



SCHIFF NATURAL
LANDS TRUST

2022-2032

Schiff Natural Lands Trust

Land Management Plan



Photo by Jennifer Santoro, Summer 2021

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Vision 1: Manage and Monitor Existing Natural Resources

Schiff is dedicated to the preservation and conservation of a healthy, functioning landscape nestled in suburban Morris County, New Jersey. To accomplish this mission, Schiff will continue to manage and monitor their existing natural resources by focusing on non-native invasive species management, white-tailed deer control efforts, and overall ecological maintenance of the property. This vision, in line with Schiff's "Our Land" target in the 2021-2025 Strategic Plan, highlights both short- and long-term management goals and actions to continue Schiff's long tenure of land stewardship practices.

Schiff has established a set of core conservation values for its land base, which include:

- A functioning, healthy, and diverse native forest ecosystem.
- A functioning, healthy, and diverse native meadow and early successional habitat.
- Maintaining healthy, functioning water resources and streams.
- Providing habitat for rare species of plants and animals living on the preserve.
- Enabling public access.
- Promoting environmental education.

Maintaining and protecting healthy native ecosystems is incredibly important. Aside from the intrinsic and aesthetic value provided by forests, meadows, and streams, they provide many ecosystem services. A few ecosystem services associated with the habitats that can be found on Schiff's property include:

- Carbon sequestration.
- Habitat for native wildlife.
- Recreation (including hiking, hunting, birdwatching, mental health benefits).
- Nutrient cycling.
- Regulation of the local climate.

For a property like Schiff that is uniquely nestled amongst dense human populations, it may serve as a sole source of certain ecosystem services to the surrounding population. Unfortunately, human development and the introduction of non-native species over the past few centuries have disrupted local ecosystems. While restoring local ecosystems to a state of pre-European contact is not feasible, tactful management of natural lands can help maximize the benefits of such spaces for humans and wildlife alike.

Some non-native species, known as invasive species, can thrive outside their native habitats and can often outcompete or completely displace native species. The introduction of non-native species can often have ripple effects across entire ecosystems affecting many other species, and in turn disrupt many of the practical ecosystem services that we rely on.

In forest ecosystems, invasive trees and shrubs often replace native species in the canopy and understory, in turn causing habitat loss for many other species that rely on native trees and shrubs. A common trait among invasive species is their ability to grow much quicker than their native competitors due to lack of herbivory. In early successional ecosystems (such as meadows which lack significant tree canopy), invasive herbaceous or woody species can move in and crowd out rarer, more sensitive native species which typically specialize in this type of

habitat. Further, the presence of invasive plant species has the capacity of changing soil ecology on a local scale – which has the potential to have lasting effects on a site even after removal of invasive species. Similar issues exist with invasive insects and wildlife, but they often go hand in hand with the presence of invasive plants.

Invasives are not the only threat to a healthy native ecosystem, unchecked native species can have massively detrimental threats on an ecosystem. A common issue in the northeastern United States (and at Schiff as well) is the overabundance and overgrazing of white-tailed deer on the forest understory. Natural predators of white-tailed deer (such as wolves) have become virtually extinct in the northeastern United States over the past few centuries leading to an explosion in the deer population. In turn, many native plants that once thrived in the understory do not stand a chance due to the herbivory of higher deer populations, and this further contributes to the invasive plant issue (which deer often do not graze upon). Due to this imbalance, considerable effort is needed to manage deer populations and protect native plants from overgrazing.

Due to the immense disruption to native ecosystems over the past several centuries, many species that once thrived in forest and meadow ecosystems could now be in trouble. Whether it is due to habitat loss from direct human development, loss of food sources from displacement of native species, or overharvesting and other human related involvement, many species of native plants and wildlife exist at populations much lower than previously. Unfortunately, it is impossible to know the full status of many species of concern without considerable monitoring efforts to observe trends in the population. For properties which have identified several threatened or endangered species (federally or locally), monitoring efforts may be considered to assess the health of local populations. Should the need be identified after monitoring, conservation and restoration efforts can be enacted in the future to help restore many species of concern to their former glory.

Goal 1a: Manage Non-Native Invasive Plant Species

Non-native invasive plant species dominate the understory of Schiff's forested lands and encroach into open meadow areas. Reducing and ultimately eliminating these non-native invaders is important to create a healthier habitat for New Jersey's native flora and fauna and maintain natural ecosystem processes.

Non-native invasive species have numerous adverse ecosystem impacts. These include, but are not limited to:

- Severely hinder or replace native vegetation in all habitats.
- Alter natural ecosystem functions.
- Harm wildlife by replacing native food-source plants.
- Further threaten rare and endangered species.
- Diminish biodiversity.
- Have economic costs to crops, forestry, and expensive management and removal programs.
- Lower property values.
- Degrade scenic view and recreational experiences.

While Schiff has historically taken steps to mitigate the spread of invasive plant species through prescribed burns, a white-tailed deer harvesting program, and volunteer removal projects, a more comprehensive effort should be launched to further reduce the presence of invasive species and restore native understory species to the landscape. Those actions are detailed here.

<p>WHAT & WHY Non-native invasive plant species dominate the understory of Schiff's forested lands and encroach into open meadow areas. Reducing and ultimately eliminating these non-native invaders is important to create a healthier habitat for New Jersey's native flora and fauna and maintain natural ecosystem processes. Non-native invasive species have numerous adverse ecosystem impacts.</p>	<p>Action 1: Monitoring Efforts</p> <ul style="list-style-type: none"> • Forest Secchi sampling to map hotspots • Target areas for removal (see following actions) • Monitor for regrowth
	<p>Action 2: Mechanical Control</p> <ul style="list-style-type: none"> • Identify target areas for invasive species removal • Acquire equipment • Engage staff and volunteers
	<p>Action 3: Chemical Herbicide</p> <ul style="list-style-type: none"> • Obtain necessary permits • Identify target areas for invasive species removal • Engage staff or outside contractors
	<p>Action 4: Agricultural Grazing</p> <ul style="list-style-type: none"> • Identify target areas & dates • Engage grazing groups or neighbors for grazing
	<p>Action 5: Prescribed Fire</p> <ul style="list-style-type: none"> • Identify target areas & dates, acquiring permits as necessary • Communicate with neighbors and state • Engage contractors
	<p>Action 6: Replanting Native Species</p> <ul style="list-style-type: none"> • Identify target locations for replanting efforts • Obtain plant material from outside nurseries • Engage volunteers for planting and cage/fence installation • Monitor deer impacts

Action 1: Invasive Plant Species Monitoring Efforts

The domination of invasive plant species is a widespread issue in hardwood forests across the northeastern United States. Invasive species are defined as non-native species that can outcompete and replace native species. This can lead to a cascade of effects across the entire ecosystem. The loss of native species in lieu of invasive species can result in negative impacts on native wildlife, soil ecology, and ecosystem services (Arrington 2021, DeBellis et al. 2019).

Invasive species monitoring is a crucial first step to developing a successful control plan. The foundation of an effective invasive species management plan is a comprehensive inventory of their locations across Schiff's land holdings. This can be supplemented by annual monitoring of invasive species "hotspots" across the property to assess growth and spread of these unwanted plants. Therefore, conducting invasive species mapping and monitoring efforts is a priority.

Whole-property invasive species mapping and monitoring efforts can be costly and time-consuming, so a top priority for Schiff is to choose selected areas of the property to inventory

and map the presence of invasive plant species. Mitigation efforts can then target those identified priority areas. If resources allow, these target areas can eventually be expanded to cover more of Schiff's property.

Strategy 1: Forest Secchi Monitoring

Forest Secchi plot monitoring (details in Appendix 1) is an effective and efficient way to understand the spatial distribution of invasive plants in these selected areas. Field sampling has been conducted in the past (early 2000s) and efforts were reestablished in the summer of 2021, when 34 plots were inventoried across Schiff's property (Figure 1). Depending on budget and personnel, sampling efforts can continue in future summers at these same plots or at additional plots located throughout the property to gauge invasive species location and spread over time. These data can help to identify invasive species hotspots and target priority areas for removals.

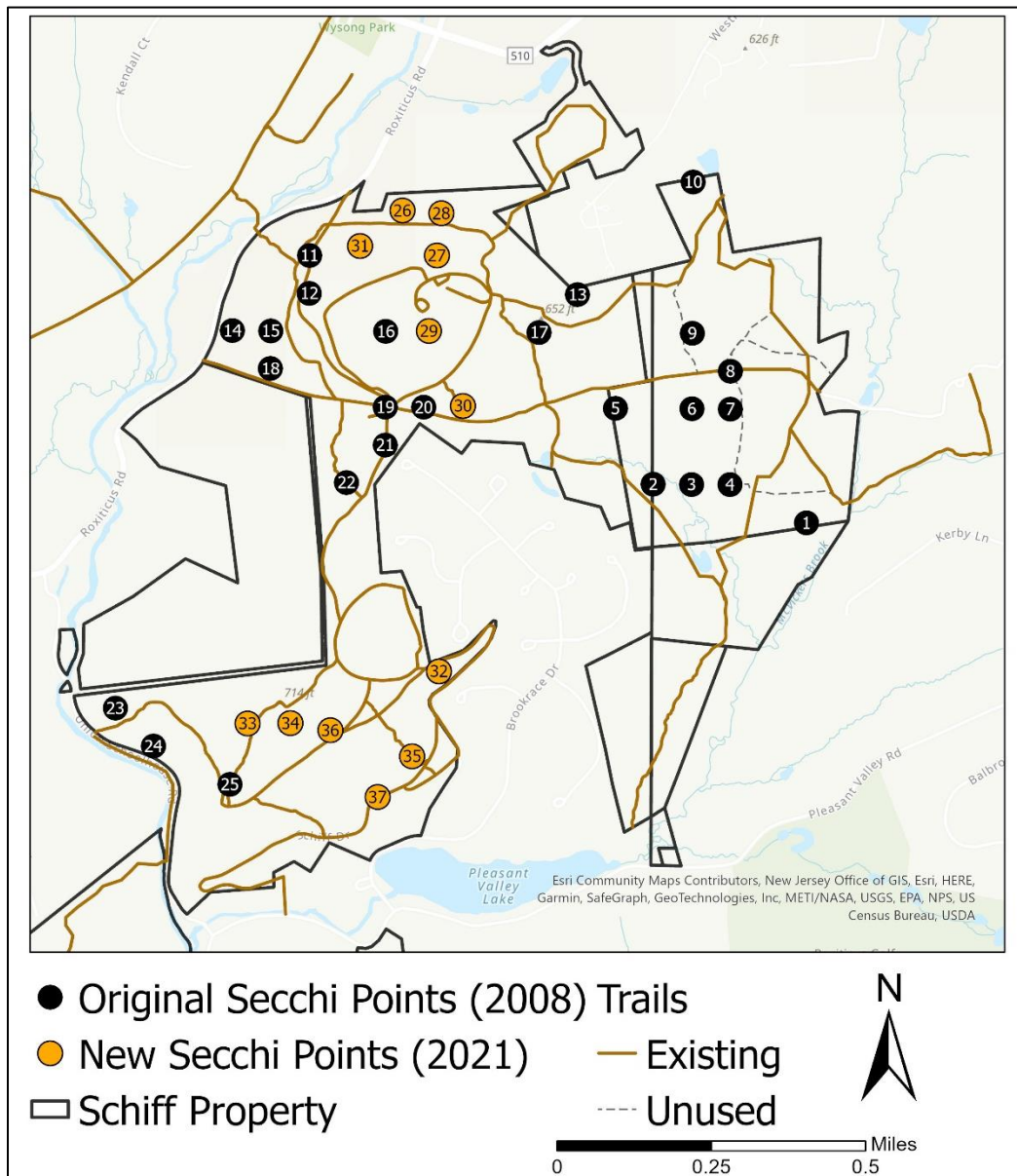


Figure 1: Map of Forest Secchi Monitoring locations that were sampled in Summer 2021. Larger version in Appendix 1c.

The 2021 Forest Secchi Survey can be used as a baseline for future invasive plant species monitoring efforts in future years. Keeping the same plot locations will allow Schiff to track vegetation change over time. The following Forest Secchi Survey guidelines provide several sampling scenarios depending on time and budget constraints (Table 1). Resampling a percentage of monitoring plots each summer may be an attractive option to reduce field efforts while still providing sufficient updates on potential invasive species spread. If there is capacity to add new sampling locations (for example, at Mount Paul Preserve), Schiff can discuss priority areas to add based on time and budgetary constraints.

A team of 3-6 people is recommended for Forest Secchi sampling efforts. A minimum of two people are needed since this sampling involves one person holding a board and another person reading measurements from a distance (see Appendix 1 for full methodology and details). Collaborating with local universities or students (undergraduate or graduate) to conduct Forest Secchi Surveys could help to reduce or eliminate costs to Schiff and could turn into a longer-term partnership. Surveying is recommended to be repeated on a biannual basis, if possible, but a full resurvey of all plots may not be necessary. As contractor rates may vary for Forest Secchi sampling, it is recommended that Schiff employ staff, volunteers, or university partnerships to conduct this work for lower costs. Discussing costs and contractors with Michael Van Clef (<http://njecologicalsolutions.com/>) may be another way to reduce or mitigate field sampling costs.

Table 1: Forest Secchi Survey annual or biannual monitoring scenarios.

Strategy	# of Plots Visited	Estimated Field Hours*	Estimated Cost**	Notes
Full Survey	34	40	\$1,200	Bi- or tri-annual survey
75% Survey	26	30	\$900	Biannual survey; some repeats in subsequent year
50% Survey	17	20	\$600	Biannual survey; no repeats in subsequent years
25% Survey	9	10	\$300	Recommend annual survey, selecting a different 25% each year

*Based on field hours needed for 2021 survey with a team of 3-6 people.

**Based on \$30 hourly rate for NJ Forestry Technicians from Zippia Careers as of April 2022. Please note that contractor rates may vary and could be higher than this number. Cost estimates do not include any company-specific overhead, insurance, or other costs, which may raise these price estimates.

Strategy 2: Early Detection and Rapid Response (EDRR) in the Great Meadow

Early Detection and Rapid Response (EDRR) methods are defined by the USGS as a coordinated set of actions to locate and eradicate invasive species (or potentially invasive species) before they spread and cause harm (Reaser et al. 2020). While the Forest Secchi Survey targets prominent invasive species already present at Schiff, EDRR can help in key locations to prevent new invasive species from becoming established. This strategy is effective for monitoring new invasive plant species in Schiff's Great Meadow. Additionally, it is critical to help maintain early successional habitats (Swanson et al. 2010).

EDRR increases the likelihood that non-native invasive plants will be found early, contained, and eradicated before they have the chance to spread and become widely established on the property. Time is of the essence. The EDRR framework includes:

1. Identify potential emergent invasive species early. Map the locations of these species.

2. Take immediate action to eradicate the species using several eradication methods (detailed in additional actions below).
3. Continually monitor the area to ensure populations are not reestablished.

The New Jersey Invasive Species Strike Team (NJISST) via the Friends of Hopewell Valley Open Space (FoHVOS) maintains a list of invasive species in New Jersey that can provide recommendations for what to search for on Schiff's property. Below, several emergent invasive species of concern are listed and provide a 'watch list' for Schiff's Great Meadow (Table 2).

Table 2: A selection of FoHVOS invasive plant species to watch for in Schiff's Great Meadow.

Common Name	Scientific Name	Category	Threat Level	Notes*
Mimosa Tree	<i>Albizia julibrissin</i>	Tree	Moderate	
Common Ragweed	<i>Ambrosia psilostachya</i>	Herb/ Forb	Mild	
Japanese Angelicatree	<i>Aralia elata</i>	Tree	High	Present near Woodbadge Lodge and Blue Trail from Pole Barn west towards lean-to and south to entrance drive.
Butterfly bush	<i>Buddleja davidii</i>	Shrub	High	
Scotch broom	<i>Cytisus scoparius</i>	Shrub	High	
Olive species (Russian, Thorny, Autumn)	<i>Elaeagnus angustifolia, pungens, umbellata</i>	Shrub	High	All three species may be present in forest and meadow habitats across Schiff's property
Giant hogweed	<i>Heracleum mantegazzianum</i>	Herb/ Forb	Moderate	
Lespedeza	<i>Lespedeza cuneata</i>	Herb/ Forb	High	Meadow edges
Princess tree	<i>Paulownia tomentosa</i>	Tree	Moderate	
Callery Pear	<i>Pyrus calleryana</i>	Tree	High	
Multiflora rose	<i>Rosa multiflora</i>	Shrub	High	
Raspberries & Blackberries	<i>Rubus spp.</i>	Shrub	Moderate to High	Many species are invasive (<i>armeniacus, laciniatus, parvifolius, phoenicolasius</i>)

* The full list, including animals and pathogens, can be found here: https://www.fohvos.info/wp-content/uploads/2021/05/2021_Strike_Team_Species_and_Control_Recommendations_2021_05_21.pdf

While EDRR methods could be applied across Schiff's entire property, they are particularly relevant in Schiff's Great Meadow. This meadow habitat is comprised primarily of native grass and herb species and provides excellent early successional (pre-forest) habitat for butterflies, songbirds, and other important fauna. However, the lack of tree cover and abundant sunshine provide increased opportunities for new invasive plant species to grow there. *Lespedeza* is one example of an emergent invasive plant that has been sighted on the edges of the meadow and

can be eradicated via EDRR methods. Thus, restricting EDRR management to the Great Meadow reduces costs and time needs while still providing a watchful eye on sensitive habitats.

EDRR monitoring could be conducted by Schiff staff or volunteers knowledgeable in plant identification during the late spring or early summer when plants are leafed out and blooming. Apps such as iNaturalist can be used to help identify vegetation. Walking around the perimeter, and in some cases, through portions of the Great Meadow is an effective way to spot potential new invaders. Their locations can be mapped with a GPS or marked on a paper map of the meadow so eradication efforts (detailed in subsequent actions) can be applied. These monitoring efforts could also feed into educational programming surrounding the importance (and sensitivity) of meadow habitats.

There are many examples of successful EDRR implementation across New Jersey and Pennsylvania that Schiff can look to as a guide for this type of meadow management. For example, the “Mows to Meadows” project in Fairmount Park, Philadelphia has converted five mowed areas to meadows by planting native wildflowers and grasses (Fairmount Park Conservancy, 2021). FoHVOS has collected some invasive species and wild food recipes on their website, which could provide fun educational opportunities for volunteers aiding in monitoring and eradication efforts (FoHVOS, 2022). Continual monitoring of the planted meadows will target any invasive species and remove them before they have a chance to take over.

Action Timeline:

- Fall/Winter: decide on Forest Secchi Monitoring targets and schedule for that year or set of years (Table 1) based on budget and management needs.
 - Allocate funds in operating budgets if outside contractors are required.
- Spring/Summer: EDRR monitoring with staff and volunteers in the Great Meadow for new invasive plant species (Table 2).
- Summer: conduct Forest Secchi Monitoring and save data to a secure location.
- Fall/Winter: prepare Forest Secchi Monitoring goals for next year so that monitoring activities are a part of the Conservation & Stewardship Committee budget prioritization process
 - Analyze data from the summer to note any trends in invasive species spread across years.
 - Update maps of invasive species as necessary to prepare for next year.
 - Identify target management areas or additional monitoring areas as necessary and include them in next year’s plans if applicable.
 - Deploy eradication efforts if necessary.

Action 2: Mechanical Control of Unwanted Vegetation

For already-established invasive species, emergent invasive species, and any other unwanted vegetation, mechanical pulling is one of the least expensive methods for removing plants. Mechanical control is any type of vegetation control performed by hand with or without machinery. Strategies include hand-pulling, cutting or chopping, digging up, sawing, mowing, or girdling. At times, mechanical methods may be combined with chemical methods (see next action) for greater effect.

Once invasive plants are detected on Schiff’s property via the Forest Secchi Survey or EDRR methods outlined above, removal of this unwanted vegetation is the next step. Using data from

the monitoring methods, Schiff can select priority areas for removal based on location (i.e. proximity to well-used areas), budget, and personnel. Mechanical methods are attractive because they can be low-cost and lend themselves to volunteer workdays. However, mechanical removal of unwanted vegetation can be time-consuming, difficult work.

Mechanical methods can be more effective for certain species, whereas others are more effectively removed via chemical methods. FoHVOS NJISST has resources on numerous invasive plant species in New Jersey with recommended management approaches. Specific timing of mechanical strategies depends on the species in question, but the majority of mechanical control efforts should occur in the spring or summer. It is important to avoid letting the plants go to seed, so efforts should be made to eradicate these species before they reproduce.

Table 3: FoHVOS recommended management strategies for some common invasive species in New Jersey.

Common Name	Threat Level	Recommended Action	Notes*
Mimosa Tree	Moderate	Chemical treatment in July-September due to strong resprouting	
Japanese Angelicatree	High	Chemical treatment in July-September due to strong resprouting	Present near Woodbadge Lodge and Blue Trail from Pole Barn west towards lean-to and south to entrance drive.
Japanese barberry	High	Cutting back stems followed by chemical treatment	
Butterfly bush	High	Cutting back stems followed by chemical treatment	
Oriental bittersweet	High	Cut vines and remove roots	
Olive species (Russian, Thorny, Autumn)	High	Chemical treatment in July-September due to strong resprouting. Cutting must be followed by chemical treatment.	All three species may be present in forest and meadow habitats across Schiff's property
Privet	High	Cutting back stems followed by chemical treatment	
Lespedeza	High	Pre-treatment cutting/mowing in June followed by chemical treatment later in summer	Meadow edges
Japanese stiltgrass	High	Mechanical pulling and covering vegetation to prevent resprouting. Chemical treatment also effective. Must be treated annually	Widespread across property
Princess tree	Moderate	Chemical treatment in July-September due to strong resprouting	
Mine-a-minute vine	High	Chemical treatment	

Callery Pear	High	Chemical treatment in July-September due to strong resprouting	
Japanese knotweed	High	Mowing in June as pre-treatment to weaken root system. Chemical treatment in September.	May need aquatic application permit due to proximity to streams and waterbodies.
Multiflora rose	High	Cutting back stems followed by chemical treatment	
Raspberries & Blackberries	Moderate to High	Cutting back stems followed by chemical treatment	Many species are invasive (<i>armeniacus</i> , <i>laciniatus</i> , <i>parvifolius</i> , <i>phoenicolasius</i>)

* The full list, including recommendations for animals and pathogens, can be found here: https://www.fohvos.info/wp-content/uploads/2021/05/2021_Strike_Team_Species_and_Control_Recommendations_2021_05_21.pdf

The removed vegetation should be taken away from the site so it cannot re-root in place. Enclosing cut stems or pulled up grasses in plastic tarps is an effective way to prevent re-rooting, and Schiff should designate a specific area of their property (likely near a maintenance building) to set up tarps. If more advanced equipment is needed to mechanically remove species (e.g., industrial mowers or chainsaws), trained Schiff staff should carry out the removals.

Action Timeline:

- Fall/Winter: Use data from invasive species monitoring methods to identify target plant species and specific areas of the property to employ removal efforts in the following year. Allocate budget as necessary.
- Spring/Summer: Employ Schiff staff, volunteers, or outside resources to remove unwanted vegetation.
- Monitor area one year later to assess possible regrowth of vegetation and determine if additional removals must take place.

Action 3: Chemical Herbicide Treatments

For already-established invasive species and any other unwanted vegetation, chemical control via herbicides is often an effective method of removal. Chemical control is any type of plant control that involves the use of herbicides. Examples include basal bark herbicides, which are applied to trunks and woody stems, and foliar sprays, which are applied to green leaves. When combined with mechanical methods (e.g., girdling and basal bark spray), chemical methods can be more effective at eradication. In fact, FoHVOS recommends that many species are eradicated via chemical means (see Table 3 for a list of common species at Schiff).

Once invasive plants are detected on Schiff’s property via the Forest Secchi Survey or EDRR methods outlined above, removal of this unwanted vegetation is the next step. Using data from the monitoring methods, Schiff can select priority areas for removal based on location (i.e., proximity to well-used areas), budget, and personnel. Chemical methods are attractive because they are often easier to apply and kill the target species faster.

Since chemical control using herbicides requires an applicator’s license, chemical control methods can only be performed by a trained and certified member of Schiff’s staff or contracted out. There is an upfront cost to obtaining chemical permits and licenses. For Schiff’s purposes,

the organization would need to acquire a New Jersey applicator business license which includes a \$150.00 annual fee in addition to a liability insurance policy with the equivalent of a \$300,000 coverage. The organization would also need to ensure staff maintained a current commercial applicator license in addition to regularly maintaining material safety data sheets (MSDS) and chemical use logs. The full pesticide control code is available through the New Jersey Department of Environmental Protection Compliance and Enforcement web page (NJDEP, 2022). Should Schiff contract out herbicide treatments, licensing and appropriate operations will be the responsibility of the contractor (NJDEP, 2022).

Regardless of which approach Schiff takes, we encourage the organization to practice integrated pest management (IPM). In brief, IPM consists of setting action thresholds, monitoring pests, preemptive prevention of pests, and control of existing pests. Schiff must first decide a threshold in which management is required, and if the property has already passed that threshold. Realistically, invasive species at Schiff will never be eliminated, but they can be managed to ensure that the detriment to native vegetation is limited. As mentioned earlier in the document, monitoring efforts are essential to determine the need for and success of invasive species management. Prevention of invasive species and pests should also be considered – this largely applies to emerging threats (emerald ash borer, spotted lanternfly, etc.). Being informed on the movement of any new invasive species and pests can allow Schiff to better prepare in case they try to move into the property. Lastly, Schiff will need to control any existing invasive species and pests using proper techniques and starting with materials that have the lowest risks involved with using them. Detailed information on IPM can be found on the EPA's website (US EPA, 2015).

When considering chemical treatments, caution must be taken to choose an appropriate basal bark or foliar spray for the species in question as herbicides can kill nearby desired vegetation as well. Chemicals may have an environmental impact, so extreme caution should be exercised especially when near bodies of water. Personal safety is also important: many herbicides are harmful if ingested or touched, so appropriate personal protective equipment must always be worn when using herbicides.

Chemical methods can be more effective for certain species, whereas others are more effectively removed via mechanical methods. FoHVOS NJISST has resources on numerous invasive plant species in New Jersey with recommended management approaches (Table 3). Specific timing of chemical strategies depends on the species in question, but the majority of chemical control efforts should occur in the spring or summer (after leaf-out but before seeding). It is important to avoid letting the plants go to seed, so efforts should be made to eradicate these species before they reproduce.

Action Timeline:

- Before management: Obtain necessary chemical applicator permits and undergo herbicide safety training.
 - Allocate funds for required herbicide supplies and permits/trainings.
 - Allocate funds in operating budgets if outside contractors are required.
- Fall/Winter: Use data from invasive species monitoring methods to identify target plant species and specific areas of the property to employ removal efforts in the following year. Allocation budget funds as necessary.
- Spring/Summer: Employ Schiff staff or outside resources to remove unwanted vegetation.
- Monitor area one year later to assess possible regrowth of vegetation and determine if additional removals must take place.

Action 4: Manual Control of Unwanted Vegetation via Agricultural Grazing

Agricultural grazing is another strategy to control non-native invasive plant species and other unwanted vegetation. Goats are great at controlling areas that are overrun with invasives in the understory because they will eat almost any vegetation – even thorny plants! Relationships with local farmers provide an excellent collaborative opportunity for Schiff to partner with the community to allow goat, sheep, and/or cattle grazing while achieving their land management goals.

Several successful grazing projects have been employed nearby in New Jersey and Pennsylvania that Schiff can look to for guidance. In addition to the benefits of grazing, some farms such as The Philly Goat Project (<https://www.phillygoatproject.org/>) offer additional services such as goat education, goat therapy, and goat yoga that could engage the local community in goat grazing practices at Schiff and raise awareness of vegetation control.

Employing this strategy involves collaboration with local farmers and organizations but provides a unique opportunity to enact land management goals using local resources.

Action Timeline:

- **Fall/Winter:** Identify target areas for grazing management and connect with local farmers or other organizations to arrange grazing plans for the following year.
- **Spring/Summer:** Employ grazing strategies on designated portions of the property.
- **Monitor area one year later** to assess possible regrowth of vegetation and determine if additional removals must take place.

Action 5: Prescribed Fire

Prescribed fire, also referred to as controlled burning, is used to meet multiple land management objectives, including removing unwanted invasive species, promoting native fire-adapted or fire-tolerant species, reducing hazardous fuel loads in the duff layer, and generally restoring natural woodlands. However, there are numerous safety measures that must be in place before a prescribed burn is planned and lit.

Prescribed burning in NJ is limited to the months of October-June, and planning for any prescribed burning efforts should begin in the spring before any efforts were to begin (NJDEP, 2022). According to the NJ Prescribed Burn Act (2018), burns on any lands not controlled by the state require several notices to neighboring entities and the public (including at least one newspaper circulation to adequately inform the surrounding public) preceding the prescribed burn (NJ - A1675, 2018).

Schiff has had a long history of working with the New Jersey Forest Fire service and local fire authorities to conduct prescribed fires in specific locations on the Schiff property since 2004 (Figure 2). After a hiatus of about 10 years, Schiff reintroduced controlled burns on the property in 2020, 2021, and 2022 (Figure 3).

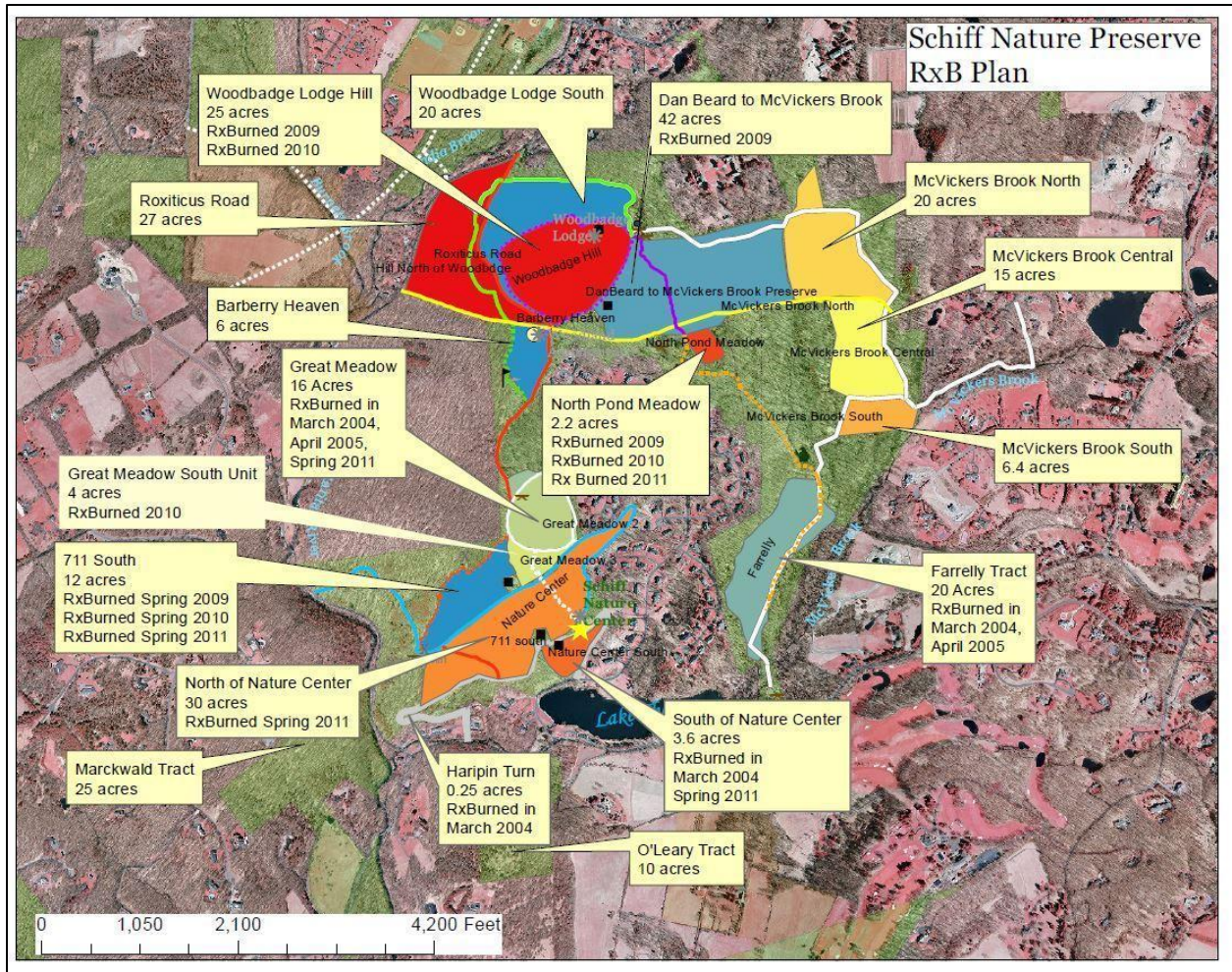


Figure 2: Map of Schiff's prescribed burning plan from 2004-2011. Map provided by Alex Battey.

Schiff has adopted a set of prescribed burning procedures to ensure that these activities are conducted with detailed preparation, documentation and sufficient communication with the proper fire authorities and the local community. Prescribed burning practices are available from Schiff's Executive Director upon request. Additionally, Schiff is committed to maintaining annual prescribed burning records and will continue to set specific schedules, locations, and acreages of future burned areas as determined by the intensity of specific invasive species, the success of prior prescribed burning efforts, funding allocation, and need.

Recent burned areas included 25 acres in the Great Meadow and Dan Beard Cabin Meadow (2020), 39 acres in the southwest area of the preserve by Entrance Drive and the Blue Trail (2021), and 151 acres in the northern part of the preserve from Roxiticus Road and the Franklin Parker Trail into McVickers Brook Preserve (2022). These areas are illustrated in Figure 3.

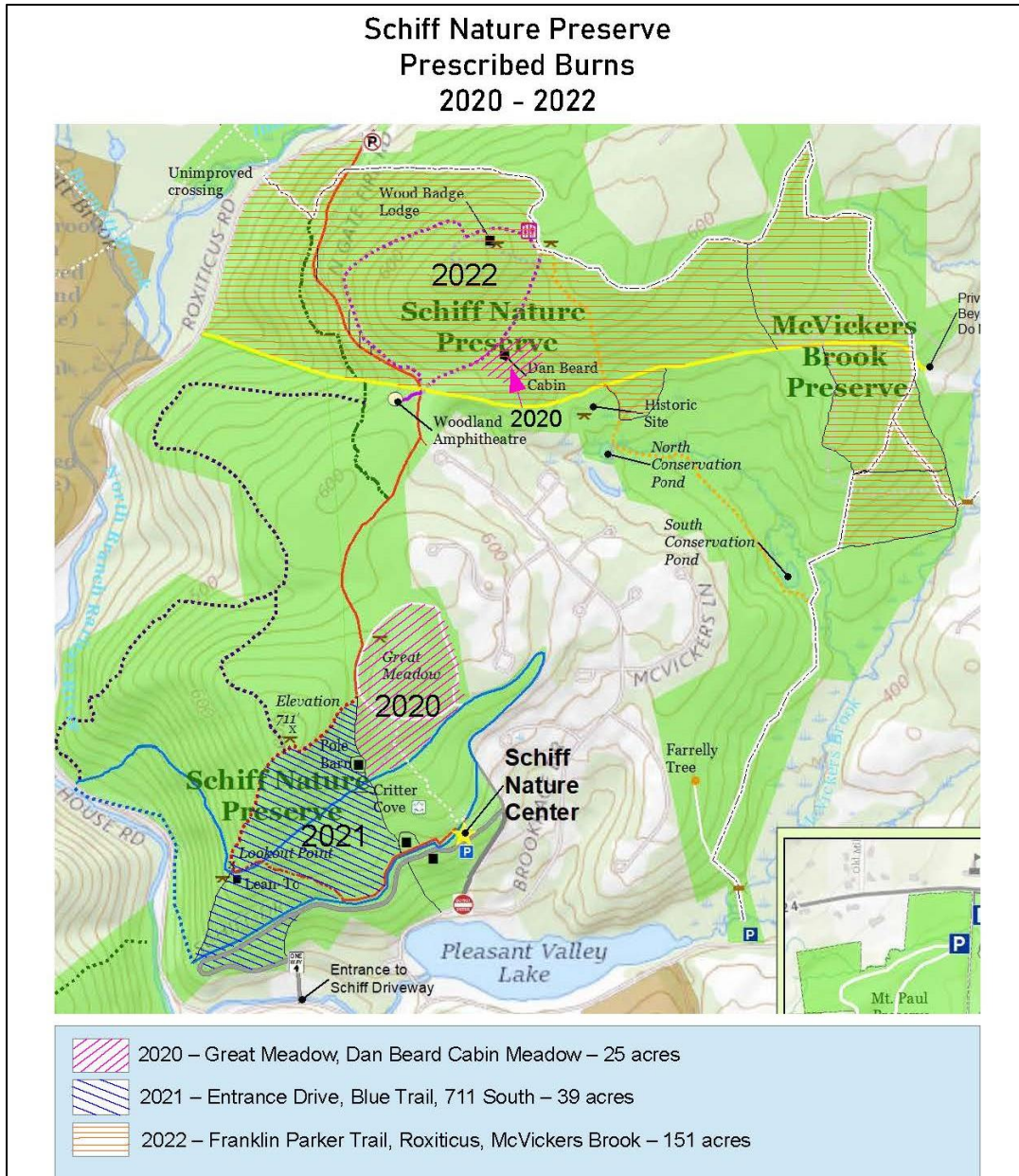


Figure 3: Map of Schiff's current targeted prescribed burning zones for 2020-2022. Map provided by Ken Rendall.

Action Timeline:

- Fall/Winter: Determine need and budget for potential controlled burns in the following year. Identify areas for burning and calculate acreage to determine budgetary allocation. If needed, update maps with target burn zones. Burning can occur in the months of October to June, so allocate approximate timing of targeted burns when budget is discussed.
- Spring: finalize controlled burning plans for summer and fall. Make contractor/NJ Forest Fire service connections as necessary.
- Summer/Fall: prepare for burn by inventorying necessary equipment and permits, notifying neighbors, and cordoning off planned burn area according to protocols.
- Monitor regrowth during the 2-3 years following the prescribed burn.

Action 6: Replanting Native Vegetation

Replanting desired native species can be an effective way to give those native species a leg up over competing forest understory or meadow vegetation. When coupled with other invasive species control strategies, such as after a prescribed burn or a year after using herbicides, replanting native trees and shrubs is an effective way to reestablish forest understory. In 2020, Schiff took action on this front by establishing an outdoor fenced-in nursery for newly acquired seedlings and saplings. Fencing this area had the added bonus of preventing deer browse on these vulnerable young plants.

However, native species may be a tasty treat for white-tailed deer, so any planted native species that are appetizing to these ungulates should be caged to protect them from browse. Cages should extend all the way to the ground and be anchored in place with wooden or metal stakes. If possible, cages should fully cover any parts of the plant within a deer's reach without impeding plant growth. Chicken wire and other wire fencing material can be effective for constructing tree or shrub cages for the early years of a plant's life. Listed below are price estimates from Pinelands Nursery as of 2/9/22. A full list of prices by species can be found in Appendix 2 (Pinelands Nursery, 2022).

Table 4: Price estimates for some tubelings and trees from Pinelands Nursery. Bulk prices reflect a purchase of at least 128 individuals.

Species	Tubeling Price	Tubeling Bulk Price	Tree Price	Tree Bulk Price
<i>Acer rubrum</i>	\$2.79	\$1.99	\$54.99	\$39.99
<i>Quercus velutina</i>	\$2.79	\$1.99	\$16.49	\$11.99
<i>Quercus rubra</i>	N/A	N/A	\$54.99	\$39.99
<i>Pinus rigida</i>	\$2.79	\$1.99	\$16.49	\$11.99

If purchasing native plants becomes too costly, Schiff could rally volunteers to help collect seeds (e.g. acorns, walnuts, hickories) of native trees on its property in the fall and germinate them over the winter. The outdoor fenced-in nursery area would be the ideal location on Schiff's property to germinate new seeds. This process would take additional labor and space but could provide an educational opportunity for all ages.

Action Timeline:

- Fall/Winter: assess budgetary needs for purchasing planting stock, cages, and/or fencing in the following year. If no budget is available or this option is not selected, then determine if seed collection should take place before winter.
- Spring/Summer: Assess appropriate locations for tree plantings. If growing seeds, monitor growth and care for new seedlings.
- Summer/Fall: Engage volunteers to assist with planting efforts (done in the fall). Install cages or fencing around all newly planted species if those species are appetizing to deer.
- Monitor health, progress, and potential deer browse on replanted species.

Goal 1b: Manage Overabundant White-Tailed Deer

Overabundant white-tailed deer pose a problem for humans and ecosystems across New Jersey. These species thrive in fragmented edge habitat; the fragmentation of forested areas by expanding suburbs across the state creates ideal conditions for deer to thrive. A 2021 study from ecosystem services firm Steward Green used thermal infrared camera-equipped drones to detect deer in eight New Jersey counties and found deer densities of up to 112 animals per square mile. Healthy deer densities are 5-15 animals per square mile. There is a lot of work to be done across the state to reduce deer populations.

Overabundant deer pose an ecological threat by browsing native trees, shrubs, herbaceous plants, and other understory vegetation, causing these plants to die and decimating forest understory cover. An unchecked deer population nearly halts forest regeneration, creating an empty understory that presents the perfect opportunity for invasive species establishment. These invasive species proliferate and continue to outcompete native vegetation, creating an understory dominated by non-native vegetation. The absence of native understory vegetation has implications for future forest composition and structure: if no new saplings are present to replace the overstory as it ages and senesces, species diversity could suffer and the northern hardwood forests currently on Schiff’s property could drastically change. This has cascading effects on the wildlife that call Schiff’s forests home.

Much of Schiff’s property bears the evidence of heavy deer browse: understories are open or sparse with native saplings. A midstory of native trees has managed to outgrow the reach of deer, but low-lying native shrubs, saplings, and herbaceous plants are less abundant. Forest gaps are filled in with invasive species – non-native trees like Japanese angelica tree and tree of heaven, and numerous shrubs such as Japanese barberry, Russian olive, and multiflora rose. In this way, impacts of overabundant deer and non-native invasive species are intertwined, and one cannot be considered without the other. Due to deer browse, any efforts to remove invasive species and reestablish native vegetation must also be coupled with a deer management program so that new, native vegetation doesn’t also become a deer’s next meal.

<p>WHAT & WHY</p> <p>Overabundant white-tailed deer have decimated forest understories at Schiff by browsing native vegetation, hindering regrowth of native hardwood forests. Managing and reducing deer populations is important to restore native species and create a healthier ecosystem.</p>	<p>Action 1: Monitoring Efforts</p> <ul style="list-style-type: none"> • Conduct nighttime drive-by counts with staff and volunteers • Contract or partner with companies or universities to use thermal cameras or drones to obtain deer counts • Incorporate deer browse measurements into Forest Secchi protocols
	<p>Action 2: Hunting Program</p> <ul style="list-style-type: none"> • Reinstate hunting program based on protocols from prior years • Make local connections for sustainable use of deer meat • Consider increasing deer take to reduce herd
	<p>Action 3: Enclosures and Fencing</p> <ul style="list-style-type: none"> • Maintain existing deer enclosure • Add small enclosures strategically across the property to encourage native forest regeneration

Duke Farms in Hillsborough, New Jersey has researched overabundant deer populations for years and has managed to control these animals within its property lines. Many management recommendations are taken from their numerous successful deer studies.

Action 1: Deer Monitoring Efforts

Obtaining hard data on deer populations at Schiff is a priority for determining appropriate management strategies. A deer count was obtained via nighttime drive-by through the property in the recent past, and a deer count per square mile was calculated based on that effort. Similar efforts could be repeated with Schiff staff and volunteers to get a low-cost baseline estimate of deer density across the property.

With increasingly accessible remote sensing technology, it is becoming cheaper and easier to detect deer via drones equipped with thermal infrared cameras. While purchasing a drone, cameras, equipment, and undergoing flight training may be a prohibitive upfront cost to Schiff, numerous universities have adopted drone technology and are eager to collect data for research projects. Schiff could reach out to local universities to establish a research partnership that would provide free or low-cost deer counts in exchange for research work on the property.

When drones are used, it is necessary to ensure all proper protocols from the State of New Jersey and Federal Aviation Administration are followed. If others are flying the drone, it is their responsibility to have a licensed drone pilot operating the drone and to obey all state and federal airspace guidelines. Schiff should ensure the rules are followed and check in with local guidelines on drone flights of their property. Since some neighboring property may be photographed during the flight, Schiff should plan ahead to seek approval from neighbors or design flight paths that avoid capturing property edges and thus neighboring property.

These counts should be repeated every 2-5 years to determine if the deer population is changing. As other deer mitigation strategies are employed at Schiff (see subsequent actions in this section), monitoring is especially important to see if strategies are working or need to be adjusted.

Additionally, it is important to quantify the impacts of deer browse across the property. In the past, Michael Van Clef, PhD, Stewardship Director at the Friends of Hopewell Valley Open Space and Program Director of the New Jersey Invasive Species Strike Team had conducted a Sentinel Seedlings study to quantify the amount of deer browse on native vegetation. These measurements have not been repeated for some time, and there is potential to include browse measurements at already-established Forest Secchi plots. Adding these data can help Schiff to determine if other deer control efforts outlined in the actions below are impacting native vegetation regrowth.

Action Timeline:

- **Fall/Winter:** determine need and budgetary considerations for deer count. Reach out to local partners such as colleges or universities to see if collaborative opportunities are available to obtain counts at low cost.
- **Spring:** incorporate measures of deer brose field data collection into existing field sampling efforts as is practical.
- **Summer:** carry out deer browse field sampling efforts and deer drive-by monitoring efforts at night.

Action 2: Hunting Program

Deer hunting has been an effective way to reduce herds. At nearby Duke Farms, deer once exceeded 200 animals per square mile, over ten times the recommended environmental limit. Duke Farms contracted with White Buffalo, Inc. to design, implement, and carry out a deer management program to reduce deer numbers on the property. One of the strategies employed in this plan was targeted deer hunting. While hunting comes with ethical implications, it is often touted as one of the best methods for reducing herd size and mitigating the environmental impacts of deer. Deer hunting season in New Jersey begins in September for bows and is restricted to December and January for firearms.

Schiff has allowed controlled deer hunting on its property since the 2004-2005 hunting season in an attempt to reduce its deer population. This deer hunting program has several objectives:

1. To reduce the overall population of deer on the Preserves, especially the number of does of breeding age.
2. To complement the recent similar efforts of Mendham Township to reduce deer populations on Township-owned open space.
3. To establish careful controls which will allow the public to continue to safely enjoy the Preserve throughout the year.
4. To facilitate and complement other efforts which are being made by the Trust to restore and enhance the ecological health of the Preserve and the variety of wildlife habitats found here.

Schiff's deer management goal should aim to reduce deer herds closer to the biological carrying capacity of 5-15 animals per square mile to allow for the forest understory to recover under less intensive browse pressure. After initial deer survey counts are taken, this may mean increasing the intensity of the hunting program. Schiff has already designated deer hunting zones and has a history of hunting on the property, so continuing to work with local hunters and established connections provides an ample opportunity to increase deer hunting (Figure 4).

Hunted deer should not be wasted; the venison can be consumed by hunters or distributed locally to ensure waste is minimized. Schiff could consider partnering with local food pantries or organizations that help to feed people in need if deer hunts produce excess meat. Additionally, local crafters may have interested in deer hides or antlers; Schiff could potentially make a small

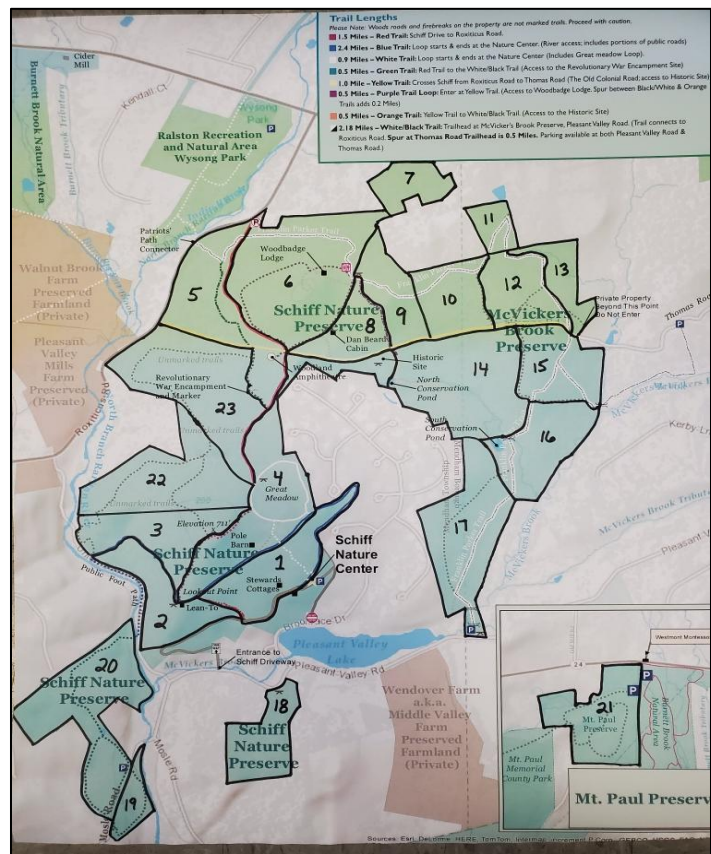


Figure 4: Deer hunting zones map. Provided by Alex Battey.

profit by selling these deer parts or could consider donating them to crafters or other organizations.

Action Timeline:

- Fall/Winter: Plan for next season's hunting goals, including any budgetary allocation and/or local regulations that must be followed or filed before hunting begins.
- Spring/Summer: contact potential hunters for participating in hunting program. Take nighttime drive-by counts to get a rough deer density.
- Fall/Winter: enact hunting program, assessing season's take and determining if take needs to change for next season.

Action 3: Deer Enclosures and Fencing

Excluding deer from an area is an effective way to immediately mitigate the impacts of overabundant deer browse. Unfortunately, fencing the entirety of Schiff's land holdings and maintaining that fence is prohibitively expensive (roughly \$14/ per linear foot for construction via the company Profence) and blocks out other desirable species along with the deer (Parker, 2022). Additionally, excluding deer from Schiff relocates adverse deer impacts onto Schiff's neighbors.

However, creating smaller fenced enclosures on Schiff's property could be an ecologically sound and cost-effective way to protect smaller sensitive habitats from deer browse and restore pockets of native vegetation across the landscape. Schiff has one enclosure on its property already that can serve as an example for constructing additional enclosures. Even small plots have been shown to have long-term positive impacts on plant species diversity on a mid-Atlantic hardwood forest (Abrams and Johnson, 2012). This includes allowing native trees and vegetation to regrow without the destructive impacts of deer browse, thus aiding in restoring native species to the landscape and regenerating forest understory.

Smaller fenced areas are less costly to install and maintain and could provide educational opportunities for all ages about the impacts of deer browse on New Jersey's forests. To mitigate costs, Schiff could consider partnering with a local university that might have funding for a research study on deer browse. Research funding, depending on the institution, may partially or fully pay for the installation of deer enclosures in exchange for data collection.

The above strategy is employed by Philadelphia Parks and Recreation which has multiple "restoration sites" in wooded areas throughout the city. These enclosure sites are identified based on species composition and are often adjacent to creeks or streams. The restoration sites serve as ideal locations for volunteer tree planting events held by the city, as trees planted in these enclosures are not vulnerable to deer browse. While fence construction and maintenance are primarily funded by the parks department; the city has a designated enclosure for research by Penn State University. Schiff may consider modeling this strategy on a smaller scale when implementing deer enclosures.

Action Timeline:

- Fall/Winter: determine if budget allows for purchase of fencing to install small enclosures on the property. Select locations for enclosures.
- Spring: install enclosures before leaf-out to protect vulnerable new seedlings and saplings in the understory.
- Fall: monitor enclosures for signs of damage and wear.

Goal 1c: Manage Rare Species and Other Species of Concern

According to ecological surveys, Schiff is home to five species of threatened, rare, and special concern species of animals and plants. In order to maintain and enhance their populations, Schiff must take action to protect their habitat and prevent further population declines. These five rare species are:

1. Wood turtle (*Glyptemys insculpta*)
2. Eastern box turtle (*Terrapene carolina*)
3. Barred owl (*Strix varia*)
4. Tiger spiketail dragonfly (*Cordulegaster erronea*)
5. Narrow-leaved Vervain (*Verbena simplex*)

Additionally, Schiff contains many ecologically important habitats, such as productive trout headwaters, native prairie grassland habitat, and diverse songbird habitat. Protecting both individual species and broad habitats is important for continued successful land stewardship.

Many of the prior sections contain actions that are beneficial for maintaining rare species and their habitat. For example, reducing invasive species (via mechanical and/or chemical methods) and replanting native vegetation are effective ways to enhance wildlife habitat. While restoration efforts of some of the above species exist in New Jersey to varying levels of success (i.e., wood turtle headstart efforts in Great Swamp) (Lebovitz, 2018), for the sake of brevity this goal will focus on inventory and monitoring efforts as they are essential before any restoration efforts can begin. Additionally, many monitoring efforts present excellent opportunities to create engaging volunteer opportunities; protocols for each individual species are included in Appendix 3. Schiff also has the ability to serve as a field site for researchers at local universities, as monitoring efforts at Schiff can act as a part of a comprehensive research study. Therefore, this section will focus on monitoring and measuring for rare and endangered species via partnership with other institutions and volunteer networks to manage any costs involved.

Action 1: Inventory Rare Species & Monitoring Efforts

Strategy 1: Turtle Monitoring Efforts

Methods of wildlife surveying are largely species dependent, but two species of concern, wood turtles and box turtles, can follow similar strategies for monitoring. With appropriate training, turtle monitoring efforts provide varied and engaging experiences for volunteers and/or interns that may work as Schiff. A detailed sampling methodology for box turtle population assessments developed by the Northeast Eastern Box Turtle working group can be found in Appendix 3 (Northeast Eastern Box Turtle Working Group, 2021).

For longer term population studies on turtles, two methods are commonly used for identifying individuals. The first and more traditional method is a unique notching in the carapace of the individual (Williamson 2022). This requires no special equipment other than a metal file and can be an inexpensive and effective way of identifying individuals in a population. The main drawbacks of this methodology include requiring diligent tracking of markings (to ensure no pattern is repeated) and the risk of the identifier no longer being readable should the animal face an injury.

The second method would be the “pit tagging” method which involves inserting a readable microchip below the skin of the animal. This method is employed by The Wetlands Institute (TWI) in Stone Harbor, NJ for their diamondback terrapin monitoring project and is common among larger scale turtle monitoring efforts. The strengths of this method include definitive evidence of an individual’s identity and ease of use when tagging and identifying previously captured individuals. This could potentially be the preferred method for more serious scientific study but may not be necessary for internal monitoring efforts at Schiff. The major drawbacks of this method include price (with proprietary readers starting at roughly \$100 and individual tags costing ~\$150 for 25 (Williamson, 2022)). This method also requires specialized equipment in order to identify an individual, so manpower may be limited by reader availability for such monitoring efforts. This method would be a collaboration opportunity with researchers or professionals who have the expertise and funds to assist Schiff with turtle monitoring efforts.

Strategy 2: Barred Owl Monitoring Efforts

Barred Owl population assessments may follow a similar mark-recapture model found in turtles, but the trapping and tagging owls can be considerably more difficult than turtles. Should Schiff choose to use a mark recapture method, banding is a common method for identifying individuals among avian species. If Schiff merely wishes to monitor population density and activity on the property, night surveys monitoring vocalizations can be used with the protocol in Appendix 3 (Wiens *et al.*, 2011). Once again, collaborations with trained ornithologists would benefit Schiff for owl management.

Strategy 3: Tiger Spiketail Dragonfly and Other Insect Monitoring Efforts

For monitoring efforts for dragonflies and smaller insects, Schiff may consider following the protocol of the New Hampshire Audubon Society (Appendix 3) (Hunt 2012). This protocol may be a good option for Schiff, as the initiative outlined by the NH Audubon society was largely a citizen science project run almost entirely by volunteers. This initiative and the above monitoring efforts would all make exciting and engaging volunteer activities for grown naturalists and aspiring scientists alike.

Strategy 4: Narrow-Leaved Vervain Monitoring Efforts

Schiff is home to a fairly robust population of narrow-leaved vervain located near the Dan Beard Cabin. This area is already cordoned off and signage is present so visitors can learn about the species and avoid damaging the plants. Seed-saving methods are already being employed by Schiff staff and this practice should continue to help the species population grow.

Action Timeline:

- Fall/Winter: determine if any budget can be allocated to rare and endangered species projects.
- Winter/Spring: reach out to potential collaborators to plan for Spring/Summer field monitoring efforts, aiming for low- to no-cost partnerships with universities and state agencies.
- Summer: engage volunteers in monitoring efforts as is appropriate.

Vision 2: Promote and Manage Recreational Opportunities

In addition to protecting and enhancing its natural resources, Schiff is dedicated to providing excellent public access and passive recreational opportunities for Morris County residents and beyond. Because many of Schiff's parcels were purchased with Green Acres funding, Schiff has an obligation to provide these passive recreational opportunities to New Jersey residents. Outdoor recreation has been shown to have both physical and mental health benefits, so Schiff's easily accessible trails provide a valuable benefit to New Jersey residents. To accomplish this mission, Schiff will continue to effectively manage its infrastructure, including its trail network, buildings, and other areas at Schiff frequented by staff, volunteers, and the public.

Goal 2a: Trail Maintenance Activities

One of the most popular passive recreational opportunities for local Morris County residents is hiking on Schiff's network of trails. Schiff has approximately 12 miles of marked trails for visitors to explore. Most trails are dirt, grass, or other natural material and are suitable for foot traffic only. However, some trails are paved in portions, constructed with gravel, or are wide and level enough to permit vehicular traffic to allow maintenance vehicles to access parts of the property (visitors are not allowed to bring vehicles on these roads).

A top priority for all trail-based activities is safety. All trails must be maintained regularly to ensure the safety of hikers and safe passage of vehicles. Additionally, signage must be present clearly marking trails and providing navigational information to hikers. The actions below detail measures Schiff can take to maintain their recreational infrastructure to ensure a safe and enjoyable visit for all.

<p>WHAT & WHY Schiff provides many passive recreational opportunities, namely hiking and trail-based activities. Maintaining trails via signage, clearing vegetation, grading, and other methods is necessary for safety and enjoyable visitor experiences. Additionally, maintaining equipment is vital to Schiff's continued stewardship of the property.</p>	<p>Action 1: Trail & Infrastructure Maintenance</p> <ul style="list-style-type: none"> • Continue regularly scheduled trail maintenance, including volunteer efforts as much as possible for engagement • Maintain equipment needed to keep trails in good shape • Monitor and repair infrastructure such as signs, blazes, steps, and footbridges as needed
	<p>Action 2: Trail Popularity</p> <ul style="list-style-type: none"> • Employ surveys and staff monitoring to assess popularity • Consider purchase of trail cameras for property
	<p>Action 3: Trail Closures</p> <ul style="list-style-type: none"> • Consider obligation to Green Acres Program • Allow closed trails to regrow naturally • Provide signs and updated maps to warn visitors of closed trails
	<p>Action 4: Trail Improvement</p> <ul style="list-style-type: none"> • Consider creation of connecting trails to minimize costs • Budget for tree removal efforts and other costs

Action 1: Maintenance of Trails and Trail Infrastructure

Schiff is committed to maintaining its 12-mile trail network for the continued enjoyment of visitors. Broadly, trail maintenance involves the following activities:

- Mowing, grading, and clearing existing trails of obstacles to maintain clear walkability and minimize safety hazards such as tripping on rough terrain.
- Maintaining equipment necessary (such as chainsaws, tractors, gators, mowers, and hand tools) for carrying out any trail maintenance activities.
- Constructing and repairing infrastructure such as footbridges, steps, and handrails that make trails more accessible to all visitors.
- Managing and maintaining trail signage, such as clearly colored trail markers and name signs, reminders about preserve rules (i.e. leashing dogs), and kiosks with maps and additional navigation information.
- Keeping updated paper trail maps at the Nature Center for visitors to use while hiking.

Maintenance activities such as trail grading, mowing, tree removal, and bridge repair keep trails safe and clear for hikers and provide opportunities to engage volunteers in trail maintenance activities. For example, volunteers can help by using hand tools such as small saws and clippers to trim overgrown woody vegetation overhanging trails for easier passage. However, outside crews may need to be contracted for large tree removal as needed. Schiff staff can perform regular duties such as mowing grassy trails and refilling any areas that have been washed out by heavy rains.

Some trails may require additional resources to enhance accessibility. Infrastructure such as footbridges over soggy ground, stone or wood steps built into steep grades, and handrails for stability support may enhance certain trails on Schiff's property. Adding trail-specific enhancements can be discussed amongst Schiff staff if budget allows for such trail improvements. For existing footbridges and other infrastructure already on the property, regular visual monitoring by Schiff staff can determine if structure integrity is a concern. If any structures need repair, Schiff should include determine if the repair can be done by staff and volunteers or requires outside contractors and include all relevant costs in the next budget. Local craftsmen or woodworking organizations may be able to assist with these efforts at low or reduced cost. Alternatively, trail improvement projects could be a future Scouting project opportunity.

Additionally, trail maintenance involves keeping signs, kiosks, and maps up to date to ensure hiker safety and navigational ease around the property. On-trail signage is important so visitors know where they are on the property and can safely navigate back to their cars. Schiff already has a system of named and color-coded trails. Signs with those colors and trail names already exist across the property; maintenance efforts can ensure that these signs are clear (not faded or obstructed by vegetation) and legible. If signs need to be replaced due to disrepair or trail renaming, costs should be allocated in the annual budget. Many signage activities, such as painting blazes on trees, can be done at low cost by Schiff staff and volunteers. This is another area for a Scouting project opportunity.

Other signage, such as reminders of preserve rules, can be included at popular points and key trail junctures across the property. Reminders to stay on the trail and leash dogs are examples of such rule reminders for visitors. Small kiosks with maps, doggy bags, and other hiker information can be installed if interest and budget allow.

Finally, providing visitors with clear trail maps can help to keep everyone safe and increase enjoyment at Schiff. These trail maps should be color-coded to Schiff's existing system of trail

colors and names and provide visitors with an easy resource to navigate the property. Maps can be available at the Nature Center and at kiosks on the property. Schiff staff can check kiosks to ensure the maps have not run out. Schiff can work with local universities that have Geographic Information Systems (GIS) software to update maps and GIS data for free or at low costs.

Action Timeline:

- Fall/Winter: Budget in necessary funds for next year's annual trail maintenance activities, which may include money for equipment purchase or repairs, road grading and repair, footbridge maintenance, and occasional contractor expense for removing trees that are too large for volunteers and staff to handle safely.
- Spring: carry out any necessary tree removals before leaf-out.
- Spring/Summer: carry out trail maintenance, grading, and repair activities to keep trails safe for increased visitor usage in the warmer months. Reach out about possible Scouting projects for some of these activities.
- Spring/Summer: check for missing or faded trail signs and update as needed.
- Fall: Make any necessary changes and updates to paper trail maps.

Action 2: Assess Trail Popularity

Trail maintenance can be costly, both from a budgetary standpoint and in staff and volunteer time. Therefore, if any trails are not well-used at Schiff, maintenance costs may not be worth it at those locations, so funds can be allocated elsewhere. Before any trails are closed or new trails are established, assessing trail popularity is important to determine visitor use and feedback. Three ways to assess trail popularity are:

- Questionnaires or other surveys of Schiff visitors.
- Trail cameras or trail counters set up at strategic locations across the property.
- Observations by Schiff staff.

Visitors to Schiff are a valuable source of information regarding outdoor recreation. There are several ways to engage Schiff visitors and gather feedback to shape Schiff's outdoor recreational planning efforts going forward. Surveys in several formats can be used to gather visitor feedback about the preserve and gauge trail popularity. Paper surveys can be designed by Schiff staff, printed, and made available in the Nature Center for visitors to complete. This option is low-cost, but all survey responses must be entered into a computer by Schiff staff, adding to the time needed to gather survey data. Another survey design option is an online survey. These can be designed and distributed for free using products such as Google Forms. While design and set-up of an online survey may initially take more staff time, Schiff will save time later because they will not have to manually type responses into a computer. For example, an online survey could show a map of Schiff with trails clearly labeled and ask respondents to select the trails they hiked from a dropdown menu in the survey. This allows for an easy tally of which trails are most popular and which trails are not often hiked, thus guiding management decisions with visitor-backed evidence. For both options, keeping the survey to a few key questions with short responses helps to increase response rate. For added incentive, Schiff could enter survey respondents into a small raffle for small Schiff-branded items like magnets, tote bags, stickers, etc.

Trail cameras are another option for assessing trail popularity and have the added benefit of trail monitoring. For example, trail cameras can help monitor any off-leash dogs or other instances of visitors breaking preserve rules. At the time of this writing, Schiff is instituting a revised dog

leash policy due to rule violations and may consider trail cameras to monitor compliance with the revised policy.

When selecting trail cameras, several considerations come into play, including:

- Camera price
- Battery life
- Detection ability, including range of detection
- Picture quality
- Potential need for cellular data for image transmission

The TrailCamPro website (<https://www.trailcampro.com/pages/first-time-trailcam-buyers-guide>) has a useful guide for trail cameras that may be useful in selecting the appropriate camera for Schiff's needs. Most trail cameras for wildlife and security range from approximately \$150-\$500 in price; many run on rechargeable batteries. Trail cameras could serve double-duty in monitoring trail use and rule compliance in addition to deer or other wildlife monitoring. Schiff staff can determine the suitable locations to place cameras for optimal counting – perhaps at key trail intersections across the property or at property entrances – and determine how many cameras are necessary to purchase and deploy if this option is selected.

Lastly, simple observations by Schiff staff regarding trail popularity can be useful, though less scientifically rigorous, to make trail decisions. As Schiff staff are leading hikes, performing maintenance, running volunteer programs, or enjoying Schiff's trails themselves, they can note the locations and number of visitors they encounter. This is a very easy, low-cost strategy, and one that Schiff staff likely already employ as they spend time on the property. Supplementing this strategy with surveys or cameras as costs allow is encouraged, but we cannot discount the valuable observations of staff. A board meeting or other formally called meeting setting would be an appropriate place to discuss trail usage and make a list of staff-noted popular and unpopular trails that can guide management decisions.

Action Timeline:

- Fall/Winter: discuss trail assessment strategies in addition to budgetary and time needs for the following year. Staff discuss their own observations of trail popularity and use that knowledge to guide further survey or camera monitoring efforts for the following year.
- Spring: if survey option is chosen, design paper or online survey and deploy.
- Summer: encourage visitor response to survey, if this option is selected
- Fall/Winter: assess results of survey and incorporation strategies for action into next year's budget planning.

Action 3: Close Unused Trails

Following the results from assessing trail popularity (above), Schiff may decide to close some unpopular or unused trails. If this is the case, then this action applies. Schiff has closed trails before in the northeast portion of the property, largely by removing trail signage and ceasing maintenance so trails become overgrown and inaccessible.

However, many of these unused trails are then repurposed as firebreaks when prescribed burns are performed in that area. In this case, closed trails may be cleared for firebreaks but must be labeled as such to prevent visitor use. After the burn, trails will remain closed with appropriate signage and allowed to regrow naturally.

When trail closure happens, trail maps must be updated with the changes. Both online and printed versions of the maps must be updated to keep things consistent and reduce visitor confusion. On-trail signage must be clear to visitors, especially as recently-closed trails are in early stages of natural regrowth.

However, before closing any trails, Schiff must discuss trail closure in a formal meeting. Because many of Schiff's parcels were purchased with Green Acres funding, Schiff is obligated to provide passive recreational opportunities (such as hiking on trails) on these parcels. Schiff staff and board members must determine if this applies to the proposed closed trail or not. Other passive recreational opportunities (such as bird viewing areas) may be discussed if the Green Acres stipulation allows.

While Schiff staff may elect to cease maintenance on any trails to be closed, thereby minimizing maintenance costs on those trails, any unused or abandoned trails must be marked as such to prevent visitors from getting lost on the property. Old trail signs and blazes must be removed to prevent hiker confusion. "Trail Closed" signs can be put up at junctions to deter hikers from using the depreciated trail. These signs can be handmade or purchased for a low cost.

Action Timeline:

- Fall/Winter: assess results of trail popularity from prior year and determine if any trails will be closed.
- Winter: if some trails will be closed, remove them from GIS maps (mark as depreciated) and remake maps without those trails. Print new maps and restock Nature Center and kiosks with updated maps. Change maps available online.
- Spring: if some trails are closed, remove trail signs. Ensure staff know to cease maintenance on those trails. Put up barriers or "Trail Closed" signs if necessary to deter hikers.

Action 4: Improve Existing Trails and Create New Trails

Visitor surveys may also highlight possibilities for new trails to be added. If this is the case, and budgetary meetings determine this action is feasible, Schiff can consider the addition of new trails across the property, perhaps on newly acquired parcels. While this action may take a backseat at the time of writing, trail creation may arise in the future. In the meantime, Schiff should focus time and monetary resources on maintaining and improving the existing trail network.

One way to accomplish this is to create additional shorter connecting trails between two existing trails on the property. This might improve visitor experience while adding only minimally to trail maintenance duties. Care should be taken to avoid cutting across sensitive habitats, such as the Great Meadow, or removing many large overstory trees in the process. Additionally, if new trails are added near wetland or stream habitats, caution should be exercised to prevent bank erosion and habitat degradation.

Many of the activities proposed in the *Maintenance of Trails and Trail Infrastructure* action can help to improve existing trail infrastructure to enhance visitor experience at lower costs and may be more attractive options to Schiff than constructing entirely new trails.

Trail creation can be costly, often involving tree removal, grading, bulldozing, and construction; many of these services may need to be contracted out. Therefore, adding additional trails is low on Schiff's priority list due to high costs. Additional efforts must be made in updated maps and signage if new trails are added.

Action Timeline:

- Fall/Winter: assess the need and budgetary requirements for new trails or connectors at a Schiff meeting.
- Spring: begin construction on new trails, or improvement activities on existing trails. Update maps to reflect any changes.

Goal 2b: Invest in Buildings and Infrastructure Maintenance

A minimum amount of investment is required to keep Schiff's permanent structures in good working order for staff, volunteers, and the visiting public. This includes the Nature Center, Wood Badge Lodge, the Pole Barn and the two residences at 335 and 336 Pleasant Valley Road. Schiff should do an annual review of the maintenance needs for all of these structures to ensure adequate funds are included in the operating and capital budgets.

<p>WHAT & WHY Schiff relies on its building infrastructure for staff space and visitor functions. Continued maintenance ensures safety, code compliance, and a welcoming environment for visitors.</p>	<p style="text-align: center;">Action 1: Building Maintenance</p> <ul style="list-style-type: none"> ● Regularly check for water, electricity, and utilities functioning ● Repaint building interiors and exteriors as necessary ● Assess signs of damage to external building infrastructure, such as stairs, picnic tables, and handrails. ● Monitor signs of pavement cracks or wear and schedule repairs ● Consider infrastructure improvements, such as fire pits, firewood storage, and equipment storage as needed.
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Action 1: Building Maintenance

Continued maintenance of all building structures owned by Schiff is important for offering a quality visitor experience and hosting a variety of activities and programs. As budgets required will vary year by year depending on what the projects are, Schiff staff should conduct an annual review of the maintenance needs of buildings and other infrastructure across the property.

Schiff's major buildings include:

- The Nature Center and parking lot
- Wood Badge Lodge
- Dan Beard Cabin
- The Pole Barn

The Nature Center: this is the main entry point for Schiff visitors and provides office space for staff. General building maintenance, including functioning plumbing and electricity, heat and cooling, and structural maintenance should be evaluated by Schiff staff annually and repaired if needed. Indoor flooring should be assessed for wear and tear, and budget funds allocated in

case of flooring replacement. Outdoor infrastructure, such as the stairs and parking lot, should be analyzed for signs of degradation such as cracks in the cement or asphalt, which may pose safety hazards for staff and visitors. Due to safety concerns, Schiff should assess these annually and allocate funds in case repaving or other repair costs are needed. Finally, if picnic tables are showing signs of rot, they should be repaired or replaced.

Wood Badge Lodge: Wood Badge Lodge is a large building that hosts many programs for staff, visitors, and camps. It has recently undergone repairs and replacement to its roof, which has included the installation of a dehumidifier to keep the wood structure from deteriorating (Ken Randall, personal communication). Plans exist to paint the interior and stain the exterior. Additional improvements include upgrading the fire pit outside and firewood storage to provide additional opportunities for staff and visitor use.

Dan Beard Cabin: There is no planned maintenance for Dan Beard Cabin aside from securing it from entry. Visitors are not permitted entry. Due to its deteriorating state and lack of use, the Schiff board members should decide whether it should be demolished or kept and what costs might be associated with either option.

The Pole Barn: The Pole Barn is used for storage of various equipment and metal and is only accessible to Schiff staff. It should be locked to ensure visitors do not access it. The roof was recently replaced on the Pole Barn, meaning roofing costs will likely not be needed in the near future for this structure. Based on personal communication with Ken Randall, repairs to siding and staining are on the list for maintenance here.

Action Timeline:

- Fall/Winter: discuss budget allocation for any building maintenance or repair notes from previous year.
- Spring/Summer: begin maintenance efforts on designated buildings as needed. Perform annual assessment of all infrastructure and note upcoming maintenance or repair needs.

Goal 2c: Promote Volunteer Programs to Assist with Infrastructure Maintenance and Repair

Schiff has a long history of volunteer programs and connections with location organizations within the larger Morris County community, such as scouting organizations. While Schiff already has extensive volunteer programming and planning, it is important to include these efforts in a land management plan as Schiff's volunteer base plays a key role in continued management across the property. Additional details about volunteer programs and community connections can be found in other Schiff resources and documents. This goal aims to provide information on how Schiff can maintain these ties to further its land management goals.

<p>WHAT & WHY Schiff has a long history of volunteer connections and is dedicated to community involvement. Continuing to support existing volunteer opportunities while expanding into new avenues can help Schiff to achieve its land management goals.</p>	<p>Action 1: Connect with Scouting Organizations</p> <ul style="list-style-type: none"> Continue maintaining scouting connections and encourage scout projects on Schiff's property
	<p>Action 2: Additional Volunteer Opportunities</p> <ul style="list-style-type: none"> Continue supporting existing volunteer opportunities and enhance connections by striving for additional volunteer hours Reach out to other diverse local organizations to recruit additional volunteers for different kinds and commitments of volunteer work Create topic-specific volunteer groups, such as those focused on birds or gardening, to engage volunteers with specific interests Highlight volunteer work on website

Action 1: Continue Activity with Local Scouting Organizations

For over 45 years, Schiff has maintained connections with The Boy Scouts of America. From 1933 to 1979, Schiff served as the Boy Scout Training Camp for the organization. Schiff has badge programs for Girl Scouts and Cub Scouts and additionally hosts badge service projects for Scouts. Today, many Scouts still work with Schiff to complete their badge requirements, which provides a great connection for both parties.

Schiff has made excellent connections with local scouting organizations and should continue to maintain those connections going forward. One way Schiff can deepen this connection is by advertising trail or infrastructure maintenance projects to scouts looking to complete badges or fulfill project requirements. Advertisement on Schiff's website or through direct communication with scouting leaders can help these projects come to fruition.

Action Timeline:

- Fall/Winter: discuss trail and infrastructure maintenance needs at full meeting and determine which projects would be appropriate for a scout.
- Winter/Spring: contact scouting leaders to advertise projects.
- Spring/Summer: assist scouts with projects as necessary and ensure scouts are on track to complete projects.

Action 2: Additional Volunteer Programming Opportunities

Schiff's extensive history with the Scouts is commendable, but there are additional opportunities to expand connections to other groups. Schiff could connect with local middle and high schools to recruit student volunteers for trail maintenance volunteer days or other programs such as Stew Crew. Schiff can emphasize the importance of volunteering and engaging young people in the community.

Some programs like this already exist:

- A "Tree and Trail" program created by the Conservation and Stewardship Committee gathers volunteers almost weekly to assist in caring for trees and performing various trail maintenance projects across the property. Schiff staff have indicated a desire to increase turnout at this program.

- A Business Partner Program, which encourages local business participation at Schiff through donations and volunteer help. This program is similar to many corporate volunteer day programs, where companies will bring a team to Schiff’s property to help out on a project – this could be invasive species removal, trail maintenance activities, etc. Over the years, various groups have participated in this program, such as Peapack & Gladstone Bank (Ken Randall, personal communication).
- Schiff’s “Stew Crew” is organized each summer to assist the Land Steward with trail maintenance activities across the property. A Stew Crew leader (paid) is hired for the season; that person is expected to enlist the support of other volunteers for help with maintenance activities. The Land Steward assigns Stew Crew weekly tasks and projects around the property.

Different programs may attract different types of volunteers: for example, the Business Partner Program appeals to local companies while Stew Crew may be geared more toward high school and college students who want to gain experience working outdoors in the summer. Diversifying Schiff’s volunteer pool is recommended, and Schiff is already making great strides on that front. Overall, Schiff’s volunteer opportunities can be classified into several categories (Table 5).

Table 5: Current volunteer programs at Schiff.

Volunteer Program	Time Commitment	Target Audience
Tree and Trail Crew	Weekly; regular attendance needed for success	Local adult residents
Business Partner Program	1+ days, depending on level of involvement with business (may or may not repeat)	Local companies: arrange with HR to gather a team of volunteers
Stew Crew	Summer only (~2 months)	High school and college students with free summers
Scouting Projects	Several contiguous months	Boy and Girl Scouts
School Community Service Days	1+ days, possibly scheduled annually	High school groups
Summer Camp Counselors	Several weeks during summer	Teens interested in environmental education

Forming connections with local groups is important to keep programs like these thriving. Because Schiff attracts a wide variety of visitors and volunteers of all ages, diversifying their local connections could help to increase the volunteer base. Connecting with local high schools could engage more students volunteering during their off time in the summer or aid in establishing additional school community service days.

Schiff could consider establishing additional topic-specific volunteer opportunities for interested groups of people. For example, creating a Birding Team may attract people of all ages who are both interested in and knowledgeable about birds and might be drawn to volunteer for bird-related activities such as bird monitoring (owl walks at night or migrating bird counts) or building and maintaining bluebird boxes. Local Shade Tree Commissions may provide valuable connections to folks who are interested in helping to plant and care for native trees on Schiff’s property. Additionally, forming small teams related to invasive species removal – which Schiff is already involved in – may help to form more regular groups for vegetation management. Gardeners may be interested in caring for the native plant garden or expanding it (whether in area or via installation of educational materials). There are many possibilities for engaging numerous volunteers of all ages at Schiff.

To emphasize volunteer efforts and encourage more people to volunteer, Schiff could consider highlighting volunteer projects on its website. Schiff already has an excellent page dedicated to volunteer opportunities, which includes an online calendar of volunteer events and age-appropriate activities. Schiff could consider spotlighting recent volunteer events on its front page to encourage visitors to sign up for future workdays and recruit new volunteers to help.

Action Timeline:

- Fall/Winter: brainstorm new connections for volunteer opportunities.
- Winter/Spring: reach out to organizations about volunteer opportunities.
- Spring/Summer: engage staff to assist with volunteer management.

Vision 3: Land Management Tools and Resource Investment

In addition to protecting its natural resources and enhancing the recreational uses of the property, Schiff is committed to maintaining other Land Trust resources that keep the organization functioning smoothly as land management actions are carried out. To accomplish this mission, Schiff is committed to general property and equipment maintenance to keep operations running smoothly in addition to digital data storage and maintenance to keep property information and files up to date.

Goal 3a: Digital Data Storage and Updates

Maintaining digital data resources is important for the continued functioning of Schiff Natural Lands Trust. From legal documents to geospatial data to property information, many documents now come in digital format. This brings advantages in minimizing physical storage space needs but comes with the added responsibility of backing up data in case of hard drive failure. This goal details best management practices for several kinds of digital data Schiff owns. Digital data maintenance involves the following resources:

- Budgetary information and other financials
- Geospatial data for the property
- Field data collected across the property
- Staff and Human Resources data
- Legal documents

<p>WHAT & WHY</p> <p>Schiff's digital files and data resources provide and important inventory of property actions. Data of all kinds must be organized and easy to find when needed, especially spatial data. Organizing and backing up data is key for land trust operations.</p>	<p>Action 1: Update all GIS Data</p> <ul style="list-style-type: none"> ● Inventory all existing GIS data ● Create metadata for all existing GIS data ● Create a list of GIS data needs ● Consider any GPS or software purchases
	<p>Action 2: Data Organization and Storage</p> <ul style="list-style-type: none"> ● Create easy-to-use file structure by topic and name ● Organize data into established file structure ● Purchase hard drives or cloud storage for data backup

Action 1: Update All GIS Data

Geospatial data are any data that have geometry and can be used in mapping software such as ArcGIS (paid) or QGIS (free). They include files such as shapefiles, geodatabases, geopackages, and raster data. Such data represent spatial elements of Schiff's property in addition to important attribute information about those elements. Examples of GIS data include trails, buildings, property boundaries, streams, and prescribed burn areas, all of which can be digitized from paper maps and stored in the computer environment.

As features change, GIS data must be updated to keep pace with changes. As such, GIS data often becomes outdated quickly. Some features do not change often, such as county and

municipal boundaries, property boundaries, and natural features like streams. Other features may have regular updates, like trails, prescribed burn areas, and field sampling plots.

Organization is also key and will be detailed in the next action. Before updating any GIS data, it is important to take stock of what Schiff already has. Older data is still useful from a land management perspective; old prescribed burn areas, trails, or field sampling plots can help Schiff understand what has been done to the property in the past. These files should not be deleted, but instead archived under appropriate folders marked by topic and year. Metadata should be created describing what the data show. This can be done for free or at very low costs with the help of university students and professors, including the author of this plan.

Based on the inventory of existing GIS data, Schiff can make a list of its GIS data needs. This identifies data that should be downloaded from the internet or collected in the field. Then, Schiff can create a plan to collect the needed data while keeping costs low. Examples of data collection could be downloading updated Morris County property maps or sending a staff member outside with a GPS unit to map a new trail.

If GPS equipment must be purchased for field data collection, costs must be considered. A quality field GPS unit such as the Trimble Juno series may cost upwards of \$1,000 per unit. Field data can also be collected with an iPad (no need for cellular data connection) and ArcGIS Field Maps app. One iPad, depending on the model, may cost between \$350-\$800. ArcGIS Online access for non-profits (which must be requested, requiring specific documentation of non-profit status) does not have public-facing costs available. If requested, ESRI can provide more information (see <https://www.esri.com/en-us/industries/nonprofit/nonprofit-program> for additional details), but Schiff would likely need the ArcGIS Online program offering with a “small” enterprise agreement based on the number of users. These resources can become expensive, especially with annual subscriptions to ArcGIS resources, so partnership with local colleges, universities, or other organizations who already have software access is the most achievable option for a small organization like Schiff.

Action Timeline:

- Fall/Winter: Review all GIS data; go through archives and identify what Schiff already has and what GIS data are lacking/needed. Make a list of data needs. Assess GPS equipment Schiff owns; determine if budgetary resources are available to purchase new equipment as needed.
- Fall/Winter: Create a plan to obtain missing GIS data via data download (i.e. publicly available data like county shapefiles) or creation (i.e. use GPS unit to map new trails).
- Spring/Summer: Collect missing GIS data.

Action 2: Digital Data Organization and Storage Needs

Digital data organization is important for locating and using digital files. Creating a standard file structure can aid in data management and allow for quick recovery of files if data from previous years is needed for a project. Additionally, ensuring data are backed up prevents losing massive amounts of information if hardware (computers or hard drives) crashes unexpectedly.

Recommended file organization is broken down by category and year. For example, Schiff may have several computer file folders with names such as “Invasive Species” for all invasive species management work, such as Forest Secchi. Then, Forest Secchi data could be organized by year the data were collected (Figure X). This structure could follow for years of prescribed burning, trail updates, etc.

Today, there are many backup options for digital data. Schiff can purchase external hard drives of several terabytes to back up data. Depending on the size of files, a 5 TB external hard drive is recommended to start, and can be purchased for around \$100-\$150. Dropbox (www.dropbox.com) is another solution for cloud storage. A standard business plan provides 5,000 GB (5 TB) of storage for 3+ users and costs \$12.50 per user per month. There are more expensive and cheaper options that Schiff can consider depending on user and storage needs. More information can be found here: <https://www.dropbox.com/plans>. Dropbox is ideal because cloud storage assuages fears of the external hard drive crashing or becoming corrupted and losing data.

Action Timeline:

- Fall/Winter: Create file organization structure and file naming convention to be used for all GIS data. Consider using a similar structure for other files, which are not documented in this plan. Allocate budget for purchase of hard drives for data storage and backup and/or cloud storage.
- Any time: organize existing data into new file structure.

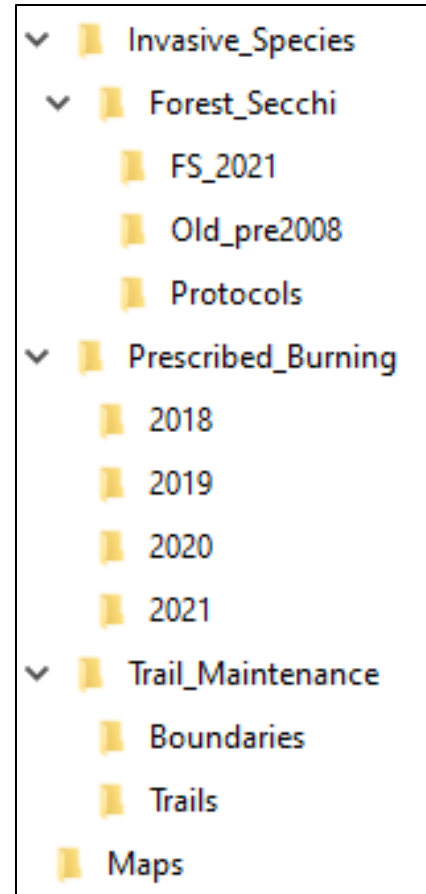


Figure 5: Example of a file structure for various land management GIS data.

Goal 3b: Continued Property Management and Maintenance

Underlying all habitat and ecological management efforts on Schiff’s property is the ability to maintain equipment, mark boundary lines, and operate within state, county, and municipality regulations in regard to Schiff’s easements.

<p>WHAT & WHY</p> <p>Stewardship to Schiff's land includes managing property boundaries, maintenance equipment, and other resources. These items must be in working order and in compliance with regulations for Schiff to continue its land management activities year to year.</p>	<p>Action 1: Monitor Easements</p> <ul style="list-style-type: none"> Review monitoring protocols and rules for specific easements Monitor easements annually, documenting any violations and reporting in accordance with easement rules
	<p>Action 2: Boundary Monitoring and Maintenance</p> <ul style="list-style-type: none"> Continue to maintain and mark clear property boundaries annually Note areas of encroachment and consider installing barrier methods to deter future boundary encroachment
	<p>Action 3: Equipment Monitoring and Maintenance</p> <ul style="list-style-type: none"> Inventory equipment condition, including damage, missing parts, or broken equipment Ensure equipment is safe to use for staff and volunteers Purchase or repair equipment as necessary

Action 1: Monitor Easements

Schiff holds three conservation and recreation easements on adjoining properties: the Kane Conservation Easement, the Union Schoolhouse Road Conservation Easement, and the Union Schoolhouse Road Walkway Easement. Specific details of these easements, including all restrictions, are outlined in the 2012 Land Management Plan, but are broadly described here:

- Kane Conservation Easement (8.5 acres): located on the private property of Mr. Roger T. and Mrs. Elizabeth H. Mahan off of Timber Ridge Road in Mendham Township. This easement serves as a development-free stream buffer. Vegetation may not be removed.
- Union Schoolhouse Road Conservation Easement (20.6 acres): located on the private properties of Mr. Ben E. and Mrs. Sheree L. Druskin and Mr. Joseph and Mrs. Bonnie Beneducci on Raintree Ridge in Mendham Township. Protects steep banks of the Raritan River from development.
- Union Schoolhouse Road Walkway Easement (<1 acre): a trail going through the Union Schoolhouse Road Conservation Easement which serves access purposes.

Each easement has unique rules and regulations that must be followed during monitoring and maintenance activities. These restrictions are documented in Schiff's files and must be referenced prior to easement monitoring to follow specific protocols.

Schiff has an annual obligation to inspect each of these easements according to the easement protocols. Monitoring efforts ensure no material violations have occurred within the easement boundaries and typically involve noting any easement rule infringements and inspecting easement boundaries for signs of encroachment. These must be documented and addressed with the private landowner on which the easement lies.

Action Timeline:

- Fall/Winter: identify easement monitoring needs and timing according to specific easement protocols. Set target month/date for monitoring.
- Spring/Summer: monitor easements for any rule violations, documenting all infringements for further action. Follow up on documentation as needed.

Action 2: Boundary Monitoring and Maintenance

Human boundaries do not often follow natural features, making boundary monitoring and maintenance an important part of Schiff's ecological management strategy. Boundary monitoring and maintenance falls into two categories: monitoring and maintaining the physical property boundary on a regular basis and keeping accurate, up-to-date geospatial data of the property for data analysis.

All boundary lines should be clearly marked with signs, fences, and property markers where appropriate. In some cases, boundaries are easier to detect, such as when they align with a natural feature (e.g. a river) or abut a state or municipal feature (e.g. a road). In other instances, Schiff's boundary abuts local homeowners, and the line may not be as obvious. It is especially important in this latter case to delineate clear boundaries and establish an understanding with neighboring property owners to mitigate any encroachment onto Schiff's land. In both cases, regular maintenance from the Schiff side is necessary. This includes posting Schiff property signage and maintaining vegetation along the boundary by mowing or mechanically cutting overgrown vegetation, so property lines are clearly demarcated.

When addressing boundary lines and signage issues, Schiff should be aware of and adhere to any regulations or specifications put forward by the New Jersey DEP related to parcels acquired under the New Jersey Green Acres program. Any updates to this program can be found on their website: <https://www.nj.gov/dep/greenacres/>.

A regular schedule of boundary maintenance should be established to ensure there are no boundary encroachments. Schiff staff should walk all boundary lines and check for clearly posted signs, evidence of encroachment, and overgrown vegetation. Staff should note any signs of encroachment, such as dumped trash or yard waste from neighbors onto Schiff's property and notify the appropriate parties immediately. Full boundary monitoring and maintenance should occur at least once per year to ensure compliance and address any issues. Performing boundary maintenance in winter without foliage present may make the boundary line easier to traverse.

In some cases, it may be prudent to establish fences, gates, or other preventative entry barriers around parts of Schiff's property while still allowing for public access in accordance with the rules of Schiff's tax-exempt status. For example, gates and fences may help to prevent users of all-terrain vehicles from entering Mount Paul Preserve, an area where these vehicles are prohibited but have been observed in the past. Any destroyed or damaged property or boundary markers must be noted immediately, and if necessary, local authorities may need to be involved. For areas of special encroachment concern, more regular check-ins may be necessary: 4-6 times per year for these portions of the property will help to ensure boundary compliance. All violations should be documented with dated photographs.

Additionally, boundary lines should be checked for accurate representation in Schiff's geospatial data repository. Updated GIS data on property lines can likely be obtained from the State of New Jersey, which must keep up-to-date, accurate parcel maps on file for taxation purposes. If property boundaries change or new property is acquired, Schiff should update its GIS data as soon as possible, since there will be some lag time with the State. Checking the accuracy of GIS data should be done in the near future, but may only require updates or checking if property boundaries shift or new property is acquired.

Action Timeline:

- Fall/Winter: Establish a monitoring and maintenance schedule to visit boundaries for compliance and complete any necessary maintenance (e.g. mowing boundary lines or installing property markers). This will likely occur 1-2 times per year, or potentially more often in certain areas with previous high levels of encroachment.
- All seasons: conduct annual boundary monitoring and maintenance.
- Spring/Summer: Ensure posting of proper signs or other boundary markers at all property boundaries. Field-truth boundary markers on all properties, documenting locations of encroachment by neighboring landowners or damaged/destroyed boundary features.

Action 3: Equipment Monitoring and Maintenance

In order to accomplish many of Schiff's habitat restoration goals, boundary management, and general property maintenance efforts, all equipment must be properly cared for to ensure consistent working order. This involves a regular schedule of maintenance for all mechanical tools (e.g. tractor, gator, lawnmowers, chainsaws, etc.). Schiff should establish a maintenance schedule that complies with the manufacturer recommendations for all equipment and document any maintenance issues found. Additionally, Schiff should maintain an inventory of existing equipment plus a list of equipment needs for budgeting purposes.

Action Timeline:

- Fall/Winter: inspect all equipment for signs of wear and damage. List desired equipment needs and repairs for the following field season. Allocate budget for repair or purchase of new equipment.
- All seasons: Routinely maintain all equipment in proper working order.
- Spring/Summer: ensure equipment is in good working order and is safe for staff and volunteers to use. Throughout the season, document and wear or damage to equipment and note replacement needs for fall/winter meeting.

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