods but don't understand and / or are unaware of the actual long - term ecological damage.

The Red Maple / Surrounding Mixed Hardwood Wetland

The most abundant and widely distributed exotic invasive woody plant infesting the red maple (*Acer rubrum*) / oak (*Quercus* spp. *Salix*), etc., wetland is glossy buckthorn. This area of the park is unique because it is home to many animals and native plants not present in the drier parcels of the park. The overstory is over 20 feet tall, making this parcel an ecologically official forested wetland.

The shade-tolerant glossy buckthorn grows and reproduces well under the canopy of the native red maple/mixed-hardwood overstory. The additional shade created by glossy buckthorn inhibits the overstory native tree seeds from successfully germinating on the woodland floor and, therefore, reducing/eliminating red maple and other hardwoods' reproductive capability and sustainability.

In other words, what is happening is there is a dense, shade-tolerant exotic invasive shrub layer and a native mid-tolerant (intermediate) hardwood overstory. The sapling stage of the hardwoods has been reduced or eliminated. The red maple and oak trees have not been successful at regeneration. They are of intermediate shade tolerance, so their seeds need at least 5 hours of sunlight to germinate and become established. When this naturally occurs over time in the absence of exotic invasive woody plants, the woodland develops different age classes originating from the growing native overstory trees. Over time, different age classes naturally develop and provide a multi-level structure to the woodland.

A healthy *native*, self-sustaining woodland has 5 vegetation layers: (1) the overstory, (2) pole or sapling stage, (3) shrubs, (4) herbs, ferns, grasses, and (5) ground covers such as

soil lichens, mosses, liverworts, etc. It is very unfortunate that this red maple/oak wetland is presenting a native tree overstory and an exotic invasive shrub layer (understory). (Native *Clethra alnifolia* shrubs are sparse.)

Observations [January 30, 2016 and Feb. 28, 2016].

Overstory: It mostly is red maple with scattered specimen site associates of red and black oak (including red/black oak hybrids), black willow (*Salix nigra*), boxelder maple (*Acer negundo*), eastern cottonwood (*Populus deltoides*), other to be determined hardwoods, and very few white pine. A more thorough tree and shrub survey needs to be done. Red maple seed does not need much sunlight to germinate. However, red maple is intermediate in shade-tolerance and has great difficulty *after* germination to sustain growth in deep shade cast by the dense glossy buckthorn understory.

The red maple overstory trees are quite large with a diameter breast height of one foot or more. On February 28, 2016, I measured several red maples as having a dbh (diameter breast height) of 16, 22 and 27 inches. Some may be larger. The red maple wetland is probably over 150 years old. Some very large old red maples have died and are decomposing on the woodland floor. More survey is needed.

Red maple roots are visually apparent growing partially above the ground or at ground level indicating a wetland of periodic flooding. The oaks are growing on drier mounds or sections. This area may have had a history of more periodic flooding than before the surrounding housing developments were installed decades ago. Some of the moist areas could have had more flooding in the distant past because the mature trees presently growing in these spots show a broad trunk flare with accompanying root stiltling. There are streams present with some having mildly steep banks indicating an old waterway. This is a very old area as compared to other similar yet smaller woodlands in the City of Newton. Neighborhoods developed around this wetland.

Sapling or pole timber stage: The tall trees just under the canopy are minimal or completely missing from this area of glossy buckthorn infestation. This indicates that the overstory trees are not regenerating on the woodland floor due to the dense, invasive population of glossy buckthorn.

Shrub layer: Mostly if not completely, glossy buckthorn. Population density is high and casting too much shade on the woodland floor during spring, summer and early fall. The dense population of mostly glossy buckthorn tends to block or reduce the normal successional stages of the existing native trees and shrubs. There are some remaining *clethra* shrubs indicating a wetland or moist woods. More survey is needed.

Herbaceous layer: This layer is composed of grasses, ferns and other plants to be determined.

Ground cover layer: To be determined.

Red Maple Wetland Woods

Promote the following using a kiosk

Ecological goal: The influx of exotic invasive woody plants into Cold Spring Park are considered biological disturbances on a large scale, affecting all native trees and shrubs-- as compared to a species specific pathogen like Dutch Elm Disease which only attacks American elm (*Ulmus Americana*). The exotic invasive woody plant disturbances created have been steadily increasing over the past few decades (since the 1960s or earlier) and have altered, reduced, and stopped native tree and shrub successional pathways, altered native woodland structure and is currently and slowly eliminating native plant regeneration and sustainability.

Therefore, the ecological goal for the red maple wetland woods is to remove the dense glossy buckthorn population, one small pre-determined parcel at a time, for the purpose of improving native woody and herbaceous plant, germination, establishment, growth and survival so they can be on the pathway to native plant woodland sustainability.

Management goals: Volunteer work groups would need to be deployed to meet the ecological goal of 90% reduction of glossy buckthorn in the Red Maple Wetland Woods. Invasive plant control measures of hand-pulling, using woody plant - pulling devices, and selected winter herbicidal applications to freshly cut stumps are the various labor inputs performed by selected volunteers with training by Newton Conservators. Shrub and vine disposal would need to be done by the City of Newton's Park Department. Permission for this project would need to be approved.

Volunteers would need to be trained to carry out monitoring tasks for newly emerging exotic invasive plants every spring and fall after a predetermined parcel was cleared or reduced by 90% of the targeted invasive plant. Monitors could easily hand-pull these seedlings.

Certain parcels that had glossy buckthorn removed would then be managed over a 5 year time-frame to observe native plant germination, growth, and establishment (i.e. native plant recovery). No attempt is needed to plant more natives or plant them in large and crowded amounts. It is best to observe the existing overstory trees for regeneration by seed drop and soil bank germination. In other words, it is best to let the existing native overstory trees and any native shrubs to seed in. We would like to observe what type of native plants germinate from the infested parcel's seed bank--both native and exotic, and how long this recovery would take.

Volunteer Recruitment: Newton Conservators would continue to attract volunteers to help with buckthorn pulling and monitoring. The red maple wetland is large so the area would need to be divided up into small manageable parcels and worked one parcel at a time.

Notes about planting more natives

In a forested wetland, woody shrub understories are usually sparse-to-absent under dense overstories. These areas are more colonized by herbaceous ground covers. However, I noticed some *Clethra* shrubs and a hydrangea (native? Don't know yet). Part of the red maple overstory is open in certain areas.

It is best to not plant any native trees and shrubs to enhance the plant biodiversity or woodland structure. Native plant additions would be more appropriate along trails and not the interior of the red maple wetland. **It is only my opinion**, but it's best to let the native tree overstory seed itself in over a **5 year time period**. During this time, the seed bank will sprout a combination of native and exotic invasive plants. There will be a constant influx of exotic invasive plants by birds into this area on a yearly basis. The exotics would be pulled by monitors, and natives would be noted. Once specific parcels are removed/reduced of glossy buckthorn, monitors would continue to hand-pull germinating invasive plants on a yearly basis in early summer and fall.

Basic Ecological Summary

Native red maple wetland plant interactions

Woody exotic invasive plants. Exotic invasive woody plants cause a type of biological site fragmentation by their invasion and successful growth characteristics. They reduce native plant vigor by competing for water, nutrients, light and space. As time passes and more of these invasive plants take hold, spread and grow larger, they create more shaded conditions on the woodland floor, which inhibits native tree and shrub seed germination. The overstory of primarily red maple is a shade-intermediate species and can not tolerate deep shade now cast by the dense population of glossy buckthorn. The red maple wetland is subjected to an interrupted reproductive cycle culminating in very poor reproduction success. To promote red maple wetland sustainability, the glossy buckthorn must be removed.

Animal populations. Continued invasion and growth of glossy buckthorn and other similar invasive plants precludes some wildlife species from using the area as they had before the invasion.

Unmanaged exotic invasive plant populations attract native birds and mammals away from native food plants (i.e. the bird-feeder effect). This increases local bird and mammal diversity, but it will not contribute to their *individual* viability or reproductive success because these animal groups are present over a larger surrounding area and survive independently away from the exotic invasive plant populations. These animals are not caged in the red maple wetland; they frequently visit it during the fruiting stage of glossy buckthorn. Birds are vectors of glossy buckthorn.

Think about how skunks, rats, and raccoons invade your trash cans. They are getting additional food that they otherwise would not get in the wild, but it is not their sole source of nutrition. They are quite adaptive and can (and should) independently survive on their natural food sources.