

Town of Mt. Washington Landscape and Forest Stewardship Plan

A project to identify opportunities for enhanced protection of natural resources on town facilities and infrastructure and to inform best practices for owners managers and visitors.

Things this will achieve:

This can meet many pre-requisites for grant funding of improvement of infrastructure or facilities

To fund infrastructure or facilities improvements for public benefit it must:

- Show that the community got the opportunity to inform the process.
- Incorporate Nature-based solutions or Green infrastructure/ BMP Best Management Practice

What we have done to date:

Meeting 1 kickoff with town staff providing record background, agenda, and establishing schedule

Meeting 2 publishing compiled maps and the opportunity to contribute and prioritize local knowledge about landscape and forest issues and opportunities.

Sponsored by DCR and funded by the Mass Woodlands Institute

Project Leadership Town of Mount Washington Conservation Commission Mack Waggaman

Landscape consultants: BSC Group, Landscape Architect Caseylee Bastien RLA,

Forestry consultant: Long View Forestry

Discussion of Previous meetings. Community wants more specificity on their role.
More insights into the process. And in-person training.
Roadmap of goals and schedule.

Disrupt physical vectors, make manageable borders

Vulnerable clearing, drainage and erosion



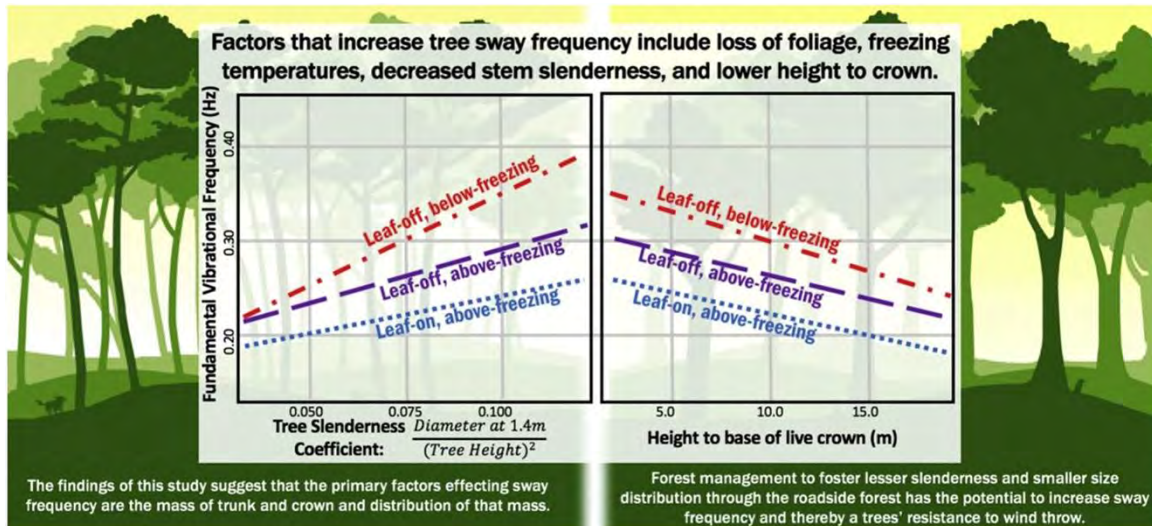
Capture of wind and water swept seed/ root



The sunlight damaged soil and repeated disturbance associated with infrastructure are key vectors (ways pollutants and infestations spread), but we can shape them and plant them so that they are contained, keeping our vulnerability to a manageable size and visible.

Include Swales so things aren't running straight off into your forest or landscape. Filter berms and infiltration basins, multiple and frequent. More than the minimum down at the end of a long run right next to the wetland.

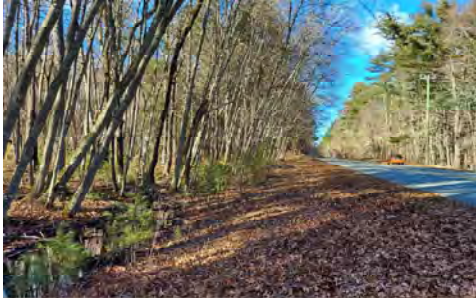
Disrupt biotic vectors, Structural borders



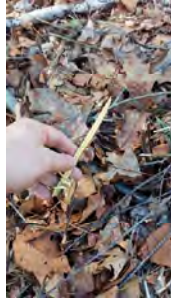
To change our roads from bad vectors to good ones we need dense understory and enough canopy shade to keep growth slow. Selective hedging and planting will over time reduce road clearing maintenance. It gives you the opportunity to select for native species rather than repeatedly opening a wound to infection by noxious or low value species. More permanent vegetation reduces erosion.

This utility study shows how that change to vegetation management also benefits utility and road safety.

Road and vegetation maintenance examples



Excess clearing increases rather than decreases tree fall hazard and reduces shying effect increasing speed and risky behavior



Invasive shrubs are not stunted by this mowing, it gives them an advantage



Clearing beyond guard rails or down slopes may be a wasted effort that does not add to road safety

Live examples of vulnerability.

Site Opportunity rating

Tools for decision support (by context) to compare sites

SPECIES MANAGEMENT OPPORTUNITIES TABLE

Triage Rating: Higher numbers to receive greater focus

Levine Site

RESTORATION OPPORTUNITY		XXX		Site aspects										
Species modifier #	Site Map Reference & Individual Site Map #s	Site Triage Rating:	Combined Triage Rating:	Has native re-seed resource	Early control opportunity	Dense stands	Non-disturbance Hazard	Vector control	Ease of access	High visibility	Human resource	Easily isolated	Site specific stress:	Threatens Resource
1	Area 34206.73079													
2	Modifier Species:	75	37125	6	7	7	1	1	6	8	7	1	1	30
3	158 Noxious													
4	45 Tree of heaven													
5	33 Norway maple													
6	31 Oriental bittersweet													
7	28 Japanese barberry													
8	23 Mugwort													
9	19 Border privet													
10	38 Knotweed													
11	17 Multiflora rose													
12	17 Potentilla													
13	17 Winged euonymus													
14	13 Autumn olive													
15	18 Honeysuckle													
16	7 Eucaly													
17	6 Black locust													
18	6 Wineberry													
19	5 Ground Ivy													
20	16 Garlic mustard													
21	Average site rating:													
22	Rating per meter													

For key locations selected we rate them for priority based on value, vulnerability, and, and We will rate sites on multiple criteria and ask you to confirm or adjust ratings. This rating table focuses on biological function. The next looks at physical structures.

Tools for decision support (by context) to compare sites

NATURE-BASED SOLUTIONS OPPORTUNITIES TABLE		Value Feasibility *					
		GOOD	BETTER	BEST			
		low	mid	high			
Number = sitemap location, A = multiple locations or entire area							
MOUNT WASHINGTON							
RESTORATION/RESILIENCE OPPORTUNITY							
NbS Memo #	Site Map Reference & Individual Site Map #s						
	Ownership						
		Map 1	Map 2	Map 3	Map 4	Map 5	Map 6
Natural Environment Restructuring							
1	River / pond bank revegetation						
2	Grassland meadow management restoration						
3	Forest / shrubland health management or restoration						
4	Wetland management restoration						
5	New wetland or floodplain construction / expansion						
6	Pond creation / elimination / alteration						
7	Stream flow alteration						
8	Pollinator hedgerow buffer						
9	Pocket forest						
10	Soil management or restoration						
Built Environment Restructuring							
11	Stormwater treatment wetlands						
12	Daylighting of streams						
13	Upstream BMPs rain-garden, bio-swale, etc.						
14	Chufa, habitat / infiltration trees						

Rating Value/ feasibility

Opportunity Sites to be selected by the Stewardship group

Restoration options

We will discuss and propose potential improvements for key sites. Here we compare what the sites and how valuable/ feasible different improvements might be. The row across the top is to be populated with areas like a segment or road, a parcel, or a stream crossing.

Comparing sites

■ Forest site



■ Landscape Site



Here is an example of rating and triaging sites. These are two very different sites with very different soil and species issues. The same municipality manages them and has to decide what to do and how much to do at these and many other sites. Of many, these two score high for how important it is to do some species management. And both are high for different reasons and each have very different needs. The process will prescribe and prioritize.

Comparing sites

- Conservation park



Another example of Triage and why analysis is valuable.

You might not need a system for judging between a small number of sites, with distinct differences but the more complex your responsibilities get the more valuable a system becomes for both where to start what to do. There are a lot of factors, we consider . Are others going to question your judgment. This way you have a response to a nimby or a busybody advocating for their site over others.

Here is an example of three sites and just looking at them it is not obvious which one you should invest in. To do it you will need All the layers of Data Rob illustrated. Team, Time of year, Approach, and an adaptable understanding of treatment approach.

Understanding Maintenance vs Management



Maintenance in cultural landscapes is for use and utility can we confirm it is needed and used



Management: restoring a naturalized buffer or bio-plot is simultaneous investment in biodiversity and risk reduction

When the community hears invasive species management they typically think of maintenance which isn't about building for future conditions its control for today and comes with some baggage. This is not part of our scope.

Adaptive management: Example on the right is a bio-diversity plot with deer fence and species management. This is not more maintenance its investing in change to reduce maintenance and there will be a distinct aesthetic difference one that takes some explanation as to why its not just a different set of weeds. It happens in different locations than maintenance with different goals.

Further Adaptive management is not a linear path with goals and objectives. Non-linear processes can be disconcerting we have a cultural preference for a plan with beginning middle and end.

Our objective is habitat, housing and feeding the good creatures in some areas that can mean killing the plants that don't provide food or shelter, or that carry pests.

Natural systems are macroscopic and complex. So The path to better biodiversity includes passing through invasive species control is to expedite succession and fill the

niches before something less valuable does it. Preferably before its so far gone that you cant afford to tackle it. The shortest path is spiraling away from the edge where stability falls off. The goal is gaining momentum to keep moving away from species loss due to vulnerable land (roads and landscapes) or the wrong types of maintenance.

Best practices for species management

- -Correct species ID
- -Time of year
- -Selective herbicides/selective methodology
- -Hands on crew observation
- -Consider feasible options for: non-chemical; Biological controls, Fire, Mechanical, etc.

Species	Growth Form	Time of Year Treatment												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Common reed	Grass													
Japanese knotweed	Grass													
Garlic mustard	Herb				pref	pref	pref	pref						
Purple loosestrife	Herb				y	y	y	y	pref	pref				
Tree of heaven	Tree	y	y											
Asiatic bittersweet	Woody	y	y											
Autumn olive	Woody	y	y											
Buckhorn spp	Woody	y	y											
Bush honeysuckle spp.	Woody	y	y											
Multiflora rose	Woody	y	y											

Legend:

- Treatment window
- Best time for treatment
- Basal growth treatment only as rest has seeded (Biannual species)
- *Until FF* - Until First Frost



Ways we can limit our management to only what we want to. Ensuring proper ID of species and suppression during time of year that accounts for native species usage and target species phenology both help to ensure that efforts are not being wasted. Or in the case of hand pulling plants that have gone to seed or which spread hypsometrically, potentially making things worse.

Example below started with partial soil replacement while dormant, Spring hand pulling, then foliar foam on knotweed, then sessions alternating hand pull and herbicide follow up seasonally with seeding and over planting.

Adapting your treatment

- New species or population emergence.
- Treatment not working.
- Monitoring
- Mobilizing



Snippet from BSC by species guidance documents which outlines proven techniques by species in the region. Techniques are adapted for respective locales and monitoring results.

Species Specific Management Recommendations for
Invasive Plants Identified

Treatment Window:
March-January
*Treatment effectiveness may vary based on phenology at target window.

Asiatic Bittersweet^{1,2,3} and *Pale and Black Swallowwort*⁴
Woody/Semi Woody and Herbaceous Perennial Vines

Manual: Manual removal is generally not recommended for most of the commonly occurring vines within the project area, except for small infestations of young plants (provided that roots have not yet developed fully and pull easily and fully out of the ground). Once plants mature, root systems may be expansive and hand pulling could result in soil disturbances or root resprout.

Mechanical: Repeated cutting and/or mowing may be an effective means of controlling the spread of invasive woody and herbaceous vines but is not a best method for eradication. Management will require repeated cutting to exhaust the plant's energy stores, as cutting/mowing will increase the number of stems produced. Mowing may be required at least twice a week during the growing season. Combining mechanical and chemical management is most effective.

Chemical:

- **Cut/Paint:** Cutting at the base of woody vines (and established herbaceous vines), and painting the cut surface with a herbicide formula, is an effective means of management especially for vines that have climbed a distance and are hard to reach for a foliar or painting application.
- **Foliar Application:** Foliar applications can be effective at managing these vines when the application is completed during the growing season (prior to flowering/seeding) and at the end of the growing season (prior to dormancy). Several herbicidal applications may be required for effective management. Drift is a factor involved in foliar applications, and non-targeted species may be impacted by this type of management. As such, foliar application should be avoided when invasive plants are growing interspersed with native, non-target species.
- **'Bloody Glove' Paint:** Application of the herbicide formula directly on the foliage is effective when completed during the growing season (and late fall for Japanese honeysuckle). Several applications may be required for effective control.

Risk Control: Currently under evaluation for both Swallowwort vines. Biocontrols have not been evaluated for Asiatic bittersweet.

Other: **Grazing:** Grazing could be an option to manage and control the spread of vines in upland habitats, however it is not being recommended at this time.

Best Management Techniques:

- Cut/paint with herbicide. Applying a dye to the herbicide mix is helpful in keeping track of treated plants.
- Glyphosate and/or Triclopyr-based herbicide formulations. If using in wetland sites, use formulations approved for wetland sites such as Rodeo and Garlon 3A respectively.

Best Non-Chemical Techniques:

- Repeated cutting of the vines to limit the spread of the species is recommended. Note: this approach is more likely to contain the spread rather than eliminate the population.
- Soap based foliar products such as ANNE may be effective for reducing population sizes.

We provide this guide in order to utilize our resources efficiently. This is an example document for Asiatic bittersweet. For each species or group of compatible species we have identified several proven management techniques for them. When one doesn't work, we can simply readjust. This gives you some backup for reviewing contractor bids ensuring they are working within your approved guidelines.

Crowd Source (informing your team)

Legend

Mount Washington Point of Interest or Concern

-  Natural Feature of Special Value
-  Great Tree
-  Vulnerable Infrastructure
-  Invasive Species Outbreak
-  Erosion Issue
-  Un-Mapped Trail
-  I have a Private Forest Stewardship Plan on my property
-  Recently Logged Forest Plot
-  Other Point of Interest or Concern

While efforts to protect special forest and landscape features will be proposed in public realm. Understanding the effect we have on landscape and forest means understanding context and priority.

<https://www.inaturalist.org/projects/mt-washington-ma-invasive-species-management-project>

Crowd sourced information can keep us and others informed of changes to the land

Discussion of Crowd Source:

We do not need the public to become experts on civil engineering or horticulture we have much of that information and our experts will be performing field checks.

What we do need from the public is to prove our recommendations include and align with your needs and wants.

A general understanding of context informs our choices about what to do in the public realm and which areas to prioritize.

Examples of what we are looking for.

Natural feature of special interest: Bashbish falls is a place of special importance, but that already shows up on maps. You probably know somewhere less grand but still beautiful and important. If so we don't want road erosion or invasive species negatively affecting it. Where we see concentrations of these we know to prioritize that area for monitoring or corrections.

Great trees: Big old trees and those with some rot are much more valuable to biodiversity and to soil production and stabilization. We don't want to negatively affect them.

Vulnerable infrastructure: We have incorporated a recent gravel roads vulnerability assessment into our study. We expand on that assessment to note the context of that

road. For instance does its instability threaten an adjacent stream, or if its culverts clog will a flood cause excessive damage.

Invasive Species outbreak: Again if this is not your expertise you don't need to contribute to this category it is a symptom of larger issues and experts will be observing for these. Your Conservation commission and the state provide guides for identification. The documents we provide add nuance rating these based on their habitat contribution or liability.

Erosion: this can affect water quality, it also exposes soil and piles up sediment which creates new vulnerability to invasive species.

Unmarked trails: Trails particularly when unofficial and poorly maintained can be both an erosion issue and a vector for invasive species.

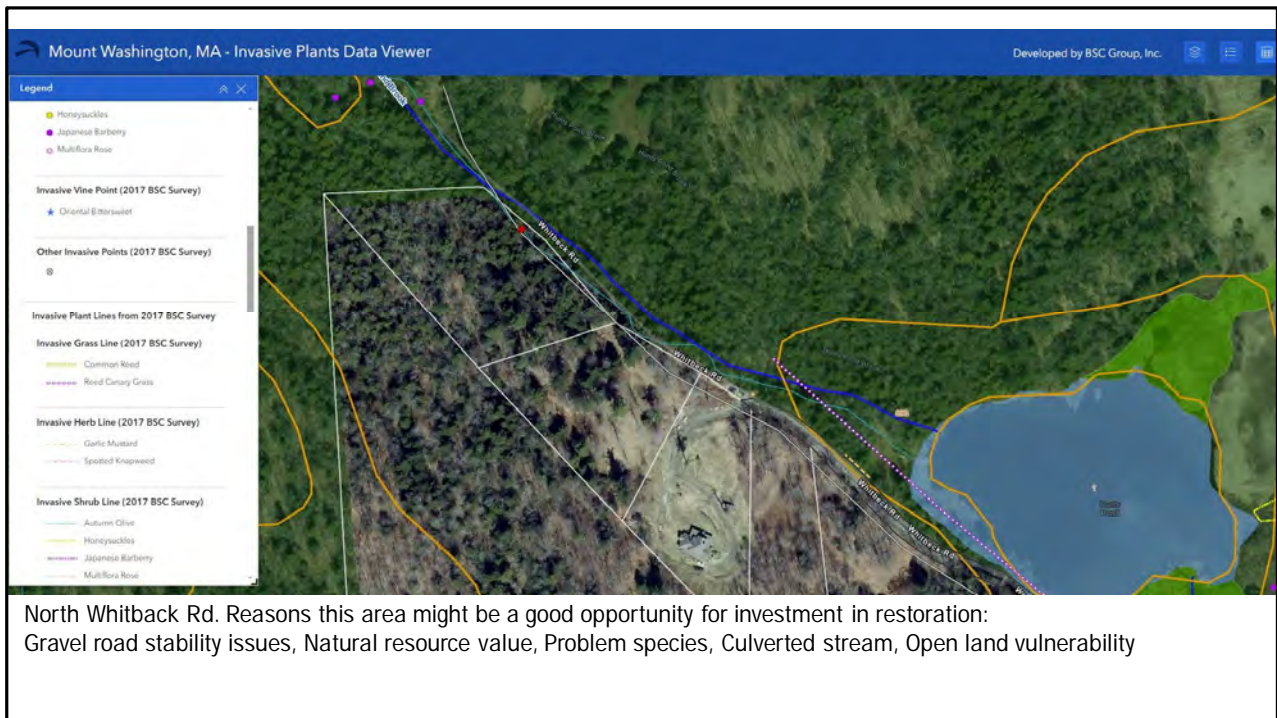
Recent Logging: Logging lets sunlight in to the forest floor making it more vulnerable to new species establishing there. If we know where to expect logging we can limit vulnerability in its vicinity to slow the spread of invasive plants into forests.

Discussion:

There was a chat question asking if we are able to lock parcels in the tool so marks cannot be made on them. Unfortunately no but we will be vetting information internally and removing problem markers. The map will close after the project and is only for the purpose of understanding the context of potential project areas.

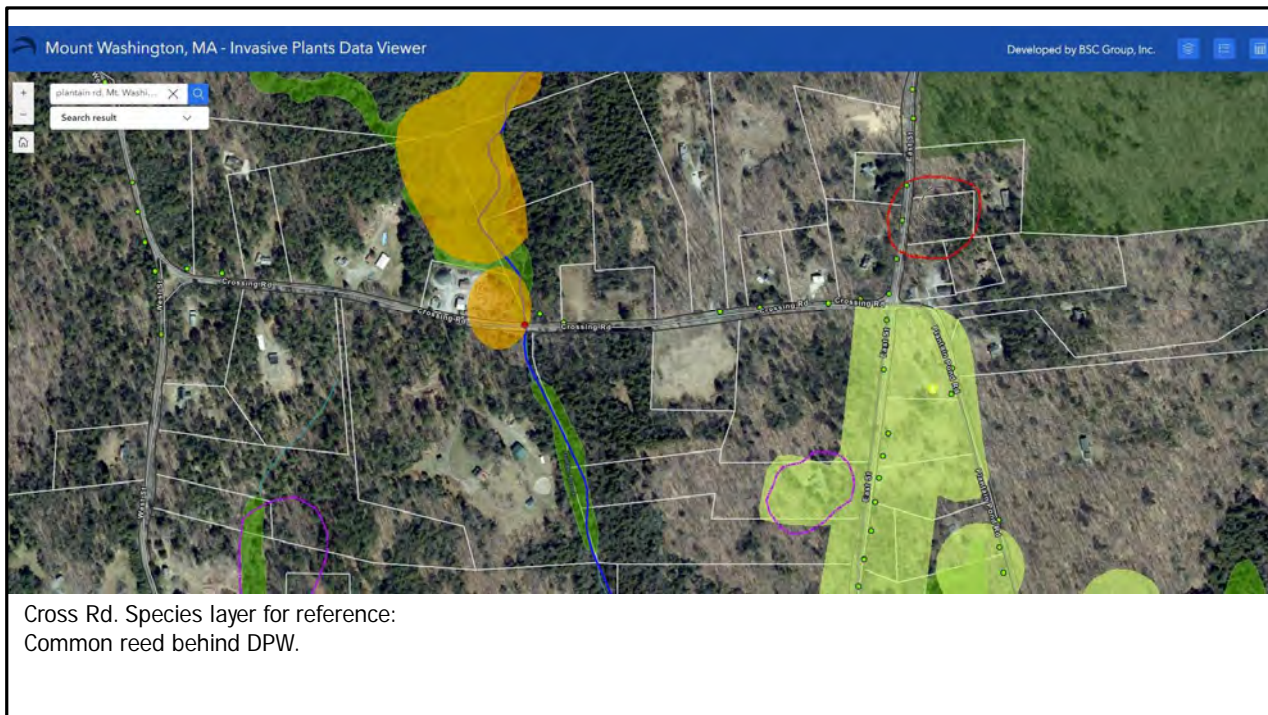
Audience question How can non-experts contribute without knowing species or engineering? Answer, Experts will be performing their analysis parallel this effort and do not need that effort duplicated, but there are points of interest, issues and opportunities to which only a lay person and long time resident can name. Identifying those issues that is the best use of this tool.

I-Naturalist: The I-Naturalist app is public crowdsource plant and animal observations. The Mount Washington project is a filter of that data specific to the town and filtered to account for problem species. This remains part of the app. And can be periodically checked by the Conservation commission to see if the public have spotted new invasive species entering the town.

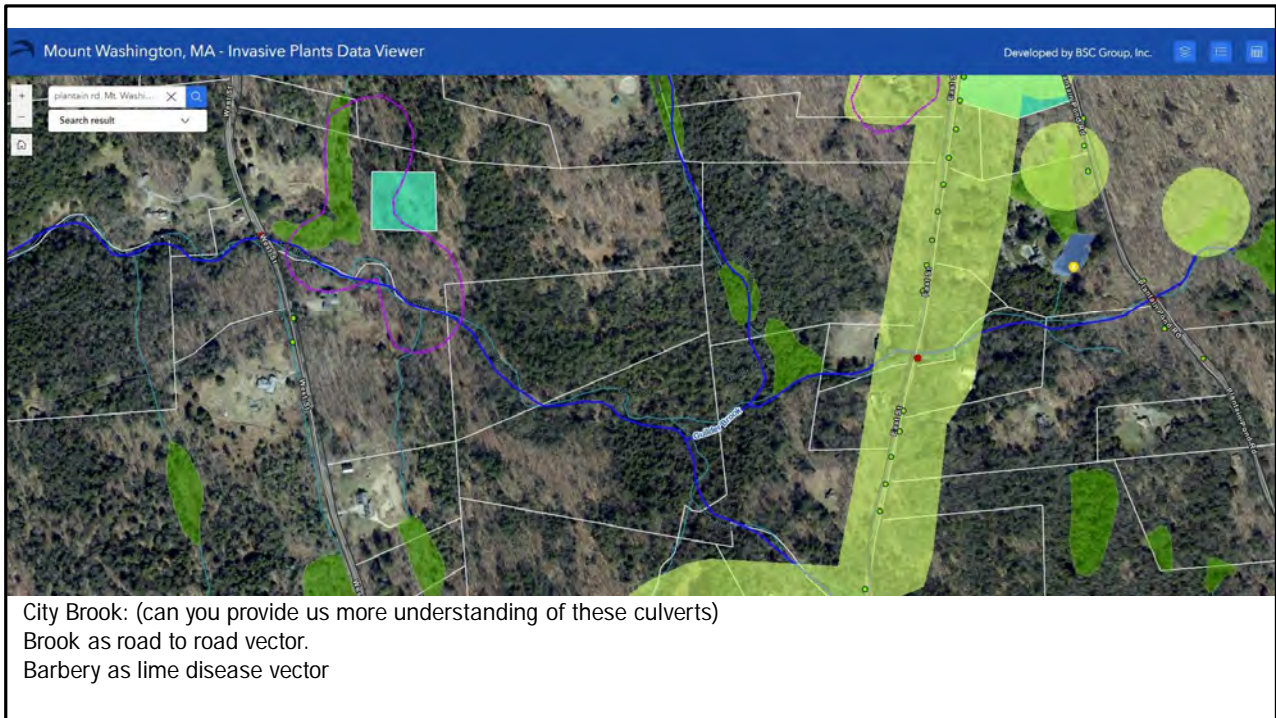


The following are a selection of sites from the Gravel Roads vulnerability study which is specific to road stability. Our project aligns with that study because where natural resources like Hunts pond and Hunts pond Brook occur along a road that has been identified as a problem we are likely to see habitat vulnerabilities like erosion, clearing, and invasive species.

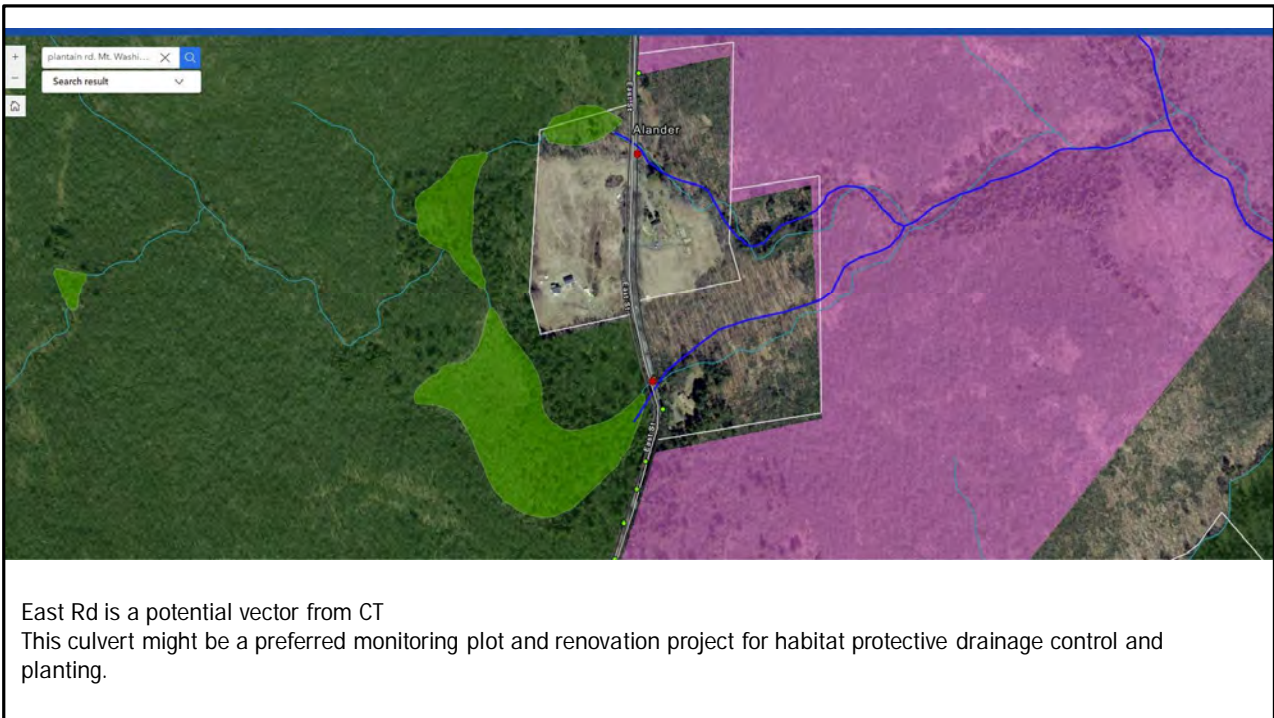
This intersection of issues increases the importance of stabilizing this section of road and may also benefit from modified maintenance or supplemental planting.



This is the same site with species layers added. Of concern is the intersection of the DPW yard where equipment could spark a fire adjacent common reed shown in yellow particularly against a stand of evergreen trees. This might be an opportunity to improve water quality and wetland plant bio-diversity while reducing the risk of fire.



City brook between East and West St. was not noted except as an identification of East St. culverts. But of interest are what protections of the brook could be achieved at east st. and the presence of Japanese barberry in purple crossing the town lot in teal. Barbary ranks high on the list of problem species because it tends to coincide with lime disease. If we understand spots like this we may be able to monitor and mitigate the spread of the deer-mouse who prefer barberry as habitat and are a common vector of the disease.



Connecticut has more severe and pervasive species problems than Mass, and many infestations tends to move northward. As a prime route into town from Connecticut the first culvert would be a logical monitoring point and a potential choke point of control.



This site is a confluence of existing and potential problems. Ensuring infrastructure is as clean as possible here can protect other areas. This is also the type of location where making direct abutters aware of the issues the town is managing for gives them the opportunity to respond with similar landscape hygiene if they choose.

Next Steps

- DPW discuss existing maintenance methods/ plan, online
- In-person tour/ training for Town Staff and Volunteers for winter ID and data collection.
 - Pick a date
- Forest Stewardship online listening session, Q&A LongView Forestry
 - Pick a date
- Follow up and assessment of volunteer field data, online
 - Pick a date
- Management guide use training online
 - Pick a date
- BSC Field tour of roadways and public site landscapes key investment identification
- LFSP draft review online and next steps for implementation

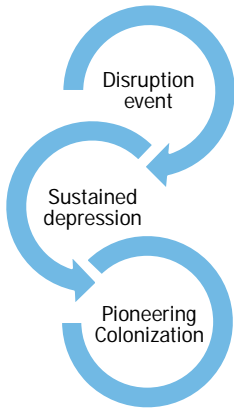
Extras: Not for presentation but for reference if a related question arises

The following are related informational slides not included in the meeting but available for discussion

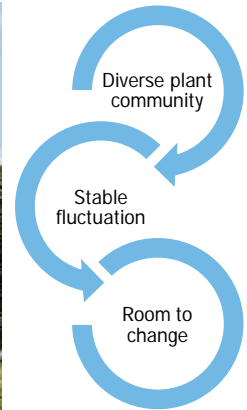
The following are related informational slide

Understanding Disruptions and making them work for us

Things to minimize



Things to promote



- Which habitats have we taken over? → Which habitat functions can we provide?
- Which plants have we excluded? → Which trees do birds and pollinators need more of?
- Which trees/ landscapes are best suited to your specific site and provide functional habitat.

For our purpose lets describe your garden in terms of two types of habitat change. We see these as separate because that's the way we think, but that's not really true its just our limited perspective and defensive animal brain that wants to divide things. So lets have a little mental stretch and think of a more than human world where these are part of the same circle.

Containing disruptions

Vulnerable clearing, soil drainage and erosion



Former Golf course converted for housing

Carefully contained and stabilized construction



Better but not quite enough (early seeding and layered erosion control)

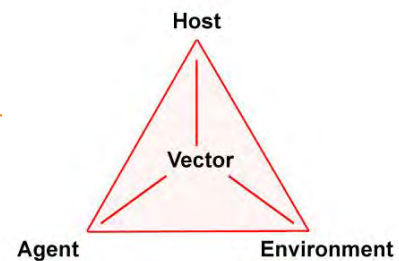
The sunlight, damaged soil, and time spent exposed in construction should always be minimized and monitored and with an upfront understanding and fiscal enforcement mechanism so that if needed the developer will be paying for invasive treatment and habitat restoration if the builder gets it wrong.

This includes addressing problems that came before their project and preparing for things that will persist after their OOC or substantial completion.

Its not their fault its their responsibility to the community.

Disrupt Vectors

- Vectors are the transfer mechanisms responsible for the introduction and spread of invasive species in a certain area, including a wide variety of physical means or agents, from ballast water to horticulture, biological control and aquaculture (Ruiz and Carlton 2003).



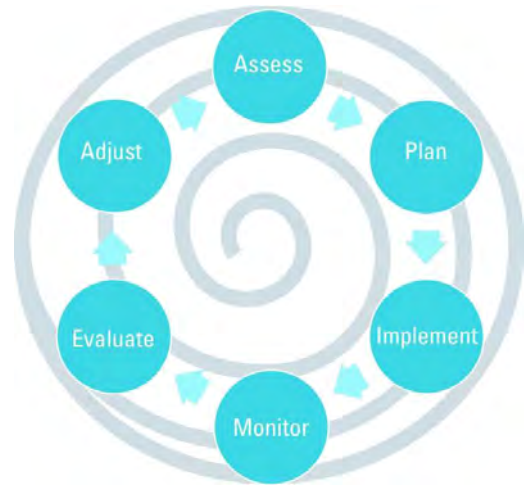
Example Municipal Compost share below a hill of invasive species greatest hits

The first step for either protection or restoration is identifying and disrupting vectors. Like this nice clean processed compost in a community transfer station right under an embankment loaded with invasive species greatest hits. That's an easy vector to understand but other can be harder to identify.

Adaptive Management Process

- Adaptive management is a structured approach to decision making that emphasizes accountability and explicitness in decision making. Adaptive management is useful when there is substantial uncertainty regarding the most appropriate strategy for managing natural resources.

-US Department of the Interior



Hess, Mc Dowel, Luber

We use this framework for thinking about the process, so to keep it clear here is a definition if you are interested in how we organize decision making when approaching the complex problem of Habitat Stewardship.

Recognizing this is a multifaceted problem we want to organize those facets so we can approach each of them in measured and effective ways (being explicit in the context of uncertainty)

See Site/ species triage tool, NbS Project Matrix, Time of Year calendar, and the Species Specific management guides.

Recognizing and preserving habitat



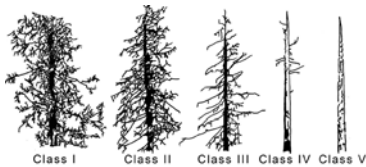
We might think:
Collapse, predation, death, decay, erosion?

We should see:
Life cycle, habitat, process, stability, balance?

Part of natural balance is chaos death destruction disruption and predation. It doesn't fit common ideas of strength and health, but it is important to our habitat without it no complex structure can form. In the landscape dying trees and eroded disturbed soils form habitat and maintain balance. We need to find ways to make them desirable parts of our landscape.



Death is essential for life. There is only one type of cell that denies death, a cancer cell.



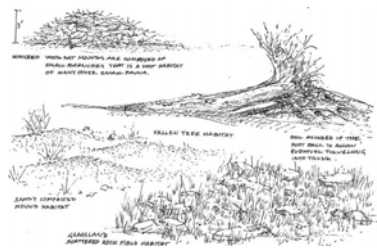
Housing options Snags / Hibernacula



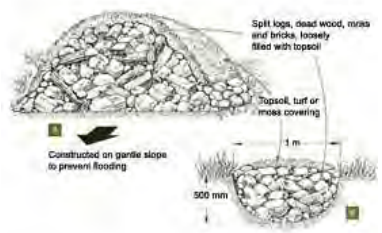
Dual use housing



Think vertical



Don't waste your waste



Erosion (in moderation) is natural and essential

More High habitat value features to include in landscape and on trails.

Shelter

- Keep the snag tree make it safe
- Keep the brush make it structural
- Keep the log make it strategic
- Keep the Root Wad make it deep
- Keep the duff, or rebuild it
- Pile the rocks, sand, soil, terrace the rest
- Clear only what you will use
- Shade the built world and the water

Food

- Plant native, diverse, site specific, and resilient
- Plant High forage value nectar, pollen, sap, foliage, seed plants, ruderals where necessary
- Include higher sequestration species Evergreens do a little more than deciduous
- Plant the cultural savannah/ replace the missing landscape
- Forrage the back yard

Order:

- Weed out direct competition by lower value plants: invasives, pioneers, commons (over populated vulnerable populations).
- Do not expel the c students. If there isn't a long term goal for something better then let biological competition manage itself (for now).
- Build the novel ecosystem of tomorrow.
- Expand compatible diversity (without feeding them to the wolves).
- Facilitate genetic migration (The birds and the bees)
- Connect with your neighbors
- Firmness, commodity, and delight (if you forget one the others will fail.)
- The raingarden versus the storm basin

Culture:

- Drawing people in and changing our culture to be ecology positive
- Incorporate art
- Hide your intervention (genius loci)
- Interpret and educate

Species move and adapt better when they have canopy & soil connectivity. Where can we restore these connections?

Soil builders move slowly and are easily cut off by paths lawns and roads. Where can you reconnect them? Can you include a puncheon in a trail to avoid dividing soil.

Diverse communities do more for water, carbon and species, Where can you diversify?

Ecologies need variety to help them fluctuate. Which Variety can you provide?

Ecologies need room What can you share? In a rural setting understory edge with flowering trees and shrubs are very important to birds and pollinators because the core forest is a sunk energy zone all of the light and soil is occupied. The edge of roads and yards are the new equivalent of the edge of indigenous food plots and beaver made meadows.

Perspective (Framing the issue)

The difference between disease and symptoms

- Land use (Development/
transportation)
- Extraction (Logging)
- Invasive species
- Related harm
(pollution from road erosion)

Loss of biodiversity by %

What key factors have contributed to this loss?
Here's a look at some of the major threats
to the world's biodiversity, and the impact
each threat has globally.

Invasive species and disease

Invasive species and disease
threaten biodiversity.

Introducing
species

Playing on
nature's forces

Spreading via trade, travel
and other connections

Spreading via trade, travel
and other connections

Species overexploitation

This can happen in two ways:

Overkill
When a specific
species is targeted
for production or trade

Indirectly
When a species is killed
unintentionally as a by-product
(e.g. harvest by fisheries)

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Climate Change

Climate change, driven by global
warming, is a major threat to
biodiversity. It is expected to
cause a significant loss of
species and ecosystems.

Pollution

Excessive release of pollutants
has a direct effect on a species'
survival. For example, oil spill
can be a major threat to marine
life. Other pollutants, like pesticides,
can have a more gradual effect.

Changes in land and sea use

Changes in land and sea use
can have a significant impact on
biodiversity. For example, logging
and agriculture can destroy
habitats and reduce the number
of species that can survive.

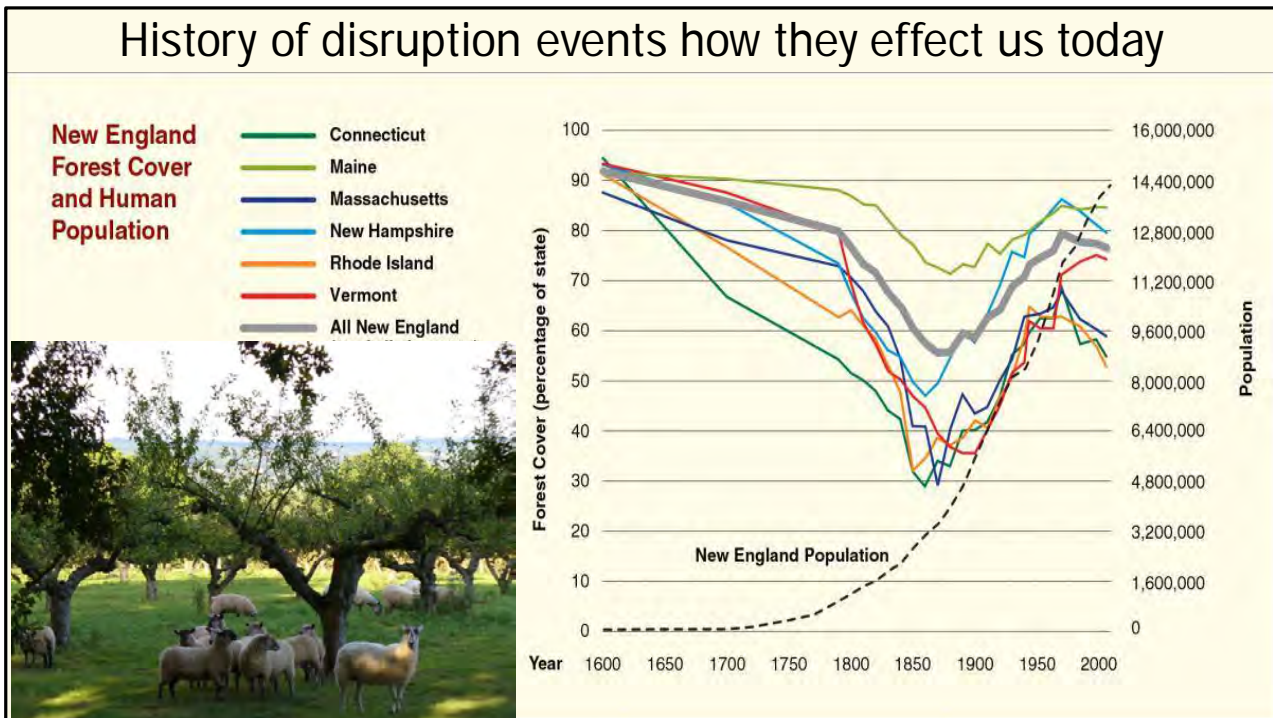
WWF Living Planet Report 2020
<https://www.visualcapitalist.com/biggest-threats-to-earths-biodiversity/>

This illustration by WWF weights the impact of different issues affecting biodiversity puts thing in perspective by % loss of biodiversity.

Public perception is weighted to concerns that while valid, aren't the prime drivers toward loss of biodiversity or ecosystem function. To most of the public those big three are invisible or too big to challenge.

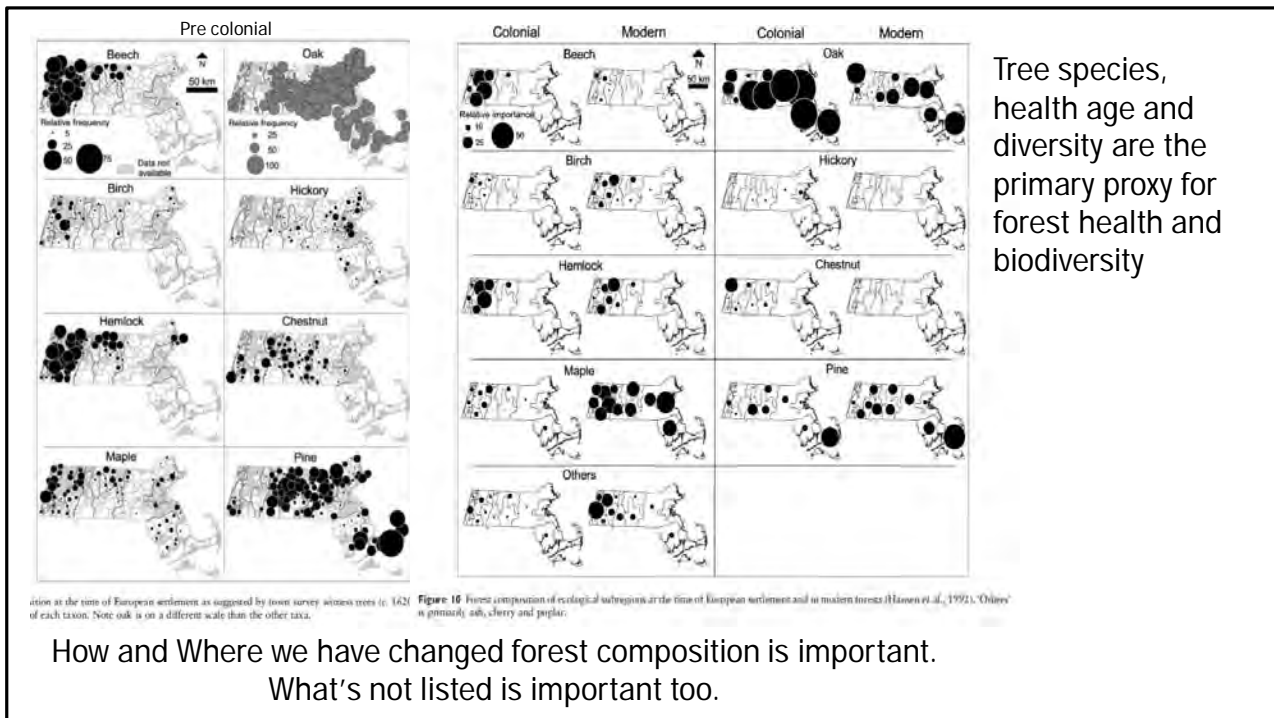
Responsible land use and species management are issues where we can have big positive effects bigger than climate or pollution control. More specifically we accomplish those goals by taking these actions.

History of disruption events how they effect us today



Historic patterns:

How did this become as pressing an issue as it is? Like many diseases it has a lot of contributing factors, but the big ones are generational and hard to see without history. The biggest was the 1800s textile industry and the millions of Marino sheep for whom we cleared the land. Industrialization dammed the rivers and filled the lowlands wetlands and floodplains around them with development. In the process we eliminated 90% of our wetlands, drove out predators and we relegated certain native species as weeds, some for practical agricultural reasons but some got an odious anti-native connotation. Even in plots that look healthy today we have fewer of the slow establishing high habitat value species, and more of the lower value aggressive species for instance less White oak, and more Red oak,



Trees are the defining structural element of the landscape. Lets take a moment to look at how the forest composition changed as we occupied the land. Forests live in a different time signature from our own cycling in thoudands of years rather than decades.

The changes we made in decades happened so devastatingly quickly and thoroughly they resulted in a serious species deficit of an already vulnerable landscape so it was ripe for invasion by hard living, resource poor pioneer species both the natives like white pine and red maple and the introduced species like ailanthus, knotweed, and bittersweet. There are species that have waxed and waned, and species we have lost like the Chesnut. As a late spring flowering, large seeded lowland canopy tree it was a keystone species. Today there are other species like the catalpa, black cherry, black walnut, linden, and black gum that could do some of those jobs that are lost. These prefer the lowland savannahs like roads and landscape gardens, but they have been culturally ostracized for being native and being nuisances.

There are certain vital species functions and landforms that have been lost and that can thrive in our roads, hedgerow and gardens.

Today resiliency will require restoring not just species but communities in both our

garden and in our attitude. Our yards and roadways have the right shape to become the landscapes where key species can thrive. We have an opportunity to help them do their job which is to move genetic capitol adding resilient flexibility to the living landscape.

The ecology of tomorrow won't be the ecology of the past the invasive species aren't going away so we need to be creative and strategic in our choices. Hands-off conservation won't be enough, between their little islands of habitat they need the safety net that you and the key species can provide.