Vassar Ecological Preserve Conservation Action Plan

Lindsay Charlop, Keri Vancamp, Meg Ronsheim, Dylan Finley, Lydia Kiewra

May 2019

Contents

Recommended citation:

Charlop, L. (2019). Vassar Ecological Preserve Conservation Action Plan. Vassar College, Poughkeepsie NY.

Vassar Ecological Preserve Conservation Action Plan

Purpose: This document contains the Vassar Ecological Preserve's Conservation Action Plan for managing the threat of invasive species within the context of climate change.

Background:

- Ecosystems around the world are changing rapidly due to various human-influenced ecological phenomena, including global warming, introduction of exotic invasive species, and destruction/ degradation / fragmentation of habitat.
- The state of northeastern United States forests reflects all of these issues. In addition, the extirpation of wolves in many areas has caused an overabundance of deer and drastically increased herbivory, which poses a serious threat to regenerating forests.
- The Environmental Monitoring and Management Alliance (EMMA) brings together organizations and individuals centered in New York's Hudson Valley to develop a regionally-coordinated ecological monitoring network that informs sustainable management practices and natural resource conservation through scientific research while engaging the public in environmental protection. EMMA's member organizations recognize climate change, invasive species, habitat loss and fragmentation, and deer overabundance as urgent threats to ecosystem health in the Hudson Valley region. We aim to address these threats through impactful, regional coordination that facilitates implementation of natural resource management solutions.
- Two EMMA members, The Huyck Preserve and Biological Field Station, and Vassar Ecological Preserve, jointly received a grant from the Land Trust Alliance to develop invasive species management plans using The Nature Conservancy's Conservation Action Planning (CAP) Process.
- Throughout the process, Huyck and Vassar will promote a culture of collaboration between EMMA sites. EMMA partners will provide feedback at various points during the process. They will be able to learn from the process that Huyck and Vassar go through, adapt the method as they see fit, and use the final product in developing their own management plans as they see fit.

Vassar Ecological Preserve Site Description

- The Vassar Ecological Preserve (VEP), located in the city and town of Poughkeepsie, is surrounded by urban and suburban land use. Similar "islands" have been shown to be important carbon sinks, migratory stopover points, and stepping stones for wildlife with larger ranges. The VEP's 415 acres contain a variety of natural habitats, including forests, old fields, shrublands, wetlands, marshes, and streams. The Preserve is a resource for Vassar College faculty and students engaged in scientific research, and is frequented by visitors who enjoy one of the few green spaces in Poughkeepsie.
- The VEP faces challenges that are particular to urban green spaces. The preserve is located adjacent to Vassar College, an arboretum that currently contains invasive trees, and is only 80 miles from New York City. These proximities make the VEP vulnerable to invasive species introductions. The VEP is part of the Casperkill watershed, downstream from the city of Poughkeepsie, which has been found to impact water quality on the preserve (Cunningham et al 2010). Lacking in connectivity with larger contiguous habitats, the VEP is unable to attract certain wildlife with larger home ranges.
- Management perspectives gained through the CAP process will be useful to other urban green spaces, including other EMMA members.

CAP Step 1: Identify People Involved in Your Project

Expected Outputs:

- ✔ Selection of core project team members and assignment of roles
- ✔ Identification of other planning team members and advisors as needed
- ✔ Identification of a process leader

Table 1. Core Project Team and associated roles.

Core Project Team	Role
Keri VanCamp	****Process leader****, advisor, participate in all aspects of planning and implementation, insure continuity throughout process
Margaret Ronsheim	Advisor, insure continuity throughout process
Dylan Finley	Data collection, pilot project manager and participant, student/volunteer coordinator
Lindsay Charlop	Process coordinator, data collection, pilot project participant, organizer of outreach events, help with monitoring, and develop work plans as needed
Jamie Deppen	Advisor (especially concerning connections to EMMA), help analyze pilot data

Table 2. Full list of involved individuals and groups and associated roles.

Involved Individuals/Groups	Initiating Team	Core Project Team	Full Project Team	Project Advisor	Stakeholder	Researcher
Keri VanCamp (Process Leader)	1	1	1			1
Anne Rhoads	1			1		1
Meg Ronsheim		1	1	1		
Dylan Finley		1	1			1
Lindsay Charlop		1	1			1
Lydia Kiewra		1	1			1
Jamie Deppen	1	1	1			1
Lynn Christenson				1		
Student Assistants/ Volunteers			1			1
Dean Jaegar						
EMMA Core Member Organisations				1	1	
LHPRISM				1	1	
ERI				1		
The Huyck Preserve					1	
Vassar College (students, faculty, staff, administrators, Environmental Cooperative)					1	
Community					1	
Outside Researchers					1	

Participants highlighted in green will participate for the entire duration the project.

CAP Step 2: Define Project Scope & Focal Conservation Targets

Expected Outputs:

- ✔ A brief text description of the project area or scope
- ✔ A basic map of the project area (s)
- ✔ A statement of the overall vision of your project
- ✔ Up to eight ecological systems, ecological communities and/or species that you assume represent the biodiversity of the area for which you are planning.
- ✔ An explanation of why these conservation targets were chosen by the team and, if applicable, the nested targets they represent.

Description of the project area and scope:

The Vassar Ecological Preserve (VEP) is located to the south of Vassar College's main campus (Map 2). The northeastern portion of the property is designated as a multiple use area. It is home to several organizations including the Environmental Cooperative at the Vassar Barns, the Hudson Valley Corps of the Student Conservation Association, Community Gardens, and the Poughkeepsie Farm Project. This area is also used by Vassar's rugby and cross-country teams. The remainder of the land is designated as a Field Station, which Vassar students and faculty use for research and education. The preserve comprises a multitude of habitats including streams, wetlands, ponds, forest, and old fields populated by a stunning diversity of flora and fauna. These communities were mapped in 1996, and again in 2016 and 2017 (Map 1). The 415-acre Vassar Ecological Preserve is an invaluable resource for Vassar faculty and students conducting scientific research. About 20,000 visitors per year also use the preserve for hiking, biking, and running on a network of marked trails, which give campus and community members access to one of the few remaining green spaces in Poughkeepsie.

In addition, the VEP provides a variety of ecosystem services that benefit Vassar and the surrounding Poughkeepsie community. According to an assessment of vegetation structure, function, and value of the VEP's forests using the i-Tree Eco Model developed by the U.S. Forest Service:

- VEP forests alone remove 5.448 tons of pollution (valued at $14.2 thousand/year)
- VEP forests produce 580.8 tons of oxygen per year
- VEP forests store 8.545 thousand tons of carbon (valued at $1.11 million) and sequester 265.3 tons per year (valued at $34.4 thousand/year)
- 695.2 thousand cubic feet/ year of runoff is avoided because of the VEP (valued at $46.5 thousand/year)

The VEP's open communities also provide valuable ecosystem services, though they haven't been systematically analyzed. For example, the VEP's old fields contain over 250 species of wildflower that serve local pollinator species. The VEP's open wetlands improve water quality, act as flood buffers that prevent erosion, and absorb atmospheric carbon.

The mission of the Vassar Ecological Preserve is to protect and preserve the ecological diversity of the land to ensure that its educational value will be maintained in perpetuity. The Vassar Ecological Preserve promotes increased understanding and appreciation of the natural systems on the preserve through field-based education and research.

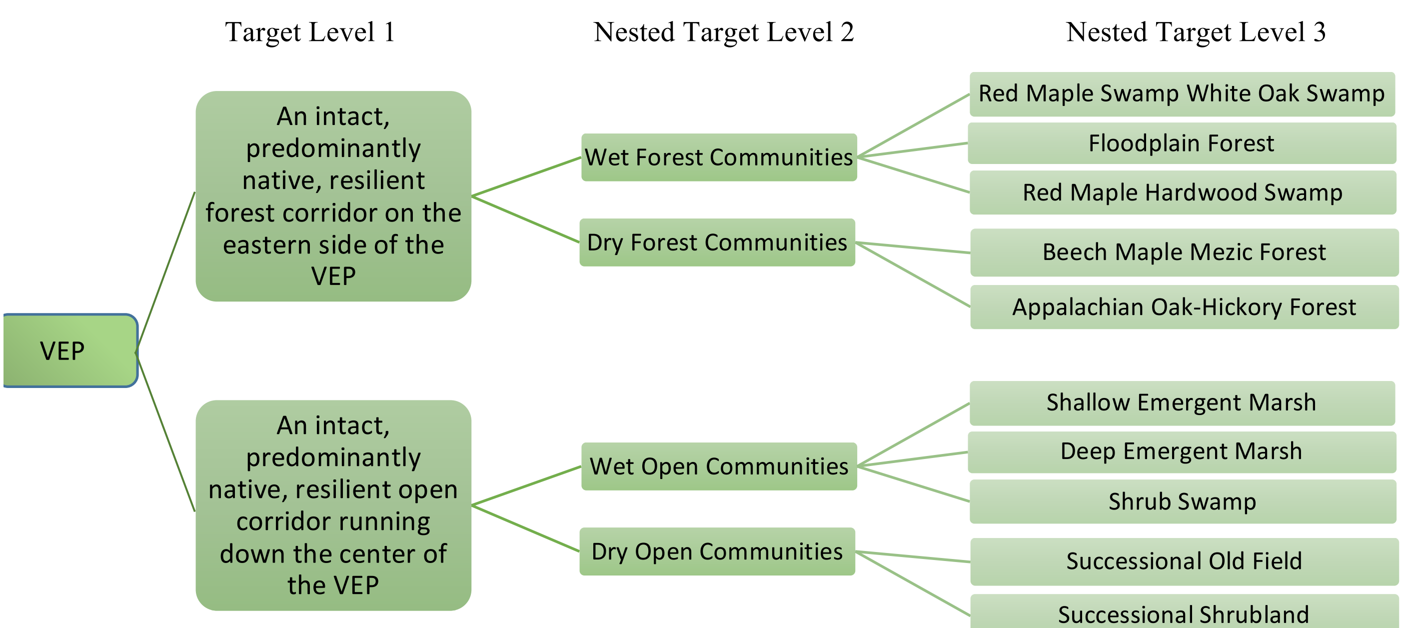
Project Goal:

The goal of this conservation action planning process is to develop a framework for conserving the communities on and ecosystem services provided by the VEP by managing the threat that invasive species pose in a changing climate. As we worked through the process, we realized that an additional goal is to connect native habitats to provide corridors for wildlife. This aspect of our vision has grown to extend beyond the VEP and onto the Vassar College campus, where forest fragments along the Casperkill river and the golf course could be connected to form a much larger forest community (Map 2).

Project Vision:

1) The VEP contains a range of native habitats needed to support native wildlife, and continues to provide the ecosystem services outlined above.
2) The threat of exotic species invasion minimized to a reasonable extent within the context of climate change.
3) The VEP contributes to corridors of relatively native and intact habitat.
3) The habitats invaded beyond intervention on the VEP remain contained, and can be studied as novel ecosystems.
4) The VEP contains examples of real conservation scenarios that can be used to teach students about conservation, environmental monitoring, and land management.

Targets:



For descriptions and characteristic plant species in the communities of Nested Target Level 3, see Appendix C.

Justification for target selection

The goal of this conservation action planning process is to develop a framework for conserving certain priority communities on the Vassar Ecological Preserve (VEP) by managing the threat that invasive species pose in a changing climate, as well as to connect corridors of native habitat as much as possible. In addition to approaching this problem on a preserve-wide level, we have broken down the preserve into three rough units: the drumlin on the west side of the preserve; a strip of old fields, shrublands, and wetland habitats along the central north-south corridor of the preserve (Map 10); and a series of forest communities on the east side of the preserve (Map 9).

Eastern Forest Corridor

The forest corridor on the east side of the preserve includes some wetland communities that are relatively rare in New York, and that have high ecological value as indicated by their plant stewardship index (See Appendix B). Many of these communities are relatively uninvaded, despite the heavy invasion of the forest communities on the drumlin (Map 3, Map 5); we believe that the annually-mowed old fields in the central corridor may serve as a buffer that prevents many invasive forest species from crossing the preserve. Even so, the eastern corridor still faces increasing invasive pressure as the VEP's ash trees succumb to emerald ash borer invasion (Map 6). Management will be necessary to prevent invasion of nonnative vines and shrubs in the newly formed light gaps.

The eastern forests are interrupted by an old industrial composting station that has since been used as a staging area for Vassar College's construction and landscaping debris. The area poses various threats to the wetlands directly south- for example, populations of insidious invasive species have been introduced through debris dumped at the site, and there have been issues with construction materials like silt leeching into the wetlands. It has been a long-standing goal of the VEP strategic planning committee to restore this area, which they renamed the Eco-Restore site, in order to recover the contiguity of the forest corridor and eliminate the threats posed by a landfill in the middle of an ecological preserve.

Because the east side of the preserve is relatively uninvaded, because it contains a corridor of wetland forested habitats that are ecologically valuable and relatively rare within New York State, and because it is a priority of VEP personnel to connect that corridor by restoring the EcoRestore site, it is a top priority conservation target. We aim to tailor our management towards the maintenance of as intact and native a forest as possible. Nested within this target are the wet forest communities and the drier communities within the corridor, and nested within these targets are the respective vegetation communities (Map 9). These tiers were chosen to help direct our thinking on varying spatial scales.

Open Central Corridor

The central corridor represents a diversity of successional old field, shrubland and wetland ecosystems. A floral resource inventory conducted in 2017-2018 showed that the VEP's successional old fields and wet meadows are home to over 250 flowering plant species, an island of nectar resources for pollinators in the urban context of Poughkeepsie. The survey also revealed several plants that are rare in New York, such as *Veronicastrum virginicum*, *Trillium cernuum,* and *Agrimonia parviflora*. The open wetlands on the VEP include relatively rare and valuable habitats, such as calcareous wet meadows. The shrublands provide important habitat for a variety of bird and small mammal species.

Later in the CAP process, we decided to add the open central corridor as an additional top-priority target, due to its diversity of important habitats. Nested within this corridor are wet open communities and dry open communities, and nested within these targets are the respective vegetation communities (Map 10). These tiers were chosen to help direct our thinking on varying spatial scales.

Western Forest Corridor, i.e. The Drumlin

The western corridor containing invaded forest communities on the drumlin was not chosen as a target because we do not believe that it can be restored or managed with any reasonable effort. However, we still believe this community should be considered in preserve-wide planning because 1) it represents significant area and habitat on the preserve; 2) it can be used to study novel invaded communities; and 3) as a highly invaded community, it can be used to study how invasive species enter and spread throughout the preserve.

CAP Step 3: Assess Viability of Focal Conservation Targets

Expected Outputs:

- ✔ At least one key ecological attribute (KEA) for each focal target
- ✔ A measurable indicator for each KEA (in some cases, the indicator may be the same as the attribute itself)
- ✔ Your assumption- to the best of your current knowledge- as to what constitutes an acceptable range of variation for each attribute
- ✔ Current and desired status of each attribute
- ✔ Brief documentation of how you arrived at your viability assessments including references, experts consulted, assumptions, and suggested research needs.

Key Ecological Attributes (KEAs) and Indicators

In the tables below, we outline our list of Key Ecological Attributes (KEAs) at each target level, a brief explanation of why each KEA was selected, associated indicators of each KEA, and what we consider the desired status of each indicator as well as acceptable deviation from that status. Any references will be listed when applicable. Because we were unable to find published standards for many of our KEAs and indicators, many of these were developed based on internal decisions made by our team of well-informed VEP staff and Vassar faculty advisors.

In developing indicators for our KEAs, we borrowed from Dr. Carrie Levine's Forest Resiliency Framework (Levine 2017). We drew from all of these concepts in order to measure the resilience of VEP ecosystems as holistically as possible. The Framework posits that forest resiliency (which is difficult to quantify and measure) can be defined as a combination of two (more approachable) concepts:

- Resistance- Processes that maintain desired states by prevent loss of resources such as energy, biomass, water, nutrients. "The capacity of a system to absorb disturbance, undergo change, and still retain essentially the same structure, function, and feedbacks." (Walker and Salt 2006)
- Recovery- Processes that promote response strategies for anticipated perturbations by rebuilding resources. **"**The degree, manner, and pace of restoration of initial structure and function in an ecosystem after disturbance." (Westman 1978)

The Framework provides guidance for selecting indicators based on the information they will provide about these two concepts, as well as four "dimensions":

- Heterogeneity- referring to localized conditions and diversity at the stand or patch scale. Corresponds to community ecology.
- Complexity- referring to conditions and diversity at the multi-patch or landscape scale. Includes trophic interactions, food web topology, and landscape-scale dynamics.
- Quality- referring to quality of individuals and populations. Includes vigor, growth increment, fecundity, population growth rate.
- Reserves- referring to the belowground-aboveground interactions and interactions of the biotic community with abiotic resources such as nutrients, carbon, water, fungal symbionts, propagules, seedlings and saplings.

Entire VEP

		KEA	Justification/ Explanation	Indicator(s)	Acceptable Variation/ Desired Status	References
Whole preserve	VEP	Native species diversity	The mission of the Vassar Ecological Preserve is to protect and preserve the ecological diversity of the land to ensure that its educational value will be maintained in perpetuity.	Native flora richness and list	Ideally, the richness of VEP native flora will remain the same or increase from the baseline value which will be recorded this year (2019).	Informed guess.
				Native fauna richness and list	Ideally, the richness of VEP native native fauna will remain the same or increase from the baseline value which will be recorded this year (2019).	Informed guess.
				Invasive flora richness and list	Ideally, the richness of VEP invasive flora will remain the same or decrease from the baseline value which will be recorded this year (2019).	Informed guess.
				Invasive fauna richness and list	Ideally, the richness of VEP invasive fauna will remain the same or decrease from the baseline value which will be recorded this year (2019).	Informed guess.
		Complexity	Part of maintaining ecological diversity is managing for a variety of habitat types. Conversely, management is also intended to maintain connectivity. The goal becomes to maintain a variety of habitat types with as few patches as possible.	Number of NYNHP community types	The number of community types on the VEP will be tracked over time. Ideally, predominantly invasive community types will shift to become more native. At the least, we hope that native community types will not shift to become more invasive.	Informed guess. Based on Carrie Levine's Forest Resiliency Framework.
				Number of patches	Ideally, predominantly invaded habitats become more fragmented, resulting in more patches; and/or predominantly native habitats become increasingly connected, resulting in fewer patches	Informed guess
				Average redundancy	Ideally, predominantly invaded habitats become increasingly fragmented, resulting in greater redundancy; and/or predominantly native habitats become increasingly connected, resulting in lower redundancy	Informed guess
				Richness of indicator predator species with broad home ranges	Ideally, the richness of indicator species will remain the same or increase from the baseline value which will be recorded this year (2019).	Informed guess. Based on Carrie Levine's Forest Resiliency Framework.
		Climate	The VEP's flora and fauna are adapted to a climate regime that we are shifting away from.	Date of first frog call- spring peepers	This indicator will be tracked so that we can understand climate change over time. Ideally, species will respond to climate change and continue to persist.	Informed guess
				Date of first frog call- wood frogs		
				Date of flowering- trout lily		
				Date of flowering- spring beauty		
				Date of flowering- bloodroot		
				Date of flowering- wild ginger		
				Date of first freeze of the autumn/winter		
				Date of last freeze of the winter/spring		

Eastern Forest Corridor

		KEA	Justification/ Explanation	Indicator(s)	Acceptable Variation/ Desired Status	References
Target Level 1	Eastern Forest Corridor	Forest structure	The structure of the forest provides habitat for the native wildlife.	Intact Canopy	According to the New York Natural Heritage vegetation classification, a forest is defined as having ≥60% canopy cover.	New York Natural Heritage Program. 2019. Online Conservation Guide. Available from: https://guides.nynhp.org/. Accessed February 21, 2019.
		Native flora at every stratum	The maintenance of the forest corridor is dependent on the presence of native species at every strata.	Average percent composition invasive flora at the tree, shrub, herb, vine layers	Very good = <10% composition of invasive flora Good = 10-30% composition of invasive flora Fair = 30-70% composition of invasive flora Poor = 70-100% composition of invasive flora	Informed guess.
		Forest Regeneration	Regeneration is essential for the continuity of the forest.	Ten Tallest Data	The data that we take this year (2019-2020) will serve as a baseline. Ideally, the average height of the ten tallest will increase or remain the same.	Informed guess.
				Deer Density	The data taken last year (in 2018) will serve as a baseline. Ideally, the deer density will decrease to <10/square mile.	Informed guess.
				Indicator species (ground-nesting birds that rely on regenerating forests)	Ideally, the richness of indicator species will remain the same or increase from the baseline value which will be recorded this year (2019).	Informed guess.
		Stable corridor boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Area of forest corridor	Very good= native species reclaim degraded habitats and the corridor increases in area Good= the corridor does not change in area Poor= the corridor decreases in area	Informed guess.
Nested T	Wet Fore	Characteristic hydrology	Hydrology determines the composition of the plant life in the forest, and by extension, the wildlife as well.	Wet forest area	Ideally, the community extent won't increase or decrease drastically, but will remain practically the same as the baseline value which will be taken this year (2019).	Informed guess.
		Breeding, native fauna that	Presence would indicate habitat quality.	Richness of native, characteristic species	Ideally, the richness of characteristic species won't decrease drastically, but will remain practically the same as the baseline value which will be recorded this year (2019).	Informed guess.

		KEA	Justification/ Explanation	Indicator(s)	Acceptable Variation/ Desired Status	References
a r g e t L e v e l 2	s t	require wet forest habitat.				
		Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Area of community	Very good= native species reclaim degraded habitats and the corridor increases in area Good= the corridor does not change in area Poor= the corridor decreases in area	Informed guess.
	D r y f o r e s t	Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Area of community	Very good= native species reclaim degraded habitats and the corridor increases in area Good= the corridor does not change in area Poor= the corridor decreases in area	Informed guess.
N e s t e d T a r g e t L e v e l 3	C o m m u n i t y L e v e l	Community structure	The structure of the community provides habitat for native wildlife.	Percent plots with all expected strata (tree, shrub, herb, vine) present	Very good= 95-100%; Good = 90-95% ; Fair = 80-90% ; Poor = <80%	Informed guess based on Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
		Characteristic flora at every stratum	Native, characteristic vegetation defines vegetation communities, and provides structure and food for native fauna.	Percent composition of characteristic flora at each stratum	Very good = 50-100% composition of characteristic flora in plot Good = 25-50% composition of characteristic flora in plot Fair = <25% composition of characteristic flora in plot Poor = no characteristic species present	Informed guess
				Percent composition of characteristically dominant flora	Varies depending on whether one or multiple species should be dominant according to the NYNHP community descriptions.	Stewart, G. (2016). Modeling the recovery of freshwater benthic macroinvertebrate communities through a riparian buffer zone (undergraduate

		KEA	Justification/ Explanation	Indicator(s)	Acceptable Variation/ Desired Status	References
						thesis). Vassar College Department of Biology, Poughkeepsie NY
				Percent species from the NYNHP list represented in community	Ideally, the number of NYNHP characteristic species will increase over time	Informed guess
		Regeneration	Regeneration is essential for the continuity of the community.	Seedling/sapling counts in plots	The data that we take this year (2019-2020) will serve as a baseline. Ideally, the average regeneration will increase or remain the same.	Informed guess.
				Spring Ephemeral Cover	The data that we take this year (2019-2020) will serve as a baseline. Ideally, the average area cover, abundance, and richness of spring ephemerals will increase or remain the same.	Informed guess.
		Native fauna with specific habitat requirements	Indicators of the quality of their respective habitats	Richness of native characteristic species	Ideally, the richness of characteristic species won't decrease drastically, but will remain practically the same as the baseline value recorded this year (2019)	Informed guess
		Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Community area	Very good= native species reclaim degraded habitats and the corridor increases in area Good= the corridor does not change in area Poor= the corridor decreases in area	Informed guess
		Water Quality (Floodplain forest only)	The quality of the water enables plants to survive in the floodplain forest. If this were to decline drastically, life would not be supported in the floodplain.	Benthic macroinvertebrates- Hilsenhoff index, shannon index, richness and evenness	Ideally, the Hilsenhoff index will show improvement in the Casperkill's water quality as the river flows through the preserve. We hope that overall water quality improves over time. Ideally, diversity remains stable or increases over time.	Hilsenhoff index
		Characteristic hydrology (Floodplain forest only)	A floodplain forest, by definition, must flood at least once every two years.	Pressure transducer data	Very good= the forest floods at least once every two years. Poor= the forest does not flood at least once every two years.	Wolman M.G., Leopold L.B. (1957). River flood plains: some observations on their formation. Washington, DC: U.S. Geological Survey.

Open Central Corridor

		KEA	Justification/ Explanation	Indicator	Acceptable Variation/ Desired Status	References
Target Level 1	Central Corridor	Native flora at every stratum	Native flora provides food and habitat for the native wildlife that coevolved with it.	Invasive species impact- shrub, herb, vine layer	Very good = <10% composition of invasive flora Good = 10-30% composition of invasive flora Fair = 30-70% composition of invasive flora Poor = 70-100% composition of invasive flora	Informed guess
Nested Target Level 2	Wet	Characteristic hydrology	Hydrology determines the composition of the plant life in the community, and by extension, the wildlife as well.	Wet community area	Ideally, the community extent won't increase or decrease drastically, but will remain practically the same as the baseline value which will be taken this year (2019).	Informed guess.
	Dry	All dry community KEAs are represented at other target levels.				

		KEA	Justification/ Explanation	Indicator	Acceptable Variation/ Desired Status	References
NestedTargetLevel3	All communities	Characteristic structure	The structure of the community provides habitat for fauna.	Percent of plots that fit the structure requirements (for open: <50% shrub and <60% canopy cover. for shrubland: >50% shrub and <60% canopy cover.)	Very good= 95-100%; Good = 90-95% ; Fair = 80-90% ; Poor = <80%	Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
		Characteristic flora at every stratum.	The structure of the community provides habitat for fauna.	Percent of plots that fit the structure requirements (for open: <50% shrub and <60% canopy cover. for shrubland: >50% shrub and <60% canopy cover.)	Very good= 95-100%; Good = 90-95% ; Fair = 80-90% ; Poor = <80%	Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
				Percent species from the NYNHP list represented in community	Ideally, the number of NYNHP characteristic species will increase over time	Informed guess
		Native fauna with specific habitat requirements	Indicators of the quality of their respective habitats	Richness of native, characteristic species	Ideally, the richness of characteristic species won't decrease drastically, but will remain practically the same as the baseline value which will be recorded this year (2019).	Informed guess
		Stable community boundary	A shrinking forest community is vulnerable to deterioration. It does not make sense to think about stable boundaries at a larger scale, because many of the open communities are not contiguous.	Area of community	"Very good= native species reclaim degraded habitats and the corridor increases in area Good= the corridor does not change in area Poor= the corridor decreases in area"	Informed guess

CAP Step 4: Identify Critical Threats

Expected Outputs:

- ✔ A list of stresses for each focal conservation target
- ✔ Ratings of the scope and severity of each stress
- ✔ A list of sources of stress for each focal conservation target
- ✔ Ratings of the contribution and reversibility for each source
- ✔ A ranking of the sources of stress affecting each focal target and a determination of the critical threats affecting your overall project

Stresses

As per the CAP process, in order to determine the direct threats to our communities, we identified *stresses* to our targets, and then rated the *scope* and *severity* of each. See the following definitions:

Stress: An impaired aspect of a conservation target that results directly or indirectly from human activities; a degraded key ecological attribute.

Scope: The proportion of the target that can reasonably be expected to be affected by the stress within ten years given the continuation of current circumstances and trends. (Low = 1-10% ; Medium = 11-30% ; High = 31-70% ; Very High = 71-100%)

Severity: Within the scope, the level of damage to the target from the stress that can reasonably be expected given the continuation of current circumstances and trends. (Low = 1-10% ; Medium = 11-30% ; High = 31-70% ; Very High = 71-100%)

Entire VEP

		KEA	Stress	Scope	Severity	Magnitude	Source of stress, i.e. Threat
Whole preserve	VEP	Native species diversity	Decline of native flora	High	High	High	Invasive species, climate change, pollinator decline, human impact
			Decline of native fauna	High	Medium	Medium	Invasive species, climate change, pollinator decline, human impact
		Complexity	Complexity describes both diversity and fragmentation, which are positive/negative respectively. We will monitor this KEA, but cannot really describe threats to it here.				
		Climate	The threat to the VEP’s climate is climate change.				

Eastern forest corridor

		KEA	Stress		Scope	Severity	Magnitude	Source of stress
TargetLevel1	EasternForestCorridor	Forest structure	Forest gaps		Medium	High	Medium	Invasive species, pollinator decline
			Increased prevalence of vines		High	Very high	High	Invasive species
			Change in forest structure		Medium	High	Medium	Invasive species
		Native flora at every stratum	Native flora declines		High	High	High	Invasive species, climate change, fragmentation, human impacts, pollinator decline, deer overabundance
		Forest Regeneration	No forest regeneration		High	High	High	Deer overbrowse, invasive species, human impacts
		Stable corridor boundary	Reduction of forest perimeter		High	Very High	High	Invasive species
NestedTargetLev	WetForest	Characteristic hydrology	Change in hydrology.		High	High	High	Climate change, human impacts
		Breeding, native fauna that require wet forest habitat.	Reduction of habitat quality/ water quality		Medium	Medium	Medium	Climate change, human impacts, habitat loss/degradation, invasive species
		Stable community boundary	Reduction in wet forest size		Medium	Very High	Medium	Climate change, human impacts, habitat loss/degradation, invasive species
	Dryfor	Stable community boundary	Reduction in dry forest size		High	High	High	Climate change, human impacts, habitat loss/degradation, invasive species

		KEA	Stress		Scope	Severity	Magnitude	Source of stress
e l 2	e s t							
N e s t e d T a r g e t L e v e l 3	C o m m u n i t y L e v e l	Community structure	Loss of structure is addressed at the forest level.					
		Native flora at every stratum	Decline of native flora is addressed at the corridor level.					
		Characteristic flora at every stratum	Decline in characteristic flora: Trees, Saplings, Shrubs, Herbs.	RMSWOS	Trees: medium. Saplings: High. Shrubs: High. Herbs: High.	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Trees: medium. Saplings: High. Shrubs: High. Herbs: High.	Invasive species, pollinator decline, climate change, deer overbrowse
				FF	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Invasive species, pollinator decline, climate change, human impacts, deer overbrowse
				RMHS	Trees: medium. Saplings: High. Shrubs: High. Herbs: High.	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Trees: medium. Saplings: High. Shrubs: High. Herbs: High.	Invasive species, pollinator decline, climate change, human impacts, deer overbrowse
				BMMF	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Trees: High. Saplings: High. Shrubs: High. Herbs: High.	Trees: low. Saplings: High. Shrubs: High. Herbs: High.	Invasive species, climate change, pollinator decline, deer overbrowse
				AOHF	Trees: medium. Saplings:		Trees: medium. Saplings:	Invasive species, pollinator decline, deer overbrowse

		KEA	Stress		Scope	Severity	Magnitude	Source of stress
					High. Shrubs: High. Herbs: High.		High. Shrubs: High. Herbs: High.	
		Native fauna with specific habitat requirements (floodplain forest only. The rest of the communities are represented at higher target levels)	Decline of native characteristic fauna	RMSWOS				
				FF	High	Medium	Medium	Climate change, human impact, habitat loss/ degradation
				RMHS				
				BMMF				
				AOHF				
		Stable community boundary	Loss of community, ie decline of native characteristic flora	RMSWOS	High	High	High	Invasive species, climate chnage
				FF	High	High	High	Climate change, invasive species
				RMHS	High	High	High	Human impacts, invasive species, climate change
				BMMF	Medium	High	Medium	Climate change, invasive species
				AOHF	High	Low	Low	Climate change, invasive species
		Water Quality (Floodplain forest only)	Reduction of water quality	FF	High	High	High	Human impact, climate change
		Characteristic hydrology (Floodplain forest only)	Change in hydrology	FF	High	High	High	Climate change

		KEA	Stress		Scope	Severity	Magnitude	Source of stress
Target Level 1	Central	Native flora at every stratum	Decline of native flora		Medium	High	Medium	Invasive species, pollinator decline, human impacts, habitat loss/ degradation, deer overbrowse, climate change
Nested Level 2	Wet	Characteristic hydrology	Altered hydrology		Medium	High	Medium	Climate change, human impact (upstream land use)
	Dry	All dry community KEAs are represented at other target levels.						
Nested Targe	All Communiti	Characteristic structure	Loss of characteristic structure	SEM	Low	High	Low	Climate change, invasive species
				DEM	Low	High	Low	Climate change, invasive species
				SS	High	Medium	Medium	Climate change, invasive species
				SOF	Medium	Medium	Medium	Pollinator decline, deer overbrowse, human impacts
				SSL	Low	Low	Low	Invasive species, pollinator decline
		Native flora at every stratum	Decline in native characteristic flora	SEM	High	High	High	Climate change, invasive species, habitat loss/ degradation, deer overbrowse, pollinator decline, human impact
				DEM	Low	High	Low	Climate change, human impact

		KEA	Stress		Scope	Severity	Magnitude	Source of stress
t L e v e l 3	e s	Characteristic flora at every stratum.		SS	High	Medium	Medium	Climate change, pollinator decline, invasive species
				SOF	Medium	High	Medium	Pollinator decline, deer overbrowse, human impacts
				SSL	Medium	Very High	Medium	Invasive species, pollinator decline
		Native fauna with specific habitat requirements	Decline in native characteristic fauna	SEM	High	Medium	Medium	climate change, invasive species, pollinator decline
				DEM	High	Low	Low	climate change, human impact
				SS	High	Medium	Medium	climate change, invasive species
				SOF	Very High	Medium	Medium	Pollinator decline
				SSL	Low	Low	Low	N/A
		Stable community boundary	Loss of community, ie decline in native, characteristic flora	SEM	Medium	High	Medium	climate change, invasive species
				DEM	Medium	High	Medium	climate change, human impacts
				SS	High	Medium	Medium	invasive species, climate change
				SOF	Very High	Medium	Medium	climate change, invasive species
				SSL	Medium	High	Medium	Invasive species

Direct Threats

From the sources of stress identified above, we determined six direct threats to our target communities. All of these issues are widespread across the Hudson Valley region.

Note: Pollinator decline is likely caused by some combination of habitat fragmentation/ degradation and climate change, and is probably an indirect threat caused by the two. However, causation hasn't been proven or reported in scientific literature, so we chose to include it independently.

Threats
Invasive Species
Human Impacts
Habitat Fragmentation and Degradation
Deer Overbrowse
Climate Change
Pollinator Decline

Target Prioritization based on vulnerability to Direct Threats

As part of the CAP process, we completed an analysis of the contribution of each threat to the degradation of each of our targets, as well as the irreversibility of the damage caused by each threat, in order to discern where management efforts could have the greatest impact. Overall, the analysis showed that the eastern forest corridor is at greater risk than the open corridor. This could reflect the differences in potential for losing structure between the two corridors; in the forest, plant mortality caused by climate change, invasive species takeover, deer, etc. would likely lead to an increase in invasive shrubs and vines, and a complete loss of forest. Plant mortality in the open communities would likely lead to an increase in invasive shrubs, vines and herbs, but the basic structure of the community would not be as dramatically altered.

Within the eastern forest, the most threatened communities include Red Maple- Swamp White Oak Swamp, Red Maple Hardwood Swamp, and Floodplain Forest, which could be attributed to their vulnerability to anthropogenic threats that the VEP can only address collaboratively with other campus and community stakeholders: the EcoRestore site, the Casperkill (which brings pollution from upstream), and the sewage easement. The Beech-Maple Mesic forest was also found to be at very high risk, likely due to the potentially deleterious impacts of climate change on sugar maples and beech trees.

Within the central forest, the Shallow Emergent Marsh was found to be at the greatest risk. This is likely because the hydrological impacts of climate change- wetter autumns, winters and springs and drier summers- could result in widespread mortality of SEM plants, which are not adapted to either of these conditions.

Entire VEP

Threats \ Targets	VEP
Fragmentation/ habitat degradation	Medium
Human Impact	Medium
Deer	Medium
Climate Change	High
Pollinator Decline	N/A
Invasive Species	High
Summary Target Ratings:	High

Eastern Forest Corridor

Threats \ Targets	VEP East Forest	Wet Forest	Dry Forest	RMSWOS	FF	RMHS	BMMF	AOHF
Fragmentation/ habitat degradation	High	Medium	Medium	Medium	Very High	Medium	Medium	Medium
Human Impact	High	Medium	High	Medium	High	Medium	Medium	Medium
Deer	High	Low	Medium	High	High	High	High	High
Climate Change	N/A	High	Low	High	High	High	High	Medium
Pollinator Decline	N/A	N/A	N/A	Very High	High	High	High	High
Invasive Species	Very High	Medium	High	High	Very High	Very High	Very High	Very High
Summary Target Ratings:	Very High	Medium	High	Very High	Very High	Very High	Very High	High

Open Central Corridor

Threats \ Targets	VEP Open Central	Wet	Dry	SEM	DEM	SS	SOF	SSL
Fragmentation/ habitat degradation	Medium	Low	N/A	High	Medium	Low	Medium	Low
Human Impact	Medium	Medium	N/A	High	Low	Low	Medium	Low
Deer	Low	N/A	N/A	Medium	Low	Low	Low	Low
Climate Change	N/A	N/A	N/A	High	Low	Medium	Medium	Medium
Pollinator Decline	N/A	N/A	N/A	Medium	Low	Medium	Medium	Medium
Invasive Species	Medium	Medium	N/A	High	Medium	Medium	Medium	Medium
Summary Target Ratings:	Medium	Medium	N/A	High	Medium	Medium	Medium	Medium

CAP Step 5: Complete Situation Analysis

Expected Outputs:

- ✔ A situation analysis that includes indirect threats and opportunities behind all critical threats and degraded targets. In particular, a "picture"- either in narrative form or in a simple diagram- of your hypothesized linkages between indirect threats and opportunities, critical threats, and targets, showing in particular where intervention would have the most impact.
- ✔ Identification of key stakeholders in the context of your situation analysis

Situation Analysis

For this step in the CAP process, we conducted a complex analysis involving a large web diagram that illustrates connections between our direct threats and several contributing factors. A table containing descriptions of these interactions, followed by a web representation, can be found below. Although climate change is a direct threat to our target communities, we decided NOT to include it in the table below, because the factors that contribute to climate change are so much broader than our ecological preserve and community. There are many opportunities to mitigate Vassar's net carbon emissions by increasing tree cover in places like the Eco-Restore site. However, further addressing Vassar's contributions to climate change would involve analysis of energy use and efficiency on campus, which is beyond the scope of this project.

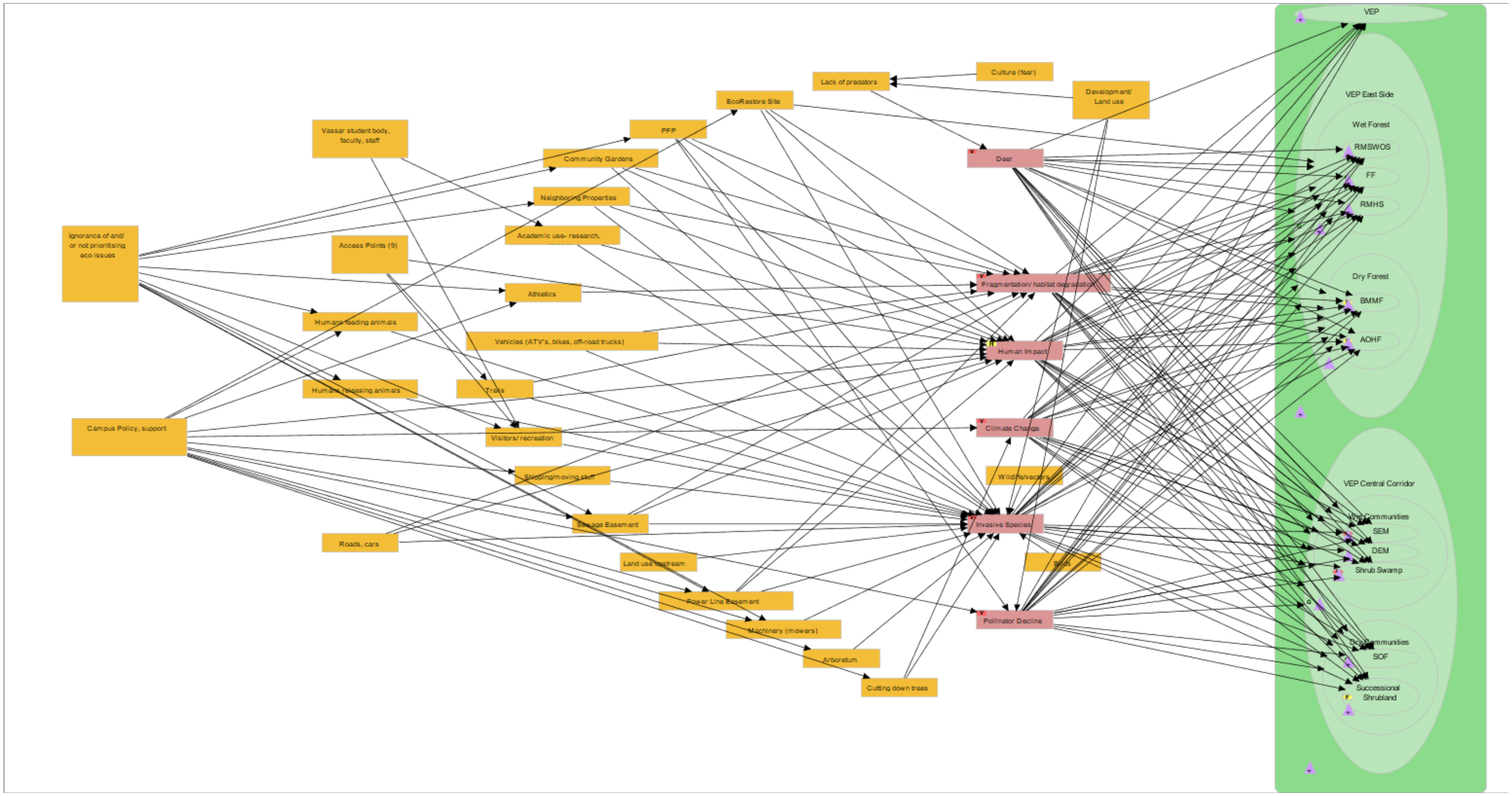
Note: The analysis below does not include the contribution of each contributing factor to climate change, because basically every human activity contributes to climate change either by emitting greenhouse gases or occupying space that would otherwise be forested land that could sequester carbon. We do not feel that it is within our scope to make a significant impact on reducing the threat of climate change by addressing the contributing factors to our other direct threats.

Factor			and Degradation		Overabundance	
Eco-Restore Site	An old composting facility that is now a staging area for Vassar College's construction debris and landscaping material. Illegal dumping occurs often.	Bringing material from other (sometimes unknown) locations increases the chance of invasive species introductions.	The EcoRestore site interrupts the eastern forest corridor. As silt from the landfill leeches south, it directly threatens the rare wetland communities that border it.	The Eco-Restore site is the result of human land-use and construction.	N/A	N/A
Poughkeepsie Farm Project (PFP)	A nonprofit CSA that leases land on the VEP	The PFP brings in plants and possibly soil and compost from unknown locations, which might contain invasive plant fragments, worms or bugs. The PFP's annex is located close to a shallow emergent marsh containing rare species, which may be at risk.	The PFP is dumping compost in a pile adjacent to a red maple hardwood swamp. The compost is migrating downslope into the swamp.	The PFP is dumping compost in a pile adjacent to a red maple hardwood swamp. The compost is migrating downslope into the swamp. Nutrient runoff from fertilizers could pollutes waterways.	N/A	The PFP brings in honeybees to pollinate their crops, which compete with native pollinators for resources
Community Gardens	A series of garden plots that can be rented by community members	Community members likely bring in fertilizer/soil from unknown locations and may unknowingly plant invasive species.	The Community Gardens has dumped plant debris on the VEP in the past. Recently, they have made more of an effort to contain the compost and dumping has ceased. Nutrient runoff from fertilizers could pollute waterways.	The Community Gardens has dumped plant debris on the VEP in the past. Recently, they have made more of an effort to contain the compost and dumping has ceased. Nutrient runoff from fertilizers could pollute waterways.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Neighboring Properties	Properties that border the VEP include private homes, Our Lady of Lourdes High School, and an assisted living facility.	Some of the private landowners bordering the VEP dump debris and trash onto the preserve. Neighbors may plant invasive flora on their properties, increasing the likelihood of introduction to the VEP.	Debris dumped by private landowners destroys the forest. Athletes from Our Lady of Lourdes sometimes jog on unofficial trails on the VEP, reinforcing those trails.	Debris dumped by private landowners destroys the forest. Athletes from Our Lady of Lourdes sometimes jog on unofficial trails on the VEP, reinforcing those trails.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Athletics	Vassar's Rugby field is located at the north end of the VEP. Cross country teams from Vassar and Our Lady of Lourdes, and perhaps other teams, jog on the VEP.	Athletes carry material into the VEP on their shoes. Maintaining the trails and fields requires mowers and other equipment that may also bring in material	Athletes use and reinforce unofficial access points and trails that fragment communities.	Athletes may trample plants and/or startle wildlife.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Academic use-research, classes	Various Vassar students and faculty conduct research on the VEP. Classes often visit the VEP.	Researchers on the VEP may transport material to and from places on the preserve that wouldn't otherwise see human contact.	Researchers on the VEP may create additional trails or fragment the landscape	Researchers may trample plants and/or startle wildlife. Researchers also leave flags and markers in the field after their projects have ended.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.

Contributing Factor	**Brief Description**	**Invasive Species**	**Habitat Fragmentation and Degradation**	**Human Impact**	**Deer Overabundance**	**Pollinator Decline**
Visitors/ recreation	Last year, the VEP was visited ~20,000 times.	Visitors bring invasive species on their shoes. Some visitors also feed invasive animals (such as cats) or release invasive animals (such as red-eared sliders) on the VEP	Visitors may use and reinforce unofficial access points and trails that fragment communities.	Visitors may trample plants or startle wildlife.	A few visitors are strongly opposed to the deer cull, and attempt to sabotage the cull (by scattering bait piles, messing with hunting shelters, etc)	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Trails	The VEP has ~7 miles of trails.	People and maintenance machines likely introduce invasive species on trails	Trails through the VEP fragment communities.	N/A	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Sewage Easement	A sewage line runs along the Casperkill river throughout the VEP. Town workers sometimes access the line through easements. The sewage line is in poor condition and will need repair in the future.	Sewage workers and maintenance equipment may bring in nonnative plants.	Easements further fragment the landscape. The compaction by vehicles makes restoration unlikely.	Construction work the VEP is loud and may be disruptive to resident fauna. Work also often requires large equipment which tramples flora.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Powerline Easement	Power lines run to the field station and along the east side of the VEP.	Powerline workers and equipment may bring in nonnative plants.	Easements further fragment the landscape. The compaction by vehicles makes restoration unlikely.	Construction work the VEP is loud and may be disruptive to resident fauna. Work also often requires large equipment which tramples flora.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Arboretum	Vassar's Arboretum Committee oversees the arboretum at Vassar College	Invasive species have been planted as part of the arboretum. Castor aralia (*Kalopanax septemlobus*) was introduced to the VEP from a mother tree on campus.	N/A. The Arboretum committee might be an ally in reforestation and replanting.	N/A	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.

Contributing Factor	**Brief Description**	**Invasive Species**	**Habitat Fragmentation and Degradation**	**Human Impact**	**Deer Overabundance**	**Pollinator Decline**
Machinery, Mowers	Machinery and mowers can introduce seeds and small fragments of invasive flora, if not cleaned, and/ or invasive fauna.	Machinery and mowers can introduce seeds and small fragments of invasive fauna, and/ or invasive fauna.	Mowing fragments habitat and can endanger wildlife. Sometimes mowers turn around by going through habitat that is typically unmowed, furthering fragmentation.	Mowing can endanger wildlife, such as reptiles and amphibians that may be run over.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Land Use Upstream	Before the Casperkill River runs onto the VEP, it runs through a strip mall shopping center and the rest of Vassar's campus.	The Casperkill likely carries invasive flora from upstream onto the VEP.	Salt, sediment, and other pollutants may flow onto the VEP from upstream, diminishing water quality and possibly creating dead zones.	Salt, sediment, and other pollutants may flow onto the VEP from upstream, diminishing water quality and harming flora and fauna.	N/A	A decline in native flora due to increased prevalence of invasive species or habitat degradation will harm native pollinators.
Lack of Predators	Deer are overabundant due to land use changes and loss of predators.	N/A	N/A	N/A	N/A	A decline in native flora due to overbrowse harms native pollinator populations.
Climate Change	Climate change is changing the phenology of many VEP species, and will ultimately force many to migrate north.	Climate change may create conditions for certain species to thrive. For example, some invasive insects are controlled by consistent freezing winter temperatures. With warming, those insect populations will explode.	Climate change will cause some native flora to die, creating ecosystem gaps.	Humans are causing climate change.	As winters warm, fewer deer will die off over the winter and populations will continue to increase.	Climate change is causing asynchrony in plant-pollinator interactions.
Wildlife vectors	Birds, small mammals, and other animals contribute to invasive species dispersal	Invasive species continue to disperse	N/A	N/A	N/A	A decline in native flora due to increased invasive species will harm native pollinators
Humans feeding animals	Preserve visitors feed invasive animals such as cats and sparrows.	Invasive animals thrive and outcompete and/or hunt native animals	N/A	Humans feed animals	N/A	N/A
Humans releasing animals	Preserve visitors release wildlife onto the VEP, such as unwanted pets (frogs, turtles, snakes, snails, fish, etc)	Many of the released animals can establish and outcompete native fauna (Chinese mystery snails, red-eared sliders)	N/A	Humans introduce invasive species directly	N/A	N/A

Contributing Factor	**Brief Description**	**Invasive Species**	**Habitat Fragmentation and Degradation**	**Human Impact**	**Deer Overabundance**	**Pollinator Decline**
Humans removing plants/ animals	Humans harvest edible species such as ramps, steal wildflowers, collect frogs and turtles, etc.	Picking native flora disrupts the soil and creates opportunities for invasive flora	N/A	Humans impact the populations of certain species on the VEP	N/A	Removing wildflowers harms native pollinators
Roads, cars	Contribute to invasive species spread	Contribute to invasive species spread	Roads fragment the landscape, severely impacting some fauna like amphibians and reptiles	Roadkill	N/A	N/A


VEP
VEP East Side
Wet Forest
RMSWOS
FF
RMHS
Dry Forest
BMMF
AOHF
VEP Central Corridor
Wet Communities
SEM
DEM
Shrub Swamp
Dry Communities
SOF
Successional Shrubland
Culture (fear)
Lack of predators
Development/ Land use
EcoRestore Site
PFP
Vassar student body, faculty, staff
Community Gardens
Neighboring Properties
Academic use- research,
Ignorance of and/ or not prioritising eco issues
Access Points (9)
Athletics
Humans feeding animals
Vehicles (ATV's, bikes, off-road trucks)
Humans releasing animals
Trails
Campus Policy, support
Visitors/ recreation
Shipping/moving stuff
Sewage Easement
Roads, cars
Land use upstream
Power Line Easement
Machinery (mowers)
Arboretum
Cutting down trees
Deer
Fragmentation/ habitat degradation
Human Impact
Climate Change
Wildlife/vectors
Invasive Species
Pollinator Decline

Through this analysis, we realized that many of our contributing factors share some common themes:

1) **Campus policy.** Many of the contributing factors could be mitigated with broader support from the Vassar community. For example, working with Buildings and Grounds and Athletics to make sure that equipment is cleaned before use on the VEP could reduce invasive species introductions. By partnering with the Arboretum Committee, we can ensure that no new invasive arboretum specimens are planted, while also promoting the planting of more native trees. Increased support from Vassar Security in enforcing preserve rules (such as no off-roading, no dogs off-leash, no picking plants or collecting animals, no releasing animals, etc.) would help address various human impacts.

2) **Ignorance and/or not prioritizing ecology issues**. We are aware that many of the preserve's visitors, neighbors, and resident organizations (such as the PFP, community gardens, athletics) may not be aware of their impact on the VEP's communities. We identified various opportunities for increased outreach to these groups, about the importance of the VEP's communities, their impact on the VEP, and the importance and benefits of collaboration in stewardship of the VEP. Such communications could also remind stakeholders that preserve staff are present and generally aware of the activities that occur on the VEP, which may discourage rule-breaking.

List of Key Stakeholders
Arboretum Committee
Buildings and Grounds
Central Hudson Power
Community Gardens
Poughkeepsie Farm Project
Safety and Security
The Environmental Cooperative
Town of Poughkeepsie sewage
Vassar Faculty
Vassar Staff, Administration, Leadership
Vassar Students
Visitors / the public

CAP Step 6: Develop Strategies: Objectives and Actions

<u>Expected Outputs:</u>

- ✔ At a minimum, good objectives for all critical threats and degraded key ecological attributes that your project will take action to address.
- ✔ If useful, good objectives for other factors relevant to project success.
- ✔ One or more strategic actions to accomplish each conservation objective.

<u>Conservation Action Plan</u>

The framework below outlines ways in which we can collaborate with other Vassar College entities to accomplish three major objectives.

Note: Action items that we have identified as relatively attainable are marked with an asterisk.

CAP ACTION PLAN	Invasive Species Prevention- Prevent the introduction of new invasive species on the VEP, eradicate early emerging invasive populations, and reduce the abundance of widespread invasive species. (Priority levels- 1 low, 4 high)		Reduce disturbance/ fragmentation- Reduce the destructive impacts of preserve visitation, use, and some and some natural phenomena. (Priority levels- 1 low, 4 high)		Restoration- Promote healthy, native plant communities and habitats on the VEP. (Priority levels- 1 low, 4 high)	
Group who can help	Action	Impact	Action	Impact	Action	Impact
Arboretum committee	Ensure no new invasive species are planted (4) *	Invasive arboretum specimens from campus are likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia (*Kalopanax septemlobus*) and Jetbead (*Rhodotypos scandens*), growing on the VEP.	Increase cover of native trees on campus, and decrease edges. (2)	Increased cover of native trees provides more contiguous habitat for wildlife, and reduces opportunities for light-seeking invasive species to establish.		
	Remove invasive arboretum specimens on campus (4) *					

Group who can help	Action	Impact	Action	Impact	Action	Impact
Buildings and Grounds	Move B&G dumping ground away from the preserve (4) *	Reduce the likelihood that invasive seeds and pests will be moved onto the preserve.	Move B&G dumping ground away from the preserve (4) *	Reduce traffic, noise, road maintenance, unauthorized dumping on the VEP.	When planting, choose native species (4) *	Native species better support local wildlife.
	Get rid of cat houses (4) *	Cats are deadly predators of birds, amphibians, small mammals and other wildlife. They are considered to be an invasive animal and should not be provided with shelter. The house needs to be demolished anyway, as it is a safety hazard.	Support VEP staff efforts to create new trails and remove unofficial trails (3)	Directing traffic through the VEP more intentionally will discourage off-trail foot traffic, trampling, fragmentation.	Support/ help restoring EcoRestore (4)	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
	Stop/regulate moving compost/ soil (4)	Moving compost and soil increases the chance that invasive seeds and pests (worms, insects, etc) will be moved from place to place, and establish on the VEP.	Help block unofficial access points (3) *	Limiting access points to the VEP by blocking with logs and rocks will help us enforce preserve rules.	Leave / use leaves as compost where possible in naturalized areas on campus (3)	Fallen leaves can help create habitat for local wildlife.
	Clean equipment to prevent spread of invasives (4)	Reduce the likelihood that invasive seeds and pests from other sites would be moved onto the VEP on equipment.	Support VEP staff efforts to create formalized access points with plantings, gates (3)	Creating formalized access points with plantings will help to intentionally direct traffic through the VEP, which will discourage off-trail foot traffic, trampling, fragmentation.		

Group who can help	Action	Impact	Action	Impact	Action	Impact
PFP	Stop bringing in honeybees (4) *	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.	Contain existing compost and woody debris. (4)	The large compost pile and woody debris is moving down slope into wetland areas.	Promote native pollinator habitat, health	
	Stop/regulate moving compost/ soil (4)	Moving compost and soil increases the chance that invasive seeds and pests will be moved from place to place, and establish on the VEP.	Move parking and/or pickup to the front lot. (2) *	Reduce traffic and disturbance. Increase pedestrian safety.		
	Control invasive species on edges. (4)	This would reduce seed source and save fence.				
	Plant native and/or non invasive species. (4) *	Reduce introductions.				
Community Gardens	Stop/regulate moving compost/ soil (4)	Moving compost and soil increases the chance that invasive seeds and pests (worms, insects, etc) will be moved from place to place, and establish on the VEP.	Continue to contain and remove compost. (4)			
	Control invasive species on edges. (4)	This would reduce seed source and save fence.				
	Plant native and/or non invasive species. (4) *	Reduce introductions.				

Group who can help	Action	Impact	Action	Impact	Action	Impact
Security	Hold unauthorized dumpers accountable (4)	Prevent the introduction of invasive seeds and pests (worms, insects, etc)	Enforce preserve rules- https://farm.vassar.edu/rules/ (leashed dogs, preserve hours, stay on trail, no unauthorized vehicles (including bikes), no removing orginisms (picking or poaching), no fires..) (4)	Reduce predation, trampling, poaching, picking, road maintenance. Keep native habitats intact.		
	Enforce preserve rules (no dumping, organism release, cat feeding) (4)	Prevent the introduction of invasive seeds, pests (worms, insects, etc), and animals	Support implementation of parking restrictions. (3)	Reduce traffic and disturbance. Increase pedestrian safety.		
VEP	Early detection via monitoring (4). Check HPAs for emerging invasives (4)	Detect early-emerging invasive species when populations are still small enough to eradicate ((repeated whole survey every 5 years at least, check HPA's every year or every other year))	Close unofficial access points (4) *	Limiting access points to the VEP will help us enforce preserve rules. Could use logs from the Shakespeare Garden to block access. *	Restoration in priority areas (4)	Prioritize restoration of native vegetation communities that serve as valuable habitat for native wildlife and provide opportunities for education about native ecosystems
	Develop a work plan for removal in priority areas. (4). Removal priorities: Emerging invasive eradication (4). Locations with vulnerable/rare species/communities (4). Edges (3). Trails (2). Barberry along trails (2).	Prioritize removal efforts aimed at reducing the abundance of widespread invasive species	Manage deer (4) *	Reduce the impact of overbrowse on regenerating vegetation across the VEP	Restore Eco-restore site (4)	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems

Group who can help	Action	Impact	Action	Impact	Action	Impact
VEP (cont.)	Install boot brush stations (3) *	Reduce the introduction of invasive seeds and pests from visitors' boots and provide an outreach opportunity (this summer season)	Strategically replan trail system- build new trails, eliminate unofficial trails (3)	Directing traffic through the VEP more intentionally will discourage off-trail foot traffic, trampling, fragmentation. Priorities for this: steep trail near pine plantation. Coupled with eco restore. Would also reduce vehicular traffic	Mapping spring ephemerals (4)	WIll help us prioritize restoration areas and inform removal areas and methods (removal can cause disturbance depending on the tecnnique, and we can minimize disturbance in areas with important spring ephemerals)
	Special events or outreach materials for neighbors (native alternatives, land management) (3) (Important, but requires a lot of thought and is difficult. Requires a lot of conversations)	Some invasive species are introduced from debris dumped onto the preserve by neighbors with bordering yards (for example- Chocolate vine). Events would involve neighbors in invasive species prevention and general stewardship. Student involvement in developing materials. Involve the Environmental Cooperative.	create formalized access points with plantings, gates (3)	Creating formalized access points with plantings will help to intentionally direct traffic through the VEP, which will discourage off-trail foot traffic, trampling, fragmentation. Donation from Landscaping company- want to donate a PR project, spend a day w equipment, etc.	Develop a plan for restoration with attention to the impact of climate change on community composition	
	Work more closely with larger neighbors such as Our Lady of Lourdes, Poughkeepsie Day School (3)	Larger neighbors could collaborate with us to reduce invasive species spread across a wider portion of our border.	Reduce traffic to field station (2)	Reduce traffic, noise, road maintenance, unauthorized dumping on the VEP.	Develop ideas for outreach	To target various audiences about prevention and stewardship practices, encourage restoration on private property

Group who can help	Action	Impact	Action	Impact	Action	Impact
VEP (cont.)	Identify potential sources of pollution upstream, and see where we might be able to change policy (2)	Reduce the probability of invasive introductions from the Casperkill. Low hanging fruit- tackling on campus (possibly)	Identify potential sources of pollution upstream, and see where we might be able to change policy (2)	Decrease sedimentation in the stream		
	Communicate with goat rental company about the diet of the goats before they come onsite	Reduce possibility of introductions from plants that the goats ate offsite	Restrict able-bodied visitor parking to north of causeway (2)	Reduce traffic and disturbance. Increase pedestrian safety.		
	Follow CAP monitoring regimen. Create 10-year framework to follow		Map the dumping along the west side of the preserve	Understand the scale and impact of the dumping issue. Notify neighbors that VEP is tracking illegal dumping- this may discourage the behavior		
			Make a shapefile showing preserve ages to determine how human impact has effected regeneration			
Neighbors	Reduce or eliminate invasive species plantings on private property (4)	Reduce the introduction of invasive species.				
	Stop dumping debris (organic and inorganic) onto the VEP (4)	Reduce the introduction of invasive species.				

Group who can help	Action	Impact	Action	Impact	Action	Impact
Students	Outreach/ signs (4)	Outreach to neighbors, visitors, easement workers, B&G, PFP, community gardens, Arboretum committee, Security	Remove debris from finished research projects (3)	Reduce plastic pollution on the VEP.	Planting/restoration in priority areas (4)	Increase native vegetation community area on the VEP, reconnect habitat corridors
	Early detection via monitoring (4)	Detect early-emerging invasive species when populations are still small enough to eradicate			Partnership between VEP and Sustainability (3)	Bring the VEP into conversations revolving around sustainability on campus, especially carbon neutrality. Campus community should come to see VEP as a resource for mitigating climate impacts.
	Removal in priority areas (4)	Reduce abundance of widespread invasive species, and eradicate early-emerging invasive species			Partnership between VEP and green student orgs (3)	Campus community should come to see VEP as a resource for mitigating climate impacts and for environmental activism
Faculty/ Classes	Better cleaning policy for researchers, enforce cleaning policy (3)	Reduce transport of invasive species around the VEP	Remove research debris from finished projects. (3)	Reduce plastic pollution on the VEP.		

Group who can help	Action	Impact	Action	Impact	Action	Impact
Environmental Cooperative	Do not bring in additional honeybees (4) *	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.				
	Collaborate on outreach to municipalities, utilities, and PFP on prevention (cleaning), and awareness. (4) * (already applying for funding)	Involve all of the VEP's visitors in preventing the spread of invasive species.				

Restoration Plan

Part of our Conservation Action Plan includes developing a more detailed framework for restoration of VEP ecosystems in the face of climate change. This is a work in progress that needs greater specificity, particularly in the outreach section.

Broad Objective: To set our targets on the track towards recovery and to promote resilience as the climate changes					
Remove barriers to recovery		Promote regeneration and recovery		Outreach	
Action	Impact	Action	Impact	Action	Impact
Eradicate early-emerging invasive flora	Prevent new invasive flora populations from out-competing native flora	Add "Percent of NYNHP species present in plot" as an indicator to each community type in Miradi	Track which native characteristic species are present in each community over time	Outreach to preserve neighbors	Remind neighbors that the VEP is a privilege and a place of value, that it is private property, that dumping is not allowed, and that we are paying attention
Map invasive flora in rare communities and near rare plants	Prioritize invasive species removal and restoration	Identify species that are missing from the target communities and species whose populations should be supplemented, either due to scarcity or due to genetic homogeneity. Focus on the tree and shrub layers (trees, shrubs, and small trees in the forest)	Restoration efforts on the VEP will aim to increase genetic diversity of target plant species in order to promote resilience in the face of climate change. Restoration plants will be both locally sourced, in order to promote gene flow between fragmented populations that would historically have been connected, and sourced from the southerly end of each species' range, in order to introduce variation that could help with species adaptation to warmer climates	Preserve entrance with rules, signage	Encourage people to treat preserve with respect, reduce fragmentation via going off trail and off-roading, explain why feeding/ releasing animals is bad, etc
Remove invasive flora in rare communities and/or near rare plants	Prevent invasive flora from out-competing rare native flora or native flora in rare communities	Collaborate with a professor or researcher to study the genetic diversity of various tree and possibly shrub populations on the VEP (Optional- it would be nice but challenging)	Determine the extent to which populations on the VEP are genetically homogeneous, and/or whether we have weird cultivars in the genetic mix already. This would direct restoration efforts	Engage intensive students in collection, propagation, planting of restoration species	
Map canopy gaps and document invasive flora in those gaps	Prioritize invasive species removal and restoration	Identify local populations of these species that could be used as sources for augmenting population size and diversity	Promote gene flow between fragmented populations that would historically have been connected	Determine how we should engage URSI students vs. intensive students in restoration activities	

Action	Impact	Action	Impact	Action	Impact
Remove invasive flora in canopy gaps	Prevent invasive flora from colonizing new areas and out-competing native flora	Identify southerly populations of these species that could be used as sources for augmenting population size and diversity	Introduce variation that could help with species adaptation to warmer climates	Design a student intensive focused on outreach; signage related to restoration efforts, habitat types, protection of habitats	Explain to the public more about the different habitats on the VEP, the value, and what we are doing to protect them. Promote the perception that we are environmental stewards.
Update Best Management Practices calendar to highlight phenological cues	Adapt invasive species management as the climate changes	Identify native southerly species that we should consider introducing to the VEP as the climate changes	Start transitioning our ecosystems to reflect native southerly ecosystems that will migrate north due to climate change		
Continue to manage deer	Prevent overbrowse of regenerating flora	Determine resources and capacity available to collect and grow restoration species	Involve intensive students		
Maintain culverts and other infrastructure to prevent interference with hydrology patterns	Prevent changes in hydrology that would result in the loss of flora adapted to wet or dry conditions, especially the rare flora near the vernal pools with the willows	Identify nurseries that could provide native plants for restoration	Increase number and diversity of restoration plants		
Reduce dumping: 1) Work with PFP to ensure containment of compost; 2) work with B&G as they remove debris from EcoRestore; 3) hold neighbors accountable for dumping	Prevent smothering native species with piles of debris and prevent invasive species introductions	Look into/ experiment with methods of protecting seedlings and saplings, such as paper and translucent bud caps	Promote regeneration of extant VEP flora that are vulnerable to herbivory		
Block unofficial trails, redesign the trail system, etc	Prevent trampling native species	Identify riparian areas where we should plant, based on benthic macroinvertebrate sampling	Improve water quality		

Action	Impact	Action	Impact	Action	Impact
Continue to mow old fields	Prevent succession	Restore / add wetland plants in the northwest deep emergent marsh	Buffer from the nearby parking lot where pollutions run off into the preserve		
Develop a plan for managing shrublands. Research habitat requirements to determine the area that we should manage.	Prevent succession	Develop novel methods for gap restoration. One possible example: Restoration around ash boles which form natural barriers	Inform whether it makes sense to devote time/energy to removing invasives from fallen tree "deer exclosures"		
Determine where we can change policies upstream to prevent pollution and sedimentation	Prevent deterioration of water quality, and improve water quality	Experiment with ways to use ash boles and other dead woody debris as a "deer exclosure"	Promote regeneration of extant VEP flora that are vulnerable to herbivory		

Tracking Progress

In addition to the viability analysis conducted as part of the CAP process, we will use the framework provided by the Society for Ecological Restoration (SER) To help track our progress. This approach involves completing a "recovery wheel" for each target, which shows clearly which aspects of the target ecosystem are functional and which are in need of further restoration. Repetition of the analysis over time will provide an easy way to visualize progress.

We decided to limit our use of the recovery wheel to the community-level targets. Deep emergent marsh was excluded from the analysis because we have not yet classified the beaver-active swamp area on the VEP, which, if classified as Deep Emergent Marsh, would drastically alter the Recovery Wheel assessment for this community. See Appendix F.

Logistics

For invasive species best management practices, see Appendix D.

For monitoring and management schedules, see Appendix E.

References

Allison, Janet. Personal communication 13 December 2018

Andrews, J. and Talmage, E. (2011). Amphibian and Reptile monitoring during the 2009 and 2010 field season on the Lester and Monique Anderson lands in Lincoln, Vermont. Vermont Reptile and Amphibian Atlas Project, Salisbury, VT.

Bien, S.M. (2015). Using coverboards to assess ambytstoma and salamander populations in mitigation wetlands at the Fernald Preserve (Masters thesis). Miami University, Miami FL

Calhoun, A. J., Walls, T. E., Stockwell, S. S., & Mccollough, M. (2003). Evaluating vernal pools as a basis for conservation strategies: A maine case study. *Wetlands,23*(1), 70-81. doi:10.1672/0277-5212(2003)023[0070:evpaab]2.0.co;2

Carignan, V. and Villard, M.A. (2002). Selecting indicator species to monitor ecological integrity: a review. *Environmental Monitoring and Assessment, 78,* 45-61.

Cunningham, MA et al. (2010). "Influence of open space on water quality in an urban stream". In: Physical Geography 31.4, pp. 336–356.

Crooks, K. R. (2002). Relative Sensitivities of Mammalian Carnivores to Habitat Fragmentation. *Conservation Biology,16*(2), 488-502. doi:10.1046/j.1523-1739.2002.00386.x

Davison, Kathryn. Personal communication 11 December 2018

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Faccio, S.D. (2011). Using egg mass surveys to monitor productivity and estimate population sizes of three pool-breeding amphibians at Marsh-Billings- Rockefeller National Historic Park. Vermont Center for Ecostudies, Norwhich, VT.

Fernandes, R. (2002). Simplified steps for salamander monitoring. The Clean Water Team Guidance Compendium for Watershed Management and Assessment, 1-4.

Gibbs, J. P. (2007). *The amphibians and reptiles of New York State identification, natural history, and conservation*. Oxford: Oxford University Press.

Gibbs, J.P. (1997). Distribution of woodland amphibians along a forest fragmentation gradient. *Landscape Ecology, 13*, 263-268.

Golden, G.M. (2004). Cover-board surveys for reptiles and amphibians on New Jersey Wildlife Management Areas, 2003. New Jersey Department of Environmental Protection.

Hager, H. A. (1998). Area-sensitivity of reptiles and amphibians: Are there indicator species for habitat fragmentation? *Écoscience,5*(2), 139-147. doi:10.1080/11956860.1998.11682463

Hamilton, Stephen. Personal communication 6 November 2018

Hesed, K. M. (2012). Uncovering Salamander Ecology: A Review of Coverboard Design. *Journal of Herpetology,46*(4), 442-450. doi:10.1670/10-220

Jacobson, H.A., J.C. Kroll, R.W. Browning, B.H. Koerth and M.H. Conway. 1997. Infrared-triggered cameras for censusing white-tailed deer. Wildlife Society Bulletin 25: 547-556

Jones, G., Jacobs, D. S., Kunz, T. H., Willig, M. R., & Racey, P. A. (2009). Carpe noctem: The importance of bats as bioindicators. *Endangered Species Research,8*, 93-115. doi:10.3354/esr00182

Jones, Kate et al. (2013). Indicator Bats Program: A System for the Global Acoustic Monitoring of Bats. 10.1002/9781118490747.ch10.

Levine, C. (2017). Forest resilience measured: Using a multi-timescale approach to quantify forest resilience in a changing world. (Doctoral thesis). UC Berkeley, Berkeley CA

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Lindsey, C. Tiller, B. (2013). Calendar year 2012 assessment report for porcupines and woody vegetation in the 100 areas of Hanford Site. US Department of Energy, Richland, WA

Maerz, J. C., Nuzzo, V. A., & Blossey, B. (2009). Declines in Woodland Salamander Abundance Associated with Non-Native Earthworm and Plant Invasions. *Conservation Biology,23*(4), 975-981. doi:10.1111/j.1523-1739.2009.01167.x

Marks, C.O., Nislow, K.H., Magilligan, F.J. (2014). Quantifying flooding regime in floodplain forests to guide river restoration. Elemental Science, 2, accessed 1/17/19. DOI: 10.12952/journal.elementa.000031

McLaren, M. A., Thompson, I. D., & Baker, J. A. (1998). Selection of vertebrate wildlife indicators for monitoring sustainable forest management in Ontario. *The Forestry Chronicle,74*(2), 241-248. doi:10.5558/tfc74241-2

N.a. (1994). Field Methods for Vegetation Mapping. NBS/NPS Vegetation Mapping Program. The Nature Conservancy, Arlington VA.

N.a. Herp Atlas Project. New York Department of Environmental Conservation. Accessed 7 May 2019 from <https://www.dec.ny.gov/animals/7140.html>

N.a. (2014). Appendix B. Coordinated Monitoring Strategy for Blanding's Turtle in the Northeastern United States: Project background, implementation protocols, and site selection process. USGS Massachusetts Cooperative Fish and Wildlife Research Unit and the Northeast Blanding's Turtle Working Group.

N.a. (2018). Spotted Turtle Assessment Protocol. Spotted Turtle Working Group. Retrieved 7 May 2019 from < http://www.northeastturtles.org/spotted-turtle-status-assessment-and-conservation-plan.html>.

N.a. Wood Turtle Population Assessment Protocol. Northeast Wood Turtle Working Group. Retrieved 7 May 2019 from < http://www.northeastturtles.org/wood-turtle-conservation-plan.html>.

New York Natural Heritage Program. 2019. Online Conservation Guides for Ecological Communities. Available from: https://guides.nynhp.org/. Accessed May 6, 2019.

New York State Department of Environmental Conservation (NYSDEC). 2015. New York State Fisher Management Plan. Albany, NY.

Persson, S., Brunström, B., Bäcklin, B., Kindahl, H., & Magnusson, U. (2012). Wild mink (Neovison vison) as sentinels in environmental monitoring. *Acta Veterinaria Scandinavica,54*(S1). doi:10.1186/1751-0147-54-s1-s9

Peterson, E. K., & Schulte, B. A. (2016). Impacts of Pollutants on Beavers and Otters with Implications for Ecosystem Ramifications. *Journal of Contemporary Water Research & Education,157*(1), 33-45. doi:10.1111/j.1936-704x.2016.03212.x

Rawinski, T.J. (2018). Monitoring White-tailed Deer Impacts: The Ten Tallest Method. USDA. Draft.

Rodewald, P. (Editor). 2015. The Birds of North America: https://birdsna.org. Cornell Laboratory of Ornithology, Ithaca, NY.

Stewart, G. (2016). Modeling the recovery of freshwater benthic macroinvertebrate communities through a riparian buffer zone (undergraduate thesis). Vassar College Department of Biology, Poughkeepsie NY

Sutherland, C., Fuller, A. K., Royle, J. A., & Madden, S. (2018). Large-scale variation in density of an aquatic ecosystem indicator species. *Scientific Reports,8*(1). doi:10.1038/s41598-018-26847-x

TNC, 2007. Conservation Action Planning Handbook: Developing Strategies, Taking Action and Measuring Success at Any Scale. The Nature Conservancy, Arlington, VA.

USNVC [United States National Vegetation Classification]. 2017. United States National Vegetation Classification Database, V2.01. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. [usnvc.org] (accessed 07 May 2019)

Vandendrische, D. (2013). A compendium of NFS regional vegetation classification algorithms. USDA, Forest Service, Forest Management Service Center. Fort Collins, CO. pg R1-1.

Weldy, Troy, David Werier, and Andrew Nelson. 2019 New York Flora Atlas. [S. M. Landry and K. N. Campbell (original application development), USF Water Institute. University of South Florida]. New York Flora Association, Albany, New York.

Wolman M.G., Leopold L.B. (1957). River flood plains: some observations on their formation. Washington, DC: U.S. Geological Survey.

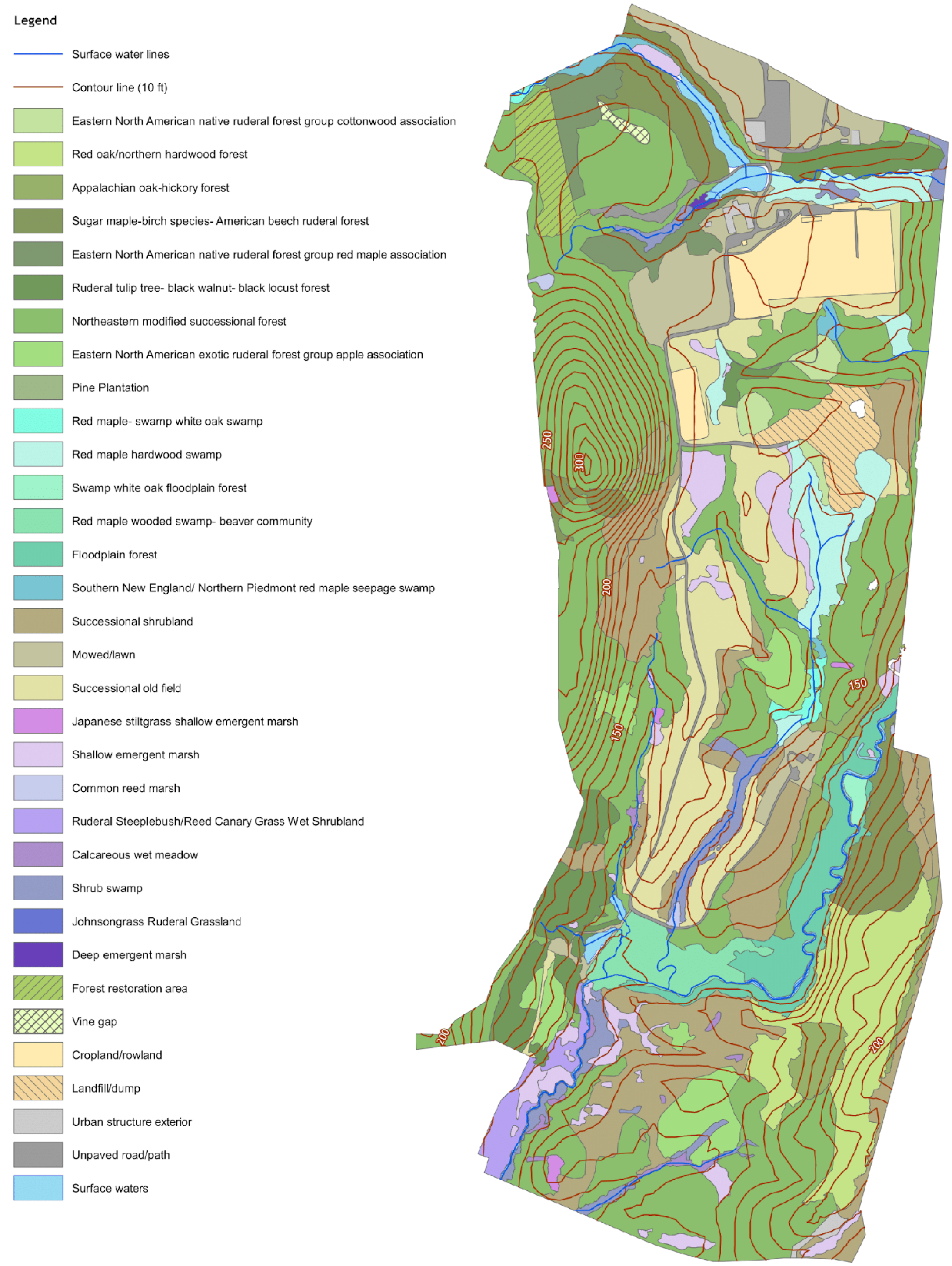
Wright, J. P., Jones, C. G., & Flecker, A. S. (2002). An ecosystem engineer, the beaver, increases species richness at the landscape scale. *Oecologia,132*(1), 96-101. doi:10.1007/s00442-002-0929-1

Yahner, R.H., Derge, K.L, Mravintz, J. (2001). Inventory of Amphibian and Reptile species at Gettysburg National Military Park and Eisenhower National Historic Site. Center for Biodiversity Research, University Park, PA.

Zorn, P., Plazeski, V., Craig, B. (2004). Joint EMAN/ Parks Canada national monitoring protocol for Plethodontid salamanders. EMAN, Parks Canada.

Appendix A. Maps

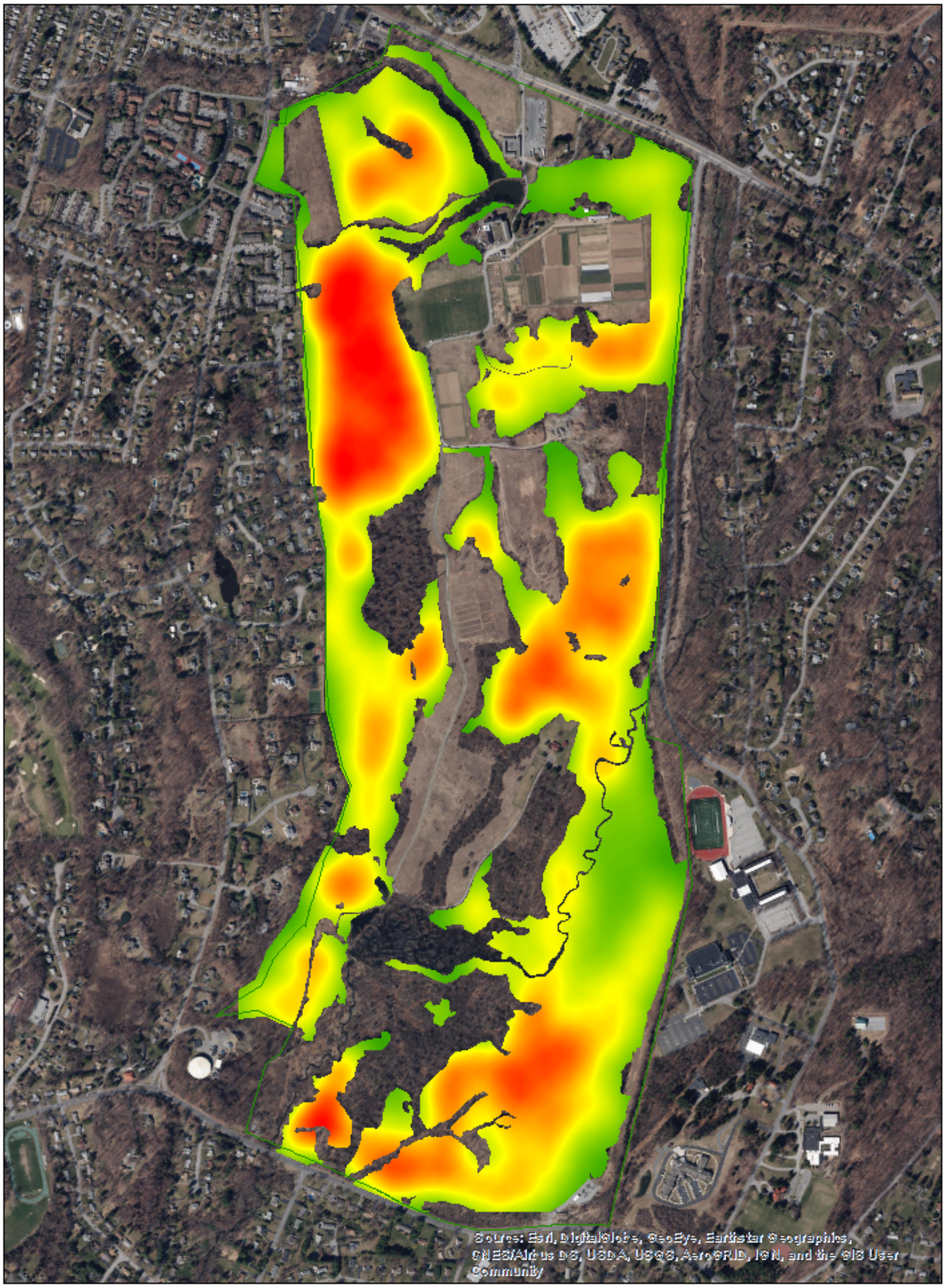
Map 1: The VEP's vegetation communities with topography:



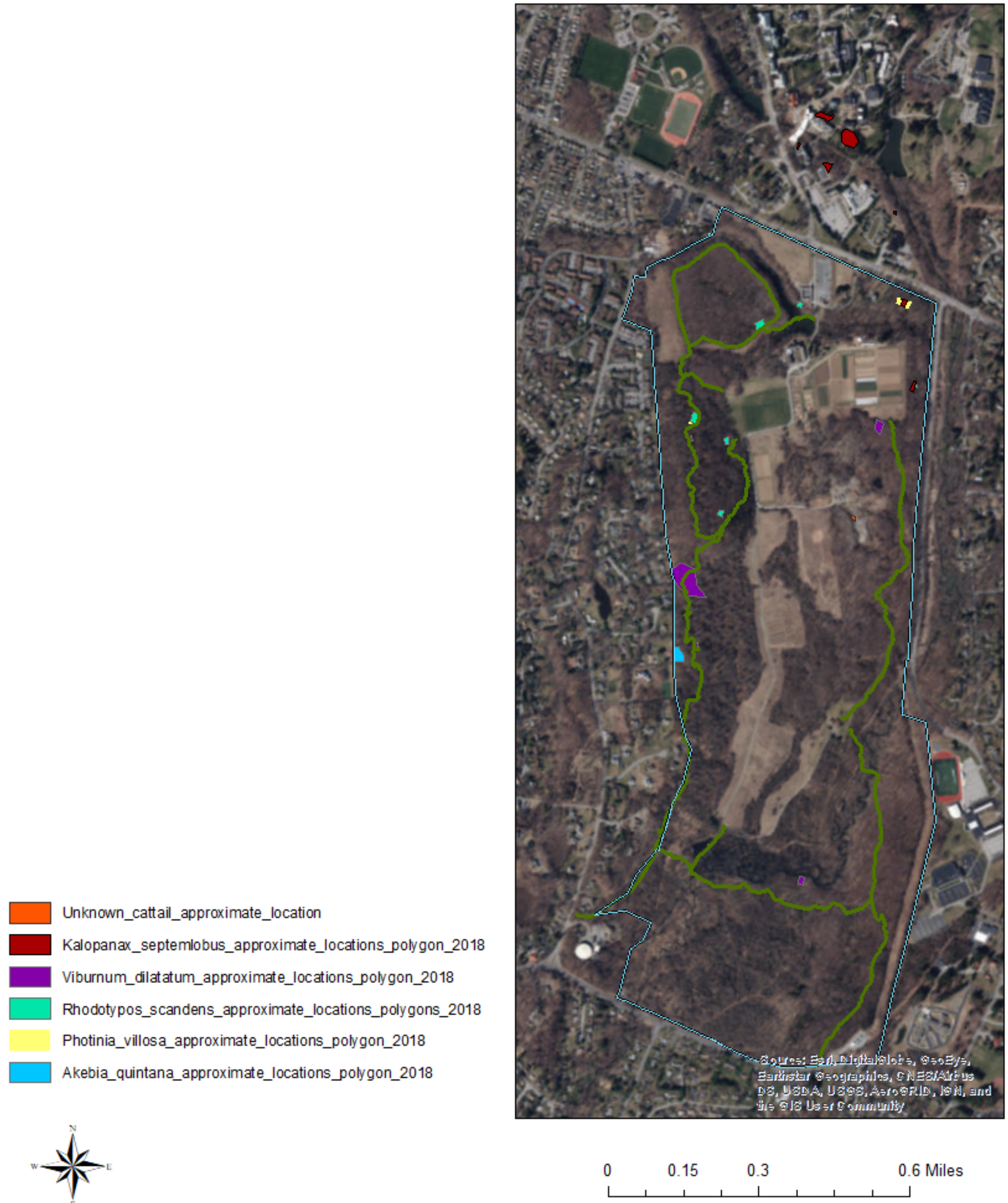
Map 2: The Extent of Vassar's Property

Map 3: Overall density of common invasive plants in the VEP's forests in 2018

Red = more invaded; green = less invaded



Map 4: Emerging invasive flora in the VEP's forests



<u>Map 5: Density of select common invasive plants on the VEP</u>
Red = more invaded

Amur Honeysuckle Density on the
Vassar Ecological Preserve

Buckthorn Density on the
Vassar Ecological Preserve

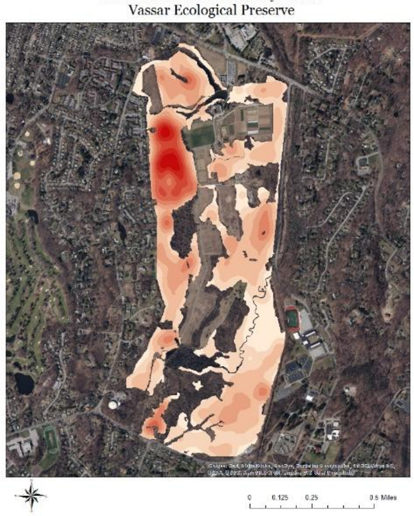
Morrow's Honeysuckle Density on the
Vassar Ecological Preserve

Japanese Stiltgrass Density on the
Vassar Ecological Preserve

Multiflora Rose Density on the
Vassar Ecological Preserve

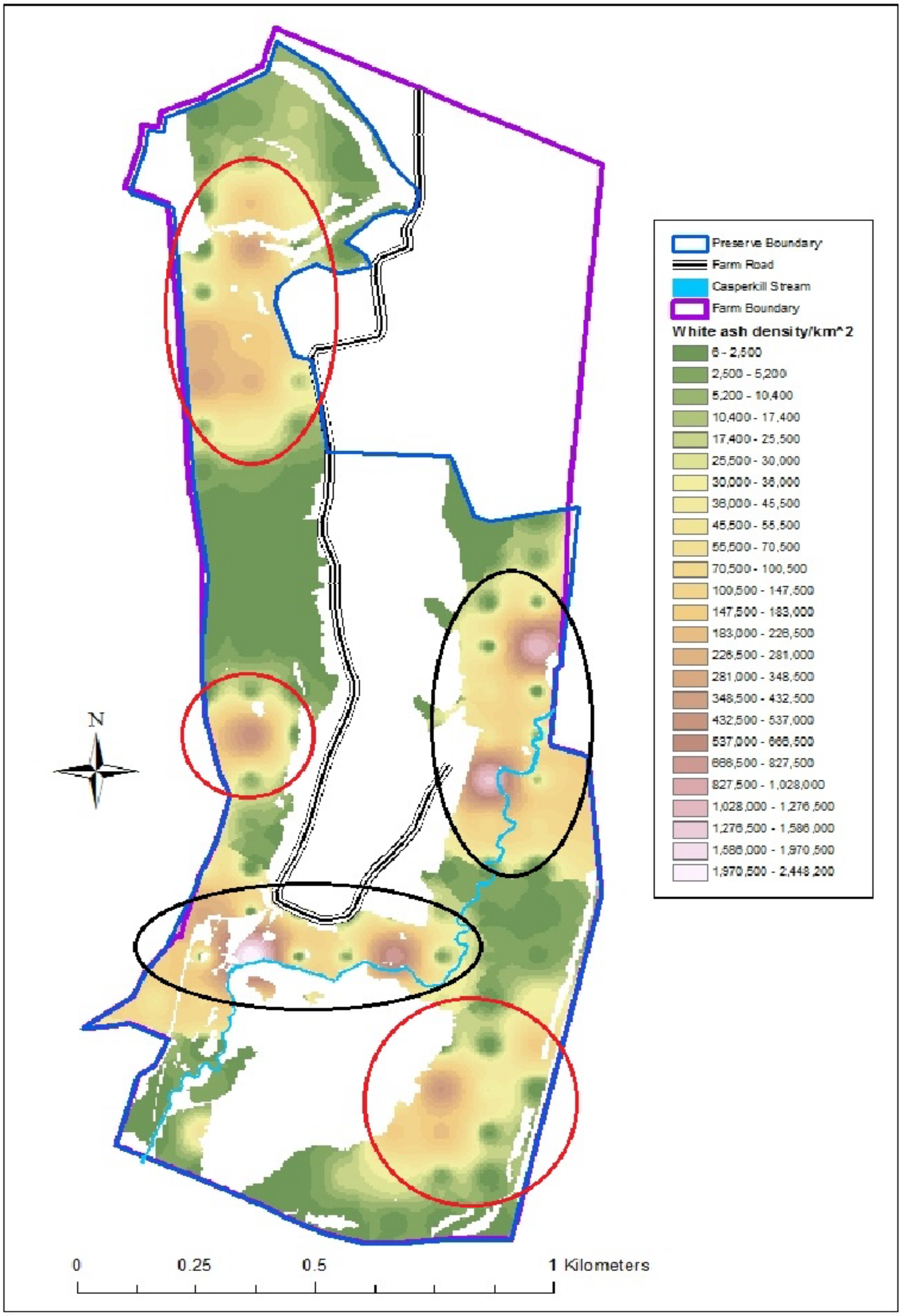
Japanese Barberry Density on the
Vassar Ecological Preserve

Oriental Bittersweet Density on the
Vassar Ecological Preserve

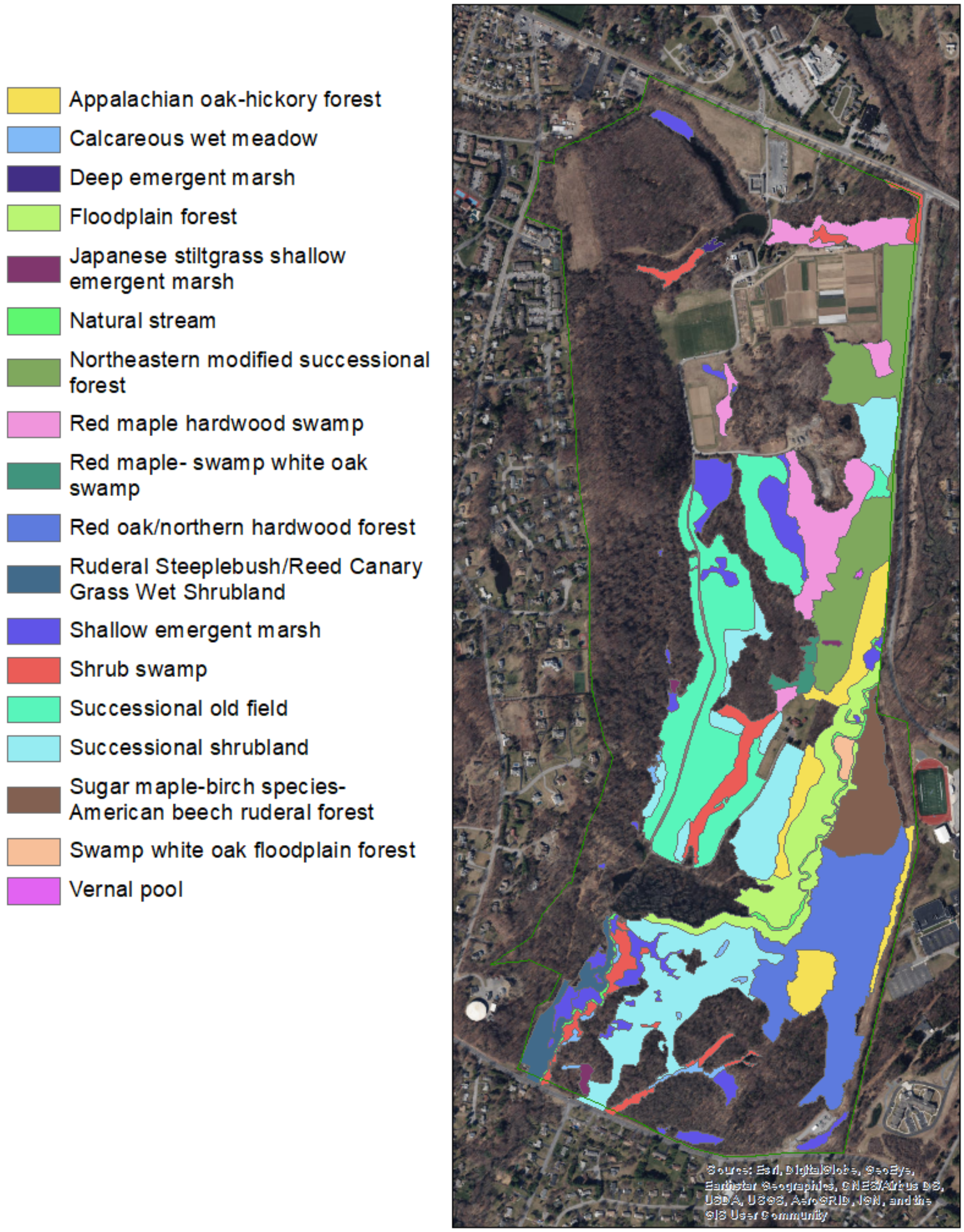


Map 6: 2012 White Ash Density on the VEP

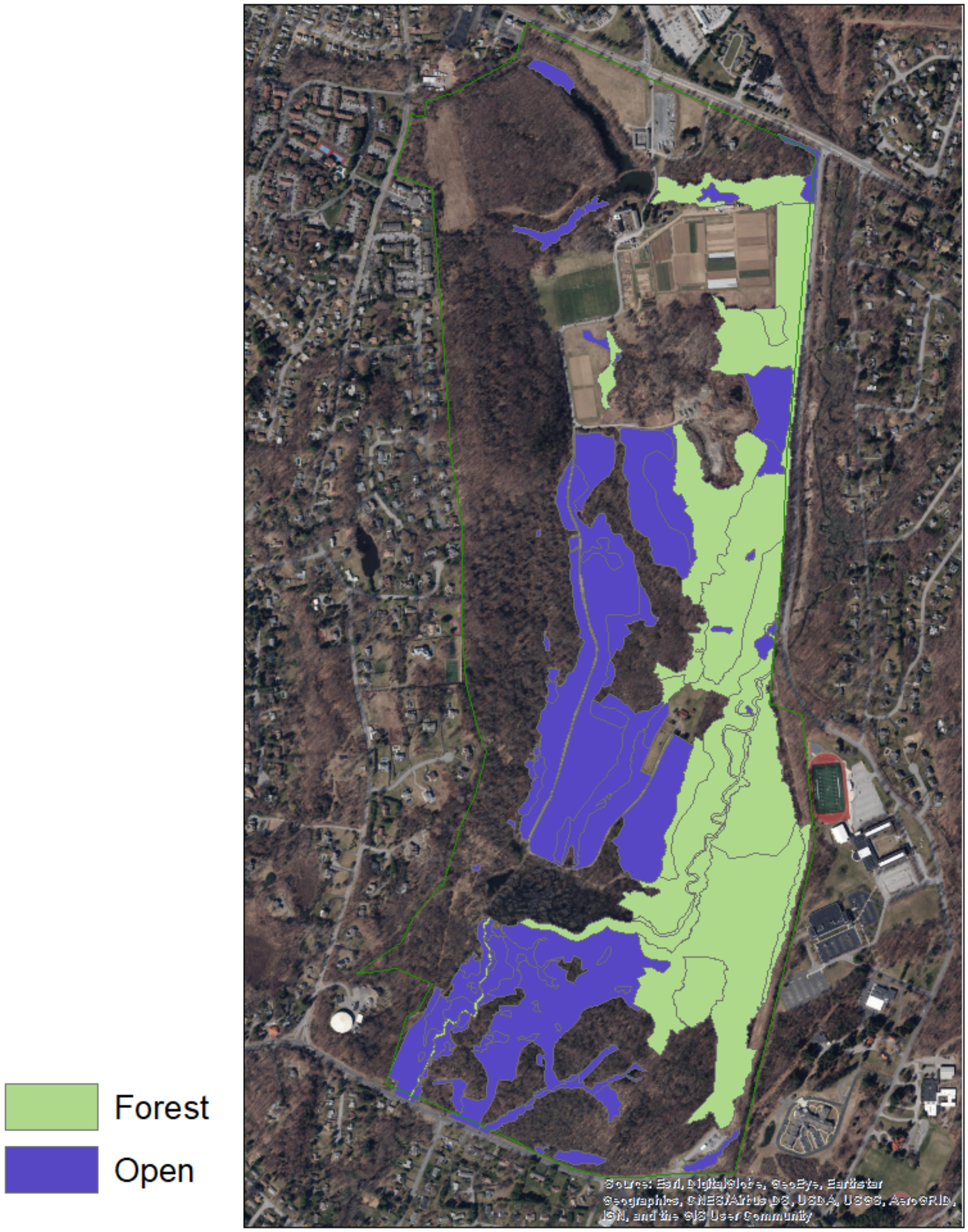
Notice how closely the areas that were densely populated with ash in 2012 match up with the highly invaded areas shown in Map 3.



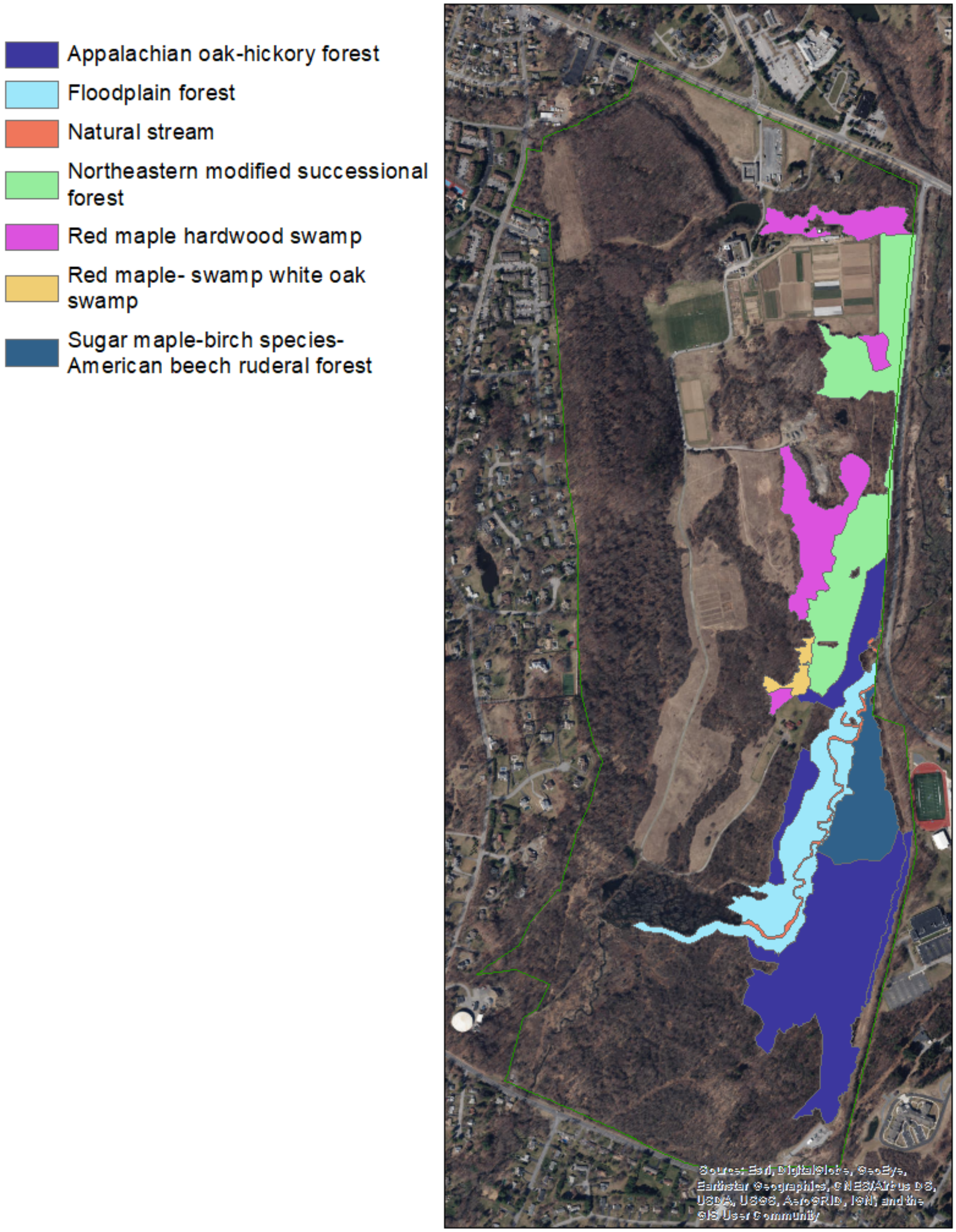
Map 7: All Target Communities on the VEP

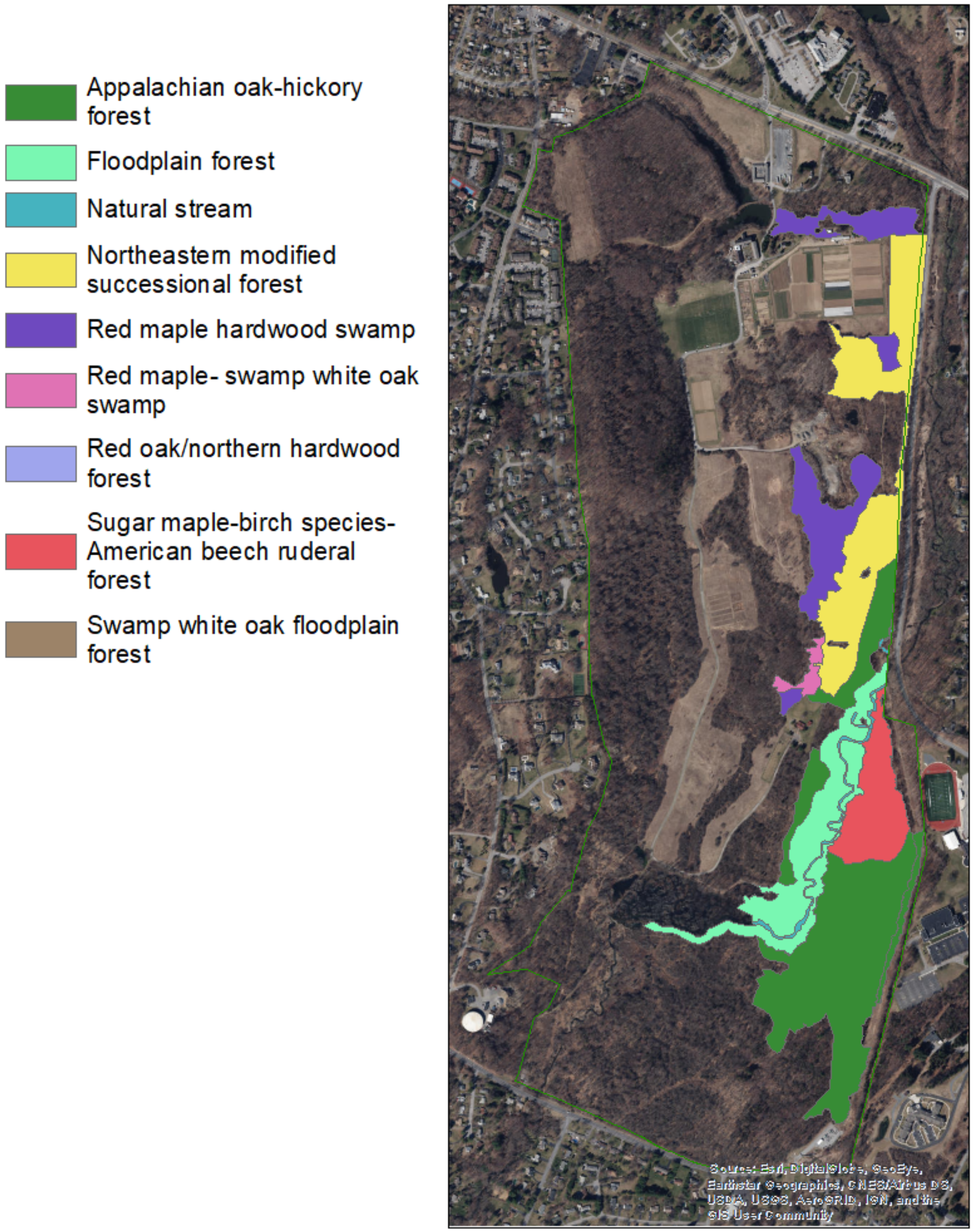


Map 8: Eastern Forest and Central Open Corridors on the VEP



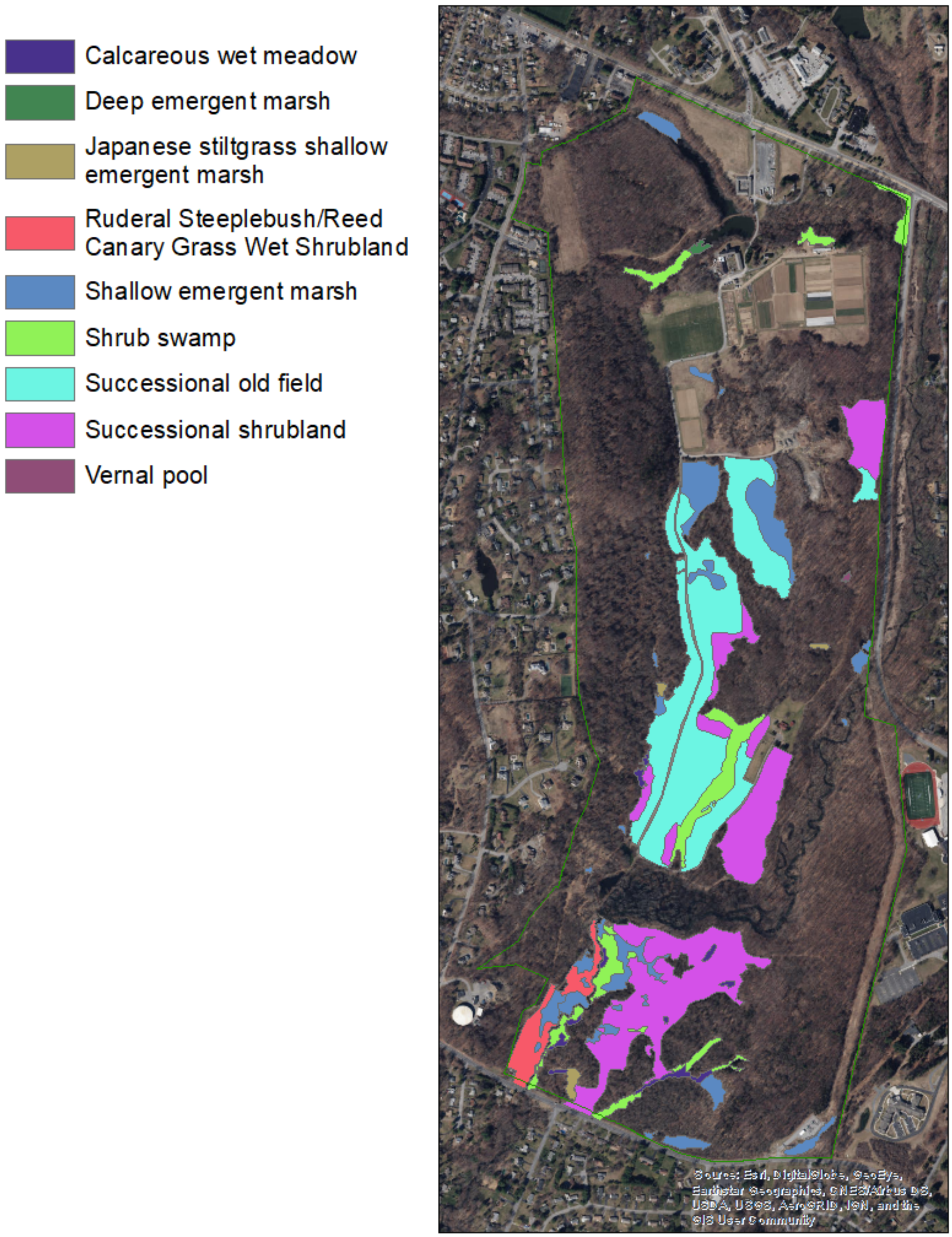
Map 9: Target Forest Communities on the VEP


Appalachian oak-hickory forest
Floodplain forest
Natural stream
Northeastern modified successional forest
Red maple hardwood swamp
Red maple- swamp white oak swamp
Sugar maple-birch species-American beech ruderal forest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Appalachian oak-hickory forest
Floodplain forest
Natural stream
Northeastern modified successional forest
Red maple hardwood swamp
Red maple- swamp white oak swamp
Red oak/northern hardwood forest
Sugar maple-birch species- American beech ruderal forest
Swamp white oak floodplain forest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map 10: Target Open Communities on the VEP



Appendix B. Plant Stewardship Indices for Target Communities

VEP Forest communities listed in rough order of ecological importance, as indicated by the plant stewardship index.

# of Plots	Community NYNH	# of Hectares	State Rank	Global Rank	Plant Stewardship Index $\bar{c}s \times \sqrt{n}$ mean coefficient of conservatism of all species, Cs, multiplied by the square root of species richness, S	# of Ash Present in Plots	Invasive Level 1= High 4= Low	Priority Level
0	Red Maple Swamp White Oak Swamp	.75	S2	G3G4	Shrub: **10.67** Herb: **11.62** Canopy: **5.2**	1	3.33	High
3	Floodplain Forest (Swamp White Oak Floodplain Forest)	6.43	S2S3	G3G4	Shrub: **13.19 ± 0.43** Herb: **7.42 ± 2.04** Canopy: **15.34 ± 0.23**	1	3.17	High
1	Red Maple Hardwood Swamp (S. New England/N. Piedmont Red Maple Seepage Swamp)	0.94	S4S5	G4	Shrub: **7.57** Herb: **7.62** Canopy: **7.6**	2	3.67	Medium
2	Appalachian Oak Hickory Forest (combined with Red Oak Northern Hardwood Forest)	16.14	S4	G4G5	Shrub: **9.13 ± 0.36** Herb: **4.07 ± 5.75** Canopy: **17.83 ± 5.56**	1	2.67*	Medium
3	Beech Maple Mesic Forest (Sugar Maple-Birch-American Beech Ruderal Forest)	8.70	S4	G4	Shrub: **8.39 ± 3.99** Herb: **4.59 ± 3.33** Canopy: **12.03 ± 2.17**	4	2.33	Medium
10	NE Modified Successional Forest	65.60			Herb: **4.15 ± 3.87** Shrub: **8.88 ± 2.88** Canopy: **10.55 ± 4.14**	26	2.19**	Low
2	Ruderal Tulip Tree-Black Walnut Locust Forest***	7.75			Shrub: **6.18 ± 0.74** Herb: **6.48 ± 2.01** Canopy: **8.48 ± 2.12**	2	1.83	Low
3	Eastern North American Exotic Ruderal Forest Group-Apple Association***	5.84			Shrub: **5.99 ± 1.87** Herb: **4.48 ± 4.28** Canopy: **7.05 ± 0.95**	46	2	Low
1	Eastern North American Native Ruderal Forest Group- Cottonwood Association***	1.56			Shrub: **10.39** Herb: **0** Canopy: **1.41**	0	2.33	Low

1	Eastern North American Native Ruderal Forest Group- Red Maple***	3.99			Shrub: **9.05** Herb: **2.89** Canopy: **4**	0	2.67	Low

VEP open communities listed in rough order of ecological importance, as indicated by the plant stewardship index.

# of Plots	Community NYNHP	# of Hectares	State Rank	Global Rank	Plant Stewardship Index $cs \times \sqrt{n}$ mean coefficient of conservatism of all species, Cs, multiplied by the square root of species richness, S	Priority Level
18	Shallow Emergent Marsh (Calcareous wet meadow, Japanese stiltgrass shallow emergent marsh, vernal pool)		S3	G5	Shrub: **3.445 ± 1.94** Herb: 7.980 ± **2.70** Canopy: **4.5 ± 0.71**	Medium
0	Deep Emergent Marsh		S3	G5	Shrub: Herb: Canopy:	Medium
9	Shrub Swamp (Ruderal steeplebush/ reed canary grass wet shrubland)		S5	G5	Shrub: 4.154 ± **2.15** Herb: 7.252±**2.54** Canopy: 3	Medium
4	Successional Old Field		S5	G5	Shrub: 5.355± **6.46** Herb: 6.124±**1.06** Canopy: --	Medium
5	Successional Shrubland		S5	G5	Shrub: 4.175 ± **1.69** Herb: 6.751± **3.01** Canopy: 4.084±**1.44**	Medium

Appendix C. New York Natural Heritage Descriptions of Target Vegetation Communities, Characteristic Vegetation, and United States National Vegetation Classification Crossovers

Species missing from our plots are highlighted in blue and should be given special consideration when selecting species for restoration plantings.

Red Maple- Swamp White Oak Swamp

General Description

This hardwood swamp is typically found in small, isolated basins on sandy soils that are underlain by a clay layer. The swamp floods seasonally and draws down in most years exposing a leaf litter substrate. The swamp is codominated by red maple (Acer rubrum) and oaks, such as swamp white oak (Quercus bicolor) and/or pin oak (Q. palustris). Characteristic shrubs include winterberry (Ilex verticillata), highbush blueberry (Vaccinium corymbosum), buttonbush (Cephalanthus occidentalis), and arrowwood (Viburnum dentatum). Herb cover is typically sparse. Characteristic herbs include various sedges (Carex spp.), such as C. crinita, C. grayi, C. lupulina, and C. tuckermanii. Other characteristic herbs include ferns, such as cinnamon fern (Osmunda cinnamomea), royal fern (Osmunda regalis), marsh fern (Thelypteris palustris), and netted chain fern (Woodwardia areolata).

Characteristic Species

Trees >5m	Shrubs	Vines/ Lianas	Herbs
Acer rubrum *Carya glabra* (pignut hickory) *Fagus grandifolia* (American beech) *Fraxinus pennsylvanica* (green ash) *Nyssa sylvatica* (black-gum, sour-gum) *Quercus bicolor* (swamp white oak) *Ulmus americana* (American elm) *Ulmus rubra* (slippery elm) Shrubs 2 - 5m	*Fagus grandifolia* (American beech) *Ilex verticillata* (common winterberry) *Quercus bicolor* (swamp white oak) *Viburnum dentatum* Tree saplings *Acer rubrum* *Amelanchier arborea* (downy shadbush)	*Smilax rotundifolia* (common greenbrier) *Toxicodendron radicans* *Vitis sp.* Short vines *Smilax rotundifolia* (common greenbrier)	*Carex bromoides* *Carex grayi* (Gray's sedge) *Carex gynandra* (nodding sedge) *Carex sp.* *Carex tuckermanii* (Tuckerman's sedge) *Cinna arundinacea* (stout wood-reed) *Dryopteris carthusiana* (spinulose wood fern) *Juncus effusus* *Ludwigia palustris* (water-purslane) *Moehringia lateriflora* (blunt-leaved-sandwort) *Onoclea sensibilis* (sensitive fern) *Osmunda cinnamomea* *Osmunda regalis* *Solidago rugosa* *Thelypteris palustris*

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Red maple-swamp white oak swamp*. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed May 6, 2019.

Note: We have no plots in this community yet as of 5/31/2019, and therefore do not know which species are missing.

Floodplain Forest

General Description

A hardwood forest that occurs on mineral soils on low terraces of river floodplains and river deltas. These sites are characterized by their flood regime; low areas are annually flooded in spring and high areas are flooded irregularly. This is a broadly defined community; floodplain forests are quite variable and may be very diverse. The composition of the forest apparently changes in relation to flood frequency and elevation of floodplain terraces along larger rivers.

Characteristic Species

Trees >5m	Shrubs	Vines/ Lianas	Herbs
Acer negundo *Acer rubrum* *Acer saccharinum* (silver maple) *Acer saccharum* (sugar maple) *Fraxinus pennsylvanica* (green ash) *Platanus occidentalis* (eastern sycamore) *Populus deltoides* *Ulmus americana* (American elm) Shrubs 2 - 5m *Alnus incana* ssp. *rugosa* (speckled alder) *Carpinus caroliniana*	*Alnus incana* ssp. *rugosa* (speckled alder) *Carpinus caroliniana* *Lindera benzoin* (spicebush)	*Parthenocissus quinquefolia* (Virginia-creeper) *Toxicodendron radicans* *Vitis riparia* (river grape, frost grape)	*Boehmeria cylindrica* (false nettle) *Impatiens capensis* (spotted jewelweed, spotted touch-me-not) *Laportea canadensis* (wood-nettle) *Lysimachia nummularia* (moneywort, creeping-Jenny) *Matteuccia struthiopteris* *Onoclea sensibilis* (sensitive fern) *Persicaria virginiana* (jumpseed) *Solidago gigantea* (swamp goldenrod)

Crossover/ Synonym: Swamp White Oak Floodplain Forest

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Floodplain forest*. Available from: https://guides.nynhp.org/floodplain-forest/. Accessed May 6, 2019.

Red Maple- Hardwood Swamp

General Description

A hardwood swamp that occurs in poorly drained depressions, usually on inorganic soils with peat, if present, that is less than 20 cm deep. This is a broadly defined community with many variants. In any one stand red maple is either the only canopy dominant, or it is codominant with one or more hardwoods such as ash, elm, and birch. Blackgum (Nyssa sylvatica), sweetgum (Liquidambar styraciflua), and swamp white oak (Quercus bicolor) if present, are only minor associates. The shrub layer is usually well-developed and may be quite dense. The herbaceous layer may be diverse and is often dominated by ferns.Characteristic Species

Characteristic Species

Trees >5m	Shrubs	Vines/ Lianas	Herbs
Acer rubrum *Betula alleghaniensis* (yellow birch) *Fraxinus pennsylvanica* (green ash) *Ulmus americana* (American elm) *Ulmus rubra* (slippery elm)	*Alnus incana* ssp. *rugosa* (speckled alder) *Ilex verticillata* (common winterberry) *Vaccinium corymbosum* (highbush blueberry) *Viburnum dentatum* *Viburnum nudum* *Lindera benzoin* (spicebush) *Vaccinium corymbosum* (highbush blueberry)	*N/A*	*Boehmeria cylindrica* (false nettle) *Carex stricta* (tussock sedge) *Impatiens capensis* (spotted jewelweed, spotted touch-me-not) *Onoclea sensibilis* (sensitive fern) *Osmunda cinnamomea* *Osmunda regalis* *Symplocarpus foetidus* (skunk-cabbage) *Thalictrum pubescens* (tall meadow-rue)

Crossover/ Synonym: Southern New England/ Northern Piedmont Red Maple Seepage Swamp

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Red maple-hardwood swamp*. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed May 6, 2019.

Note: We have no plots in this community yet as of 5/31/2019, and therefore do not know which species are missing.

Beech- Maple Mesic Forest

General Description

Beech-maple mesic forest communities are closed-canopy hardwood forests with codominating sugar maple (Acer saccharum) and American beech (Fagus grandifolia). This is a broadly defined community type with several regional and edaphic variants. These forests occur on moist, well drained, usually acid soils. There are many spring ephemerals that bloom before the canopy trees leaf out. Hemlock (Tsuga canadensis) may be present at a low density. In the Adirondacks a few red spruce (Picea rubens) may also be present.

Characteristic Species

Trees >5m	Shrubs	Vines/ Lianas	Herbs
Acer rubrum *Acer saccharum* (sugar maple) *Betula alleghaniensis* (yellow birch) *Betula lenta* (black birch) *Fagus grandifolia* (American beech) *Fraxinus americana* (white ash) *Picea rubens* (red spruce) *Prunus serotina* *Quercus rubra* (northern red oak) *Tsuga canadensis* (eastern hemlock)	*Acer pensylvanicum* (striped maple) *Hamamelis virginiana* (witch-hazel) *Viburnum lantanoides* (hobblebush) *Viburnum acerifolium* (maple-leaved viburnum)	*N/A*	*Dennstaedtia punctilobula* (hay-scented fern) *Dryopteris carthusiana* (spinulose wood fern) *Maianthemum canadense* (Canada mayflower) *Polystichum acrostichoides* (Christmas fern) *Trientalis borealis* *Trillium undulatum* (painted trillium)

Crossover/ Synonym: Sugar Maple- Birch Species- American Beech Ruderal Forest

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Beech-maple mesic forest*. Available from: https://guides.nynhp.org/beech-maple-mesic-forest/. Accessed May 6, 2019.

Appalachian Oak-Hickory Forest

General Description

A hardwood forest that occurs on well-drained sites, usually on ridgetops, upper slopes, or south- and west-facing slopes. The soils are usually loams or sandy loams. This is a broadly defined forest community with several variants. The dominant trees include one or more species of oak.

Characteristic Species

Trees >5m	Shrubs	Vines/ Lianas	Herbs
Acer rubrum *Acer saccharum* (sugar maple) *Carya glabra* (pignut hickory) *Carya ovata* *Fraxinus americana* (white ash) *Ostrya virginiana* (hop hornbeam, ironwood) *Quercus alba* (white oak) *Quercus montana* (chestnut oak) *Quercus rubra* (northern red oak)	*Cornus florida* (flowering dogwood) *Hamamelis virginiana* (witch-hazel) *Corylus cornuta* *Vaccinium pallidum* (hillside blueberry) *Viburnum acerifolium* (maple-leaved viburnum)	*N/A*	*Aralia nudicaulis* (wild sarsaparilla) *Carex pensylvanica* (Pennsylvania sedge) *Cimicifuga racemosa* *Hepatica americana* (round-lobed hepatica) *Smilacina racemosa*

Crossover/ Synonym: Northern Red Oak – Hardwood Forest

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Appalachian oak-hickory forest*. Available from: https://guides.nynhp.org/appalachian-oak-hickory-forest/. Accessed May 6, 2019

Shallow Emergent Marsh

General Description

A marsh meadow community that occurs on mineral soil or muck soils that are permanently saturated and seasonally flooded. This marsh is better drained than a deep emergent marsh; water depths may range from 6 inches to 3.3 feet (15 cm to 1 m) during flood stages, but the water level usually drops by mid to late summer and the substrate is exposed. Shallow emergent marshes typically occur in lake basins and along streams. Deep and shallow emergent marshes often intergrade, and they may occur together in a complex mosaic in a large wetland (Edinger et al. 2002).

Characteristic Species

Trees >5m	Shrubs	Floating-leaved aquatics	Herbs
Acer rubrum	*Spiraea tomentosa* (steeplebush)	*Hydrocharis morsus-ranae* (European frog's-bit)	*Boehmeria cylindrica* (false nettle) *Calamagrostis canadensis* *Carex lacustris* (lake-bank sedge) *Carex stricta* (tussock sedge) *Glyceria canadensis* (rattlesnake manna grass) *Impatiens capensis* (spotted jewelweed, spotted touch-me-not) *Juncus effusus* *Leersia oryzoides* (rice cut grass) *Onoclea sensibilis* (sensitive fern) *Persicaria sagittata* (arrow-leaved tear-thumb) *Phalaris arundinacea* (reed canary grass) *Poa trivialis* *Scirpus atrovirens* (dark-green bulrush) *Scirpus cyperinus* (common wool-grass) *Solidago gigantea* (swamp goldenrod) *Thelypteris palustris* *Typha latifolia* (wide-leaved cat-tail)

Crossover/ Synonyms: Calcareous wet meadow, Japanese Stiltgrass Shallow Emergent Marsh, Purple Loosestrife Shallow Emergent Marsh, Vernal Pool

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Shallow emergent marsh*. Available from: https://guides.nynhp.org/shallow-emergent-marsh/. Accessed May 6, 2019.

Deep Emergent Marsh

General Description

A marsh community that occurs on mineral soils or fine-grained organic soils; the substrate is flooded by waters that are not subject to violent wave action. Water depths can range from 15 cm to 2 m (6 inches to 6.6 feet); water levels may fluctuate seasonally, but the substrate is rarely dry, and there is usually standing water in the fall. Deep emergent marshes are quite variable. They may be codominated by a mixture of species or have a single dominant species.

Characteristic Species

Emergent aquatics	Floating-leaved aquatics	Submerged aquatics
Equisetum fluviatile (river horsetail) *Peltandra virginica* (green arrow-arum, tuckahoe) *Pontederia cordata* (pickerelweed) *Sagittaria latifolia* (common arrowhead) *Scirpus americanus* *Scirpus tabernaemontani* *Sparganium eurycarpum* (giant bur-reed) *Typha angustifola* *Typha latifolia* (wide-leaved cat-tail) *Zizania aquatica*)	*Lemna minor* (common duckweed) *Nymphaea odorata* *Potamogeton natans* (floating-leaved pondweed)	*Ceratophyllum demersum* (common coon-tail) *Lobelia dortmanna* (water lobelia) *Utricularia vulgaris*

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for *Deep emergent marsh*. Available from: https://guides.nynhp.org/deep-emergent-marsh/. Accessed May 6, 2019.

Note: We have no plots in this community yet as of 5/31/2019, and therefore do not know which species are missing.

Shrub Swamp

General Description

A shrub swamp is an inland wetland dominated by tall shrubs that occurs along the shore of a lake or river; in a wet depression or valley not associated with lakes; or as a transition zone between a marsh, fen, or bog and a swamp or upland community. The substrate is usually mineral soil or muck. This is a very broadly defined type that includes several distinct communities and many intermediates. In northern New York many shrub swamps are dominated by alder (Alnus incana ssp. rugosa); these swamps are sometimes called alder thickets. A swamp dominated by red osier dogwood (Cornus sericea), silky dogwood (C. amomum), and willows (Salix spp.) may be called a shrub carr. Along the shores of some lakes and ponds there is a distinct zone dominated by waterwillows (Decodon verticillatus) and/or buttonbush (Cephalanthus occidentalis) which can sometimes fill a shallow basin. Birds that may be found in shrub swamps include both common species such as common yellowthroat (Geothlypis trichas) and swamp sparrow (Melospiza georgiana) and rare species such as the American bittern (Botaurus lentiginosus).

Characteristic Species

Trees >5m	Shrubs	Vines/ Lianas	Herbs	Floating-leaved aquatics
Alnus serrulata (smooth alder) *Salix spp.*	*Alnus incana ssp. rugosa (speckled alder)* *Cephalanthus occidentalis (buttonbush)* *Clethra alnifolia (coastal sweet-pepperbush)* *Cornus sericea (red-osier dogwood)* *Spiraea alba* *Ilex laevigata (smooth winterberry)* *Salix spp.*	*Vitis aestivalis (summer grape)*	*Bidens cernua (nodding beggar-ticks)* *Carex torta (twisted sedge)* *Decodon verticillatus (water-willow)* *Osmunda cinnamomea* *Persicaria amphibia* *Persicaria arifolia (halberd-leaved tear-thumb)* *Phalaris arundinacea (reed canary grass)* *Typha angustifolia (narrow-leaved cat-tail)*	*Lemna minor (common duckweed)*

Crossover/ Synonym: Ruderal Steeplebush/ Reed Canary Grass Wet Shrubland

Citation

New York Natural Heritage Program. 2019. Online Conservation Guide for Shrub swamp. Available from: https://guides.nynhp.org/shrub-swamp/. Accessed May 6, 2019.

Successional Old Field

General Description

A meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned. Fields that are mowed at an interval (e.g., less than once per year) that favors the reproduction of characteristic successional old field species are included here.

Characteristic Species

Characteristic herbs include goldenrods (Solidago altissima, S. nemoralis, S. rugosa, S. juncea, S. canadensis, and Euthamia graminifolia), bluegrasses (Poa pratensis, P. compressa), timothy (Phleum pratense), quackgrass (Elymus repens), smooth brome (Bromus inermis), sweet vernal grass (Anthoxanthum odoratum), orchard grass (Dactylis glomerata), common chickweed (Cerastium arvense), common evening primrose (Oenothera biennis), old-field cinquefoil (Potentilla simplex), calico aster (Sympyotrichum lateriflorum var. lateriflorum), New England aster (Sympyotrichum novae-angliae), wild strawberry (Fragaria virginiana), Queen-Anne's-lace (Daucus carota), ragweed (Ambrosia artemisiifolia), hawkweeds (Hieracium spp.), dandelion (Taraxacum officinale), and ox-tongue (Picris hieracioides). Little bluestem (Schizachyrium scoparium) may be present in some examples, but is more characteristic of successional northern sandplain grassland.

Shrubs may be present, but collectively they have less than 50% cover in the community. Characteristic shrubs include gray dogwood (Cornus racemosa), silky dogwood (C. amomum), arrowwood (Viburnum dentatum var. lucidum), raspberries (Rubus spp.), sumac (Rhus typhina, R. glabra), and eastern red cedar (Juniperus virginiana).

Characteristic butterflies include black swallowtail (Papilio polyxenes), orange sulphur (Colias eurytheme), eastern tailed blue (Everes comyntas), and copper (Lycaena phlaeas). Charactertistic birds include field sparrow (Spizella pusilla), savannah sparrow (Passerculus sandwichensis), and American goldfinch (Carduelis tristis).

Characteristic mammals include meadow vole (Microtus pennsylvanicus) and woodchuck (Marmota monax) (D. Küntsler pers. comm.). This is a relatively short-lived community that succeeds to a shrubland, woodland, or forest community.

Citation (Note: There is no NYNHP profile for Successional Old Fields at this time. The following source was used instead.)

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY

Successional Shrubland

General Description

A shrubland that occurs on sites that have been cleared (for farming, logging, development, etc.) or otherwise disturbed. This community has at least 50% cover of shrubs.

Characteristic Species

Characteristic shrubs include gray dogwood (Cornus racemosa), eastern red cedar (Juniperus virginiana), raspberries (Rubus spp.), serviceberries (Amelanchier spp.), choke-cherry (Prunus virginiana), wild plum (Prunus americana), sumac (Rhus glabra, R. typhina), nanny-berry (Viburnum lentago), and arrowwood (Viburnum dentatum var. lucidum). Non-native invasive shrubs include hawthornes (Crataegus spp.), multiflora rose (Rosa multiflora), Russian and autumn olive (Elaeagnus angustifolia, E. umbellata), buckthorns (Rhamnus cathartica, Frangula alnus), and shubby honeysuckles (Lonicera tatarica, L. morrowii, L. maacckii).

Characteristic birds with varying abundance include gray catbird (Dumetella caroliniensis), brown thrasher (Toxostoma rufum), blue-winged warbler (Vermivora pinus), golden-winged warbler (V. chrysotera), chestnut-sided warbler (Dendroica pensylvanica), yellow-breasted chat (Icteria virens), eastern towhee (Pipilo erythrophthalmus), field sparrow (Spizella pusilla), song sparrow (Melospiza melodia), and indigo bunting (Passerina cyanea) (Levine 1998).

Citation (Note: There is no NYNHP profile for Successional Shrublands at this time. The following source was used instead.)

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY

Appendix D. Additional Conservation Planning Frameworks

Forest Resiliency Framework

Source: Levine, C. (2017). Forest resilience measured: Using a multi-timescale approach to quantify forest resilience in a changing world. (Doctoral thesis). UC Berkeley, Berkeley CA

Whole VEP

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
Whole preserve	VEP	Native species diversity	The mission of the Vassar Ecological Preserve is to protect and preserve the ecological diversity of the land to ensure that its educational value will be maintained in perpetuity.	Native flora richness and list	Heterogeneity (diversity in structure, composition), complexity (diversity in habitat types represented by floral assemblages, diversity of ecosystem functions), reserves (flora that are present reflect seed bank?)	Native flora dominance prevents invasive flora from establishing	Flora present reflect the seed bank that will grow after a disturbance
				Native fauna richness and list	Complexity (diversity in habitat types represented by faunal assemblages, diversity of trophic dynamics), quality (indicates ecosystem productivity)	--	Recolonization indicates recovery from habitat fragmentation and ecosystem destruction
				Invasive flora richness and list	Quality (of communities, trophic interactions, ecosystem functions. Invasive species are lower quality than natives), reserves (describes seed bank)	The number of introductions over time indicates how vulnerable or resistant the VEP is to invasion	Fewer introductions over time could indicate an increase in stability
				Invasive fauna richness and list	Quality (describes the condition of the diversity of wildlife and ecosystem functions represented).	The number of introductions over time indicates how vulnerable or resistant the VEP is to invasion	Fewer introductions over time could indicate an increase in stability
		Complexity	Part of maintaining ecological diversity is managing for a variety of habitat types. Conversely, management is also intended to maintain connectivity. The goal becomes to maintain a variety of habitat	Number of NYNHP community types	Complexity (number of community types, amount of replication)	Replication in community types could imply resistance to disturbance	--
				Number of patches	Complexity (replication of community types), quality (increasing habitat fragmentation could reduce habitat quality)	Number of patches over time could indicate resistance to fragmentation, invasive species takeover.	Decrease in the number of patches could indicate recovery from fragmentation

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
			types with as few patches as possible.	Average redundancy	Complexity (replication of community types), reserves (provides a refuge in case of destruction of one of the replicate patches)	Average redundancy over time could indicate resistance to fragmentation, invasive species takeover.	Decrease in the number of patches could indicate recovery from fragmentation
				Richness of indicator predator species with broad home ranges	Complexity (of trophic interactions), Quality (of trophic interactions/ structure)	--	Indicate recovery from fragmentation
		Climate	The VEP's flora and fauna are adapted to a climate regime that we are shifting away from.	Pseudacris crucifer (spring peeper)-Date of first vocalization of the year reported in NYS	Reserves (tells us about adaptation to changing climate)	Indicate adaptation to changing climate (or not), which would indicate resistance	--
				Lithobates sylvatica (wood frog)- Date of first vocalization of the year reported in NYS	Reserves (tells us about adaptation to changing climate)	Indicate adaptation to changing climate (or not), which would indicate resistance	--
				Erythronium americanum (Trout Lily / Dogtooth Violet)- date of first reported open flower in NYS	Reserves (tells us about adaptation to changing climate)	Indicate adaptation to changing climate (or not), which would indicate resistance	--
				Claytonia virginica (Virginia springbeauty)- date of first reported open flower in NYS	Reserves (tells us about adaptation to changing climate)	Indicate adaptation to changing climate (or not), which would indicate resistance	--
				Sanguinaria canadensis (Bloodroot)- date of first reported open flower in NYS	Reserves (tells us about adaptation to changing climate)	Indicate adaptation to changing climate (or not), which would indicate resistance	--
				Asarum canadense (Canadian wildginger)- date of first reported open flower in NYS	Reserves (tells us about adaptation to changing climate)	Indicate adaptation to changing climate (or not), which would indicate resistance	--
				Date of first freeze of the autumn/winter	--	--	--

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
				Date of last spring of the winter/spring	--	--	--

Eastern Forest Corridor

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
Nested Target Level 1	Eastern Forest Corridor	Forest structure	The structure of the forest provides habitat for the native wildlife.	Intact Canopy	Quality (health of trees)	Resistance to invasive flora takeover and edge effects	--
		Native flora at every stratum	Native flora provides food and habitat for the native wildlife that coevolved with it.	Average percent composition invasive flora at the tree, shrub, herb, vine layers	Quality (of communities, trophic interactions, ecosystem functions. Invasive species are lower quality than natives), reserves (describes seed bank)	Resistance to invasive flora takeover	Recovery from invasive flora takeover
		Forest Regeneration	Regeneration is essential for the continuity of the forest.	Ten Tallest Data	Reserves	Resistance to invasive species takeover. Describes stability of tree populations and forest structure	Ability of forest to recover from any disturbance- wind storm that knocks some trees down, etc
				Deer Density	Quality (of trophic interactions- are predators keeping deer in check? probably not), reserves (deer density determines the ability of the forest to regenerate)	Resistance to deer overbrowse	Ability of forest to recover from any disturbance- wind storm that knocks some trees down, etc
				Indicator species (ground-nesting birds that rely on regenerating forests)	Quality (of habitat for ground-nesters), Reserves (forest regeneration)	--	Indicate recovery from deer overbrowse
		Stable corridor boundary	A shrinking forest community is vulnerable to deterioration.	Area of forest corridor	Quality (shows stability over time, which indicates quality)	Resistance to edge effects	Recovery from habitat degradation or invasive species takeover
Nes	Wet	Characteristic hydrology	Hydrology determines the composition of the plant life in the forest, and by	Wet forest area	Quality (of wetland habitat over time)	Resistance to the effects of climate change	Recovery from the effects of climate change

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
tedTargetLevel2	Forest		extension, the wildlife as well.				
		Breeding, native fauna that require wet forest habitat.	Presence would indicate habitat quality.	Richness of native, characteristic species	Quality (condition of fauna indicates habitat quality), Heterogeneity (species diversity)	--	Recolonization indicates recovery from habitat fragmentation and ecosystem destruction
		Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Area of community	Quality (shows stability over time, which indicates quality)	Resistance to edge effects	Recovery from habitat degradation or invasive species takeover
	Dryforest	Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Area of community	Quality (shows stability over time, which indicates quality)	Resistance to edge effects	Recovery from habitat degradation or invasive species takeover
NestedTarge	CommunityLe	Community structure	The structure of the community provides habitat for native wildlife.	Percent composition invasive flora at the tree, shrub, herb, vine layers	Quality (of community habitat), Reserves (presence of all layers indicates seed bank)	Resistance to invasive flora takeover and edge effects	
		Native flora at every stratum	The maintenance of the forest community is dependent on the presence of native species at every strata.	Percent composition invasive flora at the tree, shrub, herb, vine layers	Quality (of communities, trophic interactions, ecosystem functions. Invasive species are lower quality than natives), reserves (describes seed bank)	Resistance to invasive flora takeover	Recovery from invasie flora takeover
		Characteristic flora at every stratum	Native, characteristic vegetation defines vegetation communities,	Percent composition of characteristic flora at each stratum	Heterogeneity (species diversity in each community), Complexity (do replicates of the same community have the same species	Resistance to habitat degradation and/or community loss	Recovery from habitat degradation and/ or community loss

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
t L e v e l 3	v e l		and provides structure and food for native fauna.		assemblages?), Quality (of community as compared with the standard provided by NYNHP, and of the individuals- health, vitality), Reserves (presence of desired species indicates desired seed bank)		
				Percent composition of characteristically dominant flora	Heterogeneity (species diversity in each community), Complexity (do replicates of the same community have the same species assemblages?), Quality (of community as compared with the standard provided by NYNHP, and of the individuals- health, vitality), Reserves (presence of desired species indicates desired seed bank)	Resistance to habitat degradation and/or community loss	Recovery from habitat degradation and/ or community loss
				Percent species from the NYNHP list represented in community	Heterogeneity (species diversity in each community), Complexity (do replicates of the same community have the same species assemblages?), Quality (of community as compared with the standard provided by NYNHP, and of the individuals- health, vitality), Reserves (presence of desired species indicates desired seed bank)	Resistance to habitat degradation and/or community loss	Recovery from habitat degradation and/ or community loss
		Regeneration	Regeneration is essential for the continuity of the community.	Seedling/sapling counts in plots	Reserves	Resistance to invasive species takeover. Describes stability of tree populations and forest structure	Ability of forest to recover from any disturbance- wind storm that knocks some trees down, etc
				Spring Ephemeral Cover	Quality (of species composition; spring ephemerals indicate recovery of native flora from deforestation), Reserves (indicates native species in the seed bank)	--	Indicate recovery from deforestation, habitat fragmentation, disturbance from clearing
		Native fauna with specific habitat requirements (floodplain forest only. The rest of the	Indicators of the quality of their respective habitats.	Richness of native, characteristic species	Quality (condition of fauna indicates habitat quality), Heterogeneity (species diversity)	--	Recolonization indicates recovery from habitat fragmentation and ecosystem destruction

		KEA	Justification/ Explanation	Indicator(s)	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
		communities are represented at higher target levels)					
		Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Community area	Quality (shows stability over time, which indicates quality)	Resistance to invasive flora takeover and edge effects	--
		Water Quality (Floodplain forest only)	The quality of the water enables plants to survive in the floodplain forest. If this were to decline drastically, life would not be supported in the floodplain.	Benthic macroinvertebrates- Hilsenhoff index, shannon index, richness and evenness	Quality (water quality)	Ability to resist damage from pollution, sedimentation upstream	Recovery from pollution, sedimentation upstream
		Characteristic hydrology (Floodplain forest only)	A floodplain forest, by definition, must flood at least once every two years.	Pressure transducer data	Quality (indicates a basic qualification for the habitat)	--	--

Open Central Corridor

		KEA	Justification/ Explanation	Indicator	Forest Resiliency Framework Dimensions	How it measures resistance	How it measures recovery
Target Level 1	Central Corridor	Native flora at every stratum- move to community level	Native flora provides food and habitat for the native wildlife that coevolved with it.	Average percent composition invasive flora at the shrub, herb, vine layers	Quality (of communities, trophic interactions, ecosystem functions. Invasive species are lower quality than natives), reserves (describes seed bank)	Resistance to invasive flora takeover	Recovery from invasive flora takeover
Nested Target Level 2	Wet	Characteristic hydrology	Hydrology determines the composition of the plant life in the community, and by extension, the wildlife as well.	Wet community area	Quality (shows stability over time, which indicates quality)	Resistance to the effects of climate change	Recovery from the effects of climate change
	Dry	All dry community KEAs are represented at other target levels.					
Nes	All	Characteristic structure	The structure of the community provides habitat for fauna.	Percent of plots that fit the structure requirements (for open:	Quality (of community habitat), Reserves (presence of all layers indicates seed bank)	Resistance to invasive flora takeover and edge effects	

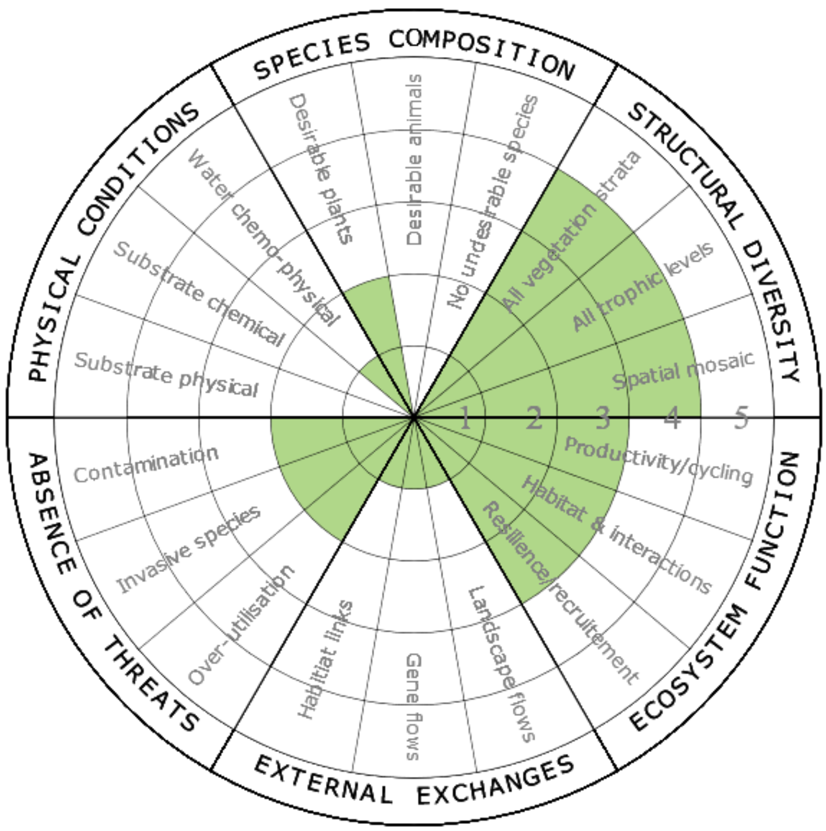
ted Target Level 3	Communities			<50% shrub and <60% canopy cover. for shrubland: >50% shrub and <60% canopy cover.)			
		Native flora at every stratum	The maintenance of the forest community is dependent on the presence of native species at every strata.	Percent composition invasive flora at the tree, shrub, herb, vine layers	Quality (of communities, trophic interactions, ecosystem functions. Invasive species are lower quality than natives), reserves (describes seed bank)	Resistance to invasive flora takeover	Recovery from invasie flc takeover
		Characteristic flora at every stratum.	Native, characteristic vegetation defines vegetation communities and provides structure and food for native fauna.	Percent composition of characteristic flora at each stratum- herbs, shrubs, vines	Heterogeneity (species diversity in each community), Complexity (do replicates of the same community have the same species assemblages?), Quality (of community as compared with the standard provided by NYNHP, and of the individuals- health, vitality), Reserves (presence of desired species indicates desired seed bank)	Resistance to habitat degradation and/or community loss	Recovery from habitat degradation and/ or community loss
			Characteristic flora determine the community type. An increase or decrease in characteristic flora would indicate ecosystem shifts. Native, characteristic vegetation defines vegetation communities, and provides structure and food for native fauna.	Percent species from the NYNHP list represented in community	Heterogeneity (species diversity in each community), Complexity (do replicates of the same community have the same species assemblages?), Quality (of community as compared with the standard provided by NYNHP, and of the individuals- health, vitality), Reserves (presence of desired species indicates desired seed bank)	Resistance to habitat degradation and/or community loss	Recovery from habitat degradation and/ or community loss
		Native fauna with specific habitat requirements	Indicators of the quality of their respective habitats	Richness of native, characteristic species	Quality (condition of fauna indicates habitat quality), Heterogeneity (species diversity)	--	Recolonization indicates recovery from habitat fragmentation and ecosystem destruction
		Stable community boundary	The stability of the border influences how protected the forest interior is from invasive species and other disturbances, like wind, etc. A shrinking forest community is vulnerable to deterioration.	Area of community	Quality (shows stability over time, which indicates quality)	Resistance to invasive flora takeover and edge effects	

Recovery Wheels (from the Society for Ecological Restoration)

Source: McDonald T, Gann GD, Jonson J, and Dixon KW (2016) International standards for the practice of ecological restoration – including principles and key concepts. Society for Ecological Restoration, Washington, D.C.

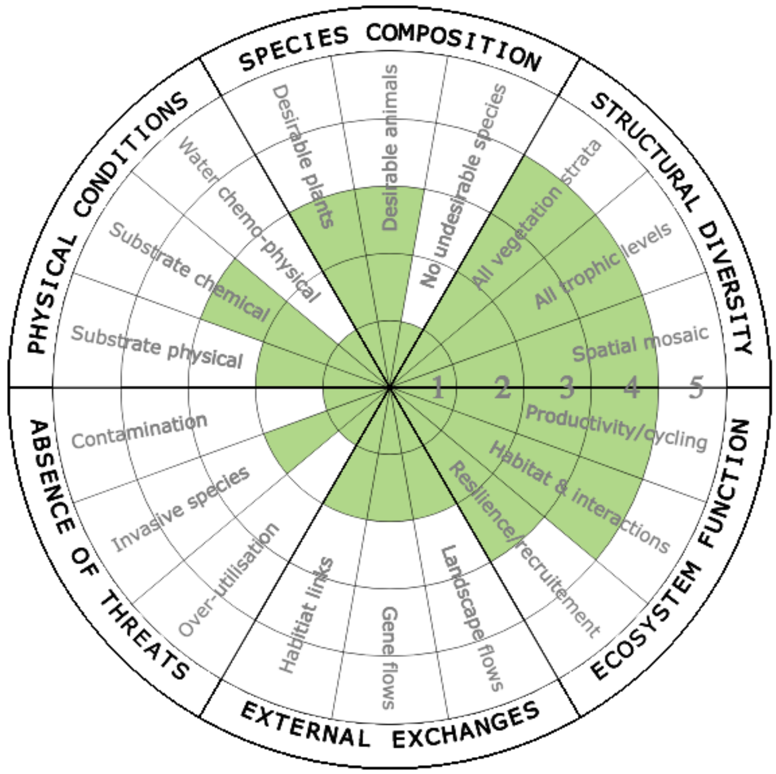
The following analyses show the status of various parameters of our targets at the community level. More green coloration extending outwards from the center point indicates greater recovery. See bottom of section for a key showing the significance of each level of recovery.

Note: A restoration wheel was not completed for the Deep Emergent Marsh because we have not yet classified the beaver-active swamp area, which, if classified as Deep Emergent Marsh, would drastically alter the Recovery Wheel assessment.



ASSESSOR: Lindsay Charlop DATE: 2019-05-28

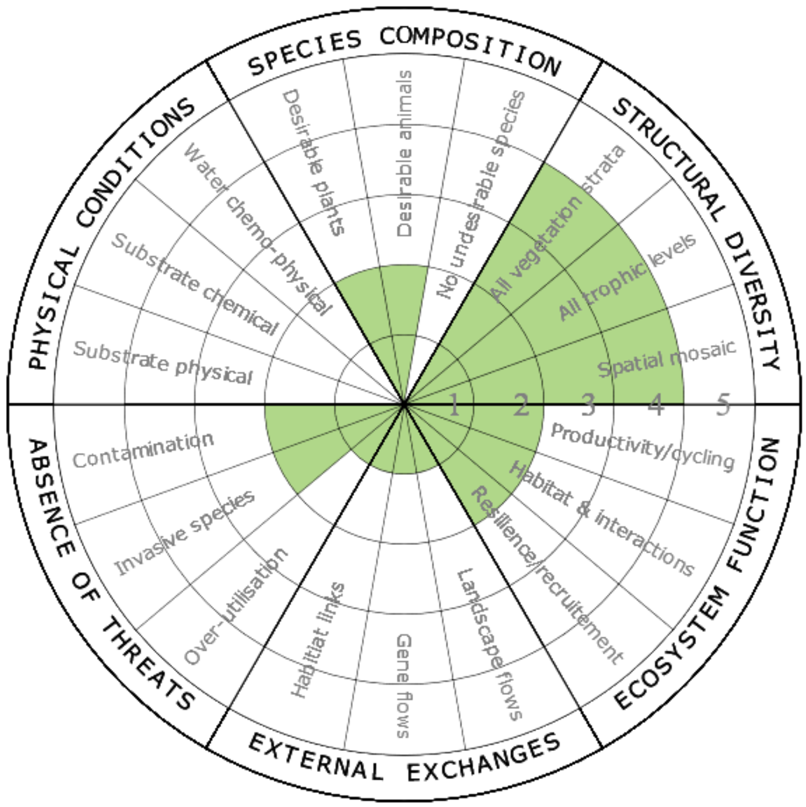
SITE: Vassar Ecological Preserve: Red Maple-Swamp White Oak Swamp



ASSESSOR: Keri VanCamp

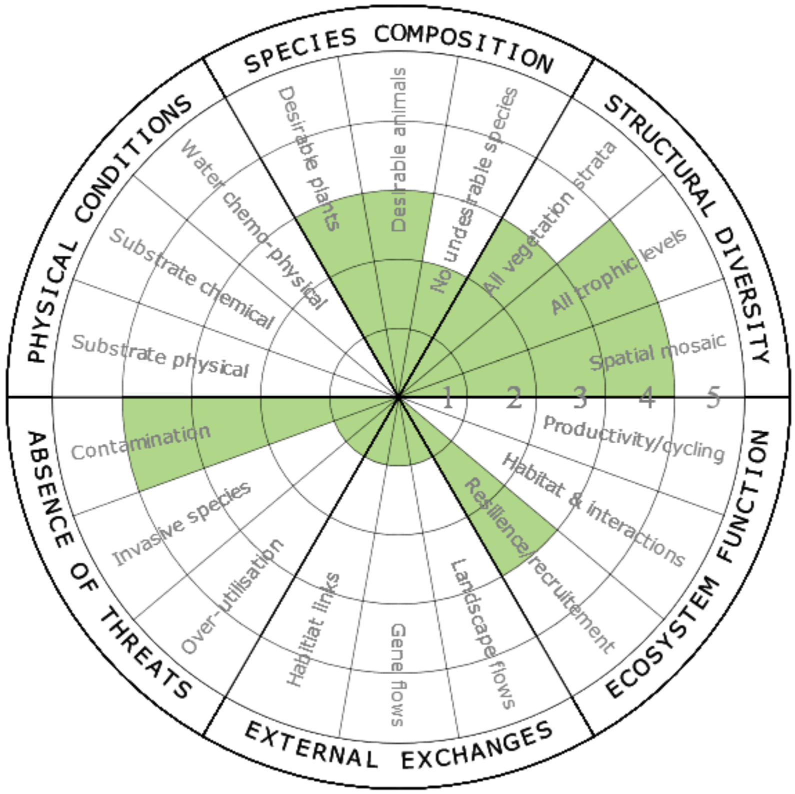
DATE: 2019-05-17

SITE: Floodplain Forest



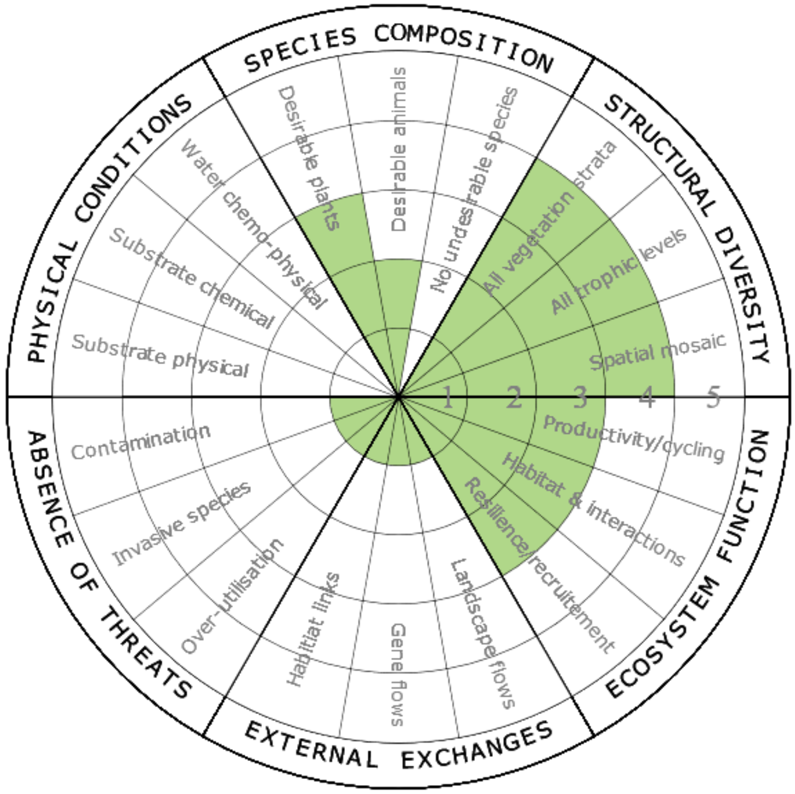
ASSESSOR: Lindsay Charlop DATE: 2019-05-28

SITE: Vassar Ecological Preserve: Red Maple Hardwood Swamp



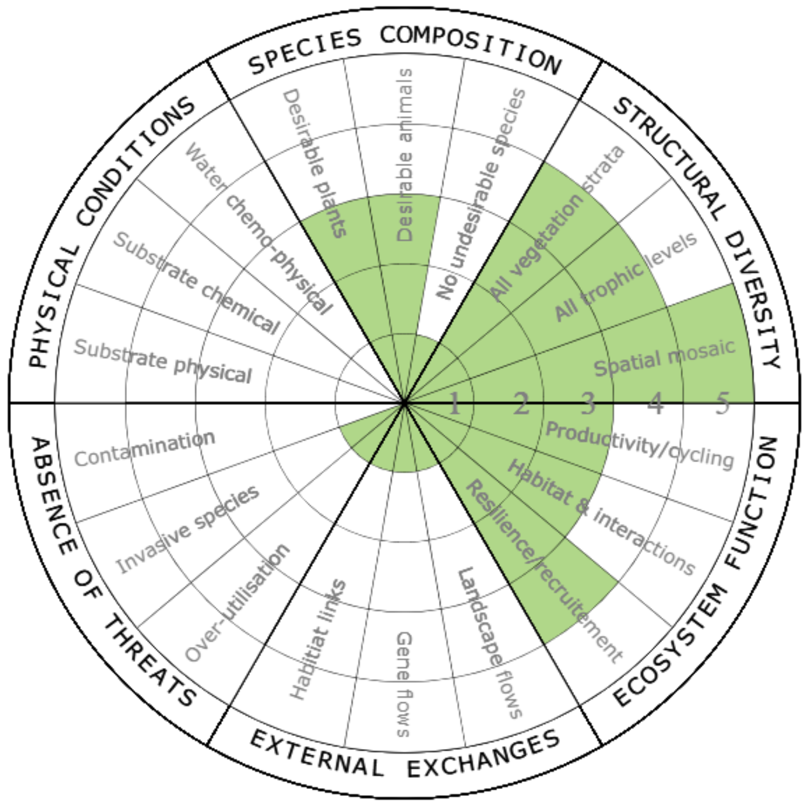
ASSESSOR: Lindsay Charlop **DATE:** 2019-05-28

SITE: Vassar Ecological Preserve: Beech-Maple Mezic Forest



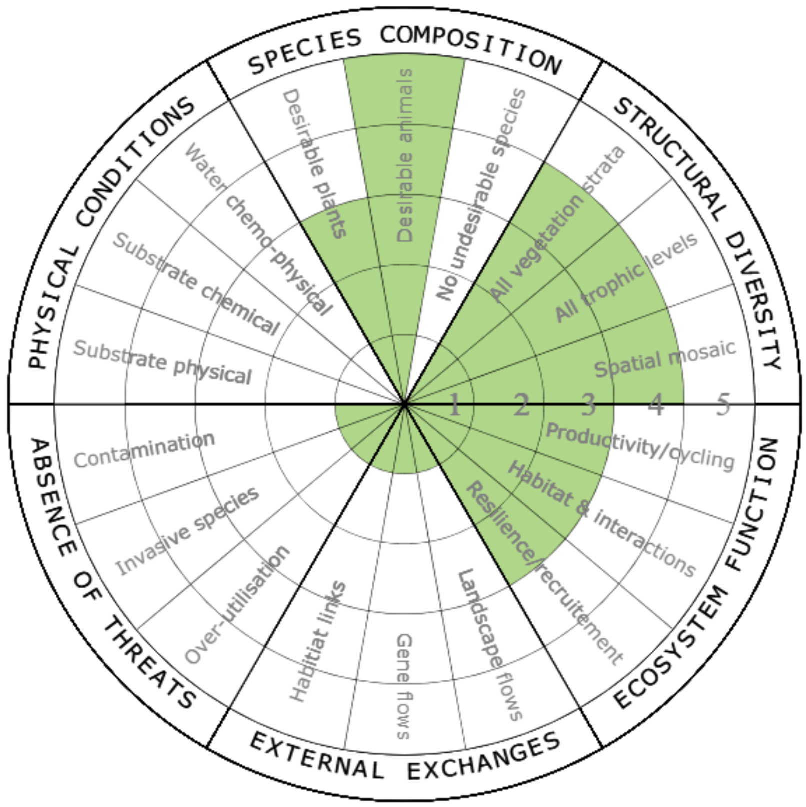
ASSESSOR: Lindsay Charlop DATE: 2019-05-28

SITE: Vassar Ecological Preserve: Appalachian Oak-Hickory Forest



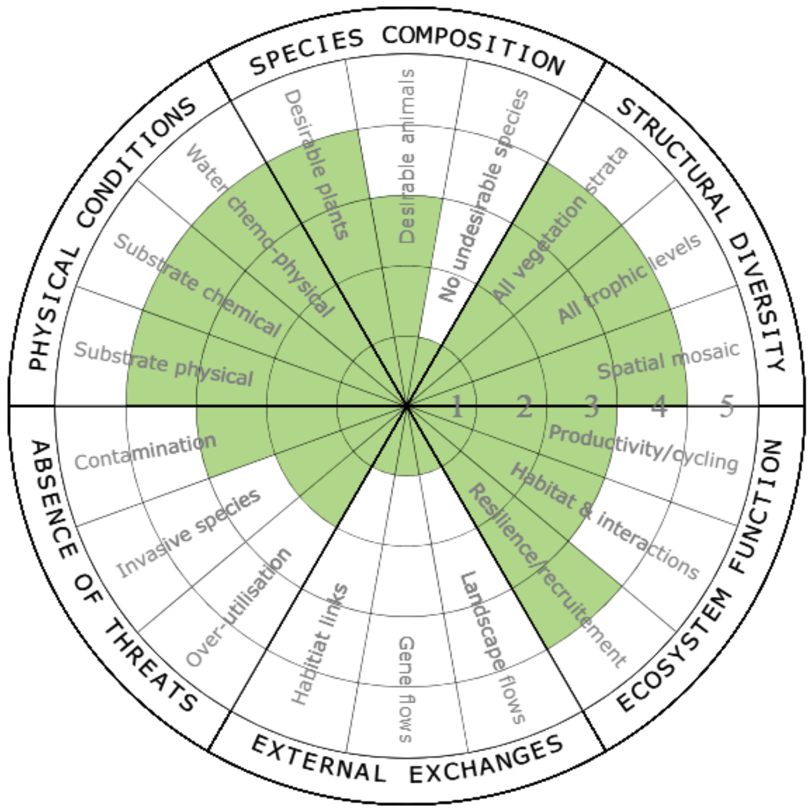
ASSESSOR: Lindsay Charlop **DATE:** 2019-05-30

SITE: Vassar Ecological Preserve: Shallow Emergent Marsh



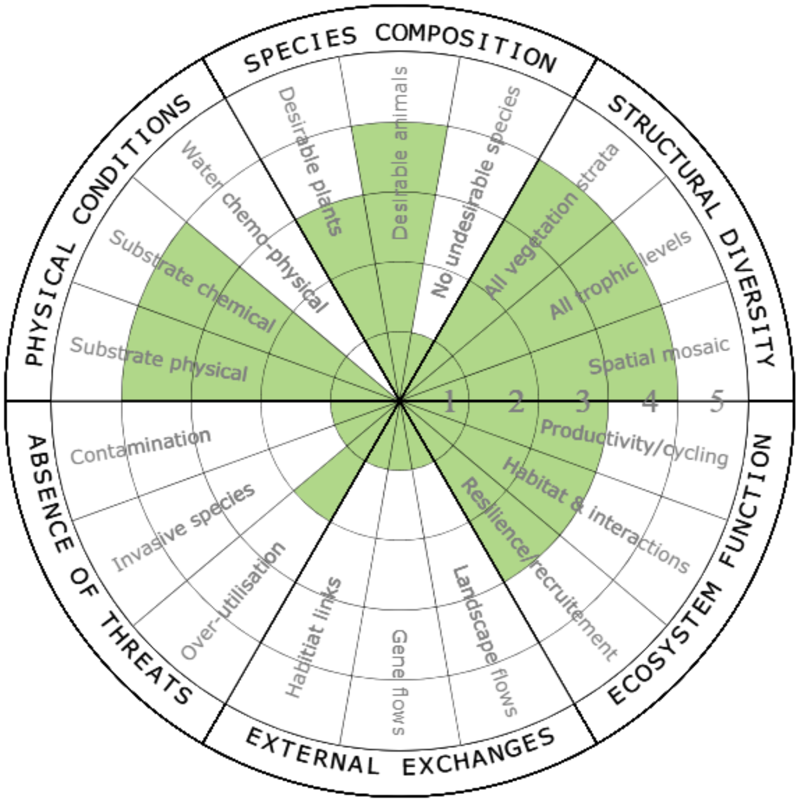
ASSESSOR: Lindsay Charlop DATE: 2019-05-30

SITE: Vassar Ecological Preserve: Shrub Swamp



ASSESSOR: Lindsay Charlop **DATE:** 2019-05-30

SITE: Vassar Ecological Preserve: Successional Old Field



ASSESSOR: Lindsay Charlop DATE: 2019-05-30

SITE: Vassar Ecological Preserve: Successional Shrublands

Table 3. Generic 1-5 star recovery scale interpreted in the context of the six key ecosystem attributes used to measure progress towards a self-organizing status. See interpretive notes, next page.

Note: This 5-star scale represents a cumulative gradient from very low to very high similarity to the reference ecosystem. It provides a generic framework only; requiring users to develop indicators and a monitoring metric specific to the ecosystem and sub-attributes identified.

ATTRIBUTE	★	★★	★★★	★★★★	★★★★★
Absence of threats	Further deterioration discontinued and site has tenure and management secured.	Threats from adjacent areas beginning to be managed or mitigated.	All adjacent threats managed or mitigated to a low extent.	All adjacent threats managed or mitigated to an intermediate extent.	All threats managed or mitigated to high extent.
Physical conditions	Gross physical and chemical problems remediated (e.g., contamination, erosion, compaction).	Substrate chemical and physical properties (e.g., pH, salinity) on track to stabilize within natural range.	Substrate stabilized within natural range and supporting growth of characteristic biota.	Substrate securely maintaining conditions suitable for ongoing growth and recruitment of characteristic biota.	Substrate exhibiting physical and chemical characteristics highly similar to that of the reference ecosystem with evidence they can indefinitely sustain species and processes.
Species composition	Colonising native species (e.g., ~2% of the species of reference ecosystem). No threat to regeneration niches or future successions.	Genetic diversity of stock arranged and a small subset of characteristic native species establishing (e.g., ~10% of reference). Low onsite threat from exotic invasive or undesirable species.	A subset of key native species (e.g., ~25% of reference) establishing over substantial proportions of the site. Very low onsite threat from undesirable species.	Substantial diversity of characteristic biota (e.g. ~60% of reference) present on the site and representing a wide diversity of species groups. No onsite threat from undesirable species.	High diversity of characteristic species (e.g., >80% of reference) across the site, with high similarity to the reference ecosystem; improved potential for colonization of more species over time.
Structural diversity	One or fewer strata present and no spatial patterning or trophic complexity relative to reference ecosystem.	More strata present but low spatial patterning and trophic complexity, relative to reference ecosystem.	Most strata present and some spatial patterning and trophic complexity relative to reference site.	All strata present. Spatial patterning evident and substantial trophic complexity developing, relative to the reference ecosystem.	All strata present and spatial patterning and trophic complexity high. Further complexity and spatial pattering able to self-organize to highly resemble reference ecosystem.
Ecosystem functionality	Substrates and hydrology are at a foundational stage only, capable of future development of functions similar to the reference.	Substrates and hydrology show increased potential for a wider range of functions including nutrient cycling, and provision of habitats/resources for other species.	Evidence of functions commencing - e.g., nutrient cycling, water filtration and provision of habitat resources for a range of species.	Substantial evidence of key functions and processes commencing including reproduction, dispersal and recruitment of species.	Considerable evidence of functions and processes on a secure trajectory towards reference and evidence of ecosystem resilience likely after reinstatement of appropriate disturbance regimes.
External exchanges	Potential for exchanges (e.g. of species, genes, water, fire) with surrounding landscape or aquatic environment identified.	Connectivity for enhanced positive (and minimized negative) exchanges arranged through cooperation with stakeholders and configuration of site.	Connectivity increasing and exchanges between site and external environment starting to be evident (e.g., more species, flows etc.).	High level of connectivity with other natural areas established, observing control of pest species and undesirable disturbances.	Evidence that potential for external exchanges is highly similar to reference and long term integrated management arrangements with broader landscape in place and operative.

Appendix E. Management Resources

Concise Best Management Practices Calendar

	January	February	March	April	May	June	July	August	September	October	November	December		Biocontrol
Amur corktree (Phellodendron amurense)			Pull young seedlings by hand. Girdle repeatedly. (Mark plants in autumn when fruits are distinct). Herbicide can be applied to girdled trunk											
Amur honeysuckle (Lonicera maackii)					Repeated clipping, cutting + herbicide, or girdling + herbicide anytime but in winter (will cause extensive re-sprouting)				Hand-pulling (in fall to disturb soil least)					
Black swallow-wort (Vincetoxicum nigrum)						Hand-dig entire root crown (small patches) or cut and remove all top growth and tarp.								Hypena opulenta, a defoliating moth, has been released in Canada and may be improved in NY.
Black swallow-wort (Vincetoxicum nigrum)			In old fields- plow and plant an annual or cut/mow repeatedly throughout the year.											Hypena opulenta, a defoliating moth, has been released in Canada and may be improved in NY.
Border privet (Ligustrum obtusifolium)			Hand-pull/ dig seedlings. Repeated mowing with herbicide (eradication) or without (prevent spread)											
Buckthorn (Rhamnus cathartica)	Girdle (summer or winter)		Mow young stems early spring and fall. Hand-pulling (growing season).		Cutting stems (and cover with coffee can or black bag). Girdle (summer or winter). Hand-pulling (growing season).				Mow young stems early spring and fall		Girdle (summer or winter)			
Burning bush (Euonymus alatus)			Hand-pulling seedlings; Cutting followed by herbicide for mature shrubs; remove entire mature shrubs. All methods done multiple times during growing season for several years											Deer
Canada thistle (Cirsium arvense)			Cutting new growth						Herbicide					
Castor aralia (Kalopanax septemlobus)	Not much info													
Chocolate vine (Akebia quintana)	Repeated cutting for small/scattered populations, cover w cardboard and several inches of wood chips													
Chocolate vine (Akebia quintana)						Foliar applications of glyphosate. Can paint stems if worried about surrounding native flora								
Cypress spurge (Euphorbia cyparissias)				Continual cutting and digging										
English hawthorn (Crataegus laevigata)	Not much info from anywhere nearby. Found a source from Washington state.													
Fortune's spindle (Euonymus fortunei)	Hand-pulling- remove entire plant. Foliar or cut-stem applications of herbicides. Do not cut.													

	January	February	March	April	May	June	July	August	September	October	November	December	Biocontrol
Garlic mustard (Alliaria petiolata)			Cutting or hand-pulling (after bolting but prior to seed maturation- around the time of flowering), or herbicide spot application (March/April)						Hand-pull (first year rosettes)				Potential weevil species
Japanese barberry (Berberis thunbergii)			Cutting followed by direct flame treatment			Cutting prior to fruiting							
Japanese barberry (Berberis thunbergii)	Hand-pull small shrubs												
Japanese honeysuckle (Lonicera japonica)			Hand-pulling small patches. Spray triclopyr periodically. DO NOT MOW.										
Japanese knotweed (Fallopia japonica)							Repeated cutting at least monthly. Apply mesh as needed. Or 3x/season on holidays						Check soon for availability of leaf-feeding psyllid, Aphalara itadori, from knotweed's native range. Pending approval as of 2016
Japanese stiltgrass (Microstegium vimineum)						Direct flame prior to flowering		Mow (after July 1)		Hand-pull (prior to fruiting); herbicide treatment of glyphosate to leaves and shoots			
Jetbead (Rhodotypos scandens)	Hand-dig, remove entire plant and root system												
Johnson Grass (Sorghum halepense)			Tilling, mowing, flooding repeatedly and with restoration. The goal is to kill the rhizomes. Not much info about management in wild places.										Heavy grazing. Geese???
Lesser celandine (Ficaria verna)			Hand-pull / dig small infestations. Important to remove all tubers and bulblets. DO NOT try to hand-pull large populations growing in high-quality natural soil- the risk of soil disturbance and other invasive sp recruitment is too high										
Lesser celandine (Ficaria verna)	Herbicide treatment over many years												
Linden viburnum (Viburnum dilatatum)	Not much info												
Mile-a-minute													
Morrow's honeysuckle (Lonicera morrowii)			Hand-pulling, cutting/clipping. Prior to fruiting.										
Mugwort (Artemesia vulgaris)			Repeated mowing 2-3x per year, or herbicide 2x/year										
Multiflora rose (Rosa multiflora)			Cut stems near ground. After resprouting, direct flame treatment		Cutting (growing season, after flowering)								Goats, cows, sheep
Multiflora rose (Rosa multiflora)	Herbicide spot treatment, grazing												Goats, cows, sheep
Narrowleaf bittercress (Cardamine impatiens)	Not much info												
Norway Maple (Acer planatoides)	Girdle or cutting; decrowning; cut and cover			Hand-pulling									
Oriental bittersweet (Celastrus orbiculatus)	Cut stems and herbicide			Hand-dig seedlings			Cut mature vines				Cut stems and herbicide		Goats

	January	February	March	April	May	June	July	August	September	October	November	December		Biocontrol
Oriental bittersweet (Celastrus orbiculatus)				Regular mowing										Goats
Oriental photinia (Photinia villosa)	Not much info													
Phragmites (Phragmites australis)			Hand-digging/ tarping. Cut stems below water-line. Mowing non-wetland areas.											Goats
Porcelain berry (Ampelopsis brevipedunculata)				Hand-pull (prior to fruiting)						Hand-pull (prior to fruiting); herbicide treatment of glyphosate to leaves and shoots				
Purple loosestrife (Lythrum salicaria)						Hand-dig; cut stems during flowering								Four biocontrol agents have been approved for purple loosestrife: two leaf-feeding beetles (Galerucella calmariensis, G. pusilla) and two weevils, a flower bud-feeder (Nanophys marmoratus) and a root-feeder (Hylobius transversovittatus).
Russian Olive (Elaeagnus angustifolia)	Varies per setting of plant, but timing is not specified for any of the methods. See table here: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd563043.pdf													
Siberian elm (Ulmus pumila)				girdling in late spring										
Siberian elm (Ulmus pumila)			Prescribed burnings. Pulling seedlings.											
Spotted knapweed (Centaurea maculosa)					Hand-pulling or mowing (during flowering, late spring and late summer)			Hand-pulling or mowing (during flowering, late spring and late summer)		Dicamba treatment (while fruiting, in autumn)				Potentially goats
Toringo crabapple (Malus sieboldii)	Not much info													
Tree of heaven (Ailanthus altissima)	Girdling, then cutting root sprouts, then hand-pulling once roots are dead.										Girdling, then cutting root sprouts, then hand-pulling once roots are dead.			
Wineberry (Rubus phoenicolasius)			Hand-pulling/ manual removal. Herbicide spot treatment.											
Yellow Iris				Pull out small clumps. Repeated cutting. Can apply herbicides approved for aquatic use.										

Appendix F. Monitoring Schedules

<table>
<tr><th>January</th><th>February</th><th>March</th><th>April</th><th>May</th><th>June</th><th>July</th><th>August</th><th>September</th><th>October</th><th>November</th><th>December</th></tr>
<tr><td>Beaver dam monitoring</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Place pressure transducer in Casperkill</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="2">Pellet/browse surveys</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="3">Fungi survey/ monitoring</td><td></td><td></td><td></td><td colspan="2">Fungi survey/ monitoring</td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="3">Monitoring earlier-breeding amphibians (call surveys, spatial survey at peak, cover boards, transects), turtles (hoop traps, visual search), reptiles</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="9">flowering plant survey</td><td></td></tr>
<tr><td></td><td></td><td></td><td>macroinvertebrates</td><td></td><td></td><td>macroinvertebrates</td><td></td><td></td><td>macroinvertebrates</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Spring ephemeral mapping</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Spring ephemeral monitoring (reestablishment)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="3">Bird monitoring</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Hoop trap for turtles</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Delineate wetland boundary</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Revisit RMHS and RMSWOS, reclassify</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Forest gap survey- drone flight</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">Deer exclosure work- annual</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">Deer exclosure work- EMMA</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">Ten tallest</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

January	February	March	April	May	June	July	August	September	October	November	December
					Ash gap monitoring						
					Add additional plots, collect year 0 sapling count data at established plots						
					Redo accuracy assessment						
					Revisit veg mapping plots- forest						
					Revisit veg mapping plots- open						
					Emerging Invasive Species Search- all forests						
					Emerging Invasive Species Search- High Priority Areas						
					Monitor later-breeding amphibians, reptiles(call surveys, spatial survey at peak, cover boards)						
					Purple loosestrife biocontrol monitoring (beetles, weevils)						
						Pollinator survey					
							Monitoring planting sites				
								Estimate deer population with camera traps			
										Check ebird data	
phenology											
Check pressure transducer data											
Weather											
monitoring removal sites											
bird monitoring											
camera traps											
data management											

Ten Year Monitoring Schedule

Activity	Frequency (once every x years)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Notes
Beaver Dam Monitoring, data analysis	1	done	1	1	1	1	1	1	1	1	1	1	Georeference images, draw polygons in Arcmap for comparison
Place pressure transducer in casperkill	once	1											Talk to Vicky
Check pressure transducer data	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	
Monitor earlier-breeding amphibians, reptiles	5	1					1						Depending on what Myra may be doing
Macroinvertebrates	5	1					1						
Spring ephemeral mapping	5	1					1						
Spring ephemeral monitoring (for reestablishment)	1	1	1	1	1	1	1	1	1	1	1	1	
Delineate wetland boundary	5	1					1						
Revisit RMHS and RMSWOS, reclassify as needed, go over other ambiguous boundaries and finalize veg map	once	1											
Forest gap survey- drone flight	2	1		1		1		1		1		1	
Deer exclosure work- annual	1	1	1	1	1	1	1	1	1	1	1	1	
Deer exclosure work- EMMA	5					1					1		
Ten tallest	1	1	1	1	1	1	1	1	1	1	1	1	
Ash gap monitoring	5	1					1					1	
Add additional plots, collect year 0 sapling stem count data at established plots	once	1											
Redo accuracy assessment	5	1					1					1	
Revisit veg mapping plots- forest	5			1					1				
Revisit veg mapping plots- open	5				1					1			
Monitor later-breeding amphibians, reptiles	5	1					1					1	
Purple loosestrife biocontrol monitoring	As interested												
Monitoring planting sites	1	1	1	1	1	1	1	1	1	1	1	1	
Estimate deer populations with camera traps	1	1	1	1	1	1	1	1	1	1	1	1	
Monitor fungus	5	1					1					1	
Phenology	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	
Weather	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	
Monitoring removal sites	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	
Bird monitoring	ongoing (citizen scientists using ebird)	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	ongoing	
Check ebird data	2		1		1		1		1		1		
Pollinators	Probably 5	1											Empire state pollinator survey. See how often survey repeats, if at all
Flowering plant survey	5				1					1			
Emerging invasive species search	5					1					1		
Emerging invasive species search - HPAs	2		1		1		1		1		1		

Appendix G. Monitoring and Management Methods

The Reclassification and Mapping of the Vassar Farm and Ecological Preserve Fate Syewoangnuan, '18, Mirit Rutishauser, '19, Jamie Deppen, and Keri VanCamp: Plot locations were picked subjectively based on perceived differences in vegetation aerial photography and on the previous forest classifications from a 1996 ecological communities map. Three plot locations were selected for each forest community type. A GPS was used to navigate to plot's southwest corner, which was marked with spray-painted rebar. A 20x20 sampling plot with points facing cardinal directions was demarcated. The following information was recorded: ● Percent cover of non-vegetated surfaces, i.e. bedrock, rocks, sand, leaf litter, wood, standing dead, water, and bare soil o Intensity of slope and aspect o Soil texture o Assessed additional environmental information such as soil drainage, surficial geology, cowardin system, hydrologic regime, landform, and topographic position o List of species and their percent cover in herb, shrub, canopy, vine strata. A 5x5 meter subplot was created for herb identification and a 10x10 meter subplot was created for shrub identification, both with a base at the southwest corner. o Percent cover of each stratum over the entire plot o Assessed additional vegetation information such as leaf phenology and leaf type o DBH of canopy trees over 4cm in diamater o Densiometer readings facing north, south, east, west o Tallest trees in each sublayer (T1, T2, T3) o Invasive species impact, using a subjective scale of 1-4, with 1 being most invaded. ● Plot data was used to classify community types using Ecological Communities of New York: Second Edition by the New York Natural Heritage Program and the United States National Vegetation Classification (USNVC) online database. ● An accuracy assessment was performed in which researchers unfamiliar with the mapped locations of the various communities traveled to points in the communities (the number of points per community was scaled by size), recorded dominant species and tried to identify the community. Confidence level was recorded. ● The map was revised based on the accuracy assessment. Plots will be revisited every 5 years after baseline data is established.
Source: N.a. (1994). Field Methods for Vegetation Mapping. NBS/NPS Vegetation Mapping Program. The Nature Conservancy, Arlington VA.

VEP Flora and Herbarium: Information from the Vassar Herbarium and VEP Flora, which is due to be completed in 2022, will be used to compile a list of native flora on the VEP.

Call Surveys for Frogs and Toads: Call surveys were conducted at various points throughout the VEP from April through June. Surveys were timed depending on weather, and were intended to identify periods of maximum breeding activity of each frog species on the VEP. Calls were used to identify likely breeding habitats for each species. Shortly after peak activity, during the day, egg mass surveys were conducted to confirm breeding habitat locations, in order to determine which habitats are being used by frog species on the VEP. Call surveys will be repeated every 5 years.

Cover Boards for Amphibians: 48 1x1ft cover boards made of untreated white pine were placed at points along transects set 50m apart from one another in the target forest communities. Cover boards, as well as logs, rocks, and other objects along the transects between cover boards, were flipped once per month from April through June. Amphibians found underneath were documented. Amphibian monitoring will be repeated every five years.

Cover Boards for Snakes: Place 6 cover boards in old field patches. Check once per month, in the morning. Do active search in old fields while checking cover boards

Hoop Traps for Turtles: Paired 3-ft and 1-ft hoop traps are set for 12 days in wetlands that are deep enough to support turtles. Traps are baited with sardines in soybean oil and checked daily. Turtle species of interest are marked with nontoxic nail polish so that they may be identified if recaptured.

Point Counts for Birds: 12 points (one in each priority community) were established at least 100m apart from one another. Points are sampled beginning at dawn for five minutes each. Bird species, gps coordinates, date, time, and other notes such as approximate abundance, sex, behavior, abnormalities. Data is uploaded to eBird

Pollinator Inventory: Survey participants will photograph insects along meandering transects through the VEP's old fields and shallow emergent marshes on sunny days in July and August as frequently as time and weather allow. Photographs will be identified subsequently, possibly using iNaturalist. In 2019, photographs will be sent to the Empire Pollinator Survey for identification.

Pollinator monitoring will be repeated every five years.

Emerging Invasive Flora Survey: A 50x50m was superimposed over a map of the VEP's forest communities. The vertices of the grid were visited. At each point, invasive flora within a 5 meter radius were surveyed. Emerging invasive species were listed along with the percent cover and/or number of individuals (whichever made more sense). In addition, the percent cover or number of individuals (whichever made more sense) was recorded for select common invasive species.

The Emerging Invasive Flora Survey will be repeated every five years.

Number of NYNHP Community Types: All communities classified during the vegetation mapping process that are not already NYNHP classifications will be crosswalked to NYNHP classifications. These community types will be counted. This analysis will be repeated when the VEP updates its vegetation map, exact timeframe uncertain.

Drone Flyover Photography: An aerial photograph will be taken of the eastern forest corridor using drones, with the help of Steve Taylor in CIS. The image will be analyzed for forest gaps.

Invasive Flora Average Percent Composition: Vegetation mapping plots located in the eastern forest corridor were identified. From the vegetation data collected at those plots, invasive species and their percent cover values (which were ranges, such as 2-5%, 5-10%, etc) were selected. (Invasive species come from the Lower Hudson Partnership for Regional Invasive Species Management -LHPRISM- species categorizations.) The low bound and the high bound of the observed percent cover for each species were divided by the total percent cover of the layer in which the species was observed, in order to determine the percent composition of that species. For example, if Microstegium vimineum was observed in the H layer covering 25-50% of a plot, but the H layer only covered 70% of the plot, then the percent composition of Microstegium vimineum in the H layer is (25/70*100) - (50/70*100) %, or ~35-71%. For each strata (tree, shrub, herb, vine), the percent composition of invasive species was recorded as a range. The low bound was determined by assuming that all invasive vegetation in a single layer overlaps, and was taken from the highest minimum percent composition value in the layer. The high bound was determined by assuming that no characteristic vegetation in a single layer overlaps, and was taken from the sum of the maximum percent composition values in the layer. If this sum exceeded 100%, then 100% was input.

This process was repeated for each plot in the eastern forest corridor. Then, the minimum percent composition values for each layer across all plots were averaged, and the maximum percent composition values for each layer across all plots were averaged. These values were input as the average percent composition of invasive flora in the layer.

(Notes on the averaging calculations. 1: If a plot did not contain a certain layer (eg there were no vines in the plot) then that plot was excluded from the analysis for that layer. 2: If the percent composition of a given layer in a given plot came out to a single value instead of a range (eg if the cover of Phragmites were 100% in the herb layer of a plot), that value was included in both the minimum average percent composition and maximum average percent composition calculations.)

Invasive species percent composition will be rechecked every 5 years after baseline data is established.

Stem Counts: Stems of saplings 0.5-2m will be counted in a nested plots within the long-term vegetation mapping plots. Size of the plot TBD. Possibly variable.

Estimating deer population using camera traps: Formula for Calculating Deer Population

The estimated total buck population is calculated using a ratio and the number of identifiable branch-antlered bucks:

Ps = Nsa/Nba

Where

Ps = ratio of spike:branch-antlered bucks

Nsa = total # of spike deer occurrences in photos
Nba = total # of branch-antlered deer occurrences in photos
And
Eb = (B x Ps) + B
Where
Eb = estimated total buck population
B = number of individually identified branch-antlered bucks

The estimated doe population can be calculated using the estimated buck population and the buck:doe ratio calculated from the photos:
Pd = Nd/Nb
Where
Pd = ratio of does:bucks
Nd = total # of antlerless adult deer occurrences in photos
Nb = total # antlered adult deer occurrences in photos (spikes and branch-antlered)
And
Ed = Eb x Pd
Where
Ed = estimated total doe population

The estimated fawn population is calculated in the same way:
Pf = Nf/Nd
Where
Pf = ratio of fawns:does
Nf = total # of fawn occurrences in photos
And
Ef = Ed x Pf
Where
Ef = estimated total fawn population
Total population estimate = Eb + Ed + Ef
From: Jacobson, H.A., J.C. Kroll, R.W. Browning, B.H. Koerth and M.H. Conway. 1997. Infrared-triggered cameras for censusing white-tailed deer. Wildlife Society Bulletin 25: 547-556

Spring Ephemeral Mapping: The goal of the survey is to determine the locations of spring ephemeral populations on the VEP. If possible, we would like to map the boundaries of spring ephemeral populations. Preliminary data was taken in the established vegetation plots in the target forest communities, in nested 5mx5m plots.
Spring ephemerals will be surveyed along a meandering transect through the VEP's eastern forest corridor. The 1936 and other old aerial photographs will be used to determine historic "boundaries", such as old stone walls, fences, etc. that are more likely to have been relatively undisturbed. These areas will be prioritized during the spring ephemeral survey. The phenology trail will also be prioritized, as we are already aware of spring ephemeral populations (of trout lily, blood root, etc.) there.

Area of corridor: The area of the forest corridor will be determined using the VEP's vegetation communities map, and will be updated when the vegetation communities map is updated.

Community Area: The community area was determined from the 2016-2017 VFEP Vegetation Map shapefile in ArcMap. Community area will be reassessed when the vegetation map is next updated, exact timeframe uncertain.

Hydric Soils: Hydric soils will serve as a backup indicator that we will use to clarify any uncertainties encountered during the wetland delineation process using wetland indicator species. Method TBD.

Wetland Delineation using Hydric Plants: We will use a GPS to ground-truth the boundaries of the wet forested communities identified during the vegetation mapping process, using the presence of wetland indicator species as a guide.

Our reference for wetland plants is the US Army Corps list of wetland plants for the Northcentral Northeast United States, from:

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Forest Community Structure: Vegetation mapping plots located in the eastern forest corridor were identified. The percent layer cover data from each plot was checked. If layer cover >0, the layer was considered present. Layers with low percent cover, <10%, were noted.

Characteristic Species Percent Composition: Vegetation mapping plots located in the target community were identified. From the vegetation data collected at those plots, characteristic species and their percent cover values (which were ranges, such as 2-5%, 5-10%, etc) were selected. (Characteristic species come from vegetation communities as per the New York Natural Heritage Program classifications.) The low and high bound of the observed percent cover for each species was divided by the total percent cover of the layer in which the species was observed, in order to determine the percent composition of that species. For example, if Quercus rubra was observed in the T1 layer covering 25-50% of a plot, but the T1 layer only covered 70% of the plot, then the percent composition of Quercus Rubra in the T1 layer is (25/70*100) - (50/70*100) %, or ~35-71%.

For each strata (tree, shrub, herb, vine), the percent composition of characteristic species was recorded as a range. The low bound was determined by assuming that all characteristic vegetation in a single layer overlaps, and was taken from the highest minimum percent composition value in the layer. The high bound was determined by assuming that no characteristic vegetation in a single layer overlaps, and was taken from the sum of the maximum percent composition values in the layer. If this sum exceeded 100%, then 100% was input.

Characteristic species percent composition will be rechecked every 5 years after baseline data is established.

Pressure Transducer Measurements: A pressure transducer will be deployed in the Casperkill River on the VFEP. Periods of exceeding bank-full will be indicated by readings that reach a peak and remain constant at that peak for a relatively long period of time.

Water Quality Monitoring Using Benthic Macroinvertebrates: Benthic macroinvertebrates (BMI) can serve as an indicator of varying water quality in an ecosystem. As such, we have decided to utilize them to assess and monitor water quality in our lotic environments (Casperkill, beaver pond, ect.), which impact our preserve and priority communities.

We will go out and sample 3 points in the Casperkill (points set up by Stewart 2016), the beaver pond, and the outflow from the ponds neighboring the one-way bridge. In total, we will be sampling these 5 points seasonally (spring, summer, and fall). Prior to macroinvertebrate collection, we will record time, date, weather, previous day's weather, pH, water and air temperature, turbidity, bottom substrate, water depth, velocity, dissolved oxygen, and conductivity. In these lotic environments, we will be sampling using D-shaped nets, and use a kick-net method. A person will stand upstream, and position the net downstream from them (holding firmly onto it). The net will be submerged in the water, and open at the bottom of the stream so water and substrate may be collected. The person will then kick and dance in front of the net for 30 seconds. They will then carefully lift the net and dump their findings into a collection vessel (bucket) and rinse their net off in the bucket making sure to collect and remove all macroinvertebrates from the net. This process will be repeated twice at each point.

Once benthic macroinvertebrates have been successfully collected, they will be taken back to the lab to be identified and counted. From this information, we will calculate water quality based on the Shannon Diversity Index, taxon richness, effective species richness, EPT index, and the Hilsenhoff Biotic Index. The Hilsenhoff Biotic Index is key in determining water quality for this assessment.

Shannon Diversity Index Equation:

$$H' = -\sum_{i=1}^{S} p_i \ln p_i$$

Where: S= the number of species in your sample
H= Shannon Diversity Index
Pi= Proportion of the population made up of species 'i'
Taxon Richness: A simple count of how many different species are present in the sample
Effective Species Richness: The number of species that would give the same Shannon value, if they were perfectly evenly distributed

Effective Species Richness= eShannon

Taxon Evenness Equation:

Taxon Evenness= H/ln((S-1)/ln(n))

Where: S= Number of species recorded
n= Number of individuals in the sample
H= Shannon diversity index
EPT Index: A measure of water quality based on Ephemeroptera, Trichoptera, and Plecoptera.

% Abundance= Total EPT Taxa/Total Taxa Found x 100

A higher percent indicates good water quality
The Hilsenhoff Biotic Index equation:

$$HBI = \frac{\sum n_i \times a_i}{N};$$

n = number of specimens in taxa i
a = tolerance value of taxa i
N = total number of specimens in sample

Water quality chart

Family Biotic Index	Water Quality	Degree of Organic Pollution
0.00-3.75	Excellent	Organic pollution unlikely
3.76-4.25	Very Good	Possible slight organic pollution
4.26-5.00	Good	Some organic pollution probable
5.01-5.75	Fair	Fairly substantial pollution likely
5.76-6.50	Fairly Poor	Substantial pollution likely
6.51-7.25	Poor	Very substantial pollution likely
7.26-10.00	Very Poor	Severe organic pollution likely

We will be using methods and biotic index values for each macroinvertebrate based off of Stewart 2016's thesis, and Cunningham et al. 2010's work. This study will be repeated annually, and will allow us to assess increase or decrease in water pollutants based off of benthic macroinvertebrate assembles, and shifts in our biotic index scores.

<u>*Dominant Species Analysis:*</u> Vegetation mapping plots located in the target community were identified. From the vegetation data collected at those plots, dominant species (according to the New York Natural Heritage Program vegetation community classifications) and their percent cover (recorded as ranges, such as 2-5%, 5-10%, etc.) were selected. The low and high bound of the observed percent cover of the species in each layer was divided by the total percent cover of that layer, in order to determine the percent composition of that species. For example, if Acer rubrum was observed in the T1 layer covering 25-50% of a plot, but the T1 layer only covered 70% of the plot, then the percent composition of Acer rubrum in the T1 layer is (25/70*100) - (50/70*100) %, or ~35-71%. The percent composition of these species in all strata (tree,

shrub, herb, vine) was combined and recorded as a range. The low bound was determined by assuming that all dominant species in the plot overlap, and was taken from the highest minimum percent composition value. The high bound was determined by assuming that no dominant species in the plot, and was taken from the sum of the maximum percent composition values in the layer. If this sum exceeded 100%, then 100% was input. This process was repeated for each species listed as dominant (or codominant) in the New York Natural Heritage Program vegetation community classification. Dominant species within a plot will be rechecked every 5 years after baseline data is established.

Invasive Flora Percent Composition

Vegetation mapping plots located in the eastern forest corridor were identified. From the vegetation data collected at those plots, invasive species and their percent cover values (which were ranges, such as 2-5%, 5-10%, etc) were selected. (Invasive species come from the Lower Hudson Partnership for Regional Invasive Species Management -LHPRISM- species categorizations.) The low bound and the high bound of the observed percent cover for each species were divided by the total percent cover of the layer in which the species was observed, in order to determine the percent composition of that species. For example, if Microstegium vimineum was observed in the H layer covering 25-50% of a plot, but the H layer only covered 70% of the plot, then the percent composition of Microstegium vimineum in the H layer is (25/70*100) - (50/70*100) %, or ~35-71%. For each strata (tree, shrub, herb, vine), the percent composition of invasive species was recorded as a range. The low bound was determined by assuming that all invasive vegetation in a single layer overlaps, and was taken from the highest minimum percent composition value in the layer. The high bound was determined by assuming that no invasive vegetation in a single layer overlaps, and was taken from the sum of the maximum percent composition values in the layer. If this sum exceeded 100%, then 100% was input. Invasive species percent composition will be rechecked every 5 years after baseline data is established.

Characteristic Structure for Non-forested Communities: Vegetation mapping plots located in the target community were identified. From the vegetation data collected at those plots, the percent cover of each layer was determined. The percent cover of each layer was compared to the structure requirements for each community type (either open or shrubland), as discussed in Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Stream Species Monitoring: The banks of the Casperkill stream will be surveyed for Wood Turtles, Northern Map Turtles, and Eastern Musk Turtles. Dead wood, rocks, and other objects will be flipped to survey for the Northern Two-lined salamander.

Phenology: Phenology data is taken from the USA-National Phenology Database. Data was downloaded from all of New York State, from 01 January 2010 through the present day.

NYNHP Community Species Presence Vegetation mapping plots located in the target community were identified. Species lists from the various plots were compiled into one, which was compared to the flora listed in the NYNHP community guide. The number of species present was listed as X/Y, where X is species present and Y is the total number of species in the NYNHP community guide. Species listed in the NYNHP community guide that were not found in those communities on the VEP were noted as well.

Weather Station Temperature data comes from the VEP's weather station.

Number of Patches The number of patches will be taken from the 2016-2017 VEP ecological community map (the version with only NYNHP communities).

Average Redundancy Average redundancy will be determined using the 2016-2017 VEP ecological community map (the version with only NYNHP communities). The number of patches per community type will be counted. These values will be averaged.

Appendix H. Miradi Export

Project Plan For Vassar Ecological Preserve Conservation Action Plan

Version: 2019-05-31

Project Name	Vassar Ecological Preserve Conservation Action Plan
Primary Project Data Language	Unspecified
Project Data Effective Date	2018-03-01
Project Filename	053119VFEP_Conservation_Action Plan
Project Number	
Related Projects	
Project Website	
Project Description	To conserve the forested communities on the Vassar Ecological Preserve by managing the threat that invasive species pose in a changing climate.

Team

First Name	Last Name	ID	Organization	Position	Roles	Email	Office
Meg	Ronsheim		Vassar College	Biology Professor	Stakeholder;Project Advisor;Team Member;Team Contact;	maronsheim@vassar.edu	
Lindsay	Charlop		Environmental Monitoring and Management Alliance	Invasive Species Outreach and Management Coordinator	Process Facilitator;Leader/Manager;Team Member;Team Contact;	licharlop@vassar.edu	845-437-7439
Jamie	Deppen		Environmental Monitoring and Management Alliance	Coordinator	Project Advisor;Team Member;Team Contact;	jadeppen@vassar.edu	845-437-7413
Dylan	Finley		Vassar College	SCA Intern	Team Member;Team Contact;	dyfinley@vassar.edu	
Lydia	Kiewra		Vassar College	SCA Intern	Team Member;Team Contact;	lkiewra@vassar.edu	
Keri	VanCamp		Vassar College	Vassar Farm and Ecological	Process Facilitator;Stakeholder;Leader/Manager;Project Advisor;Team Member;Team Contact;	kevancamp@vassar.edu	845-437-7414

				Preserve Manager			

Organization

ID	Name	Role(s)	First Name	Last Name	Email	Phone
THP	The Huyck Preserve	Project partner	Anne	Rhoads	Anne@huyckpreserve.org	

Scope

Scope and Vision

Scope/Site Name	Vassar Ecological Preserve
Scope/Site Description	The Vassar Ecological Preserve (VEP) is located to the south of Vassar's campus. The northeastern portion of the property is designated as a multiple use area. It is home to a number of organizations including the Environmental Cooperative at the Vassar Barns, the Hudson Valley Corps of the Student Conservation Association, Community Gardens, and the Poughkeepsie Farm Project. This area is also used by Vassar's rugby and cross-country teams. The remainder of the land is designated as a Field Station. The preserve comprises a multitude of habitats including streams, wetlands, ponds, forest, and old fields populated by a stunning diversity of flora and fauna. These communities were mapped in 1996, and again in 2016 and 2017 (see Map 1). The 415-acre Vassar Ecological Preserve is an invaluable resource for Vassar faculty and students conducting scientific research. Visitors also use the preserve by hiking, biking, and running on a network of marked trails, which give campus and community members access to one of the few remaining green spaces in Poughkeepsie. The mission of the Vassar Ecological Preserve is to protect and preserve the ecological diversity of the land to ensure that its educational value will be maintained in perpetuity. The Vassar Ecological Preserve promotes increased understanding and appreciation of the natural systems on the preserve through field-based education and research. The VEP, located in the city of Poughkeepsie, is surrounded by urban and suburban land use. Similar "islands" have been shown to be important carbon sinks, migratory

	stopover points, and stepping stones for wildlife with larger ranges. The VEP's 415 acres contain a variety of natural habitats, including forests, old fields, shrublands, wetlands, marshes, and streams. The Preserve is a resource for Vassar College faculty and students engaged in scientific research, and is frequented by visitors who enjoy one of the few green spaces in Poughkeepsie. The VEP faces challenges that are particular to urban green spaces. The preserve is located adjacent to Vassar College, an arboretum that currently contains invasive trees, and is only 80 miles from New York City. These proximities make the VEP vulnerable to invasive species introductions. The VEP is part of the Casperkill watershed, downstream from the city of Poughkeepsie, which may impact water quality on the preserve. Lacking in connectivity with larger contiguous habitats, the VEP is unable to attract certain wildlife with larger home ranges. The goal of this conservation action planning process is to develop a framework for conserving the communities on the VEP by managing the threat that invasive species pose in a changing climate. As we worked through the process, we realized that an additional goal is to connect native habitats to provide corridors for wildlife. This aspect of our vision has grown to extend beyond the VEP and onto the Vassar College campus, where forest fragments along the Casperkill river and the golf course could be connected to form a much larger forest community.
Vision Statement Text	
Comments	

Biodiversity Features

Biodiversity Area (hectares)	Notes

Human Stakeholders

Human Stakeholder Pop Size	Notes
Social Context	

Protected Area Information

Protected Area Categories	Count:0 Notes
Legal Status	
Legislative Context	
Physical Description	
Biological Description	
Socio-Economic Information	

Historical Description	
Cultural Description	
Access Information	
Visitation Information	
Current Land Uses	
Management Resources	

IUCN Redlist Species

Name

Other Notable Species

Name

Project Latitude	
Project Longitude	
Countries	Count:1United States of America
States/Provinces	New York
Municipalities	Poughkeepsie
Legislative Districts	
Location Details	
Site Map Reference	
Comments	

Planning

Workplan

Project Dates	Start End
Workplan Dates	Start End
Fiscal Year	January to December
FTE Days per Year	
Comments	

Financial

Currency	Type Dollar (United States) Symbol $
Currency Decimal Places	
Total Budget for Funding	

% Budget Secured	
Key Funding Sources	
Comments	
Work Unit Rate Description	

ConPro Database Download Date	
ConPro Project Number	
ConPro Data Sharing	
Related Projects	
Planning Team (legacy)	
Parent Child	
Operating Units (Field Programs)	Count:0
Terrestrial Ecoregion	Count:0
Marine Ecoregion	Count:0
Freshwater Ecoregion	Count:0
Overall Project Goal	
Risks	
Fundraising Plan	

Financial Plan	
Project Resources Scorecard	
Project-level Comments	
Citations	
CAP Standards Scorecard	

Managing Offices	Count:0
Regions	Count:0
Ecoregions	Count:0

Organizational Focus	
Organizational Level	
SWOT	Completed? URL
STEP	Completed? URL

Rare Tracking

Project Number	(See Project tab)
Cohort	
Country	(See Location tab)

Campaign

Threats Addressed (legacy)	
Threats Addressed	Count:0
Threats at Site	(see Diagram)
Number of Communities in Campaign Area	
Human Stakeholder Pop Size	(see Scope tab)
Biodiversity Area (ha)	(see Scope tab)

Habitat	(see TNC tab for Ecoregions)
Biodiversity Hotspot(s)	
Flagship Species Common Name	
Flagship Species Scientific Name	
Flagship Species Details (< 200 words)	

Campaign Planning

Campaign Theory of Change (< 200 words)	
Campaign Slogan	
Summary of Key Messages	
Main Activities of the Projects (< 200 words)	
Related Projects	(see Project tab)

Audience

Audiences	# of People in Audience	Audience Summary

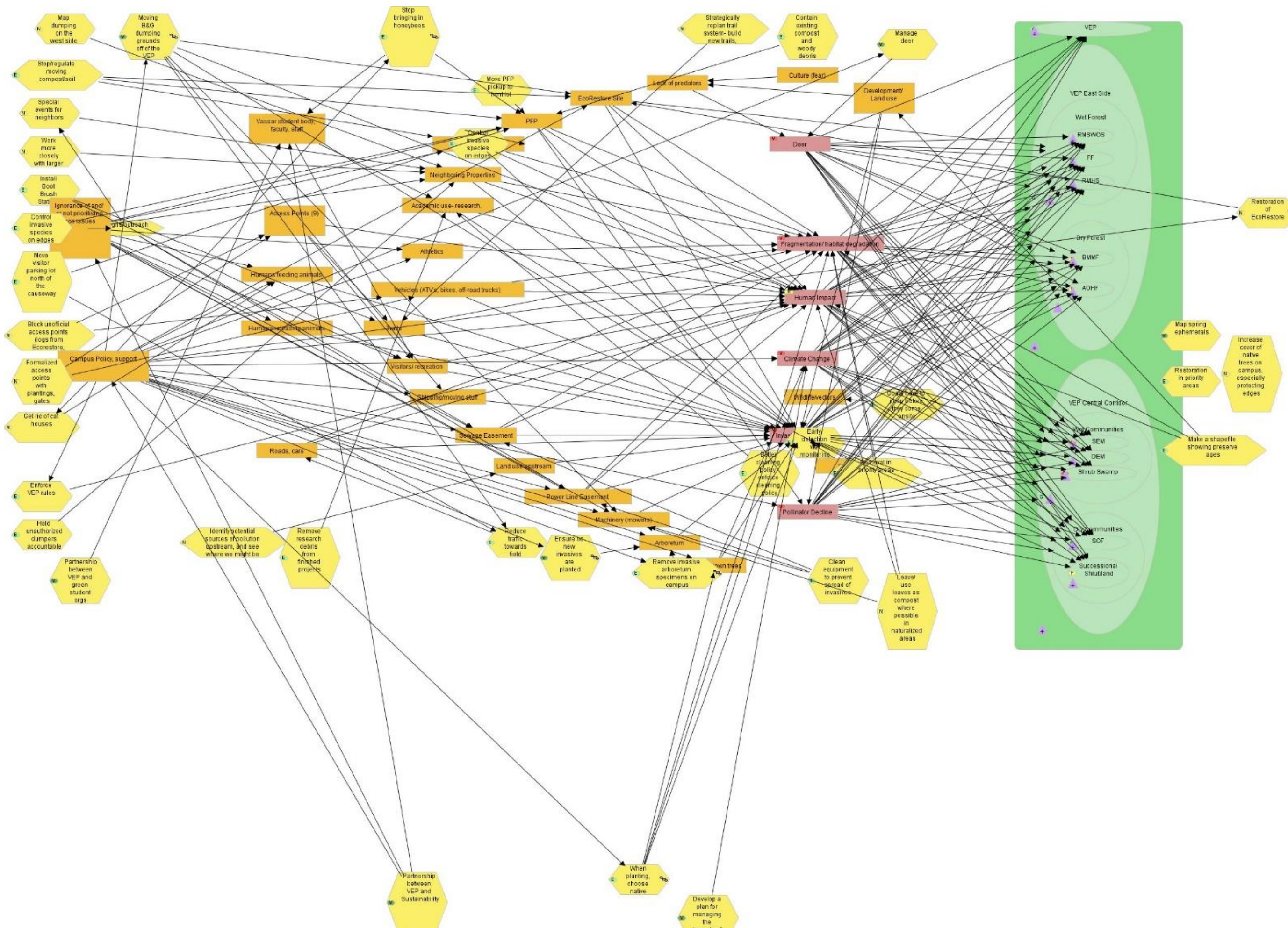
Training Type	Not Specified
Training Dates	
Trainer(s)	
Coach(es)	

Project Name	

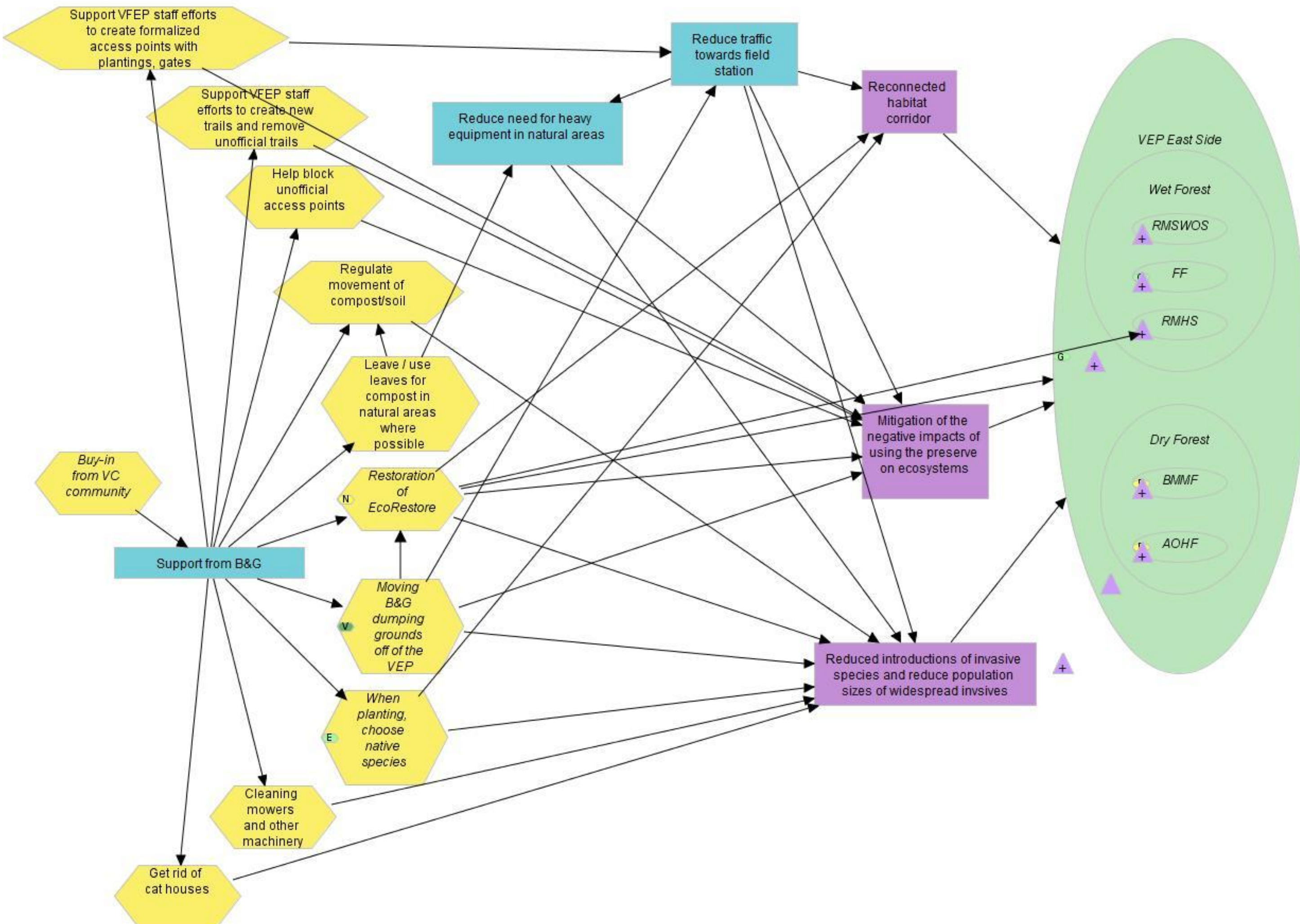
Project Id	
Project URL	
Program Id	
Program Name	
Program URL	
Project Template Id	
Project Template Name	

Project Version	
Program Taxonomy Set Name	
Program Taxonomy Set Version Id	
Program Taxonomy Set Version	

[Main Diagram]

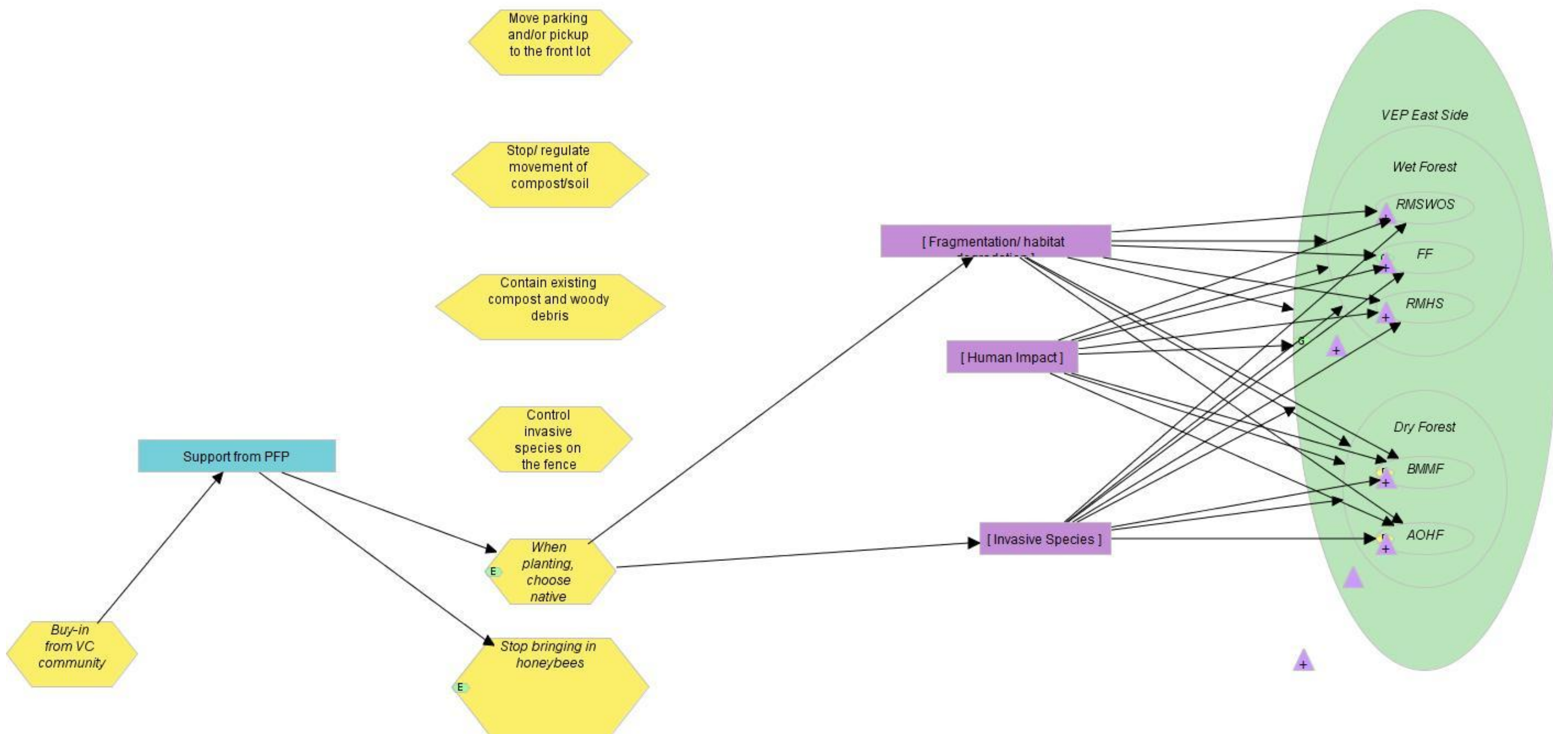


Intervention2. Buy-in VC Community



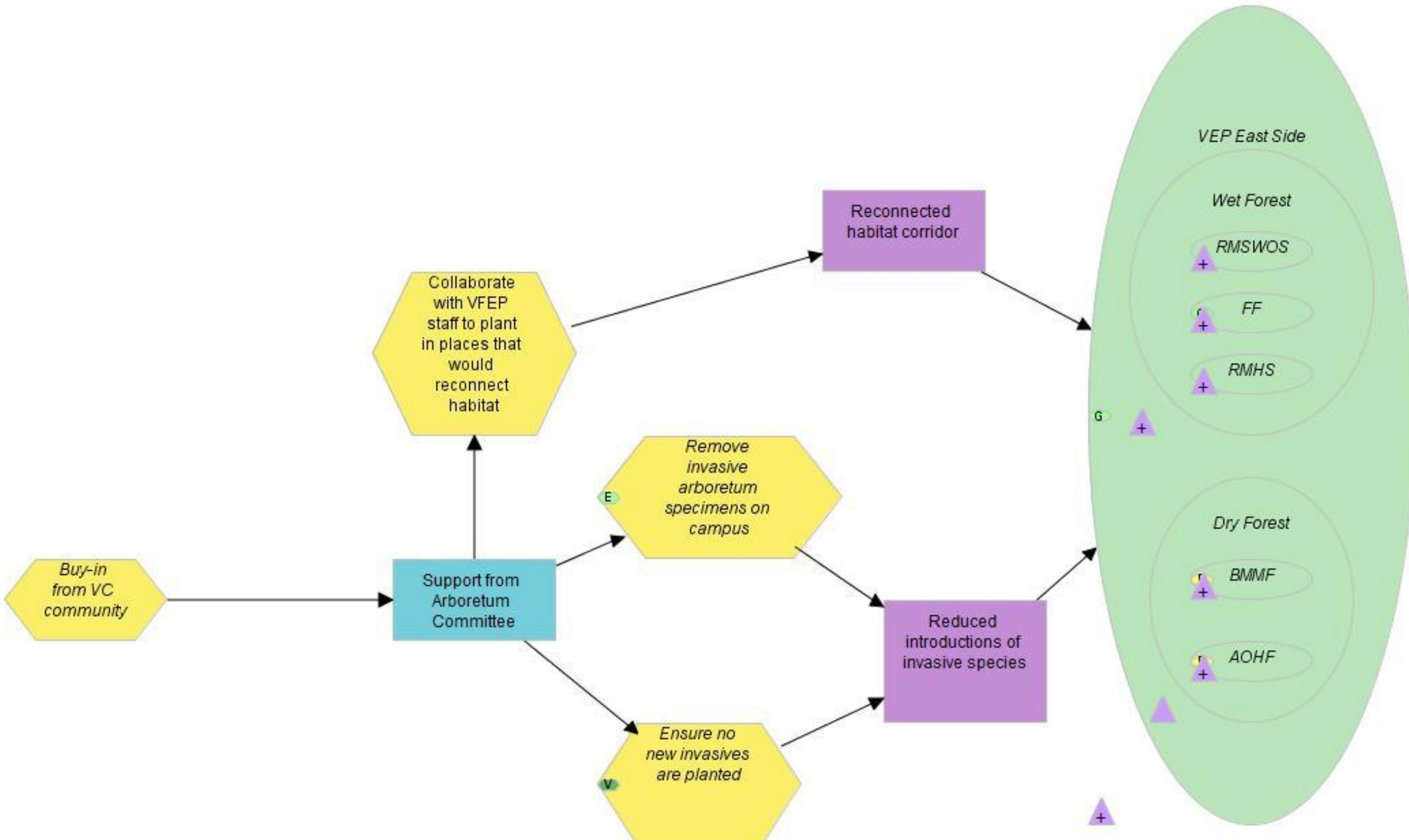
Support VFEP staff efforts to create formalized access points with plantings, gates
Support VFEP staff efforts to create new trails and remove unofficial trails
Help block unofficial access points
Regulate movement of compost/soil
Leave / use leaves for compost in natural areas where possible
Buy-in from VC community
Restoration of EcoRestore
N
Support from B&G
Moving B&G dumping grounds off of the VEP
V
When planting, choose native species
E
Cleaning mowers and other machinery
Get rid of cat houses
Reduce traffic towards field station
Reduce need for heavy equipment in natural areas
Reconnected habitat corridor
Mitigation of the negative impacts of using the preserve on ecosystems
Reduced introductions of invasive species and reduce population sizes of widespread invsives
VEP East Side
Wet Forest
RMSWOS
FF
RMHS
G
Dry Forest
BMMF
AOHF

PFP



Move parking and/or pickup to the front lot
Stop/ regulate movement of compost/soil
Contain existing compost and woody debris
Control invasive species on the fence
Support from PFP
When planting, choose native
Stop bringing in honeybees
Buy-in from VC community
[Fragmentation/ habitat
[Human Impact]
[Invasive Species]
VEP East Side
Wet Forest
RMSWOS
FF
RMHS
Dry Forest
BMMF
AOHF

Intervention1. Arboretum Committee



Target Viability - Table

Item	Viability Mode	Status	Future Status	Type	Poor	Fair	Good	Very Good	Source	Progress
053119VFEP_Conservation_Action Plan		Fair	Not Specified							
VEP	Key Attribute	Good	Not Specified							
Native Species Diversity		Not Specified	Not Specified	Condition						
I100. Native flora species richness and list		Not Specified	Not Specified		The richness of VEP native flora decreases	N/A	The richness of VEP native flora remains roughly the same	The richness of VEP native flora increases	Onsite / Project Research	Not Specified

2019-05-24: 373									Intensive Assessment	
I101. Native fauna species richness and list		Not Specified	Not Specified		The richness of VEP native fauna decreases	N/A	The richness of VEP native fauna remains roughly the same	The richness of VEP native fauna increases	Onsite / Project Research	Not Specified
2019-05-24: 205									Intensive Assessment	
I107. Nonnative flora species richness and list		Not Specified	Not Specified		The richness of VEP invasive flora increases	N/A	The richness of VEP invasive flora remains roughly the same	The richness of VEP invasive flora decreases	Onsite / Project Research	Not Specified
2019-05-24: 213									Intensive e	

									Assessment	
I108. Nonnative fauna species richness and list		Not Specified	Not Specified		The richness of VEP invasive fauna increases	N/A	The richness of VEP invasive fauna remains roughly the same	The richness of VEP invasive fauna decreases	Onsite / Project Research	Not Specified
: 6									Intensive Assessment	
Complexity		Not Specified	Not Specified	Landscape Context						
I100. Number of NYNHP community types		Not Specified	Not Specified		VEP communities become increasingly fragmented and/or communities	N/A	The number and assemblage of VEP communities remains roughly the same	Communities characterized by invasive species become	Onsite / Project Research	Not Specified

					characterized by native vegetation become invasive			more native		
I106. Richness of indicator predator species with broad home ranges		Not Specified	Not Specified		there are no indicator predator species on the VEP	richness of indicator predator species has decreased from the previous round of monitoring	richness of indicator predator species remains the same from the previous round of monitoring	richness of indicator predator species increases from the previous round of monitoring	Onsite / Project Research	Not Specified
2019-05-25: 9									Intensive Assessment	
I110. Number of patches		Not Specified	Not Specified		Predominantly invaded habitats become	N/A	Predominantly invaded habitats become more	N/A	Onsite / Project Research	Not Specified

					more contiguous, resulting in fewer patches; or predominantly native habitats become increasingly fragmented, resulting in more patches		fragmented, resulting in more patches; and/or predominantly native habitats become increasingly connected, resulting in fewer patches			
I111. Average redundancy		Not Specified	Not Specified		Predominantly invaded habitats become more contiguous, resulting in less redundancy; or predominantly native	N/A	Predominantly invaded habitats become increasingly fragmented, resulting in greater redundancy; and/or predominantly native habitats	N/A	Onsite / Project Research	Not Specified

					habitats become increasingly fragmented, resulting in more redundancy		become increasingly connected, resulting in lower redundancy			
Climate		Good	Not Specified	Landscape Context						
I2000. Pseudacris crucifer (spring peeper)-Date of first vocalization of the year reported in NYS		Fair	Not Specified		Vocalizations are not heard at all	Vocalizations are heard all year round, or vocalizations are heard earlier in the year than during the previous round of monitoring	Vocalizations are heard around the same time as or later in the year than the previous round of monitoring	N/A	External Research	Not Specified

2019-05-25: 2015/03/15						2015/03/15			Rapid Assessment	
2019-05-25: 2016/03/08						2016/03/08			Rapid Assessment	
2019-05-25: 2017/02/24						2017/02/24			Rapid Assessment	
2019-05-25: 2018/02/21						2018/02/21			Rapid Assessment	
2019-05-25: 2019/03/20							2019/03/20		Rapid Assessment	
2019-05-25: 2013/04/09									Rapid Assessment	
2019-05-25: 2014/04/10							2014/04/10		Rapid Assessment	

I2001. Lithobates sylvatica (wood frog)- Date of first vocalization of the year reported in NYS		Not Specified	Not Specified		Vocalizations are not heard at all	Vocalizations are heard all year round, or vocalizations are heard earlier in the year than during the previous round of monitoring	Vocalizations are heard around the same time as or later in the year than the previous round of monitoring	N/A	External Research	Not Specified
2019-05-25: 2010/04/03									Rapid Assessment	
2019-05-25: 2013/04/19							2013/04/19		Rapid Assessment	
2019-05-25: 2014/04/22							2014/04/22		Rapid Assessment	
2019-05-25: 2015/04/03						2015/04/03			Rapid Assessment	

2019-05-25: 2016/03/08						2016 /03/08			Rapid Assessment	
2019-05-25: 2017/03/01						2017 /03/01			Rapid Assessment	
2019-05-25: 2018/04/22							2018 /04/22		Rapid Assessment	
2019-05-25: 2019/03/20						2019 /03/20			Rapid Assessment	
I2002. Erythronium americanum (Trout Lily / Dogtooth Violet)- date of first reported open flower in NYS		Good	Not Specified		Flowering does not occur at all.	Flowering occurs earlier in the year than during the previous round of monitoring	Flowering occurs around the same time as or later in the year than during the previous round of monitoring	N/A	External Research	Not Specified

2019-05-25: 2019/04/13							2019 /04/13		Rapid Assessment	
2019-05-25: 2018/04/17							2018 /04/17		Rapid Assessment	
2019-05-25: 2017/04/10							2017 /04/10		Rapid Assessment	
2019-05-25: 2016/04/03							2016 /04/03		Rapid Assessment	
2019-05-25: 2015/03/09						2015 /03/09			Rapid Assessment	
2019-05-25: 2013/04/13							2013 /04/13		Rapid Assessment	
2019-05-25: 2013/04/08							2013 /04/08		Rapid Assessment	

2019-05-25: 2012/03/27						2012 /03/27			Rapid Assessm ent	
2019-05-25: 2011/04/14									Rapid Assessm ent	
I2003. Sanguinaria canadensis (Bloodroot)- date of first reported open flower in NYS		Good	Not Specifi ed		Flowering does not occur at all.	Flowering occurs earlier in the year than during the previous round of monitoring	Flowering occurs around the same time as or later in the year than during the previous round of monitoring	N/A	External Researc h	Not Specifie d
2019-05-25: 2019/04/13							2019 /04/13		Rapid Assessm ent	
2019-05-25: 2018/04/14							2018 /04/14		Rapid Assessm ent	

2019-05-25: 2017/04/10							2017/04/10		Rapid Assessment	
2019-05-25: 2016/03/26						2016/03/26			Rapid Assessment	
2019-05-25: 2015/04/15							2015/04/15		Rapid Assessment	
2019-05-25: 2014/04/14									Rapid Assessment	
I2004. Claytonia virginica (Virginia springbeauty)- date of first reported open flower in NYS		Not Specified	Not Specified		Flowering does not occur at all.	Flowering occurs earlier in the year than during the previous round of monitoring	Flowering occurs around the same time as or later in the year than during the previous round of monitoring	N/A	External Research	Not Specified

2019-05-25: 2018/05/03									Rapid Assessment	
I2005. Asarum canadense (Canadian wildginger)- date of first reported open flower in NYS		Good	Not Specified		Flowering does not occur at all.	Flowering occurs earlier in the year than during the previous round of monitoring	Flowering occurs around the same time as or later in the year than during the previous round of monitoring	N/A	External Research	Not Specified
2019-05-25: 2019/05/15							2019/05/15		Rapid Assessment	
2019-05-25: 2017/04/17						2017/04/17			Rapid Assessment	
2019-05-25: 2013/05/15									Rapid Assessment	

2019-05-25: 2015/04/28						2015 /04/28			Rapid Assessment	
2019-05-25: 2014/05/07						2014 /05/07			Rapid Assessment	
I2006. Date of first freeze of the autumn/winter		Not Specified	Not Specified		There is no freeze.	Date of first freeze occurs later in the year than during the previous round of monitoring.	Date of first freeze occurs around the same time as or earlier than during the previous round of monitoring.	N/A	Onsite / Project Research	Not Specified
I2007. Date of last freeze of the winter/spring		Not Specified	Not Specified		There is no freeze.	Date of last freeze occurs earlier in the year than during the previous round of monitoring.	Date of last freeze occurs around the same time as or later than during the previous	N/A	Onsite / Project Research	Not Specified

							round of monitoring.			
VEP East Side	Key Attribute	Good	Not Specified							
Stable Corridor Boundary		Not Specified	Not Specified	Size						
I09. Area of forest corridor		Not Specified	Not Specified		Area of corridor has decreased from the previous round of monitoring	N/A	Area of corridor is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 444694									Intensive Assessment	

Forest Structure		Not Specified	Not Specified	Condition						
I01. Intact Canopy		Not Specified	Not Specified		<60	60-70	>70	N/A	External Research	Not Specified
Native Flora at Every Stratum		Good	Not Specified	Condition						
I02. Average percent composition of invasive flora in the tree layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-09-01: 0								0	Intensive Assessment	
I03. Average percent composition invasive flora in the shrub layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-09-01: 22.4-84.8						22.4-84.8			Intensive	

									Assessment	
I04. Average percent composition of invasive flora in the herb layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-09-01: 12.8-45.2						12.8-45.2			Intensive Assessment	
I05. Average percent composition of invasive flora in the vine layer		Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-09-01: 5.7-12.2							5.7-12.2		Intensive Assessment	
Native Forest Regeneration		Good	Not Specified	Condition						

I07. Ten Tallest Data (for measuring deer impact)		Not Specified	Not Specified		TBD	TBD	TBD	TBD	External Research	Not Specified
I08. Deer Density		Fair	Not Specified		>40 deer / sq mi at max population size	20-40 deer / sq mi at max population size	10-20 deer / sq mi at max population size	<10 deer / sq mi at max population size	Rough Guess	Not Specified
2018-03-01: 21						21			Rapid Assessment	
I105. Richness of indicator species that require regenerating understory habitat		Very Good	Not Specified		there are no species that indicate regeneration on the VEP	richness of species that indicate regeneration has decreased from the previous round of monitoring	richness of species that indicate regeneration remains the same from the previous round of monitoring	richness of species that indicate regeneration increases from the previous round of monitoring	Onsite / Project Research	Not Specified
2019-05-25: 3								3	Intensive	

									Assessment	
Wet Forest	Key Attribute	Not Specified	Not Specified							
Stable forest boundary		Not Specified	Not Specified	Size						
I09. Area of Ecological Community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
Characteristic Hydrology		Not Specified	Not Specified	Landscape Context						

I10. Wet Forest Area		Not Specified	Not Specified		Area of community has decreased or increased drastically from the previous round of monitoring	N/A	Area of community is practically unchanged from the previous round of monitoring	N/A	Onsite / Project Research	Not Specified
Native Fauna		Not Specified	Not Specified	Landscape Context						
I35. Richness of characteristic fauna		Not Specified	Not Specified		There are no native characteristic species in the wet forest	richness of native species characteristic of wet forest habitat has decreased from the previous round of monitoring	richness of native species characteristic of wet forest habitat remains the same from the previous round of monitoring	richness of native species characteristic of wet forest habitat increases from the previous round of	Onsite / Project Research	Not Specified

								monitoring		
2019-05-25: 5									Intensive Assessment	
Dry Forest	Key Attribute	Not Specified	Not Specified							
Stable forest boundary		Not Specified	Not Specified	Size						
I09. Area of Ecological Community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 299469									Intensive	

									Assessment	
RMSWOS	Key Attribute	Not Specified	Not Specified							
Stable community boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2016-08-01: 6063									Intensive Assessment	

Characteristic Flora		Not Specified	Not Specified	Condition						
I13. Percent composition of native characteristic tree species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I14. Percent composition of native characteristic shrub species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I15. Percent composition of native characteristic herb species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I16. Percent composition of native characteristic vine species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I46. Red maple and swamp white oak codominance		Not Specified	Not Specified		neither Red Med Maple nor Swamp	Red Maple and Swamp White Oak present, but individually	Red Maple and Swamp White Oak present and individually	Red Maple and Swamp white oak	Onsite / Project Research	Not Specified

					White Oak present	comprise <20% cover. OR only one species is present, but comprises <60% cover.	comprise >20% cover, but together comprise <80% cover OR only one species is present and dominant, comprising >60% cover	individually comprise >20% cover, and together comprise >80% cover		
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified

Community Structure		Not Specified	Not Specified	Condition						
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present		Not Specified	Not Specified		>80	80-90	90-95	95-100	Onsite / Project Research	Not Specified
Native flora at every stratum		Not Specified	Not Specified	Condition						
I02. Percent composition of invasive flora in the tree layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I03. Percent composition of invasive flora in the shrub layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I04. Percent composition of invasive flora in the herb layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified

I05. Percent composition of invasive flora in the vine layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
Regeneration		Not Specified	Not Specified	Condition						
I06. Sapling/seedling abundance		Not Specified	Not Specified		Number of saplings and seedlings has decreased from the previous round of monitoring	N/A	Number of saplings and seedlings has remained the same from the previous round of monitoring	Number of saplings and seedlings has increased from the previous round of monitoring	Onsite / Project Research	Not Specified
I50. Spring ephemeral cover		Not Specified	Not Specified		Spring ephemeral cover has decreased since the previous	N/A	Spring ephemeral cover has remained the same since the previous	Spring ephemeral cover has increased since the previous	Onsite / Project Research	Not Specified

					round of monitoring		round of monitoring	round of monitoring		
FF	Key Attribute	Good	Not Specified							
Stable Forest Boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	I09. Area of ecological community	Onsite / Project Research	Not Specified
2016-08-01: 68070									Intensive Assessment	

Characteristic Flora		Good	Not Specified	Condition						
I13. Percent composition of native characteristic tree species		Good	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-20: 18-100							18-100		Intensive Assessment	
2016-06-14: 20-28							20-28		Intensive Assessment	
I14. Percent composition of native characteristic shrub species		Fair	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-20: 13-30						13-30			Intensive Assessment	

2016-06-14: 27-65							27-65		Intensive Assessment	
I15. Percent composition of native characteristic herb species		Fair	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-20: 2-7						2-7			Intensive Assessment	
2016-06-14: 13-38						13-38			Intensive Assessment	
I16. Percent composition of native characteristic vine species		Very Good	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-20: 67-100								67-100	Intensive Assessment	

2016-06-14: 100								100	Intensive Assessment	
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified
2017-09-01: 9/21									Intensive Assessment	
Community Structure		Very Good	Not Specified	Condition						

I105. Percent plots with all expected strata (tree, shrub, herb, vine) present		Very Good	Not Specified		<80	80-90	90-95	95-100	Onsite / Project Research	Not Specified
2016-09-01: 100								100	Intensive Assessment	
Native Characteristic Fauna		Not Specified	Not Specified	Condition						
I103. Richness of characteristic fauna		Not Specified	Not Specified		There are no native characteristic species in the floodplain forest	richness of native species characteristic of floodplain forest habitat has decreased from the previous round of monitoring	richness of native species characteristic of floodplain forest habitat remains the same from the previous round of monitoring	richness of native species characteristic of floodplain forest habitat increases from the previous round of monitoring	Onsite / Project Research	Not Specified

2019-05-25: 3									Intensive Assessment	
Native flora at every stratum		Good	Not Specified	Condition						
I02. Percent composition of invasive flora in the tree layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-20: 0								0	Intensive Assessment	
2016-06-14: 0								0	Intensive Assessment	
I03. Percent composition of invasive flora in the shrub layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified

2016-06-20: 12.5-67.5						12.5-67.5			Intensive Assessment	
2016-06-14: 41.7-100						41.7-100			Intensive Assessment	
I04. Percent composition of invasive flora in the herb layer		Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-20: 12.5-31.3							12.5-31.3		Intensive Assessment	
2016-06-14: 1.25-6.3								1.25-6.3	Intensive Assessment	
I05. Percent composition of invasive flora in the vine layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified

2016-06-20: 0.6-6.7								0.6-6.7	Intensive Assessment	
2016-06-14: 0								0	Intensive Assessment	
Regeneration		Not Specified	Not Specified	Condition						
I06. Sapling/seedling abundance		Not Specified	Not Specified		Number of saplings and seedlings has decreased from the previous round of monitoring	N/A	Number of saplings and seedlings has remained the same from the previous round of monitoring	Number of saplings and seedlings has increased from the previous round of monitoring	Onsite / Project Research	Not Specified

I50. Spring ephemeral cover		Not Specified	Not Specified		Spring ephemeral cover has decreased since the previous round of monitoring	N/A	Spring ephemeral cover has remained the same since the previous round of monitoring	Spring ephemeral cover has increased since the previous round of monitoring	Onsite / Project Research	Not Specified
Water Quality		Not Specified	Not Specified	Landscape Context						
I104. Hilsenhoff Biotic Index for benthic macroinvertebrates		Not Specified	Not Specified		6.51-10.00	5.76-6.50	4.26- 5.75	0.00-4.25	Onsite / Project Research	Not Specified
I111. Shannon-Weiner Diversity Index for benthic macroinvertebrates		Not Specified	Not Specified		Diversity decreases from the 2019 baseline.	N/A	Diversity remains the same or increases from the 2019 baseline.	N/A	Onsite / Project Research	Not Specified

I112. Species Evenness for benthic macroinvertebrates		Not Specified	Not Specified		Evenness decreases from the 2019 baseline.	N/A	Evenness remains the same or increases from the 2019 baseline.	N/A	Onsite / Project Research	Not Specified
I113. Species richness of benthic macroinvertebrates		Not Specified	Not Specified		Richness decreases from the 2019 baseline.	N/A	Richness remains the same or increases from the 2019 baseline.	N/A	Onsite / Project Research	Not Specified
Characteristic Hydrology		Not Specified	Not Specified	Landscape Context						
I49. Frequency of exceeding bankfull		Not Specified	Not Specified		>5	>2	N/A	<2	Onsite / Project Research	Not Specified
RMHS	Key Attribute	Not Specified	Not Specified							

Stable Forest Boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring		Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2016-08-01: 64534									Intensive Assessment	
Characteristic Flora		Not Specified	Not Specified	Condition						
I13. Percent composition of native characteristic trees		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified

I14. Percent composition of native characteristic shrubs		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I15. Percent composition of native characteristic herbs		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I16. Percent composition of native characteristic vine species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I48. Red Maple dominant, or codominant with other hardwoods		Not Specified	Not Specified		red maple not present	red maple present but comprises <20% cover	N/A	red maple comprises >60% cover OR red maple and another hardwood comprise >20% cover individually and >80%	Onsite / Project Research	Not Specified

								cover together		
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified
Community Structure		Not Specified	Not Specified	Condition						
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present		Not Specified	Not Specified		<80	80-90	90-95	95-100	Onsite / Project Research	Not Specified
Native flora at every stratum		Not Specified	Not Specified	Condition						

I02. Percent composition of invasive flora in the tree layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I03. Percent composition of invasive flora in the shrub layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I04. Percent composition of invasive flora in the herb layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I05. Percent composition of invasive flora in the vine layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
Regeneration		Not Specified	Not Specified	Condition						
I06. Sapling/seedling abundance		Not Specified	Not Specified		Number of saplings and seedlings has	N/A	Number of saplings and seedlings has remained	Number of saplings and seedlings	Onsite / Project Research	Not Specified

					decreased from the previous round of monitoring		the same from the previous round of monitoring	has increased from the previous round of monitorin g		
I50. Spring ephemeral cover		Not Specifi ed	Not Specifi ed		Spring ephemeral cover has decreased since the previous round of monitoring	N/A	Spring ephemeral cover has remained the same since the previous round of monitoring	Spring ephemera l cover has increased since the previous round of monitorin g	Onsite / Project Researc h	Not Specifie d
BMMF	Key Attrib ute	Fair	Not Specifi ed							
Stable Forest Boundary		Not Specifi ed	Not Specifi ed	Size						

I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2016-08-01: 40455									Intensive Assessment	
Characteristic Flora		Fair	Not Specified	Condition						
I13. Percent composition of native characteristic tree species		Very Good	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-15: 67-100								67-100	Intensive	

									Assessment	
I14. Percent composition of native characteristic shrub species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-15: 0					0				Intensive Assessment	
I15. Percent composition of native characteristic herb species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-15: 0					0				Intensive Assessment	
I46. American beech and sugar maple codominance		Good	Not Specified		neither American Beech nor Sugar Maple present	American Beech and Sugar Maple present, but individually comprise	American Beech and Sugar Maple present and individually comprise	American Beech and Sugar Maple individually	Onsite / Project Research	Not Specified

						<20% cover. OR only one species is present, but comprises <60% cover.	>20% cover, but together comprise <80% cover OR only one species is present and dominant, comprising >60% cover	comprise >20% cover, and together comprise >80% cover		
2016-06-15: Acer saccharum: 55-84%, Fagus grandifolia: 0%							Acer saccharum: 55-84%, Fagus grandifolia: 0%		Intensive Assessment	
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous	N/A	Number of NYNHP characteristic species is unchanged from the previous	Number of NYNHP characteristic species has increased from the previous	Onsite / Project Research	Not Specified

					round of monitoring		round of monitoring	round of monitoring		
2017-09-01: 2/22									Intensive Assessment	
Community Structure		Very Good	Not Specified	Condition						
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present		Very Good	Not Specified		<80	80-90	90-95	95-100	Onsite / Project Research	Not Specified
2016-09-01: 100								100	Intensive Assessment	
Native flora at every stratum		Good	Not Specified	Condition						

I02. Percent composition of invasive flora in the tree layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 0								0	Intensive Assessment	
I03. Percent composition of invasive flora in the shrub layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 33-100						33-100			Intensive Assessment	
I04. Percent composition of invasive flora in the herb layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 0								0	Intensive Assessment	

I05. Percent composition of invasive flora in the vine layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 0								0	Intensive Assessment	
Regeneration		Not Specified	Not Specified	Condition						
I06. Sapling/seedling abundance		Not Specified	Not Specified		Number of saplings and seedlings has decreased from the previous round of monitoring	N/A	Number of saplings and seedlings has remained the same from the previous round of monitoring	Number of saplings and seedlings has increased from the previous round of monitoring	Onsite / Project Research	Not Specified

I50. Spring ephemeral cover		Not Specified	Not Specified		Spring ephemeral cover has decreased since the previous round of monitoring	N/A	Spring ephemeral cover has remained the same since the previous round of monitoring	Spring ephemeral cover has increased since the previous round of monitoring	Onsite / Project Research	Not Specified
AOHF	Key Attribute	Fair	Not Specified							
Stable Forest Boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified

							round of monitoring			
2016-08-01: 161386									Intensive Assessment	
Characteristic Flora		Fair	Not Specified	Condition						
I13. Percent composition of native characteristic tree species		Very Good	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Completed
2016-06-15: 55-100								55-100	Intensive Assessment	
2016-06-09: 15-70							15-70		Intensive Assessment	

I14. Percent composition of native characteristic shrub species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-15: 0					0				Intensive Assessment	
2016-06-09: 20-30							20-30		Intensive Assessment	
I15. Percent composition of native characteristic herb species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2016-06-15: 0					0				Intensive Assessment	
2016-06-09: 0					0				Intensive Assessment	

I29. One or more oak species dominant		Very Good	Not Specified		No oak species present	One oak species present but comprises <60% cover, OR multiple oak species present but together comprise <80% cover	N/A	One oak species comprises >60% cover, OR multiple oak species together comprise >80% cover	Onsite / Project Research	Not Specified
2016-06-15: Quercus rubra 55-84%, Quercus alba 1-2%								Quercus rubra 55-84%, Quercus alba 1-2%	Intensive Assessment	
2016-06-09: Quercus rubra: 14-35%, Quercus bicolor: 2-7%						Quercus rubra: 14-35%, Quercus			Intensive Assessment	

						bicolor: 2-7%				
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified
2017-09-01: 9/19									Intensive Assessment	
Community Structure		Good	Not Specified	Condition						
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present		Good	Not Specified		<80	80-90	90-95	95-100	Onsite / Project	Not Specified

									Research	
2016-09-01: 100							100		Intensive Assessment	
Native flora at every stratum		Fair	Not Specified	Condition						
I02. Percent composition of invasive flora in the tree layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 0								0	Intensive Assessment	
2016-06-09: 0								0	Intensive Assessment	

I03. Percent composition of invasive flora in the shrub layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 3.3-66.7						3.3-66.7			Intensive Assessment	
2016-06-09: 15.4-74.4						15.4-74.4			Intensive Assessment	
I04. Percent composition of invasive flora in the herb layer		Poor	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 50-100					50-100				Intensive Assessment	
2015-06-09: 10-100						10-100			Intensive Assessment	

I05. Percent composition of invasive flora in the vine layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2016-06-15: 0								0	Intensive Assessment	
2016-06-09: 33.3-66.7						33.3-66.7			Intensive Assessment	
Regeneration		Not Specified	Not Specified	Condition						
I06. Sapling/seedling abundance		Not Specified	Not Specified		Number of saplings and seedlings has decreased from the previous	N/A	Number of saplings and seedlings has remained the same from the previous	Number of saplings and seedlings has increased from the previous round of	Onsite / Project Research	Not Specified

					round of monitoring		round of monitoring	monitoring		
I50. Spring ephemeral cover		Not Specified	Not Specified		Spring ephemeral cover has decreased since the previous round of monitoring	N/A	Spring ephemeral cover has remained the same since the previous round of monitoring	Spring ephemeral cover has increased since the previous round of monitoring	Onsite / Project Research	Not Specified
VEP Central Corridor	Key Attribute	Good	Not Specified							
Native Flora at Every Stratum		Good	Not Specified	Condition						
I03. Average percent composition invasive flora in the shrub layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified

2017-09-01: 29.7-60.3						29.7-60.3				Intensive Assessment	
I04. Average percent composition of invasive flora in the herb layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-09-01: 28.5-44.5						28.5-44.5				Intensive Assessment	
I05. Average percent composition of invasive flora in the vine layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-09-01: 5.6- 12.3								5.6-12.3	Intensive Assessment	
Wet Communities	Key Attribute	Not Specified	Not Specified							

Characteristic Hydrology		Not Specified	Not Specified	Landscape Context						
I10. Wet community area		Not Specified	Not Specified		Area of community has decreased or increased drastically from the previous round of monitoring	N/A	Area of community is practically unchanged from the previous round of monitoring	N/A	Onsite / Project Research	Not Specified
Dry Communities	Key Attribute	Not Specified	Not Specified							
SEM	Key Attribute	Poor	Not Specified							
Stable Community Boundary		Not Specified	Not Specified	Size						

I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 73024									Intensive Assessment	
Characteristic Flora		Poor	Not Specified	Condition						
I14. Percent composition of native characteristic shrub species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2017-06-22: 0									Intensive	

									Assessment	
2017-06-22: 0					0				Intensive Assessment	
2017-06-22: N/A					N/A				Intensive Assessment	
2017-06-21: 0					0				Intensive Assessment	
2017-06-21: N/A					N/A				Intensive Assessment	
2017-06-20: 0					0				Intensive Assessment	

2017-06-20: 0					0				Intensive Assessment	
2017-06-20: 0					0				Intensive Assessment	
2017-06-19: 0					0				Intensive Assessment	
2017-06-16: 0					0				Intensive Assessment	
2017-06-13: 0					0				Intensive Assessment	
2017-06-13: 0					0				Intensive Assessment	

2017-06-12: 0					0				Intensive Assessment	
2017-06-09: 0									Intensive Assessment	
2017-06-09: 0					0				Intensive Assessment	
2017-06-08: 0					0				Intensive Assessment	
2017-06-07: 0					0				Intensive Assessment	
I15. Percent composition of native characteristic herb species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified

2017-06-22: 0					0				Intensive Assessment	
2017-06-22: 55.6-92								55.6-92	Intensive Assessment	
2017-06-22: 2.2-16.5						2.2-16.5			Intensive Assessment	
2017-06-21: 79-100								79-100	Intensive Assessment	
2017-06-21: 50-100								50-100	Intensive Assessment	
2017-06-20: 2.7-6.7						2.7-6.7			Intensive Assessment	

2017-06-20: 2.1-7.5						2.1-7.5			Intensive Assessment	
2017-06-20: 2.4-13.5						2.4-13.5			Intensive Assessment	
2017-06-19: 83.3-100								83.3-100	Intensive Assessment	
2017-06-16: 2.5-13.8						2.5-13.8			Intensive Assessment	
2017-06-13: 2.2-19						2.2-19			Intensive Assessment	
2017-06-13: 75-100								75-100	Intensive Assessment	

2017-06-12: 8.3-16.7						8.3-16.7			Intensive Assessment	
2017-06-09: 11.1-42.5							11.1-42.5		Intensive Assessment	
2017-06-09: 93-100								93-100	Intensive Assessment	
2017-06-08: 0					0				Intensive Assessment	
2017-06-07: 12.5-49							12.5-49		Intensive Assessment	
I13. Percent composition of native characteristic tree species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified

2017-06-22: N/A									Intensive Assessment	
2017-06-22: N/A									Intensive Assessment	
2017-06-22: N/A									Intensive Assessment	
2017-06-21: N/A									Intensive Assessment	
2017-06-21: N/A									Intensive Assessment	
2017-06-20: N/A									Intensive Assessment	

2017-06-20: N/A									Intensive Assessment	
2017-06-20: 0					0				Intensive Assessment	
2017-06-19: N/A									Intensive Assessment	
2017-06-16: N/A									Intensive Assessment	
2017-06-13: N/A									Intensive Assessment	
2017-06-13: 100								100	Intensive Assessment	

2017-06-12: N/A									Intensive Assessment	
2017-06-09: N/A									Intensive Assessment	
2017-06-09: N/A									Intensive Assessment	
2017-06-08: N/A									Intensive Assessment	
2017-06-07: N/A									Intensive Assessment	
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species	N/A	Number of NYNHP characteristic species is	Number of NYNHP characteristic	Onsite / Project Research	Not Specified

					has decreased from the previous round of monitoring		unchanged from the previous round of monitoring	species has increased from the previous round of monitorin g		
2017-09-01: 9/20									Intensiv e Assessm ent	
Characteristic Structure		Good	Not Specifi ed	Conditi on						
I100. Percentage of plots with characteristic open structure		Good	Not Specifi ed		<70	80-90	90-95	95-100	Onsite / Project Researc h	Not Specifie d
2017-09-01: 94							94		Intensiv e Assessm ent	

Native Characteristic Fauna		Not Specified	Not Specified	Condition						
I103. Richness of characteristic fauna		Not Specified	Not Specified		There are no native species characteristic of shallow emergent marsh habitat	richness of native species characteristic of shallow emergent marsh habitat has decreased from the previous round of monitoring	richness of native species characteristic of shallow emergent marsh habitat has remained the same from the previous round of monitoring	richness of native species characteristic of shallow emergent marsh habitat increases from the previous round of monitoring	Onsite / Project Research	Not Specified
2019-05-25: 5									Intensive Assessment	
Native flora at every stratum		Fair	Not Specified	Condition						

I03. Percent composition invasive flora in the shrub layer		Poor	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 50-100					50-100				Intensive Assessment	
2017-06-22: N/A									Intensive Assessment	
2017-06-22: 50-100					50-100				Intensive Assessment	
2017-06-21: 25-50						25-50			Intensive Assessment	
2017-06-21: N/A									Intensive Assessment	

2017-06-20: 50-100					50-100				Intensive Assessment	
2017-06-20: 100					100				Intensive Assessment	
2017-06-20: 33.3-66.7						33.3-66.7			Intensive Assessment	
2017-06-19: 20-60						20-60			Intensive Assessment	
2017-06-16: 40-100						40-100			Intensive Assessment	
2017-06-13: 5-50							5-50		Intensive Assessment	

2017-06-13: 0								0	Intensive Assessment	
2017-06-12: 0.7-6.7								0.7-6.7	Intensive Assessment	
2017-06-09: 0								0	Intensive Assessment	
2017-06-09: 40-100						40-100			Intensive Assessment	
2017-06-08: 13.3-40							13.3-40		Intensive Assessment	
2017-06-07: 0								0	Intensive Assessment	

I04. Percent composition invasive flora in the herb layer		Fair	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 27.8-85						27.8-85			Intensive Assessment	
2017-06-22: 11.1-27.8							11.1-27.8		Intensive Assessment	
2017-06-22: 88.2-100					88.2-100				Intensive Assessment	
2017-06-21: 10.5-31.5							10.5-31.5		Intensive Assessment	
2017-06-21: 5-10								5-10	Intensive Assessment	

2017-06-20: 10.5-53						10.5-53			Intensive Assessment	
2017-06-20: 13.3-47							13.3-47		Intensive Assessment	
2017-06-20: 5.9-15.5								5.9-15.5	Intensive Assessment	
2017-06-19: 27.8-56						27.8-56			Intensive Assessment	
2017-06-16: 6.3-15								6.3-15	Intensive Assessment	
2017-06-13: 75-100					75-100				Intensive Assessment	

2017-06-13: 55.6-100					55.6-100				Intensive Assessment	
2017-06-12: 1.6-3.3								1.6-3.3	Intensive Assessment	
2017-06-09: 1.3-2.5								1.3-2.5	Intensive Assessment	
2017-06-09: 55.5-100					55.5-100				Intensive Assessment	
2017-06-08: 0								0	Intensive Assessment	
2017-06-07: 31.3-62.5						31.3-62.5			Intensive Assessment	

I05. Percent composition invasive flora in the vine layer		Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 2-20							2-20		Intensive Assessment	
2017-06-22: 0								0	Intensive Assessment	
2017-06-22: 0								0	Intensive Assessment	
2017-06-21: N/A									Intensive Assessment	
2017-06-21: N/A									Intensive Assessment	

2017-06-20: 0								0	Intensive Assessment	
2017-06-20: 0								0	Intensive Assessment	
2017-06-20: N/A									Intensive Assessment	
2017-06-19: 0								0	Intensive Assessment	
2017-06-16: 0								0	Intensive Assessment	
2017-06-13: 0								0	Intensive Assessment	

2017-06-13: N/A									Intensive Assessment	
2017-06-12: 0								0	Intensive Assessment	
2017-06-09: N/A									Intensive Assessment	
2017-06-09: 0								0	Intensive Assessment	
2017-06-08: 0								0	Intensive Assessment	
2017-06-07: 0								0	Intensive Assessment	

DEM	Key Attribute	Not Specified	Not Specified							
Stable Community Boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 1101									Intensive Assessment	
Characteristic Flora		Not Specified	Not Specified	Condition						

I14. Percent composition of native characteristic shrub species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I15. Percent composition of native characteristic herb species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I16. Percent composition of native characteristic vine species		Not Specified	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified

Characteristic Structure		Not Specified	Not Specified	Condition						
I100. Percentage of plots with characteristic open structure		Not Specified	Not Specified		<70	80	90	100	Onsite / Project Research	Not Specified
Native Characteristic Fauna		Not Specified	Not Specified	Condition						
I103. Richness of characteristic fauna		Not Specified	Not Specified		There are no native species characteristic of deep emergent marsh habitat	richness of native species characteristic of deep emergent marsh habitat has decreased from the previous round of monitoring	richness of native species characteristic of deep emergent marsh habitat has remained the same from the previous round of monitoring	richness of native species characteristic of deep emergent marsh habitat increases from the previous round of monitoring	Onsite / Project Research	Not Specified

: 8									Intensive Assessment	
Native flora at every stratum		Not Specified	Not Specified	Condition						
I03. Percent composition invasive flora in the shrub layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I04. Percent composition invasive flora in the herb layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
I05. Percent composition invasive flora in the vine layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
Shrub Swamp	Key Attribute	Poor	Not Specified							

Stable Community Boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 42983									Intensive Assessment	
Characteristic Flora		Poor	Not Specified	Condition						
I14. Percent composition of native characteristic shrub species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified

2017-06-22: 0					0				Intensive Assessment	
2017-06-21: 0					0				Intensive Assessment	
2017-06-21: 0					0				Intensive Assessment	
2017-06-20: 0					0				Intensive Assessment	
2017-06-19: 0					0				Intensive Assessment	
2017-06-19: 0					0				Intensive Assessment	

2017-06-16: 0					0				Intensive Assessment	
2017-06-14: 0					0				Intensive Assessment	
2017-06-12: 0					0				Intensive Assessment	
I15. Percent composition of native characteristic herb species		Poor	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2017-06-22: 0					0				Intensive Assessment	
2017-06-21: 0					0				Intensive Assessment	

2017-06-21: 0					0				Intensive Assessment	
2017-06-20: 0					0				Intensive Assessment	
2017-06-19: 0					0				Intensive Assessment	
2017-06-19: 0					0				Intensive Assessment	
2017-06-16: 0					0				Intensive Assessment	
2017-06-14: 0					0				Intensive Assessment	

2016-06-12: 0					0				Intensive Assessment	
I16. Percent composition of native characteristic vine species		Good	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2017-06-22: 25-62.5							25-62.5		Intensive Assessment	
2017-06-21: 0					0				Intensive Assessment	
2017-06-21: 0					0				Intensive Assessment	
2017-06-20: 0					0				Intensive Assessment	

2017-06-19: N/A									Intensive Assessment	
2017-06-19: 0					0				Intensive Assessment	
2017-06-16: 0					0				Intensive Assessment	
2017-06-14: 0					0				Intensive Assessment	
2017-06-12: 0					0				Intensive Assessment	
I13. Percent composition native characteristic tree species		Poor	Not Specified		0	<25	25-50	50-100	Not Specified	Not Specified

2017-06-20: 0					0				Not Specified	
2017-06-19: 0					0				Not Specified	
2017-06-14: 0					0				Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified
2017-09-01: 1/15									Intensive	

									Assessment	
Characteristic Structure		Very Good	Not Specified	Condition						
I101. Percentage of plots with characteristic shrubby structure		Very Good	Not Specified		<70	80	90	100	Onsite / Project Research	Not Specified
2017-09-01: 100								100	Intensive Assessment	
Native Characteristic Fauna		Not Specified	Not Specified	Condition						
I103. Richness of characteristic fauna		Not Specified	Not Specified		There are no native species characteristic of shrub swamp habitat	richness of native species characteristic of shrub swamp habitat has decreased	richness of native species characteristic of shrub swamp habitat has remained	richness of native species characteristic of shrub swamp habitat	Onsite / Project Research	Not Specified

						from the previous round of monitoring	the same from the previous round of monitoring	increases from the previous round of monitoring		
2019-05-25: 7									Intensive Assessment	
Native flora at every stratum		Very Good	Not Specified	Condition						
I03. Percent composition of invasive flora in the shrub layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 3.3-8.3								3.3-8.3	Intensive Assessment	
2017-06-21: 10-43.5							10-43.5		Intensive	

									Assessment	
2017-06-21: 18.2-63.5						18.2-63.5			Intensive Assessment	
2017-06-20: 14.3-35.8							14.3-35.8		Intensive Assessment	
2017-06-19: 0								0	Intensive Assessment	
2017-06-19: 18.2-45.5						18.2-45.5			Intensive Assessment	
2017-06-16: 66.7-100					66.7-100				Intensive Assessment	

2017-06-14: 77-100					77-100				Intensive Assessment	
2017-06-12: 20-100						20-100			Intensive Assessment	
I04. Percent composition of invasive flora in the herb layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 6.7-20								6.7-20	Intensive Assessment	
2017-06-21: 88.2-100					88.2-100				Intensive Assessment	
2017-06-21: 11.1-31.1							11.1-31.1		Intensive Assessment	

2017-06-20: 88.2-100					88.2-100				Intensive Assessment	
2017-06-19: 95-100					95-100				Intensive Assessment	
2017-06-19: 95-100					95-100				Intensive Assessment	
2017-06-16: 6.7-20							6.7-20		Intensive Assessment	
2017-06-14: 0.4-8								0.4-8	Intensive Assessment	
2017-06-12: 11.1-31.5							11.1-31.5		Intensive Assessment	

I05. Percent composition of invasive flora in the vine layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 0								0	Intensive Assessment	
2017-06-21: 20-40						20-40			Intensive Assessment	
2017-06-21: 0								0	Intensive Assessment	
2017-06-20: 0								0	Intensive Assessment	
2017-06-19: N/A									Intensive Assessment	

2017-06-19: 0								0	Intensive Assessment	
2017-06-16: 20-70						20-70			Intensive Assessment	
2017-06-14: 0								0	Intensive Assessment	
2017-06-12: 66.7-100					66.7-100				Intensive Assessment	
SOF	Key Attribute	Good	Not Specified							
Stable Community Boundary		Not Specified	Not Specified	Size						

I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 143495									Intensive Assessment	
Characteristic Flora		Good	Not Specified	Condition						
I14. Percent composition of native characteristic shrub species		Fair	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2017-06-12: 1.25-12.5						1.25-12.5			Intensive	

									Assessment	
2017-06-09: 0					0				Intensive Assessment	
2017-06-08: 50-100								50-100	Intensive Assessment	
2017-06-07: 0					0				Intensive Assessment	
I15. Percent composition of native characteristic herb species		Good	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2017-06-12: 29.4-100							29.4-100		Intensive Assessment	

2017-06-09: 29.4-94.1							29.4-94.1		Intensive Assessment	
2017-06-08: 58.8-94								58.8-94	Intensive Assessment	
2017-06-07: 0					0				Intensive Assessment	
I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified

2017-09-01: 5/18									Intensive Assessment	
Characteristic Structure		Very Good	Not Specified	Condition						
I100. Percentage of plots with characteristic open structure		Very Good	Not Specified		<70	80	90	100	Onsite / Project Research	Not Specified
2017-09-01: 100								100	Intensive Assessment	
Native Characteristic Fauna		Not Specified	Not Specified	Condition						
I103. Richness of characteristic fauna		Not Specified	Not Specified		There are no native species characteristic of succession	richness of native species characteristic of successional	richness of native species characteristic of successional	richness of native species characteristic of successio	Onsite / Project Research	Not Specified

					al old field habitat	old field habitat has decreased from the previous round of monitoring	old field habitat has remained the same from the previous round of monitoring	nal old field habitat increases from the previous round of monitoring		
Native flora at every stratum		Good	Not Specified	Condition						
I03. Percent composition of invasive flora in the shrub layer		Poor	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-12: 62.5-100					62.5-100				Intensive Assessment	
2017-06-09: 40-100						40-100			Intensive Assessment	

2017-06-08: 25-50						25-50			Intensive Assessment	
2017-06-07: 5.7-14.3							5.7-14.3		Intensive Assessment	
I04. Percent composition of invasive flora in the herb layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-12: 0								0	Intensive Assessment	
2017-06-09: 0								0	Intensive Assessment	
2017-06-08: 0								0	Intensive Assessment	

2017-06-07: 0								0	Intensive Assessment	
I05. Percent composition of invasive flora in the vine layer		Very Good	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-12: 0								0	Intensive Assessment	
2017-06-09: 0								0	Intensive Assessment	
2017-06-08: 0								0	Intensive Assessment	
2017-06-07: N/A									Intensive Assessment	

Successional Shrubland	Key Attribute	Fair	Not Specified							
Stable Community Boundary		Not Specified	Not Specified	Size						
I09. Area of ecological community		Not Specified	Not Specified		Area of community has decreased from the previous round of monitoring	N/A	Area of community is unchanged and/or has grown slightly from the previous round of monitoring	Native species reclaim degraded habitat and area of corridor increases	Onsite / Project Research	Not Specified
2017-09-01: 142237									Intensive Assessment	
Characteristic Flora		Fair	Not Specified	Condition						

I14. Percent composition of native characteristic shrub species		Fair	Not Specified		0	<25	25-50	50-100	Onsite / Project Research	Not Specified
2017-06-22: 2.4-5.9						2.4-5.9			Intensive Assessment	
2017-06-14: 1.4-2.9						1.4-2.9			Intensive Assessment	
2017-06-08: 50-100								50-100	Intensive Assessment	
2017-06-07: 71.4-100								71.4-100	Intensive Assessment	
2017-06-07: 6.3-27.5						6.3-27.5			Intensive Assessment	

I70. Number of species listed in NYNHP community guide present at VEP		Not Specified	Not Specified		Number of NYNHP characteristic species has decreased from the previous round of monitoring	N/A	Number of NYNHP characteristic species is unchanged from the previous round of monitoring	Number of NYNHP characteristic species has increased from the previous round of monitoring	Onsite / Project Research	Not Specified
2017-09-01: 3/10									Intensive Assessment	
Community Structure		Fair	Not Specified	Condition						
I101. Percentage of plots with characteristic shrubby structure		Fair	Not Specified		<70	80	90	100	Onsite / Project Research	Not Specified
2017-09-01: 80						80			Intensive	

									Assessment	
Native Characteristic Fauna		Not Specified	Not Specified	Condition						
I103. Richness of characteristic fauna		Not Specified	Not Specified		There are no native species characteristic of successional shrubland habitat	richness of native species characteristic of successional shrubland habitat has decreased from the previous round of monitoring	richness of native species characteristic of successional shrubland habitat has remained the same from the previous round of monitoring	richness of native species characteristic of successional shrubland increases from the previous round of monitoring	Onsite / Project Research	Not Specified
2019-05-25: 6									Intensive Assessment	

Native flora at every stratum		Not Specified	Not Specified	Condition						
I03. Percent composition of invasive flora in the shrub layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 5-15									Intensive Assessment	
2017-06-14: 66.7-100									Intensive Assessment	
2017-06-08: 50-100									Intensive Assessment	
2017-06-07: 14.3-100									Intensive Assessment	

2017-06-07: 31.3-90									Intensive Assessment	
I04. Percent composition of invasive flora in the herb layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 1.2-2.4									Intensive Assessment	
2017-06-14: 8-28									Intensive Assessment	
2017-06-08: 2.5-6.3									Intensive Assessment	
2017-06-07: 0.2-2									Intensive Assessment	

2017-06-07: 100									Intensive Assessment	
I05. Percent composition of invasive flora in the vine layer		Not Specified	Not Specified		70-100	30-70	10-30	<10	Onsite / Project Research	Not Specified
2017-06-22: 0									Intensive Assessment	
2017-06-14: 40-100									Intensive Assessment	
2017-06-08: 0									Intensive Assessment	
2017-06-07: N/A									Intensive Assessment	

2017-06-07: 1.3-4									Intensive Assessment	

Threat Ratings - Table

	Threats \ Targets	Dry Forest	BMMF	AOHF	Wet Forest	VEP East Side	RMSWOS	RMHS	FF	VEP	VEP Central Corridor	Wet Communities	Dry Communities	SEM	DEM	Shrub Swamp	SOF	Successional Shrubland	Summary Threat Rating
	Fragmentation/ habitat degradation	Medium	Medium	Medium	Medium	High	Medium	Medium	Very High	Medium	Medium	Low	N/A	High	Medium	Low	Medium	Low	Very High
	Human Impact	High	Medium	Medium	Medium	High	Medium	Medium	High	Medium	Medium	Medium	N/A	High	Low	Low	Medium	Low	High
	Deer	Medium	High	High	Low	High	High	High	High	Medium	Low	N/A	N/A	Medium	Low	Low	Low	Low	Very High
	Pollinator Decline	N/A	High	High	N/A	N/A	Very High	High	High	N/A	N/A	N/A	N/A	Medium	Low	Medium	Medium	Medium	N/A
	Invasive Species	High	Very High	Very High	Medium	Very	High	Very High	Very	High	Medium	Medium	N/A	High	Medium	Medium	Medium	Medium	Very High

						High			High										
	Climate Change	Low	Very High	Medium	High	N/A	High	High	High	High	N/A	N/A	N/A	High	Low	Medium	Medium	Medium	Very High
Summary Target Ratings:		High	Very High	High	Medium	Very High	Very High	Very High	Very High	High	Medium	Medium	N/A	High	Medium	Medium	Medium	Medium	Very High

Threat Rating Details

FC02b. Dry Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S10. Reduction in dry forest size	High	High	High	High	High	

FC02b. Dry Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S10. Reduction in dry forest size	High	High	High	Medium	Medium	

FC02b. Dry Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S10. Reduction in dry forest size	High	High	High	Medium	Low	

FC02b. Dry Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S10. Reduction in dry forest size	High	High	High	Medium	Medium	

FC02b. Dry Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S10. Reduction in dry forest size	High	High	High	High	High	

FC02b. Dry Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

T05. Pollinator Decline	S10. Reduction in dry forest size	High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

FC03d. BMMF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S099. relative decrease in native characteristic tree composition	High	High	High	High	High	
T01. Invasive Species	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T01. Invasive Species	S101. relative decrease in native characteristic shrub composition	High	High	High	High	High	
T01. Invasive Species	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T01. Invasive Species	S117. Community is shrinking	High	Medium	Medium	Not Specified	Not Specified	

FC03d. BMMF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S099. relative decrease in native characteristic tree composition	High	High	High	Low	Low	
T03. Deer	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	
T03. Deer	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T03. Deer	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T03. Deer	S117. Community is shrinking	High	Medium	Medium	Not Specified	Not Specified	

FC03d. BMMF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

T04. Climate Change	S099. relative decrease in native characteristic tree composition	High	High	High	High	High	Contribution: Climate change will cause sugar maples and possibly beech trees to migrate north. Irreversibility: We can restore canopy gaps with southerly trees, but the community will be changed.
T04. Climate Change	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	Contribution: Climate change will cause sugar maples and possibly beech trees to migrate north. Irreversibility: We can restore canopy gaps with southerly trees, but the community will be changed.
T04. Climate Change	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	Contribution: Climate change will cause sugar maples and possibly beech trees to migrate north. Irreversibility: We can restore canopy gaps with southerly trees, but the community will be changed.
T04. Climate Change	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	Contribution: Climate change will cause sugar maples and possibly beech trees to migrate north. Irreversibility: We can restore canopy gaps with southerly

							trees, but the community will be changed.
T04. Climate Change	S117. Community is shrinking	High	Medium	Medium	High	High	Contribution: Climate change will cause sugar maples and possibly beech trees to migrate north. Irreversibility: We can restore canopy gaps with southerly trees, but the community will be changed.

FC03d. BMMF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S099. relative decrease in native characteristic tree composition	High	High	High	Low	High	
T11. Fragmentation/ habitat degradation	S100. relative decrease in native characteristic sapling composition	High	High	High	Low	Medium	

T11. Fragmentation/ habitat degradation	S101. relative decrease in native characteristic shrub composition	High	High	High	Low	Medium	
T11. Fragmentation/ habitat degradation	S102. relative decrease in native characteristic herb composition	High	High	High	Low	High	
T11. Fragmentation/ habitat degradation	S117. Community is shrinking	High	Medium	Medium	Not Specified	Not Specified	

FC03d. BMMF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S099. relative decrease in native characteristic tree composition	High	High	High	Medium	Medium	
CF20. Human Impact	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	
CF20. Human Impact	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	Medium	

CF20. Human Impact	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	Medium	
CF20. Human Impact	S117. Community is shrinking	High	Medium	Medium	Not Specified	Not Specified	

FC03d. BMMF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S099. relative decrease in native characteristic tree composition	High	High	High	Low	High	
T05. Pollinator Decline	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T05. Pollinator Decline	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	
T05. Pollinator Decline	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T05. Pollinator Decline	S117. Community is shrinking	High	Medium	Medium	Medium	High	

FC03e. AOHF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	High	High	
T01. Invasive Species	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T01. Invasive Species	S101. relative decrease in native characteristic shrub composition	High	High	High	High	High	
T01. Invasive Species	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T01. Invasive Species	S117. Community is shrinking	Low	High	Low	Medium	Medium	

FC03e. AOHF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

T03. Deer	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	Low	
T03. Deer	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	
T03. Deer	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T03. Deer	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T03. Deer	S117. Community is shrinking	Low	High	Low	Not Specified	Not Specified	

FC03e. AOHF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	High	Contribution: AOHF dought-tolerant species are projected to do well under changing climate conditions. Insect-pollinated species may struggle as climate change causes increasing asynchrony.

							Irreversibility: Climate change is not reversable.
T04. Climate Change	S100. relative decrease in native characteristic sapling composition	High	High	High	Low	High	Contribution: AOHF dought-tolerant species are projected to do well under changing climate conditions. Insect-pollinated species may struggle as climate change causes increasing asynchrony. Irreversibility: Climate change is not reversable.
T04. Climate Change	S101. relative decrease in native characteristic shrub composition	High	High	High	Low	High	Contribution: AOHF dought-tolerant species are projected to do well under changing climate conditions. Insect-pollinated species may struggle as climate change causes increasing asynchrony. Irreversibility: Climate change is not reversable.
T04. Climate Change	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	High	Contribution: AOHF dought-tolerant species are projected to do well under changing climate conditions. Insect-pollinated species may struggle as climate change causes increasing asynchrony.

							Irreversibility: Climate change is not reversable.
T04. Climate Change	S117. Community is shrinking	Low	High	Low	Low	High	Contribution: AOHF dought-tolerant species are projected to do well under changing climate conditions. Insect-pollinated species may struggle as climate change causes increasing asynchrony. Irreversibility: Climate change is not reversable.

FC03e. AOHF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	Medium	
T11. Fragmentation/ habitat degradation	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	

T11. Fragmentation/ habitat degradation	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	
T11. Fragmentation/ habitat degradation	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	High	
T11. Fragmentation/ habitat degradation	S117. Community is shrinking	Low	High	Low	Not Specified	Not Specified	

FC03e. AOHF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	Medium	
CF20. Human Impact	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	
CF20. Human Impact	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	Medium	

CF20. Human Impact	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	Medium	
CF20. Human Impact	S117. Community is shrinking	Low	High	Low	Not Specified	Not Specified	

FC03e. AOHF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	High	
T05. Pollinator Decline	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T05. Pollinator Decline	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	
T05. Pollinator Decline	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T05. Pollinator Decline	S117. Community is shrinking	Low	High	Low	Medium	High	

ENTIRE. VEP

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S101. Decline of native fauna	Medium	High	Medium	Medium	High	
T01. Invasive Species	S100. Decline of native flora, invasion	High	High	High	Very High	High	

ENTIRE. VEP

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S101. Decline of native fauna	Medium	High	Medium	Not Specified	Not Specified	
T03. Deer	S100. Decline of native flora, invasion	High	High	High	High	Medium	

ENTIRE. VEP

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S101. Decline of native fauna	Medium	High	Medium	Medium	High	Contribution: Climate change contributes moderately to the decline of some fauna, like mammals and reptiles, but could significantly impact amphibians, insects (including pollinators), and birds. Likewise, some flora might benefit while other flora collapse. Irreversability: If populations crash due to climate change, we hope that some individuals better adapted to warmer temperatures/drier conditions will persist, or that new southerly species come in so that we don't lose the ecosystem function. We are more confident that we can restore gaps on the time scale of plant death and migration, especially in the forest.
T04. Climate Change	S100. Decline of native flora, invasion	High	High	High	High	High	Contribution: Climate change contributes moderately to the decline of some fauna, like mammals and reptiles, but could significantly impact amphibians, insects (including pollinators), and birds. Likewise, some flora might benefit while other flora collapse. Irreversability: If populations crash due to climate change, we hope that some individuals better adapted to warmer temperatures/drier conditions will persist, or that new southerly species come in so that we don't lose the ecosystem function. We are more confident that we can restore gaps on

							the time scale of plant death and migration, especially in the forest.

ENTIRE. VEP

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S101. Decline of native fauna	Medium	High	Medium	Medium	High	
T11. Fragmentation/ habitat degradation	S100. Decline of native flora, invasion	High	High	High	Medium	Medium	

ENTIRE. VEP

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S101. Decline of native fauna	Medium	High	Medium	Medium	Medium	
CF20. Human Impact	S100. Decline of native flora, invasion	High	High	High	Medium	Medium	

ENTIRE. VEP

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S101. Decline of native fauna	Medium	High	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S100. Decline of native flora, invasion	High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

FC01. VEP East Side

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S01. Forest Gaps	High	Medium	Medium	High	High	
T01. Invasive Species	S02. Native flora declines	High	High	High	Very High	High	
T01. Invasive Species	S03. Forests not regenerating	High	High	High	High	High	

T01. Invasive Species	S05. Reduction of forest perimeter	Very High	High	High	High	High	
T01. Invasive Species	S06. Increased prevalence of vines	Very High	High	High	Very High	High	
T01. Invasive Species	S080. change of forest structure	High	Medium	Medium	High	High	

FC01. VEP East Side

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S01. Forest Gaps	High	Medium	Medium	Medium	High	
T03. Deer	S02. Native flora declines	High	High	High	High	High	
T03. Deer	S03. Forests not regenerating	High	High	High	High	Medium	
T03. Deer	S05. Reduction of forest perimeter	Very High	High	High	High	High	

T03. Deer	S06. Increased prevalence of vines	Very High	High	High	Low	High	
T03. Deer	S080. change of forest structure	High	Medium	Medium	High	High	

FC01. VEP East Side

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S01. Forest Gaps	High	Medium	Medium	Not Specified	Not Specified	
T04. Climate Change	S02. Native flora declines	High	High	High	Not Specified	Not Specified	
T04. Climate Change	S03. Forests not regenerating	High	High	High	Not Specified	Not Specified	
T04. Climate Change	S05. Reduction of forest perimeter	Very High	High	High	Not Specified	Not Specified	
T04. Climate Change	S06. Increased prevalence of vines	Very High	High	High	Not Specified	Not Specified	

T04. Climate Change	S080. change of forest structure	High	Medium	Medium	Not Specified	Not Specified	

FC01. VEP East Side

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S01. Forest Gaps	High	Medium	Medium	High	Medium	
T11. Fragmentation/ habitat degradation	S02. Native flora declines	High	High	High	Medium	Medium	
T11. Fragmentation/ habitat degradation	S03. Forests not regenerating	High	High	High	Medium	High	
T11. Fragmentation/ habitat degradation	S05. Reduction of forest perimeter	Very High	High	High	High	High	
T11. Fragmentation/ habitat degradation	S06. Increased prevalence of vines	Very High	High	High	High	High	
T11. Fragmentation/ habitat degradation	S080. change of forest structure	High	Medium	Medium	High	High	

FC01. VEP East Side

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S01. Forest Gaps	High	Medium	Medium	Low	Low	
CF20. Human Impact	S02. Native flora declines	High	High	High	Medium	High	
CF20. Human Impact	S03. Forests not regenerating	High	High	High	Medium	High	
CF20. Human Impact	S05. Reduction of forest perimeter	Very High	High	High	High	High	
CF20. Human Impact	S06. Increased prevalence of vines	Very High	High	High	High	High	
CF20. Human Impact	S080. change of forest structure	High	Medium	Medium	Medium	Medium	

FC01. VEP East Side

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S01. Forest Gaps	High	Medium	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

T05. Pollinator Decline	S02. Native flora declines	High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S03. Forests not regenerating	High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S05. Reduction of forest perimeter	Very High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S06. Increased prevalence of vines	Very High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S080. change of forest structure	High	Medium	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

OC01. VEP Central Corridor

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

T01. Invasive Species	S100. Decline of native flora, invasion	High	Medium	Medium	Very High	High	

OC01. VEP Central Corridor

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S100. Decline of native flora, invasion	High	Medium	Medium	Low	Medium	

OC01. VEP Central Corridor

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S100. Decline of native flora, invasion	High	Medium	Medium	Not Specified	Not Specified	

OC01. VEP Central Corridor

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S100. Decline of native flora, invasion	High	Medium	Medium	High	High	

OC01. VEP Central Corridor

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S100. Decline of native flora, invasion	High	Medium	Medium	Very High	High	

OC01. VEP Central Corridor

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S100. Decline of native flora, invasion	High	Medium	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

OC02a. Wet Communities

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	T102. Altered hydrology	High	Medium	Medium	High	High	

OC02a. Wet Communities

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	T102. Altered hydrology	High	Medium	Medium	Low	Low	

OC02a. Wet Communities

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	T102. Altered hydrology	High	Medium	Medium	Not Specified	Not Specified	

OC02a. Wet Communities

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	T102. Altered hydrology	High	Medium	Medium	Low	Very High	

OC02a. Wet Communities

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	T102. Altered hydrology	High	Medium	Medium	High	High	

OC02a. Wet Communities

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	T102. Altered hydrology	High	Medium	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

OC03a. SEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S115. Loss of characteristic structure	High	Low	Low	High	High	
T01. Invasive Species	S116. Loss of native characteristic flora	High	High	High	High	High	
T01. Invasive Species	S117. Community is shrinking	High	Medium	Medium	High	High	
T01. Invasive Species	S118. Loss of native fauna with specific habitat requirements	Medium	High	Medium	Medium	Very High	

OC03a. SEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S115. Loss of characteristic structure	High	Low	Low	Low	Not Specified	

T03. Deer	S116. Loss of native characteristic flora	High	High	High	Medium	Medium	
T03. Deer	S117. Community is shrinking	High	Medium	Medium	Low	Not Specified	
T03. Deer	S118. Loss of native fauna with specific habitat requirements	Medium	High	Medium	Medium	High	

OC03a. SEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S115. Loss of characteristic structure	High	Low	Low	Low	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SEM water-tolerant species are at risk due to longer, hotter summers and drier conditions. The SEM habitats may become Successional Old Fields Many SEM species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Amphibians may be at greater risk due to more quickly-drying SEM pools.

							Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S116. Loss of native characteristic flora	High	High	High	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SEM water-tolerant species are at risk due to longer, hotter summers and drier conditions. The SEM habitats may become Successional Old Fields Many SEM species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Amphibians may be at greater risk due to more quickly-drying SEM pools. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S117. Community is shrinking	High	Medium	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SEM water-tolerant species are at risk due to longer, hotter summers and drier conditions. The SEM habitats may become Successional Old Fields Many SEM species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Amphibians may be at greater risk due to more quickly-drying SEM pools.

							Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S118. Loss of native fauna with specific habitat requirements	Medium	High	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SEM water-tolerant species are at risk due to longer, hotter summers and drier conditions. The SEM habitats may become Successional Old Fields Many SEM species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Amphibians may be at greater risk due to more quickly-drying SEM pools. Irreversibility: Climate change likely is not reversable.

OC03a. SEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S115. Loss of characteristic structure	High	Low	Low	Medium	High	

T11. Fragmentation/ habitat degradation	S116. Loss of native characteristic flora	High	High	High	High	High	
T11. Fragmentation/ habitat degradation	S117. Community is shrinking	High	Medium	Medium	Very High	High	
T11. Fragmentation/ habitat degradation	S118. Loss of native fauna with specific habitat requirements	Medium	High	Medium	High	High	

OC03a. SEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S115. Loss of characteristic structure	High	Low	Low	Not Specified	Not Specified	
CF20. Human Impact	S116. Loss of native characteristic flora	High	High	High	High	High	
CF20. Human Impact	S117. Community is shrinking	High	Medium	Medium	High	High	
CF20. Human Impact	S118. Loss of native fauna with specific habitat requirements	Medium	High	Medium	High	High	

OC03a. SEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S115. Loss of characteristic structure	High	Low	Low	Low	High	
T05. Pollinator Decline	S116. Loss of native characteristic flora	High	High	High	Medium	High	
T05. Pollinator Decline	S117. Community is shrinking	High	Medium	Medium	Medium	High	
T05. Pollinator Decline	S118. Loss of native fauna with specific habitat requirements	Medium	High	Medium	High	High	

OC03b. DEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S119. Loss of characteristic structure	High	Low	Low	High	Very High	

T01. Invasive Species	S120. Loss of native characteristic flora	High	Low	Low	High	Very High	
T01. Invasive Species	S121. Community shrinks	High	Medium	Medium	High	Very High	
T01. Invasive Species	S122. Loss of native characteristic fauna with specific habitat requirements	Low	High	Low	Medium	High	

OC03b. DEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S119. Loss of characteristic structure	High	Low	Low	Low	Low	
T03. Deer	S120. Loss of native characteristic flora	High	Low	Low	Low	Low	
T03. Deer	S121. Community shrinks	High	Medium	Medium	Low	Low	
T03. Deer	S122. Loss of native characteristic fauna with specific habitat requirements	Low	High	Low	Low	Low	

OC03b. DEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S119. Loss of characteristic structure	High	Low	Low	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions, which may result in greater depths during the fall and spring and shallower depths during the summer. DEM species that cannot tolerate these extremes will likely decline. DEM species are mostly propagated vegetatively, and will not be as impacted by asynchrony. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S120. Loss of native characteristic flora	High	Low	Low	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions, which may result in greater depths during the fall and spring and shallower depths during the summer. DEM species that cannot tolerate these extremes will likely decline. DEM species are mostly propagated vegetatively, and will not be as impacted by asynchrony.

							Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S121. Community shrinks	High	Medium	Medium	Medium	High	Contribution: Climate change will cause greater variability in wet/dry conditions, which may result in greater depths during the fall and spring and shallower depths during the summer. DEM species that cannot tolerate these extremes will likely decline. DEM species are mostly propagated vegetatively, and will not be as impacted by asynchrony. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S122. Loss of native characteristic fauna with specific habitat requirements	Low	High	Low	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions, which may result in greater depths during the fall and spring and shallower depths during the summer. DEM species that cannot tolerate these extremes will likely decline. DEM species are mostly propagated vegetatively, and will not be as impacted by asynchrony. Irreversibility: Climate change likely is not reversable.

OC03b. DEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S119. Loss of characteristic structure	High	Low	Low	High	High	
T11. Fragmentation/ habitat degradation	S120. Loss of native characteristic flora	High	Low	Low	High	High	
T11. Fragmentation/ habitat degradation	S121. Community shrinks	High	Medium	Medium	Very High	High	
T11. Fragmentation/ habitat degradation	S122. Loss of native characteristic fauna with specific habitat requirements	Low	High	Low	High	Medium	

OC03b. DEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S119. Loss of characteristic structure	High	Low	Low	Medium	Medium	

CF20. Human Impact	S120. Loss of native characteristic flora	High	Low	Low	Low	High	
CF20. Human Impact	S121. Community shrinks	High	Medium	Medium	Low	Low	
CF20. Human Impact	S122. Loss of native characteristic fauna with specific habitat requirements	Low	High	Low	High	High	

OC03b. DEM

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S119. Loss of characteristic structure	High	Low	Low	Not Specified	Not Specified	
T05. Pollinator Decline	S120. Loss of native characteristic flora	High	Low	Low	Not Specified	Not Specified	
T05. Pollinator Decline	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	
T05. Pollinator Decline	S122. Loss of native characteristic fauna with specific habitat requirements	Low	High	Low	Medium	High	

OC03c. Shrub Swamp

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S123. Loss of characteristic structure	Medium	High	Medium	High	High	
T01. Invasive Species	S124. Decline of native characteristic flora	Medium	High	Medium	High	High	
T01. Invasive Species	S125. Decline of native characteristic fauna	Medium	High	Medium	Low	Low	
T01. Invasive Species	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03c. Shrub Swamp

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S123. Loss of characteristic structure	Medium	High	Medium	Low	Low	
T03. Deer	S124. Decline of native characteristic flora	Medium	High	Medium	Low	Low	

T03. Deer	S125. Decline of native characteristic fauna	Medium	High	Medium	Low	Low	
T03. Deer	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03c. Shrub Swamp

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S123. Loss of characteristic structure	Medium	High	Medium	Low	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Shrub Swamp water-tolerant species are at risk due to longer, hotter summers and drier conditions. The Shrub Swamp habitats may become Successional Shrublands. Shrub Swmap species that are insect-pollinated may be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S124. Decline of native characteristic flora	Medium	High	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Shrub Swamp water-tolerant species are at risk due to longer, hotter summers and

							drier conditions. The Shrub Swamp habitats may become Successional Shrublands. Shrub Swmap species that are insect-pollinated may be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S125. Decline of native characteristic fauna	Medium	High	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Shrub Swamp water-tolerant species are at risk due to longer, hotter summers and drier conditions. The Shrub Swamp habitats may become Successional Shrublands. Shrub Swmap species that are insect-pollinated may be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S121. Community shrinks	High	Medium	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Shrub Swamp water-tolerant species are at risk due to longer, hotter summers and drier conditions. The Shrub Swamp habitats may become Successional Shrublands. Shrub Swmap species that are insect-

							pollinated may be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.

OC03c. Shrub Swamp

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S123. Loss of characteristic structure	Medium	High	Medium	Low	Medium	
T11. Fragmentation/ habitat degradation	S124. Decline of native characteristic flora	Medium	High	Medium	Low	Medium	
T11. Fragmentation/ habitat degradation	S125. Decline of native characteristic fauna	Medium	High	Medium	Low	Very High	
T11. Fragmentation/ habitat degradation	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03c. Shrub Swamp

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S123. Loss of characteristic structure	Medium	High	Medium	Low	High	
CF20. Human Impact	S124. Decline of native characteristic flora	Medium	High	Medium	Low	High	
CF20. Human Impact	S125. Decline of native characteristic fauna	Medium	High	Medium	Low	High	
CF20. Human Impact	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03c. Shrub Swamp

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S123. Loss of characteristic structure	Medium	High	Medium	Medium	High	
T05. Pollinator Decline	S124. Decline of native characteristic flora	Medium	High	Medium	Medium	High	

T05. Pollinator Decline	S125. Decline of native characteristic fauna	Medium	High	Medium	High	High	
T05. Pollinator Decline	S121. Community shrinks	High	Medium	Medium	Medium	High	

OC03d. SOF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S1110. Loss of open structure	Medium	Medium	Medium	High	High	
T01. Invasive Species	S1111. Decline of native characteristic flora	High	Medium	Medium	High	High	
T01. Invasive Species	S1112. Decline of native characteristic fauna	Medium	Very High	Medium	Medium	High	
T01. Invasive Species	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03d. SOF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S1110. Loss of open structure	Medium	Medium	Medium	Low	Low	
T03. Deer	S1111. Decline of native characteristic flora	High	Medium	Medium	Medium	High	
T03. Deer	S1112. Decline of native characteristic fauna	Medium	Very High	Medium	Low	Low	
T03. Deer	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03d. SOF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S1110. Loss of open structure	Medium	Medium	Medium	Medium	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SOF's are highly diverse and may be able to tolerate the changing conditions Many SOF species are likely insect-pollinated, and

							both the plants and the insects will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S1111. Decline of native characteristic flora	High	Medium	Medium	Medium	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SOF's are highly diverse and may be able to tolerate the changing conditions Many SOF species are likely insect-pollinated, and both the plants and the insects will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S1112. Decline of native characteristic fauna	Medium	Very High	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SOF's are highly diverse and may be able to tolerate the changing conditions Many SOF species are likely insect-pollinated, and both the plants and the insects will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators.

							Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S121. Community shrinks	High	Medium	Medium	Medium	High	Contribution: Climate change will cause greater variability in wet/dry conditions. SOF's are highly diverse and may be able to tolerate the changing conditions Many SOF species are likely insect-pollinated, and both the plants and the insects will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.

OC03d. SOF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S1110. Loss of open structure	Medium	Medium	Medium	Medium	Medium	
T11. Fragmentation/ habitat degradation	S1111. Decline of native characteristic flora	High	Medium	Medium	High	High	

T11. Fragmentation/ habitat degradation	S1112. Decline of native characteristic fauna	Medium	Very High	Medium	Medium	High	
T11. Fragmentation/ habitat degradation	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03d. SOF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S1110. Loss of open structure	Medium	Medium	Medium	Low	Medium	
CF20. Human Impact	S1111. Decline of native characteristic flora	High	Medium	Medium	High	High	
CF20. Human Impact	S1112. Decline of native characteristic fauna	Medium	Very High	Medium	Medium	High	
CF20. Human Impact	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03d. SOF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S1110. Loss of open structure	Medium	Medium	Medium	Low	Low	
T05. Pollinator Decline	S1111. Decline of native characteristic flora	High	Medium	Medium	Medium	High	
T05. Pollinator Decline	S1112. Decline of native characteristic fauna	Medium	Very High	Medium	Very High	High	
T05. Pollinator Decline	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

FC02a. Wet Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S07. Change in hydrology	High	High	High	Low	Low	
T01. Invasive Species	S08. Reduction in wet forest size	Very High	Medium	Medium	High	High	
T01. Invasive Species	S09. Reduction of water quality	Medium	Medium	Medium	Low	Low	

FC02a. Wet Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S07. Change in hydrology	High	High	High	Low	Low	
T03. Deer	S08. Reduction in wet forest size	Very High	Medium	Medium	Medium	Medium	
T03. Deer	S09. Reduction of water quality	Medium	Medium	Medium	Low	Low	

FC02a. Wet Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S07. Change in hydrology	High	High	High	High	High	Contribution: Climate change will likely be the primary driver behind hydrology changes, and possibly reduction of water quality as increased stream velocity during severe storm events leads to increased sedimentation. Wet forest size may not decrease, but will likely experience greater extremes of wet/dry conditions.

							Irreversability: None of these impacts are really reversable.
T04. Climate Change	S08. Reduction in wet forest size	Very High	Medium	Medium	Medium	High	Contribution: Climate change will likely be the primary driver behind hydrology changes, and possibly reduction of water quality as increased stream velocity during severe storm events leads to increased sedimentation. Wet forest size may not decrease, but will likely experience greater extremes of wet/dry conditions. Irreversability: None of these impacts are really reversable.
T04. Climate Change	S09. Reduction of water quality	Medium	Medium	Medium	Medium	High	Contribution: Climate change will likely be the primary driver behind hydrology changes, and possibly reduction of water quality as increased stream velocity during severe storm events leads to increased sedimentation. Wet forest size may not decrease, but will likely experience greater extremes of wet/dry conditions. Irreversability: None of these impacts are really reversable.

FC02a. Wet Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S07. Change in hydrology	High	High	High	Medium	High	
T11. Fragmentation/ habitat degradation	S08. Reduction in wet forest size	Very High	Medium	Medium	Medium	High	
T11. Fragmentation/ habitat degradation	S09. Reduction of water quality	Medium	Medium	Medium	Medium	High	

FC02a. Wet Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S07. Change in hydrology	High	High	High	High	Medium	
CF20. Human Impact	S08. Reduction in wet forest size	Very High	Medium	Medium	High	High	
CF20. Human Impact	S09. Reduction of water quality	Medium	Medium	Medium	High	Medium	

FC02a. Wet Forest

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S07. Change in hydrology	High	High	High	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S08. Reduction in wet forest size	Very High	Medium	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.
T05. Pollinator Decline	S09. Reduction of water quality	Medium	Medium	Medium	Not Specified	Not Specified	Pollinator success will be analyzed at the community level.

OC03e. Successional Shrubland

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S1113. Decline of open structure	Low	Low	Low	High	High	
T01. Invasive Species	S1114. Decline of native characteristic flora	Very High	Medium	Medium	High	High	

T01. Invasive Species	S1115. Decline of native characteristic fauna	Low	Low	Low	Low	High	
T01. Invasive Species	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03e. Successional Shrubland

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S1113. Decline of open structure	Low	Low	Low	Low	Medium	
T03. Deer	S1114. Decline of native characteristic flora	Very High	Medium	Medium	Low	Medium	
T03. Deer	S1115. Decline of native characteristic fauna	Low	Low	Low	Low	Low	
T03. Deer	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03e. Successional Shrubland

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S1113. Decline of open structure	Low	Low	Low	Medium	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Successional Shrubland species may be at risk due to increasingly wet conditions during the spring and fall. Southerly species may move in, changing the community composition. Some Successional Shrubalnd species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S1114. Decline of native characteristic flora	Very High	Medium	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Successional Shrubland species may be at risk due to increasingly wet conditions during the spring and fall. Southerly species may move in, changing the community composition. Some Successional Shrubalnd species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and

							pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S1115. Decline of native characteristic fauna	Low	Low	Low	Medium	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Successional Shrubland species may be at risk due to increasingly wet conditions during the spring and fall. Southerly species may move in, changing the community composition. Some Successional Shrubalnd species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators. Irreversibility: Climate change likely is not reversable.
T04. Climate Change	S121. Community shrinks	High	Medium	Medium	High	High	Contribution: Climate change will cause greater variability in wet/dry conditions. Successional Shrubland species may be at risk due to increasingly wet conditions during the spring and fall. Southerly species may move in, changing the community composition. Some Successional Shrubalnd species are likely insect-pollinated, and will be at increasing risk as climate change leads to greater asynchrony between plants and pollinators.

							Irreversibility: Climate change likely is not reversable.

OC03e. Successional Shrubland

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S1113. Decline of open structure	Low	Low	Low	Low	High	
T11. Fragmentation/ habitat degradation	S1114. Decline of native characteristic flora	Very High	Medium	Medium	Low	High	
T11. Fragmentation/ habitat degradation	S1115. Decline of native characteristic fauna	Low	Low	Low	Low	High	
T11. Fragmentation/ habitat degradation	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03e. Successional Shrubland

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

CF20. Human Impact	S1113. Decline of open structure	Low	Low	Low	Medium	Medium	
CF20. Human Impact	S1114. Decline of native characteristic flora	Very High	Medium	Medium	Medium	Medium	
CF20. Human Impact	S1115. Decline of native characteristic fauna	Low	Low	Low	Low	Medium	
CF20. Human Impact	S121. Community shrinks	High	Medium	Medium	Not Specified	Not Specified	

OC03e. Successional Shrubland

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S1113. Decline of open structure	Low	Low	Low	Medium	Medium	
T05. Pollinator Decline	S1114. Decline of native characteristic flora	Very High	Medium	Medium	High	High	
T05. Pollinator Decline	S1115. Decline of native characteristic fauna	Low	Low	Low	High	High	

T05. Pollinator Decline	S121. Community shrinks	High	Medium	Medium	Medium	High	

FC03a. RMSWOS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	High	High	
T01. Invasive Species	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	
T01. Invasive Species	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T01. Invasive Species	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T01. Invasive Species	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03a. RMSWOS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	Low	
T03. Deer	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	
T03. Deer	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T03. Deer	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T03. Deer	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03a. RMSWOS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

T04. Climate Change	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	High	Contribution: Climate change will contribute at least moderately to the decline of species that can't tolerate increased wet conditions or increased dry conditions. The Red Maple- Swamp White Oak swamp is small, but there are other wetlands bordering it, which could allow species to shift and find micro-habitats and refugia as hydrological conditions become more extreme. Likewise, fauna may be able to find micro-habitats and refugia, though amphibians will be at increased risk due to more quickly-drying vernal pools. Climate change is also likely to exacerbate the impacts of invasive pests, because fewer will die back during the winter. Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. Irreversability: Climate change is not looking reversable at this point.
T04. Climate Change	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	Contribution: Climate change will contribute at least moderately to the decline of species that can't tolerate increased wet conditions or increased dry conditions. The Red Maple- Swamp White Oak swamp is small, but there are other wetlands bordering it, which could allow

							species to shift and find micro-habitats and refugia as hydrological conditions become more extreme. Likewise, fauna may be able to find micro-habitats and refugia, though amphibians will be at increased risk due to more quickly-drying vernal pools. Climate change is also likely to exacerbate the impacts of invasive pests, because fewer will die back during the winter. Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. Irreversability: Climate change is not looking reversable at this point.
T04. Climate Change	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	Contribution: Climate change will contribute at least moderately to the decline of species that can't tolerate increased wet conditions or increased dry conditions. The Red Maple- Swamp White Oak swamp is small, but there are other wetlands bordering it, which could allow species to shift and find micro-habitats and refugia as hydrological conditions become more extreme. Likewise, fauna may be able to find micro-habitats and refugia, though amphibians will be at increased risk due to more quickly-drying vernal pools. Climate change is also likely

							to exacerbate the impacts of invasive pests, because fewer will die back during the winter. Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. Irreversability: Climate change is not looking reversable at this point.
T04. Climate Change	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	Contribution: Climate change will contribute at least moderately to the decline of species that can't tolerate increased wet conditions or increased dry conditions. The Red Maple- Swamp White Oak swamp is small, but there are other wetlands bordering it, which could allow species to shift and find micro-habitats and refugia as hydrological conditions become more extreme. Likewise, fauna may be able to find micro-habitats and refugia, though amphibians will be at increased risk due to more quickly-drying vernal pools. Climate change is also likely to exacerbate the impacts of invasive pests, because fewer will die back during the winter. Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators.

							Irreversability: Climate change is not looking reversable at this point.
T04. Climate Change	S117. Community is shrinking	High	High	High	Medium	High	Contribution: Climate change will contribute at least moderately to the decline of species that can't tolerate increased wet conditions or increased dry conditions. The Red Maple- Swamp White Oak swamp is small, but there are other wetlands bordering it, which could allow species to shift and find micro-habitats and refugia as hydrological conditions become more extreme. Likewise, fauna may be able to find micro-habitats and refugia, though amphibians will be at increased risk due to more quickly-drying vernal pools. Climate change is also likely to exacerbate the impacts of invasive pests, because fewer will die back during the winter. Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. Irreversability: Climate change is not looking reversable at this point.

FC03a. RMSWOS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	High	
T11. Fragmentation/ habitat degradation	S100. relative decrease in native characteristic sapling composition	High	High	High	Low	High	
T11. Fragmentation/ habitat degradation	S101. relative decrease in native characteristic shrub composition	High	High	High	Low	High	
T11. Fragmentation/ habitat degradation	S102. relative decrease in native characteristic herb composition	High	High	High	Low	High	
T11. Fragmentation/ habitat degradation	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03a. RMSWOS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	same as wet forest reduction of forest size

FC03a. RMSWOS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

T05. Pollinator Decline	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	High	High	
T05. Pollinator Decline	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T05. Pollinator Decline	S101. relative decrease in native characteristic shrub composition	High	High	High	High	High	
T05. Pollinator Decline	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T05. Pollinator Decline	S117. Community is shrinking	High	High	High	High	High	

FC03c. RMHS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	High	High	
T01. Invasive Species	S101. relative decrease in native characteristic shrub composition	High	High	High	High	High	

T01. Invasive Species	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T01. Invasive Species	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T01. Invasive Species	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03c. RMHS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	Low	
T03. Deer	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T03. Deer	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	
T03. Deer	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	

T03. Deer	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03c. RMHS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant

							species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf , 9). Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-

							atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor

							along the Casperkill, as there is a large population of white ash present there.
T04. Climate Change	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf , 9). Herbs and some shrubs will likely decline as

							climate change causes increased asynchrony with pollinators. 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp

							white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climate Change	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer

							periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf , 9). Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges.

							Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No

							evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climate Change	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems

							due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf , 9). Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators. 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at

							https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.

T04. Climate Change	S117. Community is shrinking	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf , 9). Herbs and some shrubs will likely decline as climate change causes increased asynchrony with pollinators.

							2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under

							projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.

FC03c. RMHS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	High	

T11. Fragmentation/ habitat degradation	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	Medium	
T11. Fragmentation/ habitat degradation	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	
T11. Fragmentation/ habitat degradation	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	High	
T11. Fragmentation/ habitat degradation	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03c. RMHS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
CF20. Human Impact	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Medium	Medium	same as wet forest reduction of forest size

CF20. Human Impact	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	Medium	same as wet forest reduction of forest size
CF20. Human Impact	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	same as wet forest reduction of forest size

FC03c. RMHS

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S099. relative decrease in native characteristic tree composition	High	Medium	Medium	Low	High	
T05. Pollinator Decline	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	

T05. Pollinator Decline	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T05. Pollinator Decline	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T05. Pollinator Decline	S117. Community is shrinking	High	High	High	Medium	High	

FC03b. FF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T01. Invasive Species	S09. Reduction of water quality	High	High	High	Medium	High	
T01. Invasive Species	S099. relative decrease in native characteristic tree composition	High	High	High	High	High	
T01. Invasive Species	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T01. Invasive Species	S101. relative decrease in native characteristic shrub composition	High	High	High	High	High	

T01. Invasive Species	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T01. Invasive Species	S1100. Decline of native characteristic fauna	Medium	High	Medium	Not Specified	Not Specified	
T01. Invasive Species	T102. Altered hydrology	High	High	High	Not Specified	Not Specified	
T01. Invasive Species	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03b. FF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T03. Deer	S09. Reduction of water quality	High	High	High	Low	Low	
T03. Deer	S099. relative decrease in native characteristic tree composition	High	High	High	Low	Low	
T03. Deer	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	

T03. Deer	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T03. Deer	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T03. Deer	S1100. Decline of native characteristic fauna	Medium	High	Medium	Not Specified	Not Specified	
T03. Deer	T102. Altered hydrology	High	High	High	Not Specified	Not Specified	
T03. Deer	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03b. FF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T04. Climate Change	S09. Reduction of water quality	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or

							prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they

							depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle

							are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climat e Change	S099. relative decrease in native characteristi c tree composition	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests

							of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood,

							green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climat e Change	S100. relative decrease in native characteristi	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation

	c sapling composition						changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for

							regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in

							lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climate Change	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern

							Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white

							oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climat e Change	S102. relative decrease in native characteristi c herb composition	High	High	High	High	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of

							drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and

							the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under

							climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climate Change	S1100. Decline of native characteristic fauna	Medium	High	Medium	High	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at

							https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already

							established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climat e Change	T102. Altered hydrology	High	High	High	Very High	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased

							precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf, 9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host

							upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally

							occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.
T04. Climate Change	S117. Community is shrinking	High	High	High	Medium	High	Impacts (from the Climate Adaptation Workbook): 1) (No evidence provided) Lowland and riparian hardwood forests can cope with a high level of natural variability and may have some tolerance to changes in precipitation and water tables with the exception of extreme drought, extreme erosion, or prolonged flooding. The predicted precipitation changes for our region include longer periods of drought during the summer with increased precipitation during the winter months. However, the overall precipitation projections for our region trend towards greater annual precipitation, with increases expected between 7 and 14% per year. This makes periods of prolonged drought less likely. Flooding and erosion are both expected to increase however, and it is reasonable to assume that many plant species along the Casperkill ill-adapted to submerged root systems (or exposed root systems due to erosion) will not survive (Rustad et al. (2011) Changing Climate, Changing Forests: The impacts of climate change on forests of the Northeastern United States and Eastern Canada, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs99.pdf,

							9) 2) (No evidence provided) Lowland and riparian hardwoods thrive across a variety of soil moisture tolerances and is expected to find micro-habitats and refugia in order to persist in some form on the landscape, increasing its adaptive capacity. Along the Casperkill there will be limited capacity for many characteristic species of these riparian hardwoods to find refugia or expand their ranges. Species restricted to riparian forests are not expected to migrate to upland areas because they depend on seasonal flood dynamics for regeneration and a competitive advantage, and the Casperkill is bordered by slopes that host upland hardwood forests, specifically Appalachian Oak Hickory Forest (Butler-Leopold et al. (2018). Mid-Atlantic forest ecosystem vulnerability assessment and synthesis: a report from the mid-atlantic climate change response framework project, US Forest Service, found at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs181.pdf, 142) 3) (No evidence provided) Many lowland and riparian tree species are expected to remain stable or increase, including American hornbeam, blackgum, boxelder, bur oak, eastern cottonwood, green ash, pin oak, shagbark hickory, swamp white oak, sweetgum, and sycamore. There are already established seedbanks for many of the lowland

							tree species predicted to thrive under projected climate scenarios. Shagbark hickory, swamp white oak, and American hornbeam make up a significant portion of the species composition in the Preserve's riparian habitats. Smaller populations of cottonwood, boxelder, blackgum, sycamore, and plantings of pin oak and sweetgum will also give some stability to transitioning species compositions in these forests.4) (No evidence provided) Invasive species such as gypsy moth, emerald ash borer, and Asian long-horned beetle are expected to become more problematic in lowland and riparian hardwood forests under climate change, with greater impacts generally occurring downstream. Emerald ash borer already has a significant presence in the riparian corridor along the Casperkill, as there is a large population of white ash present there.

FC03b. FF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T11. Fragmentation/ habitat degradation	S09. Reduction of water quality	High	High	High	High	High	

T11. Fragmentation/ habitat degradation	S099. relative decrease in native characteristic tree composition	High	High	High	High	High	
T11. Fragmentation/ habitat degradation	S100. relative decrease in native characteristic sapling composition	High	High	High	High	Medium	
T11. Fragmentation/ habitat degradation	S101. relative decrease in native characteristic shrub composition	High	High	High	High	Medium	
T11. Fragmentation/ habitat degradation	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T11. Fragmentation/ habitat degradation	S1100. Decline of native characteristic fauna	Medium	High	Medium	Not Specified	Not Specified	
T11. Fragmentation/ habitat degradation	T102. Altered hydrology	High	High	High	Not Specified	Not Specified	
T11. Fragmentation/ habitat degradation	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03b. FF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments

CF20. Human Impact	S09. Reduction of water quality	High	High	High	High	Medium	
CF20. Human Impact	S099. relative decrease in native characteristic tree composition	High	High	High	Medium	Medium	
CF20. Human Impact	S100. relative decrease in native characteristic sapling composition	High	High	High	Medium	Medium	
CF20. Human Impact	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	Medium	
CF20. Human Impact	S102. relative decrease in native characteristic herb composition	High	High	High	Medium	Medium	
CF20. Human Impact	S1100. Decline of native characteristic fauna	Medium	High	Medium	Not Specified	Not Specified	
CF20. Human Impact	T102. Altered hydrology	High	High	High	Not Specified	Not Specified	
CF20. Human Impact	S117. Community is shrinking	High	High	High	Not Specified	Not Specified	

FC03b. FF

Threat	Stress	Severity	Scope	Magnitude	Contribution	Irreversibility	Comments
T05. Pollinator Decline	S09. Reduction of water quality	High	High	High	Not Specified	Not Specified	
T05. Pollinator Decline	S099. relative decrease in native characteristic tree composition	High	High	High	Low	High	
T05. Pollinator Decline	S100. relative decrease in native characteristic sapling composition	High	High	High	High	High	
T05. Pollinator Decline	S101. relative decrease in native characteristic shrub composition	High	High	High	Medium	High	
T05. Pollinator Decline	S102. relative decrease in native characteristic herb composition	High	High	High	High	High	
T05. Pollinator Decline	S1100. Decline of native characteristic fauna	Medium	High	Medium	Not Specified	Not Specified	
T05. Pollinator Decline	T102. Altered hydrology	High	High	High	Not Specified	Not Specified	
T05. Pollinator Decline	S117. Community is shrinking	High	High	High	Medium	High	

Action Plan: Objective-based

Item	People	Rating	Progress	Details
Intervention1. Arboretum Committee			Not Specified	
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1
FC02a. Wet Forest		Not Specified		Nested Target Level 2
FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest
FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest

Collaborate with VFEP staff to plant in places that would reconnect habitat		Unknown	Not Specified	
S.AC01. Ensure no new invasives are planted		Very Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S.AC02. Remove invasive arboretum specimens on campus		Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S18. Buy-in from VC community		Unknown	Not Specified	Clean mowers and equipment, don't plant invasives, remove invasive plants
Intervention2. Buildings&Grounds			Not Specified	
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1
S.VEP16. Restoration of EcoRestore		Need More Info	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
FC02a. Wet Forest		Not Specified		Nested Target Level 2

FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest
FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
S.VEP16. Restoration of EcoRestore		Need More Info	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest
Cleaning mowers and other machinery		Unknown	Not Specified	
Get rid of cat houses		Unknown	Not Specified	
Help block unofficial access points		Unknown	Not Specified	

Leave / use leaves for compost in natural areas where possible		Unknown	Not Specified	
Regulate movement of compost/soil		Unknown	Not Specified	
S.BG01. Moving B&G dumping grounds off of the VEP		Very Effective	Not Specified	Reduce the likelihood that invasive seeds and pests will be moved onto the preserve.
S.Mult02. When planting, choose native species		Effective	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.
S18. Buy-in from VC community		Unknown	Not Specified	Clean mowers and equipment, don't plant invasives, remove invasive plants
Support VFEP staff efforts to create formalized access points with plantings, gates		Unknown	Not Specified	
Support VFEP staff efforts to create new trails and remove unofficial trails		Unknown	Not Specified	
PFP			Not Specified	
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1

FC02a. Wet Forest		Not Specified		Nested Target Level 2
FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest
FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest
Contain existing compost and woody debris		Unknown	Not Specified	
Control invasive species on the fence		Unknown	Not Specified	
Move parking and/or pickup to the front lot		Unknown	Not Specified	
S.Mult02. When planting, choose native species		Effective	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.

S.PFP01. Stop bringing in honeybees		Effective	Not Specified	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.
S18. Buy-in from VC community		Unknown	Not Specified	Clean mowers and equipment, don't plant invasives, remove invasive plants
Stop/ regulate movement of compost/soil		Unknown	Not Specified	
[Main Diagram]	Not Specified		Not Specified	
ENTIRE. VEP		Good		
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1
FC02a. Wet Forest		Not Specified		Nested Target Level 2
FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest

FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest
OC01. VEP Central Corridor		Good		
OC02a. Wet Communities		Not Specified		
OC02b. Dry Communities		Not Specified		
OC03a. SEM		Poor		
OC03b. DEM		Not Specified		
OC03c. Shrub Swamp		Poor		
OC03d. SOF		Good		
OC03e. Successional Shrubland		Fair		
S.AC01. Ensure no new invasives are planted		Very Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum

				specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S.AC02. Remove invasive arboretum specimens on campus		Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S.AC03. Increase cover of native trees on campus, especially protecting edges		Need More Info	Not Specified	Increased cover of native trees provides more contiguous habitat for wildlife, and reduces opportunities for light-seeking invasive species to establish.
S.BG01. Moving B&G dumping grounds off of the VEP		Very Effective	Not Specified	Reduce the likelihood that invasive seeds and pests will be moved onto the preserve.
S.BG02. Get rid of cat houses		Need More Info	Not Specified	Cats are deadly predators of birds, amphibians, small mammals and other wildlife. They are considered to be an invasive animal and should not be provided with shelter. The house needs to be demolished anyway, as it is a safety hazard.
S.BG03. Clean equipment to prevent spread of invasives		Effective	Not Specified	Reduce the likelihood that invasive seeds and pests from other sites would be moved onto the VEP on equipment.
S.BG04. Leave/ use leaves as compost where possible in naturalized areas		Need More Info	Not Specified	Fallen leaves can help create habitat for local wildlife.

S.CG01. Control invasive species on edges of Community Gardens		Effective	Not Specified	This would reduce seed source and save fence.
S.Fac01. Better cleaning policy, enforce cleaning policy		Effective	Not Specified	Reduce transport of invasive species around the VEP
S.Mult01. Stop/regulate moving compost/soil		Effective	Not Specified	Moving compost and soil increases the chance that invasive seeds and pests (worms, insects, etc) will be moved from place to place, and establish on the VEP.
S.Mult02. When planting, choose native species		Effective	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.
S.Mult03. Remove research debris from finished projects		Effective	Not Specified	Reduce plastic pollution on the VEP.
S.Multi04. Signs/outreach	Not Specified	Effective	Not Specified	Promote buy-in from campus community and surrounding community Outreach to neighbors, visitors, easement workers, B&G, PFP, community gardens. Arboretum committee? Security?
S.PFP01. Stop bringing in honeybees		Effective	Not Specified	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.
S.PFP02. Control invasive species on edges of PFP lease-hold		Effective	Not Specified	This would reduce seed source and save fence.

S.PFP03. Contain existing compost and woody debris		Effective	Not Specified	The large compost pile and woody debris is moving down slope into wetland areas.
S.PFP04. Move PFP pickup to front lot		Effective	Not Specified	Reduce traffic and disturbance. Increase pedestrian safety.
S.Sec01. Hold unauthorized dumpers accountable		Effective	Not Specified	Prevent the introduction of invasive seeds and pests (worms, insects, etc)
S.Sec02. Enforce VEP rules		Effective	Not Specified	Prevent the introduction of invasive seeds, pests (worms, insects, etc), and animals. Reduce predation, trampling, poaching, picking, road maintenance. Keep native habitats intact.Reduce traffic and disturbance. Increase pedestrian safety.
S.Stu01. Partnership between VEP and Sustainability		Very Effective	Not Specified	Bring the VEP into conversations revolving around sustainability, especially carbon neutrality. Campus community should come to see VEP as a resource for mitigating climate impacts.
S.Stu02. Partnership between VEP and green student orgs		Very Effective	Not Specified	Campus community should come to see VEP as a resource for mitigating climate impacts and for environmental activism
S.VEP01. Early detection via monitoring		Effective	Not Specified	Detect early-emerging invasive species when populations are still small enough to eradicate ((repeated whole survey every 5 years at least, check HPA's every year or every other year))
S.VEP02. Removal in priority areas		Effective	Not Specified	Removal priorities: Emerging invasive eradication > Locations with vulnerable/rare species/communities > Edges> Trails> Barberry along trails

				Reduce abundance of widespread invasive species (as we are able, focus on high priority areas), and eradicate early-emerging invasive species (priority). Vine work in the winter, spring ephemerals in the spring. Removal of shrubs can happen anytime; look at best management practices, think about when you would be able to do restoration in those areas. honeysuckle is appealing because it doesn't come back, seems like low-hanging fruit. Shrubs in early spring- can see easily. more people power in the summer... but with intensives, that could change. What widespread invasives are doing the most damage?
S.VEP03. Install Boot Brush Stations		Effective	Not Specified	Reduce the introduction of invasive seeds and pests from visitors' boots. Also an outreach opportunity
S.VEP04. Special events for neighbors		Need More Info	Not Specified	Some invasive species are introduced from debris dumped onto the preserve by neighbors with bordering yards (for example- Chocolate vine). Events would involve neighbors in invasive species prevention and general stewardship. Student involvement in developing materials. Involve Jen. Find out how Mohonk reaches out
S.VEP05. Work more closely with larger neighbors such as Our Lady of Lourdes		Need More Info	Not Specified	Larger neighbors could collaborate with us to reduce invasive species spread across a wider portion of our border.
S.VEP06. Identify potential sources of pollution upstream, and see where we might be able to change policy		Need More Info	Not Specified	Reduce the probability of invasive introductions from the river. Start with campus.Decrease sedimentation in the stream

S.VEP07. Goats have to poop before they come onsite		Effective	Not Specified	Reduce possibility of introductions from plants that the goats ate offsite
S.VEP08. Block unofficial access points (logs from Ecorestore, rocks)		Need More Info	Not Specified	Limiting access points to the VEP will help us enforce preserve rules. Could use logs from the Shakespeare Garden to block access.
S.VEP09. Manage deer		Very Effective	Not Specified	Reduce the impact of overbrowse on regenerating vegetation across the VEP
S.VEP10. Strategically replan trail system- build new trails, eliminate unofficial trails		Need More Info	Not Specified	Directing traffic through the VEP more intentionally will discourage off-trail foot traffic, trampling, fragmentation. Priorities for this: steep trail near pine plantation. Coupled with restoration of Ecorestore. Would also reduce vehicular traffic
S.VEP11. Formalized access points with plantings, gates		Need More Info	Not Specified	Creating formalized access points with plantings will help to intentionally direct traffic through the VEP, which will discourage off-trail foot traffic, trampling, fragmentation. Donation from Landscaping company- want to donate a PR project, spend a day w equipment, etc. Price of card access gate: 25000
S.VEP12. Reduce traffic towards field station		Effective	Not Specified	Reduce traffic, noise, road maintenance, unauthorized dumping on the VEP.
S.VEP13. Move visitor parking lot north of the causeway		Effective	Not Specified	Reduce traffic and disturbance. Increase pedestrian safety.

S.VEP14. Map dumping on the west side of the VEP		Need More Info	Not Specified	Understand the scale and impact of the dumping issueNotify neighbors that VEP is tracking illegal dumping- this may discourage the behavior
S.VEP15. Restoration in priority areas		Effective	Not Specified	Prioritize restoration of native vegetation communities that serve as valuable habitat for native wildlife and provide opportunities for education about native ecosystems
S.VEP16. Restoration of EcoRestore		Need More Info	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
S.VEP17. Map spring ephemerals		Very Effective	Not Specified	Will help us prioritize restoration areas and inform removal areas and methods (removal can cause disturbance depending on the technique, and we can minimize disturbance in areas with important spring ephemerals)
S.VEP18. Develop a plan for managing the impacts of climate change		Very Effective	Not Specified	Help prepare for impacts of climate change. Plan should include restoration practices to foster in southerly species
S2010. Make a shapefile showing preserve ages		Effective	Not Specified	To determine how human impact has affected regeneration, help prioritize restoration and goals for different parts of the VEP

Action Plan: Strategy-based

Item	People	Rating	Progress	Details
Intervention1. Arboretum Committee			Not Specified	
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1
FC02a. Wet Forest		Not Specified		Nested Target Level 2
FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest
FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest

Collaborate with VFEP staff to plant in places that would reconnect habitat		Unknown	Not Specified	
S.AC01. Ensure no new invasives are planted		Very Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S.AC02. Remove invasive arboretum specimens on campus		Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S18. Buy-in from VC community		Unknown	Not Specified	Clean mowers and equipment, don't plant invasives, remove invasive plants
Intervention2. Buildings&Grounds			Not Specified	
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1
S.VEP16. Restoration of EcoRestore		Need More Info	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
FC02a. Wet Forest		Not Specified		Nested Target Level 2

FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest
FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
S.VEP16. Restoration of EcoRestore		Need More Info	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest
Cleaning mowers and other machinery		Unknown	Not Specified	
Get rid of cat houses		Unknown	Not Specified	
Help block unofficial access points		Unknown	Not Specified	

Leave / use leaves for compost in natural areas where possible		Unknown	Not Specified	
Regulate movement of compost/soil		Unknown	Not Specified	
S.BG01. Moving B&G dumping grounds off of the VEP		Very Effective	Not Specified	Reduce the likelihood that invasive seeds and pests will be moved onto the preserve.
S.Mult02. When planting, choose native species		Effective	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.
S18. Buy-in from VC community		Unknown	Not Specified	Clean mowers and equipment, don't plant invasives, remove invasive plants
Support VFEP staff efforts to create formalized access points with plantings, gates		Unknown	Not Specified	
Support VFEP staff efforts to create new trails and remove unofficial trails		Unknown	Not Specified	
PFP			Not Specified	
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1

FC02a. Wet Forest		Not Specified		Nested Target Level 2
FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest
FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest
Contain existing compost and woody debris		Unknown	Not Specified	
Control invasive species on the fence		Unknown	Not Specified	
Move parking and/or pickup to the front lot		Unknown	Not Specified	
S.Mult02. When planting, choose native species		Effective	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.

S.PFP01. Stop bringing in honeybees		Effective	Not Specified	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.
S18. Buy-in from VC community		Unknown	Not Specified	Clean mowers and equipment, don't plant invasives, remove invasive plants
Stop/ regulate movement of compost/soil		Unknown	Not Specified	
[Main Diagram]	Not Specified		Not Specified	
ENTIRE. VEP		Good		
FC01. VEP East Side		Good		An intact, predominantly native, resilient forest corridor on the eastern side of the VFEP. Target Level 1
FC02a. Wet Forest		Not Specified		Nested Target Level 2
FC02b. Dry Forest		Not Specified		
FC03a. RMSWOS		Not Specified		Red Maple Swamp White Oak Swamp
FC03b. FF		Good		Floodplain Forest

FC03c. RMHS		Not Specified		Red Maple Hardwood Swamp
FC03d. BMMF		Fair		Beech-Maple Mezic Forest
FC03e. AOHF		Fair		Appalachian Oak-Hickory Forest
OC01. VEP Central Corridor		Good		
OC02a. Wet Communities		Not Specified		
OC02b. Dry Communities		Not Specified		
OC03a. SEM		Poor		
OC03b. DEM		Not Specified		
OC03c. Shrub Swamp		Poor		
OC03d. SOF		Good		
OC03e. Successional Shrubland		Fair		
S.AC01. Ensure no new invasives are planted		Very Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum

				specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S.AC02. Remove invasive arboretum specimens on campus		Effective	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.
S.AC03. Increase cover of native trees on campus, especially protecting edges		Need More Info	Not Specified	Increased cover of native trees provides more contiguous habitat for wildlife, and reduces opportunities for light-seeking invasive species to establish.
S.BG01. Moving B&G dumping grounds off of the VEP		Very Effective	Not Specified	Reduce the likelihood that invasive seeds and pests will be moved onto the preserve.
S.BG02. Get rid of cat houses		Need More Info	Not Specified	Cats are deadly predators of birds, amphibians, small mammals and other wildlife. They are considered to be an invasive animal and should not be provided with shelter. The house needs to be demolished anyway, as it is a safety hazard.
S.BG03. Clean equipment to prevent spread of invasives		Effective	Not Specified	Reduce the likelihood that invasive seeds and pests from other sites would be moved onto the VEP on equipment.
S.BG04. Leave/ use leaves as compost where possible in naturalized areas		Need More Info	Not Specified	Fallen leaves can help create habitat for local wildlife.

S.CG01. Control invasive species on edges of Community Gardens		Effective	Not Specified	This would reduce seed source and save fence.
S.Fac01. Better cleaning policy, enforce cleaning policy		Effective	Not Specified	Reduce transport of invasive species around the VEP
S.Mult01. Stop/regulate moving compost/soil		Effective	Not Specified	Moving compost and soil increases the chance that invasive seeds and pests (worms, insects, etc) will be moved from place to place, and establish on the VEP.
S.Mult02. When planting, choose native species		Effective	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.
S.Mult03. Remove research debris from finished projects		Effective	Not Specified	Reduce plastic pollution on the VEP.
S.Multi04. Signs/outreach	Not Specified	Effective	Not Specified	Promote buy-in from campus community and surrounding community Outreach to neighbors, visitors, easement workers, B&G, PFP, community gardens. Arboretum committee? Security?
S.PFP01. Stop bringing in honeybees		Effective	Not Specified	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.
S.PFP02. Control invasive species on edges of PFP lease-hold		Effective	Not Specified	This would reduce seed source and save fence.

S.PFP03. Contain existing compost and woody debris		Effective	Not Specified	The large compost pile and woody debris is moving down slope into wetland areas.
S.PFP04. Move PFP pickup to front lot		Effective	Not Specified	Reduce traffic and disturbance. Increase pedestrian safety.
S.Sec01. Hold unauthorized dumpers accountable		Effective	Not Specified	Prevent the introduction of invasive seeds and pests (worms, insects, etc)
S.Sec02. Enforce VEP rules		Effective	Not Specified	Prevent the introduction of invasive seeds, pests (worms, insects, etc), and animals. Reduce predation, trampling, poaching, picking, road maintenance. Keep native habitats intact.Reduce traffic and disturbance. Increase pedestrian safety.
S.Stu01. Partnership between VEP and Sustainability		Very Effective	Not Specified	Bring the VEP into conversations revolving around sustainability, especially carbon neutrality. Campus community should come to see VEP as a resource for mitigating climate impacts.
S.Stu02. Partnership between VEP and green student orgs		Very Effective	Not Specified	Campus community should come to see VEP as a resource for mitigating climate impacts and for environmental activism
S.VEP01. Early detection via monitoring		Effective	Not Specified	Detect early-emerging invasive species when populations are still small enough to eradicate ((repeated whole survey every 5 years at least, check HPA's every year or every other year))
S.VEP02. Removal in priority areas		Effective	Not Specified	Removal priorities: Emerging invasive eradication > Locations with vulnerable/rare species/communities > Edges> Trails> Barberry along trails

				Reduce abundance of widespread invasive species (as we are able, focus on high priority areas), and eradicate early-emerging invasive species (priority). Vine work in the winter, spring ephemerals in the spring. Removal of shrubs can happen anytime; look at best management practices, think about when you would be able to do restoration in those areas. honeysuckle is appealing because it doesn't come back, seems like low-hanging fruit. Shrubs in early spring- can see easily. more people power in the summer... but with intensives, that could change. What widespread invasives are doing the most damage?
S.VEP03. Install Boot Brush Stations		Effective	Not Specified	Reduce the introduction of invasive seeds and pests from visitors' boots. Also an outreach opportunity
S.VEP04. Special events for neighbors		Need More Info	Not Specified	Some invasive species are introduced from debris dumped onto the preserve by neighbors with bordering yards (for example- Chocolate vine). Events would involve neighbors in invasive species prevention and general stewardship. Student involvement in developing materials. Involve Jen. Find out how Mohonk reaches out
S.VEP05. Work more closely with larger neighbors such as Our Lady of Lourdes		Need More Info	Not Specified	Larger neighbors could collaborate with us to reduce invasive species spread across a wider portion of our border.
S.VEP06. Identify potential sources of pollution upstream, and see where we might be able to change policy		Need More Info	Not Specified	Reduce the probability of invasive introductions from the river. Start with campus.Decrease sedimentation in the stream

S.VEP07. Goats have to poop before they come onsite		Effective	Not Specified	Reduce possibility of introductions from plants that the goats ate offsite
S.VEP08. Block unofficial access points (logs from Ecorestore, rocks)		Need More Info	Not Specified	Limiting access points to the VEP will help us enforce preserve rules. Could use logs from the Shakespeare Garden to block access.
S.VEP09. Manage deer		Very Effective	Not Specified	Reduce the impact of overbrowse on regenerating vegetation across the VEP
S.VEP10. Strategically replan trail system- build new trails, eliminate unofficial trails		Need More Info	Not Specified	Directing traffic through the VEP more intentionally will discourage off-trail foot traffic, trampling, fragmentation. Priorities for this: steep trail near pine plantation. Coupled with restoration of Ecorestore. Would also reduce vehicular traffic
S.VEP11. Formalized access points with plantings, gates		Need More Info	Not Specified	Creating formalized access points with plantings will help to intentionally direct traffic through the VEP, which will discourage off-trail foot traffic, trampling, fragmentation. Donation from Landscaping company- want to donate a PR project, spend a day w equipment, etc. Price of card access gate: 25000
S.VEP12. Reduce traffic towards field station		Effective	Not Specified	Reduce traffic, noise, road maintenance, unauthorized dumping on the VEP.
S.VEP13. Move visitor parking lot north of the causeway		Effective	Not Specified	Reduce traffic and disturbance. Increase pedestrian safety.

S.VEP14. Map dumping on the west side of the VEP		Need More Info	Not Specified	Understand the scale and impact of the dumping issueNotify neighbors that VEP is tracking illegal dumping- this may discourage the behavior
S.VEP15. Restoration in priority areas		Effective	Not Specified	Prioritize restoration of native vegetation communities that serve as valuable habitat for native wildlife and provide opportunities for education about native ecosystems
S.VEP16. Restoration of EcoRestore		Need More Info	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems
S.VEP17. Map spring ephemerals		Very Effective	Not Specified	Will help us prioritize restoration areas and inform removal areas and methods (removal can cause disturbance depending on the technique, and we can minimize disturbance in areas with important spring ephemerals)
S.VEP18. Develop a plan for managing the impacts of climate change		Very Effective	Not Specified	Help prepare for impacts of climate change. Plan should include restoration practices to foster in southerly species
S2010. Make a shapefile showing preserve ages		Effective	Not Specified	To determine how human impact has affected regeneration, help prioritize restoration and goals for different parts of the VEP

Monitoring Plan

Item	Priority	Progress	Details
I01. Intact Canopy	Not Specified	Not Specified	Invasive plants tend to recruit in light gaps. We are interested in identifying these gaps and restoring as we are able. According to the New York Natural Heritage Program, an intact forest should have at least 60% canopy cover:Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I01. Intact Canopy	Not Specified	Not Specified	
I02. Average percent composition of invasive flora in the tree layer	Not Specified	Not Specified	
I02. Invasive Species Impact-Tree Layer	Not Specified	Not Specified	Tells you how well the forest is resisting invasion. Holistic picture.Trees act as seed sources that lead to regrowth of a native canopy after disturbance.
I02. Percent composition of invasive flora in the tree layer	Not Specified	Not Specified	

I02. Percent composition of invasive flora in the tree layer	Not Specified	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	Not Specified	
I03. Average percent composition invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Average percent composition invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	

I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	Not Specified	
I03. Sapling Cover- estimate of sapling/seedling cover	Not Specified	Not Specified	

I04. Average percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Average percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Invasive species impact-sapling/seedlings	Not Specified	Not Specified	
I04. Percent composition invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	

I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I04. Percent composition of invasive flora in the herb layer	Not Specified	Not Specified	
I05. Average percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Average percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Invasive species impact-shrub layer	Not Specified	Not Specified	
I05. Percent composition invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition invasive flora in the vine layer	Not Specified	Not Specified	

I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I05. Percent composition of invasive flora in the vine layer	Not Specified	Not Specified	
I06. Invasive species impact-herb layer	Not Specified	Not Specified	
I06. Sapling/seedling abundance	Not Specified	Not Specified	

I06. Sapling/seedling abundance	Not Specified	Not Specified	
I06. Sapling/seedling abundance	Not Specified	Not Specified	
I06. Sapling/seedling abundance	Not Specified	Not Specified	
I06. Sapling/seedling abundance	Not Specified	Not Specified	
I07. Invasive species impact-vine layer	Not Specified	Not Specified	
I07. Ten Tallest Data (for measuring deer impact)	Not Specified	Not Specified	
I08. Deer Density	Not Specified	Not Specified	
I08. Deer population size	Not Specified	Not Specified	
I09. Area of Ecological Community	Not Specified	Not Specified	The are of the wet forest can be compared to the dry forest to determine whether hydrology dynamics are changing within the forest, especially as the climate changes.

I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of Ecological Community	Not Specified	Not Specified	The are of the dry forest can be compared to the wet forest to determine whether hydrology dynamics are changing within the forest, especially as the climate changes.
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	

I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of ecological community	Not Specified	Not Specified	
I09. Area of forest corridor	Not Specified	Not Specified	
I10. Wet community area	Not Specified	Not Specified	
I10. Wet Forest Area	Not Specified	Not Specified	
I100. Native flora species richness and list	Not Specified	Not Specified	
I100. Number of NYNHP community types	Not Specified	Not Specified	The number of community types reflects the diversity of the VEP. The status of this indicator should be determined on a subjective basis. For example, while losing a community type is a loss of diversity, losing an invasive community type is a good thing.NYNHP community types will be counted.
I100. Percentage of plots with characteristic open structure	Not Specified	Not Specified	An open area should not be dominated by trees or shrubs. According to the New York Natural Heritage Program, this means it should have <50% collective shrub cover and <60% tree canopy cover. Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological

			Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I100. Percentage of plots with characteristic open structure	Not Specified	Not Specified	An open area should not be dominated by trees or shrubs. According to the New York Natural Heritage Program, this means it should have <50% collective shrub cover and <60% tree canopy cover. Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I100. Percentage of plots with characteristic open structure	Not Specified	Not Specified	An open area should not be dominated by trees or shrubs. According to the New York Natural Heritage Program, this means it should have <50% collective shrub cover and <60% tree canopy cover. Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I101. Native fauna species richness and list	Not Specified	Not Specified	
I101. Percentage of plots with characteristic shrubby structure	Not Specified	Not Specified	According to the New York Natural Heritage Program, a shrubland should have >50% collective shrub cover and <60% tree canopy cover. Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological

			Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I101. Percentage of plots with characteristic shrubby structure	Not Specified	Not Specified	According to the New York Natural Heritage Program, a shrubland should have >50% collective shrub cover and <60% tree canopy cover. Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I103. Richness of characteristic fauna	Not Specified	Not Specified	Indicator Fauna for floodplain forest habitat: Bald Eagle (Haliaeetus leucocephalus)Belted Kingfisher (Megaceryle alcyon)Northern two-lined salamander (Eurycea bislineata)Wood Turtle (Glyptemis insculpta)Northern Map Turtle (Graptemys geographica)Eastern Musk Turtle (Sternotherus odoratus) Characteristic fauna were found through research or through consulting advisors.
I103. Richness of characteristic fauna	Not Specified	Not Specified	Native Characteristic Fauna for Shallow Emergent Marsh: Spring peeper (Pseudacris crucifer)Green frog (Rana clamitans melanota)American Toad (Anaxyrus americana)Common Yellowthroat (Geothlypis trichas)Red-winged blackbird (Agelaius phoeniceus)Marsh wren (Cistothorus palustris)Bog Turtle - Calcareous wet meadow Characteristic species were selected from the following sources. Bird species were chosen if they breed locally according to the Birds of North America database:Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological

			Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. Gibbs, J. P., Breisch, A. R., Ducey, P. K., Johnson, G., Behler, J. L., & Bothner, R. C. (2007). The amphibians and reptiles of New York State identification, natural history, and conservation. Oxford: Oxford University Press.
I103. Richness of characteristic fauna	Not Specified	Not Specified	Characteristic fauna for deep emergent marshes include:Red-winged blackbird (Agelaius phoeniceus)Pied-billed grebe (Podilymbus podiceps)Marsh wren (Cistothorus palustris)American bullfrog (Rana catesbeiana)Snapping turtle (Chelydra serpentina)Painted turtle (Chrysemis picta)Spotted turtle (Clemmys guttata)Blanding's turtle (Emydoidea blandingii)Northern watersnake (Nerodia sipedon)American mink (Neovison vison)North American river otter (Lontra canadensis)North American beaver (Castor canadensis) Characteristic species were selected from the following sources. Bird species were chosen if they breed locally according to the Birds of North America database:Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. Gibbs, J. P., Breisch, A. R., Ducey, P. K., Johnson, G., Behler, J. L., & Bothner, R. C. (2007). The amphibians and reptiles of New York State identification, natural history, and conservation. Oxford: Oxford University Press.
I103. Richness of characteristic fauna	Not Specified	Not Specified	Characteristic species for shrub swamps: Flycatchers (Epidonax sp.)Lincoln's sparrow (Passarella lincolnii)Common Yellowthroat (Geothlypis trichas) Characteristic species were selected from the following sources. Bird species were chosen if they breed locally according to the Birds of North America

			database:Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I103. Richness of characteristic fauna	Not Specified	Not Specified	Characteristic fauna for Successional Old Field: Smooth Green Snake (Opherodrys vernalis)American Goldfinch (Spinus tristis)Black Swallowtail (Papilio polyxenes)Orange Sulphur (Colias eurytheme)Eastern-tailed Blue (Cupido comyntas)American Copper (Lycaena phlaeas) Characteristic species were selected from the following sources. Bird species were chosen if they breed locally according to the Birds of North America database:Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. Gibbs, J. P., Breisch, A. R., Ducey, P. K., Johnson, G., Behler, J. L., & Bothner, R. C. (2007). The amphibians and reptiles of New York State identification, natural history, and conservation. Oxford: Oxford University Press.
I103. Richness of characteristic fauna	Not Specified	Not Specified	Characteristic fauna for Successional Shrubland: Grey Catbird (Dumetella caroliniensis)Brown Thrasher (Toxostoma rufum)Blue-winged Warbler (Vermivora cyanoptera)Chestnut-sided Warbler (Setophaga pensylvanica)Song Sparrow (Melospiza melodia)Indigo Bunting (Passerina cyanea) Characteristic species were selected from the following source. Bird species were chosen if they breed locally according to the Birds of North America

			database:Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I104. Hilsenhoff Biotic Index for benthic macroinvertebrates	Not Specified	Not Specified	
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	Not Specified	
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	Not Specified	
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	Not Specified	
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	Not Specified	
I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	Not Specified	

I105. Richness of indicator species that require regenerating understory habitat	Not Specified	Not Specified	Indicators for forest regeneration include species that need understory regeneration in order to complete their life cycles: Ovenbird (Seiurus aurocapilla)Black and White Warbler (Mniotilta varia)Veery (Catharus fuscenscens) Indicator species were determined through research or through consulting advisors.
I106. Richness of indicator predator species with broad home ranges	Not Specified	Not Specified	Indicator predator species with home ranges across the VEP include:BobcatGray FoxFisherPorcupineSharp-shinned hawkCooper's hawkRed-shouldered hawkRed-tailed hawkBroad-winged hawkNorthern goshawkBarred OwlBald eagle Indicator predator species were determined through literature searches or through consulting advisors.
I107. Nonnative flora species richness and list	Not Specified	Not Specified	
I108. Nonnative fauna species richness and list	Not Specified	Not Specified	
I110. Number of patches	Not Specified	Not Specified	
I111. Average redundancy	Not Specified	Not Specified	
I111. Shannon-Weiner Diversity Index for benthic macroinvertebrates	Not Specified	Not Specified	

I112. Species Evenness for benthic macroinvertebrates	Not Specified	Not Specified	
I113. Species richness of benthic macroinvertebrates	Not Specified	Not Specified	
I13. Percent composition native characteristic tree species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shrub swamp. Available from: https://guides.nynhp.org/shrub-swamp/. Accessed March 27, 2019.
I13. Percent composition of native characteristic tree species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-swamp white oak swamp. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed January 17, 2019.
I13. Percent composition of native characteristic tree species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Floodplain forest. Available from: https://guides.nynhp.org/floodplain-forest/. Accessed January 17, 2019.
I13. Percent composition of native characteristic tree species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Beech-maple mesic forest. Available from: https://guides.nynhp.org/beech-maple-mesic-forest/. Accessed January 17, 2019.

I13. Percent composition of native characteristic tree species	Not Specified	Completed	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Appalachian oak-hickory forest. Available from: https://guides.nynhp.org/appalachian-oak-hickory-forest/. Accessed January 17, 2019.
I13. Percent composition of native characteristic tree species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shallow emergent marsh. Available from: https://guides.nynhp.org/shallow-emergent-marsh/. Accessed March 27, 2019.
I13. Percent composition of native characteristic trees	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-hardwood swamp. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed January 17, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-swamp white oak swamp. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed January 17, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide

			for Floodplain forest. Available from: https://guides.nynhp.org/floodplain-forest/. Accessed January 17, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Beech-maple mesic forest. Available from: https://guides.nynhp.org/beech-maple-mesic-forest/. Accessed January 17, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Appalachian oak-hickory forest. Available from: https://guides.nynhp.org/appalachian-oak-hickory-forest/. Accessed January 17, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shallow emergent marsh. Available from: https://guides.nynhp.org/shallow-emergent-marsh/. Accessed March 27, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Deep emergent marsh. Available from: https://guides.nynhp.org/deep-emergent-marsh/. Accessed March 27, 2019.

I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shrub swamp. Available from: https://guides.nynhp.org/shrub-swamp/. Accessed March 27, 2019.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species typically come from the New York Natural Heritage Program vegetation classification system. However, NYNHP does not currently have a community guide for Successional Old Fields, so instead we used the following reference: Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I14. Percent composition of native characteristic shrub species	Not Specified	Not Specified	Characteristic species typically come from the New York Natural Heritage Program vegetation classification system. However, NYNHP does not currently have a community guide for Successional Shrublands, so instead we used the following reference: Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York

			State Department of Environmental Conservation, Albany, NY.
I14. Percent composition of native characteristic shrubs	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-hardwood swamp. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed January 17, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-swamp white oak swamp. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed January 17, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Floodplain forest. Available from: https://guides.nynhp.org/floodplain-forest/. Accessed January 17, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Beech-maple mesic forest. Available from: https://guides.nynhp.org/beech-maple-mesic-forest/. Accessed January 17, 2019.

I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Appalachian oak-hickory forest. Available from: https://guides.nynhp.org/appalachian-oak-hickory-forest/. Accessed January 17, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shallow emergent marsh. Available from: https://guides.nynhp.org/shallow-emergent-marsh/. Accessed March 27, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Deep emergent marsh. Available from: https://guides.nynhp.org/deep-emergent-marsh/. Accessed March 27, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shrub swamp. Available from: https://guides.nynhp.org/shrub-swamp/. Accessed March 27, 2019.
I15. Percent composition of native characteristic herb species	Not Specified	Not Specified	Characteristic species typically come from the New York Natural Heritage Program vegetation classification system. However, NYNHP does not currently have a community guide for Successional Old Fields, so instead we used the following reference:

			Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I15. Percent composition of native characteristic herbs	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-hardwood swamp. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed January 17, 2019.
I16. Percent composition of native characteristic vine species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-swamp white oak swamp. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed January 17, 2019.
I16. Percent composition of native characteristic vine species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-hardwood swamp. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed January 17, 2019.
I16. Percent composition of native characteristic vine species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide

			for Floodplain forest. Available from: https://guides.nynhp.org/floodplain-forest/. Accessed January 17, 2019.
I16. Percent composition of native characteristic vine species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Deep emergent marsh. Available from: https://guides.nynhp.org/deep-emergent-marsh/. Accessed March 27, 2019.
I16. Percent composition of native characteristic vine species	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shrub swamp. Available from: https://guides.nynhp.org/shrub-swamp/. Accessed March 27, 2019.
I2000. Pseudacris crucifer (spring peeper)-Date of first vocalization of the year reported in NYS	Not Specified	Not Specified	
I2001. Lithobates sylvatica (wood frog)- Date of first vocalization of the year reported in NYS	Not Specified	Not Specified	
I2002. Erythronium americanum (Trout Lily / Dogtooth Violet)- date of first reported open flower in NYS	Not Specified	Not Specified	

I2003. Sanguinaria canadensis (Bloodroot)- date of first reported open flower in NYS	Not Specified	Not Specified	
I2004. Claytonia virginica (Virginia springbeauty)- date of first reported open flower in NYS	Not Specified	Not Specified	
I2005. Asarum canadense (Canadian wildginger)- date of first reported open flower in NYS	Not Specified	Not Specified	
I2006. Date of first freeze of the autumn/winter	Not Specified	Not Specified	Using daily temperature data
I2007. Date of last freeze of the winter/spring	Not Specified	Not Specified	Using daily temperature data
I29. One or more oak species dominant	Not Specified	Not Specified	The New York Natural Heritage Program's classification of Appalachian Oak Hickory Forest specifies that "The dominant trees include one or more species of oak." Our definition for dominance and codominance comes from the National Park Service:"in order for a setting to have a single-species elemental dominance type, one species must comprise at least 60% abundance (ie photo; canopy cover; inventory; basal area or trees per acre) of the total abundance. If not classified as a single-species type, and two species comprise at least 80% of the relative abundance with each species comprising more than 20%, the setting is classified a two-species type."

			Sources:New York Natural Heritage Program. 2019. Online Conservation Guide for Appalachian oak-hickory forest. Available from: https://guides.nynhp.org/appalachian-oak-hickory-forest/. Accessed January 17, 2019.Vandendrieche, D. 2013. A compendium of NFS regional vegetation classification algorithms. Forest Management Service Center, USDA, USFS. pg R1-1
I35. Richness of characteristic fauna	Not Specified	Not Specified	Characteristic fauna for wet forests include: Northern Red SalamanderFour-toed SalamanderJefferson/ Blue-spotted Salamander (difficult to tell apart)Marbled SalamanderEastern NewtSpotted SalamanderSpring PeeperWood FrogGrey Tree FrogGreen Frog Characteristic fauna were found through literature searches or through consulting advisors.
I46. American beech and sugar maple codominance	Not Specified	Not Specified	The New York Natural Heritage Program classification of a Beech-Maple Mesic forest specifies that "Beech-maple mesic forest communities are closed-canopy hardwood forests with codominating sugar maple (Acer saccharum) and American beech (Fagus grandifolia)." Our definition for dominance and codominance comes from the National Park Service:"in order for a setting to have a single-species elemental dominance type, one species must comprise at least 60% abundance (ie photo; canopy cover; inventory; basal area or trees per acre) of the total abundance. If not classified as a single-species type, and two species comprise at least 80% of the relative abundance with each species comprising more than 20%, the setting is classified a two-species type." Sources:New York Natural Heritage Program. 2019. Online Conservation Guide for Beech-maple mesic forest. Available from: https://guides.nynhp.org/beech-maple-mesic-forest/. Accessed January 17, 2019. Vandendrieche, D. 2013. A compendium of NFS regional vegetation

			classification algorithms. Forest Management Service Center, USDA, USFS. pg R1-1
I46. Red maple and swamp white oak codominance	Not Specified	Not Specified	The New York Natural Heritage Program classification of a Red Maple-Swamp White Oak Swamp specifies that "It is codominated by red maple (Acer rubrum) and oaks, such as swamp white oak (Quercus bicolor) and/or pin oak (Q. palustris)."Our definition for dominance and codominance comes from the National Park Service:"in order for a setting to have a single-species elemental dominance type, one species must comprise at least 60% abundance (ie photo; canopy cover; inventory; basal area or trees per acre) of the total abundance. If not classified as a single-species type, and two species comprise at least 80% of the relative abundance with each species comprising more than 20%, the setting is classified a two-species type." Sources: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-swamp white oak swamp. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed January 17, 2019. Vandendrieche, D. 2013. A compendium of NFS regional vegetation classification algorithms. Forest Management Service Center, USDA, USFS. pg R1-1
I48. Red Maple dominant, or codominant with other hardwoods	Not Specified	Not Specified	The New York Natural Heritage Program classification of a Red Maple Hardwood Swamp specifies that "In any one stand red maple is either the only canopy dominant, or it is codominant with one or more hardwoods such as ash, elm, and birch." Our definition for dominance and codominance comes from the National Park Service:"in order for a setting to have a single-species elemental dominance type, one species must comprise at least 60% abundance (ie photo; canopy cover; inventory; basal area or trees per acre) of the total abundance. If not

			classified as a single-species type, and two species comprise at least 80% of the relative abundance with each species comprising more than 20%, the setting is classified a two-species type." Sources:New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-hardwood swamp. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed January 17, 2019.Vandendrieche, D. 2013. A compendium of NFS regional vegetation classification algorithms. Forest Management Service Center, USDA, USFS. pg R1-1.
I49. Frequency of exceeding bankfull	Not Specified	Not Specified	"The active floodplain is a morphologic feature constructed by either lateral channel migration or overbank flooding that generally has a recurrence interval of about 2 years or less." - Marks et al. 2014 (citing Wolman & Leopold 1957) Sources:Marks, C.O., Nislow, K.H., Magilligan, F.J. (2014). Quantifying flooding regime in floodplain forests to guide river restoration. Elemental Science, 2, accessed 1/17/19. DOI: 10.12952/journal.elementa.000031Wolman M.G., Leopold L.B. (1957). River flood plains: some observations on their formation. Washington, DC: U.S. Geological Survey.
I50. Spring ephemeral cover	Not Specified	Not Specified	
I50. Spring ephemeral cover	Not Specified	Not Specified	
I50. Spring ephemeral cover	Not Specified	Not Specified	
I50. Spring ephemeral cover	Not Specified	Not Specified	

△ I50. Spring ephemeral cover	Not Specified	Not Specified	
△ I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-swamp white oak swamp. Available from: https://guides.nynhp.org/red-maple-swamp-white-oak-swamp/. Accessed January 17, 2019.
△ I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Red maple-hardwood swamp. Available from: https://guides.nynhp.org/red-maple-hardwood-swamp/. Accessed January 17, 2019.
△ I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Floodplain forest. Available from: https://guides.nynhp.org/floodplain-forest/. Accessed January 17, 2019.
△ I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Beech-maple mesic forest. Available from: https://guides.nynhp.org/beech-maple-mesic-forest/. Accessed January 17, 2019.

I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Appalachian oak-hickory forest. Available from: https://guides.nynhp.org/appalachian-oak-hickory-forest/. Accessed January 17, 2019.
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shallow emergent marsh. Available from: https://guides.nynhp.org/shallow-emergent-marsh/. Accessed March 27, 2019.
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Deep emergent marsh. Available from: https://guides.nynhp.org/deep-emergent-marsh/. Accessed March 27, 2019.
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species come from the New York Natural Heritage Program vegetation classification system: New York Natural Heritage Program. 2019. Online Conservation Guide for Shrub swamp. Available from: https://guides.nynhp.org/shrub-swamp/. Accessed March 27, 2019.
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species typically come from the New York Natural Heritage Program vegetation classification system. However, NYNHP does not currently have a community guide for Successional Old Fields, so instead we used the following reference:

			Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	Not Specified	Characteristic species typically come from the New York Natural Heritage Program vegetation classification system. However, NYNHP does not currently have a community guide for Successional Shrublands, so instead we used the following reference: Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Work Plan

	Work Units	Projected Expenses	Budget Totals
Item	**Total**	**Total**	**Total**
[Main Diagram]			
S.AC01. Ensure no new invasives are planted			
S.AC02. Remove invasive arboretum specimens on campus			
S.AC03. Increase cover of native trees on campus, especially protecting edges			
S.BG01. Moving B&G dumping grounds off of the VEP			
S.BG02. Get rid of cat houses			
S.BG03. Clean equipment to prevent spread of invasives			
S.BG04. Leave/ use leaves as compost where possible in naturalized areas			
S.CG01. Control invasive species on edges of Community Gardens			
S.Fac01. Better cleaning policy, enforce cleaning policy			
S.Mult01. Stop/regulate moving compost/soil			

S.Mult02. When planting, choose native species			
S.Mult03. Remove research debris from finished projects			
S.Multi04. Signs/outreach			
A01. Create a survey for students, faculty			
S.PFP01. Stop bringing in honeybees			
S.PFP02. Control invasive species on edges of PFP lease-hold			
S.PFP03. Contain existing compost and woody debris			
S.PFP04. Move PFP pickup to front lot			
S.Sec01. Hold unauthorized dumpers accountable			
S.Sec02. Enforce VEP rules			
S.Stu01. Partnership between VEP and Sustainability			
S.Stu02. Partnership between VEP and green student orgs			
S.VEP01. Early detection via monitoring			
S.VEP02. Removal in priority areas			

S.VEP03. Install Boot Brush Stations			
S.VEP04. Special events for neighbors			
S.VEP05. Work more closely with larger neighbors such as Our Lady of Lourdes			
S.VEP06. Identify potential sources of pollution upstream, and see where we might be able to change policy			
S.VEP07. Goats have to poop before they come onsite			
S.VEP08. Block unofficial access points (logs from Ecorestore, rocks)			
S.VEP09. Manage deer			
S.VEP10. Strategically replan trail system- build new trails, eliminate unofficial trails			
S.VEP11. Formalized access points with plantings, gates			
S.VEP12. Reduce traffic towards field station			
S.VEP13. Move visitor parking lot north of the causeway			
S.VEP14. Map dumping on the west side of the VEP			
S.VEP15. Restoration in priority areas			
S.VEP16. Restoration of EcoRestore			

S.VEP17. Map spring ephemerals			
S.VEP18. Develop a plan for managing the impacts of climate change			
S2010. Make a shapefile showing preserve ages			

Progress Report

Item	Progress	Progress Details
Reduce need for heavy equipment in natural areas	Not Specified	
Reduce traffic towards field station	Not Specified	
Support from Arboretum Committee	Not Specified	
Support from B&G	Not Specified	
Support from PFP	Not Specified	
I01. Intact Canopy	Not Specified	
I01. Intact Canopy	Not Specified	
I02. Average percent composition of invasive flora in the tree layer	Not Specified	
I02. Invasive Species Impact- Tree Layer	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	

I02. Percent composition of invasive flora in the tree layer	Not Specified	
I02. Percent composition of invasive flora in the tree layer	Not Specified	
I03. Average percent composition invasive flora in the shrub layer	Not Specified	
I03. Average percent composition invasive flora in the shrub layer	Not Specified	
I03. Percent composition invasive flora in the shrub layer	Not Specified	
I03. Percent composition invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	
I03. Percent composition of invasive flora in the shrub layer	Not Specified	

△ I03. Sapling Cover- estimate of sapling/seedling cover	Not Specified	
△ I04. Average percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Average percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Invasive species impact- sapling/seedlings	Not Specified	
△ I04. Percent composition invasive flora in the herb layer	Not Specified	
△ I04. Percent composition invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	
△ I04. Percent composition of invasive flora in the herb layer	Not Specified	

△ I05. Average percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Average percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Invasive species impact- shrub layer	Not Specified	
△ I05. Percent composition invasive flora in the vine layer	Not Specified	
△ I05. Percent composition invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I05. Percent composition of invasive flora in the vine layer	Not Specified	
△ I06. Invasive species impact- herb layer	Not Specified	

I06. Sapling/seedling abundance	Not Specified	
I06. Sapling/seedling abundance	Not Specified	
I06. Sapling/seedling abundance	Not Specified	
I06. Sapling/seedling abundance	Not Specified	
I06. Sapling/seedling abundance	Not Specified	
I07. Invasive species impact- vine layer	Not Specified	
I07. Ten Tallest Data (for measuring deer impact)	Not Specified	
I08. Deer Density	Not Specified	
I08. Deer population size	Not Specified	
I09. Area of Ecological Community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of Ecological Community	Not Specified	

I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of ecological community	Not Specified	
I09. Area of forest corridor	Not Specified	
I10. Wet community area	Not Specified	
I10. Wet Forest Area	Not Specified	
I100. Native flora species richness and list	Not Specified	
I100. Number of NYNHP community types	Not Specified	
I100. Percentage of plots with characteristic open structure	Not Specified	
I100. Percentage of plots with characteristic open structure	Not Specified	

△ I100. Percentage of plots with characteristic open structure	Not Specified	
△ I101. Native fauna species richness and list	Not Specified	
△ I101. Percentage of plots with characteristic shrubby structure	Not Specified	
△ I101. Percentage of plots with characteristic shrubby structure	Not Specified	
△ I103. Richness of characteristic fauna	Not Specified	
△ I103. Richness of characteristic fauna	Not Specified	
△ I103. Richness of characteristic fauna	Not Specified	
△ I103. Richness of characteristic fauna	Not Specified	
△ I103. Richness of characteristic fauna	Not Specified	
△ I103. Richness of characteristic fauna	Not Specified	
△ I104. Hilsenhoff Biotic Index for benthic macroinvertebrates	Not Specified	
△ I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	
△ I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	
△ I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	

△ I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	
△ I105. Percent plots with all expected strata (tree, shrub, herb, vine) present	Not Specified	
△ I105. Richness of indicator species that require regenerating understory habitat	Not Specified	
△ I106. Richness of indicator predator species with broad home ranges	Not Specified	
△ I107. Nonnative flora species richness and list	Not Specified	
△ I108. Nonnative fauna species richness and list	Not Specified	
△ I110. Number of patches	Not Specified	
△ I111. Average redundancy	Not Specified	
△ I111. Shannon-Weiner Diversity Index for benthic macroinvertebrates	Not Specified	
△ I112. Species Evenness for benthic macroinvertebrates	Not Specified	
△ I113. Species richness of benthic macroinvertebrates	Not Specified	
△ I13. Percent composition native characteristic tree species	Not Specified	
△ I13. Percent composition of native characteristic tree species	Not Specified	
△ I13. Percent composition of native characteristic tree species	Not Specified	

I13. Percent composition of native characteristic tree species	Not Specified	
I13. Percent composition of native characteristic tree species	Completed	
I13. Percent composition of native characteristic tree species	Not Specified	
I13. Percent composition of native characteristic trees	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrub species	Not Specified	
I14. Percent composition of native characteristic shrubs	Not Specified	

I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herb species	Not Specified	
I15. Percent composition of native characteristic herbs	Not Specified	
I16. Percent composition of native characteristic vine species	Not Specified	
I16. Percent composition of native characteristic vine species	Not Specified	
I16. Percent composition of native characteristic vine species	Not Specified	
I16. Percent composition of native characteristic vine species	Not Specified	
I16. Percent composition of native characteristic vine species	Not Specified	

△ I2000. Pseudacris crucifer (spring peeper)-Date of first vocalization of the year reported in NYS	Not Specified	
△ I2001. Lithobates sylvatica (wood frog)- Date of first vocalization of the year reported in NYS	Not Specified	
△ I2002. Erythronium americanum (Trout Lily / Dogtooth Violet)- date of first reported open flower in NYS	Not Specified	
△ I2003. Sanguinaria canadensis (Bloodroot)- date of first reported open flower in NYS	Not Specified	
△ I2004. Claytonia virginica (Virginia springbeauty)- date of first reported open flower in NYS	Not Specified	
△ I2005. Asarum canadense (Canadian wildginger)- date of first reported open flower in NYS	Not Specified	
△ I2006. Date of first freeze of the autumn/winter	Not Specified	
△ I2007. Date of last freeze of the winter/spring	Not Specified	
△ I29. One or more oak species dominant	Not Specified	
△ I35. Richness of characteristic fauna	Not Specified	
△ I46. American beech and sugar maple codominance	Not Specified	
△ I46. Red maple and swamp white oak codominance	Not Specified	
△ I48. Red Maple dominant, or codominant with other hardwoods	Not Specified	
△ I49. Frequency of exceeding bankfull	Not Specified	

I50. Spring ephemeral cover	Not Specified	
I50. Spring ephemeral cover	Not Specified	
I50. Spring ephemeral cover	Not Specified	
I50. Spring ephemeral cover	Not Specified	
I50. Spring ephemeral cover	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	

I70. Number of species listed in NYNHP community guide present at VEP	Not Specified	
A01. Create a survey for students, faculty	Not Specified	

Item

[Custom 2]

Item	Progress	Details	Rating
[Main Diagram]	Not Specified		
S.AC01. Ensure no new invasives are planted	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.	Very Effective
S.AC02. Remove invasive arboretum specimens on campus	Not Specified	Invasive arboretum specimens from campus are extremely likely to spread to the VEP. We have seen invasive arboretum specimens, such as Castor Aralia and Autumn Olive, growing on the VEP.	Effective
S.AC03. Increase cover of native trees on campus, especially protecting edges	Not Specified	Increased cover of native trees provides more contiguous habitat for wildlife, and reduces opportunities for light-seeking invasive species to establish.	Need More Info
S.BG01. Moving B&G dumping grounds off of the VEP	Not Specified	Reduce the likelihood that invasive seeds and pests will be moved onto the preserve.	Very Effective
S.BG02. Get rid of cat houses	Not Specified	Cats are deadly predators of birds, amphibians, small mammals and other wildlife. They are considered to be an invasive animal and should not be provided with shelter. The house needs to be demolished anyway, as it is a safety hazard.	Need More Info

S.BG03. Clean equipment to prevent spread of invasives	Not Specified	Reduce the likelihood that invasive seeds and pests from other sites would be moved onto the VEP on equipment.	Effective
S.BG04. Leave/ use leaves as compost where possible in naturalized areas	Not Specified	Fallen leaves can help create habitat for local wildlife.	Need More Info
S.CG01. Control invasive species on edges of Community Gardens	Not Specified	This would reduce seed source and save fence.	Effective
S.Fac01. Better cleaning policy, enforce cleaning policy	Not Specified	Reduce transport of invasive species around the VEP	Effective
S.Mult01. Stop/regulate moving compost/soil	Not Specified	Moving compost and soil increases the chance that invasive seeds and pests (worms, insects, etc) will be moved from place to place, and establish on the VEP.	Effective
S.Mult02. When planting, choose native species	Not Specified	Or at least, when planting on campus, choose non-invasive non-natives.	Effective
S.Mult03. Remove research debris from finished projects	Not Specified	Reduce plastic pollution on the VEP.	Effective
S.Multi04. Signs/outreach	Not Specified	Promote buy-in from campus community and surrounding community Outreach to neighbors, visitors, easement workers, B&G, PFP, community gardens. Arboretum committee? Security?	Effective
A01. Create a survey for students, faculty	Not Specified	Assess students' and faculty members' knowledge, use of, involvement with, interest in the VEP	

S.PFP01. Stop bringing in honeybees	Not Specified	Although they are popular, honeybees are a nonnative species that compete with our native bees. Research shows that native bees are more effective at crop pollination than honeybees.	Effective
S.PFP02. Control invasive species on edges of PFP lease-hold	Not Specified	This would reduce seed source and save fence.	Effective
S.PFP03. Contain existing compost and woody debris	Not Specified	The large compost pile and woody debris is moving down slope into wetland areas.	Effective
S.PFP04. Move PFP pickup to front lot	Not Specified	Reduce traffic and disturbance. Increase pedestrian safety.	Effective
S.Sec01. Hold unauthorized dumpers accountable	Not Specified	Prevent the introduction of invasive seeds and pests (worms, insects, etc)	Effective
S.Sec02. Enforce VEP rules	Not Specified	Prevent the introduction of invasive seeds, pests (worms, insects, etc), and animals. Reduce predation, trampling, poaching, picking, road maintenance. Keep native habitats intact.Reduce traffic and disturbance. Increase pedestrian safety.	Effective
S.Stu01. Partnership between VEP and Sustainability	Not Specified	Bring the VEP into conversations revolving around sustainability, especially carbon neutrality. Campus community should come to see VEP as a resource for mitigating climate impacts.	Very Effective
S.Stu02. Partnership between VEP and green student orgs	Not Specified	Campus community should come to see VEP as a resource for mitigating climate impacts and for environmental activism	Very Effective

S.VEP01. Early detection via monitoring	Not Specified	Detect early-emerging invasive species when populations are still small enough to eradicate ((repeated whole survey every 5 years at least, check HPA's every year or every other year))	Effective
S.VEP02. Removal in priority areas	Not Specified	Removal priorities: Emerging invasive eradication > Locations with vulnerable/rare species/communities > Edges> Trails> Barberry along trails Reduce abundance of widespread invasive species (as we are able, focus on high priority areas), and eradicate early-emerging invasive species (priority). Vine work in the winter, spring ephemerals in the spring. Removal of shrubs can happen anytime; look at best management practices, think about when you would be able to do restoration in those areas. honeysuckle is appealing because it doesn't come back, seems like low-hanging fruit. Shrubs in early spring- can see easily. more people power in the summer... but with intensives, that could change. What widespread invasives are doing the most damage?	Effective
S.VEP03. Install Boot Brush Stations	Not Specified	Reduce the introduction of invasive seeds and pests from visitors' boots. Also an outreach opportunity	Effective
S.VEP04. Special events for neighbors	Not Specified	Some invasive species are introduced from debris dumped onto the preserve by neighbors with bordering yards (for example- Chocolate vine). Events would involve neighbors in invasive species prevention and general stewardship. Student involvement in developing materials. Involve Jen. Find out how Mohonk reaches out	Need More Info
S.VEP05. Work more closely with larger neighbors such as Our Lady of Lourdes	Not Specified	Larger neighbors could collaborate with us to reduce invasive species spread across a wider portion of our border.	Need More Info

S.VEP06. Identify potential sources of pollution upstream, and see where we might be able to change policy	Not Specified	Reduce the probability of invasive introductions from the river. Start with campus.Decrease sedimentation in the stream	Need More Info
S.VEP07. Goats have to poop before they come onsite	Not Specified	Reduce possibility of introductions from plants that the goats ate offsite	Effective
S.VEP08. Block unofficial access points (logs from Ecorestore, rocks)	Not Specified	Limiting access points to the VEP will help us enforce preserve rules. Could use logs from the Shakespeare Garden to block access.	Need More Info
S.VEP09. Manage deer	Not Specified	Reduce the impact of overbrowse on regenerating vegetation across the VEP	Very Effective
S.VEP10. Strategically replan trail system- build new trails, eliminate unofficial trails	Not Specified	Directing traffic through the VEP more intentionally will discourage off-trail foot traffic, trampling, fragmentation. Priorities for this: steep trail near pine plantation. Coupled with restoration of Ecorestore. Would also reduce vehicular traffic	Need More Info
S.VEP11. Formalized access points with plantings, gates	Not Specified	Creating formalized access points with plantings will help to intentionally direct traffic through the VEP, which will discourage off-trail foot traffic, trampling, fragmentation. Donation from Landscaping company- want to donate a PR project, spend a day w equipment, etc. Price of card access gate: 25000	Need More Info
S.VEP12. Reduce traffic towards field station	Not Specified	Reduce traffic, noise, road maintenance, unauthorized dumping on the VEP.	Effective

S.VEP13. Move visitor parking lot north of the causeway	Not Specified	Reduce traffic and disturbance. Increase pedestrian safety.	Effective
S.VEP14. Map dumping on the west side of the VEP	Not Specified	Understand the scale and impact of the dumping issueNotify neighbors that VEP is tracking illegal dumping- this may discourage the behavior	Need More Info
S.VEP15. Restoration in priority areas	Not Specified	Prioritize restoration of native vegetation communities that serve as valuable habitat for native wildlife and provide opportunities for education about native ecosystems	Effective
S.VEP16. Restoration of EcoRestore	Not Specified	Reconnect the corridor of mostly uninvaded forests on the east side of the VEP, which provides valuable habitat for native wildlife and opportunities for education about native ecosystems	Need More Info
S.VEP17. Map spring ephemerals	Not Specified	Will help us prioritize restoration areas and inform removal areas and methods (removal can cause disturbance depending on the technique, and we can minimize disturbance in areas with important spring ephemerals)	Very Effective
S.VEP18. Develop a plan for managing the impacts of climate change	Not Specified	Help prepare for impacts of climate change. Plan should include restoration practices to foster in southerly species	Very Effective
S2010. Make a shapefile showing preserve ages	Not Specified	To determine how human impact has affected regeneration, help prioritize restoration and goals for different parts of the VEP	Effective

People

Item	Type
Dylan Finley	Person
Jamie Deppen	Person
Keri VanCamp	Person
Lindsay Charlop	Person
Lydia Kiewra	Person
Meg Ronsheim	Person
Not Specified	

Legend Table
Project
Conceptual Model
Results Chain
Target
Human Wellbeing Target
Biophysical Factor
Biophysical Result
Direct Threat
Contributing Factor
Intermediate Result
Threat Reduction Result
Strategy
Goal

Objective
Indicator
Stress
Text Box
Group Box
Task
Method
Activity
Monitoring Activity
Measurement