Robert Ferrel
State Forester

COMMONWEALTH of VIRGINIA

DEPARTMENT OF FORESTRY
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Date 2/15/2021

Tract Number: SHE 20023

Virginia Military Institute

Dear Mr. Marshall:

Please find within your *Virginia Forest Stewardship Plan* for your property located in Shenandoah County. It was my pleasure to prepare this plan for you knowing that you have a true interest in the good stewardship and active management of your natural resources.

In this plan, there are two basic components. The first is a personalized management plan based upon your objectives for managing your property. The second part is an extensive appendix containing important information to help you understand the plan's recommendations and make your future management decisions. All of the recommendations within this plan are for your consideration, but I believe that they will help you achieve your long- and short-term goals for your property.

The first step you should take in managing your forest resources is to start an invasive species treatment program.

I trust that you will find this plan to be informative and useful as you actively manage your natural resources. If you have any questions or comments please feel free to contact me at any time.

Sincerely,

Cain Harbison

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Virginia Forest Stewardship Management Plan

ABOUT THIS PLAN

This Forest Stewardship Plan was developed to help guide you in the active management of the natural resources on your property. The plan is based upon the objectives you identified as being important to you. All of the management recommendations are for your consideration. The stand data table figures in this plan are for planning purposes ONLY and not intended for making economic decisions where more detailed information would be required.

PRIMARY GOALS THAT YOU IDENTIFIED FOR MANAGING THE PROPERTY

1. Maintenance of a Scenic Forest
2. Historical/ Cultural Resources
3. Forest Stand Management
4. Soil and Water Conservation
5. Non-Wildlife Related Outdoor Recreation

INTRODUCTION

This multiple-use forest management plan covers the examination of approximately 137 acres of forestland in Shenandoah County, Virginia. The management recommendations, given on the following pages, were developed for each specific parcel on your property. Boundaries and acres are only estimates derived from aerial photographs. The tract map is located in the plastic folder at the front of this book, allowing you to see the map as you read through your plan.

By having this plan developed, your property is now eligible to become a certified Tree Farm through the American Forest Foundation's Tree Farm System. It also qualifies as a Natural Resources Conservation Service's Conservation Activity Plan #106. Contact your local VDOF Forester to learn more about the benefits of these two programs.

TRACT LOCATION

The tract is located at 8895 George Collins Pkwy, New Market, VA 22844 in Shenandoah County Virginia at Virginia Museum of the Civil War and hall of valor.

PROPERTY OVERVIEW

Site is the location of a notable civil war engagement (Battle of New Market) and is currently being managed as a historic park/ battlefield.

The tract includes both open fielded areas and areas of forested land. The forested area is divided into four distinctive stands (A-D).

Stand A is a well-stocked upland oak-hickory stand in good health and relatively good form. The timber although still a little under sized is now commercially viable for pulp wood.

Stand B is an over-stocked pioneer cedar forest with sporadic large misc. oaks and hickories scattered through-out the stand. This stand also has a large patches of invasive species coverage.

Stand C is a historically important stand referred to as the "Bloody Cedars". The stand is mentioned in serval primary historic sources and accounts of the battle. There is some invasive presence in the stand and adjoining field.

Stand D is a newly acquired stand located adjacent to "Shirley's Hill". The stand itself is comprised of pioneer forest with a percentage of invasive coverage across the entire stand.

PARCEL A (BETWEEN THE MUSEUM AND RIVER)

Descriptions and Recommendations: Timber Stand Improvement/ Invasive Species Management

Acres:	51 (50.9)
Forest Type:	Mixed Hardwoods upland oak-hickory dominated forest
Species Present:	White Oak, Black Oak, Northern Red Oak, Scarlet Oak, Blackgum, Sassafras, Mockernut Hickory, Bitternut Hickory, Black Walnut, Virginia Pine, Amur Honeysuckle*, Red Maple, Yellow-poplar, Japanese Stilt Grass*, Tree of Heaven
Age:	40-50
Size:	4" DBH to 20" DBH averaging 8"-12" DBH
Tree Quality:	Fair to Good
Stocking/Density:	Well Stocked
Growth Rate & Vigor:	Moderate
Site Quality & Soils:	Please see accompanying soil map and descriptions

Recommendations:

The timber in this stand currently holds the best potential for future economic return (in the form of timber harvests). The stand is commercially viable now, however most of the timber is still on the smaller side and would be cut for hardwood pulp if it were to be harvested now. I recommend giving the stand more time to develop and grow (20-30 years). I also recommend implementing a TSI (Timber Stand Improvement) program in this stand.

""The goal of TSI is to improve the quality, value, growth rate, and health of the forest resource. This goal is accomplished by periodically thinning the forest and removing poor quality trees and inferior tree species. The result of this work will be a forest of quality crop trees growing to saw timber size in a shorter period of time"

I advise that for your TSI program you focus on crop tree species that have a high wildlife value and high timber value. The species I recommend focusing on are White Oak, Northern Red oak, Black Oak, Mockernut Hickory and Chestnut Oak. There is also a small portion of the stand that has some good yellow poplar on it. At the beginning of your TSI program it is important to identify crop trees that have the best form and remove trees surrounding each crop tree. Removing the inferior stock from around your crop trees will free up water and nutrients and make it easier for them to gather sunlight. Increasing their growth rate and lead to a high value saw timber crop in a shorter period of time. Identified crops trees should be straight with little or no branching along the main bole of the tree. TSI is an ongoing process that requires continued monitoring and adjustments as the stand further develops. Effort should be made to leave trees that have voids or cavities in them. These hollow trees provide excellent dens and nesting

sites to a wide variety of wildlife. Trees that are cut during this process can be used as firewood or left on the forest floor to return nutrients to the stand

There is some invasive species starting to appear in the stand which should be dealt with before they start negativity impacting forest health. The invasive species of primary concern in this stand are tree of heaven, Japanese honeysuckle, and Amur honeysuckle. Detailed recommendations for dealing with these invasive species can found in the section for stand D.

PARCEL B (QUARRY AND SURROUNDING FOREST)

Descriptions and Recommendations: Invasive Species Management/ Disable Species Establishment

Acres:	50.4
Forest Type:	Mid Successional Pioneer Forest Slowly Transitioning Upland oaks.
Species Present:	Red Cedar, Black Locust, Black Cherry, Black Walnut, Ash snags, Amur Honey Suckle*, Japanese Honey Suckle*, Chestnut oak, Black Oak, Virginia Pine
Age:	40-60
Size:	Size in this stand is highly variable due to sporadic large upland species being intermixed with smaller pioneer species and a percentage of eastern red cedar.
Tree Quality:	Poor to Fair
Stocking/Density:	The majority of this stand is over stocked with eastern red cedar.
Growth Rate & Vigor:	Poor
Site Quality & Soils:	Please see accompanying soil map and descriptions

Recommendations:

This stand has a very high percentage of cedar with intermittent patches of thick invasive cover in throughout in the interior and edges of the stand. Your first course of action in this area should be to start an aggressive invasive species eradication program. Due it how thick the stand currently is, you may want to consider either renting or perching a forestry mulcher it first mechanically clear the worst areas and then follow up with chemical herbicide treatments in the following years. Invasive control is often a long process where targeted effort over a number of years leads to the most effective control. Detailed recommendations for invasive control across the entire property can be found in the section for stand D.

Once you have started to control the invasive problem in the stand. There are going to be large sections that will need to be allowed to regenerate. As there is a high percentage of cedar in the current stand I suggest planting clusters of disable hardwood species as areas are cleared of invasive species. The best available option for this would be to purchase hardwood seedlings from VDOF's nursery and plant them using shelters insure their survival. This is something that your staff could take on themselves as having a contractor plant sheltered hardwoods on a large scale is extremely expensive. I would be than happy to develop planting recommendations and show your staff how to properly install both the seedlings and the shelters once you are ready to move into this phase of stand management.

After there you have achieved good control of the invasives across the stand I would consider targeting selected areas of the thickest cedars (A forestry mulcher can also be used for this process) and continue planting clusters of sheltered hardwood seedlings. I would do this at a much slower rate clearing no more than ¼ to ½ an acre at any one time. I doubt you will reach this point of management in the next ten years as the invasive work in this stand and stand D will be extensive and should be your primary goal over the next ten years.

It is important to remember that hardwood management is an extremely slow process often taking decades or even centuries to reach desired conditions.

Another option for this stand would be to forestry mulch the majority of the stand (everything currently under cedar or invasive cover) and replant with southern yellow (ideally shortleaf). This option would be much faster than the hardwood option and a larger initial economic commitment but would yield a timber crop in 25-30 years. In is also important to note that this option is going to be highly visible and will negativity impact the visual aesthetics until the planted pine is well established. 5-10 years post planting.

PARCEL C ("BLOODY CEDARS")

Descriptions and Recommendations: **Invasive Species Control/ Removal of Mid-Size Cedars**

Acres:	10 (9.9)
Forest Type:	Early Successional Cedar Forest
Species Present:	Eastern Red Cedar, Autumn Olive, Callery Pear, Japanese Honeysuckle
Age:	30-40
Stand History:	Site was previously in agriculture until allowed to develop as a cedar forest
Size:	N/A
Tree Quality:	N/A
Stocking/Density:	Moderate
Growth Rate & Vigor:	Moderate
Site Quality & Soils:	Please see accompanying soil map and descriptions
Cultural Resources:	The stand itself qualifies as a cultural resource as it is mentioned in serval primary sources from the battle.

Recommendations: Because of the cultural significance of this cedar, it should be maintained in its current condition. Removing up to 25% of the midsize trees in the area once every 5-10 will keep the stand from becoming over crowded. This could be done by either manually felling selected trees with a chain saw and removing them from the site; or by using a forestry mulcher attached to the front of a skid steer and leaving the masticated trees behind in the stand to return nutrients to the soil and help in the prevention of further invasive species establishment. During this process trees of the largest size and superior form should be left in place. Trees of superior form will have straight main boles (this may be difficult to see with many) and will have a single dominate terminal lead (they will not be doubled toped). There are times when cedar is a commercially desirable species. Periodic removal of the mid story will allow for a faster growing stand and allow you take advantage of commercial opportunities if and when market conditions favor cedar again.

As with previously discussed stands this area is showing signs of exotic invaders. Although cedar stands can shade most of these invasive plants out given enough time. It would be prudent to start treating the invasive species currently located there to prevent future forest health problems that will require large amounts of work to correct. Currently there are a number of large and medium sized autumn olive and callery pear scattered throughout the stand. It is around these trees where most of the Japanese honeysuckle is located. The autumn olive can be treated without manual cutting and

removal via basal bark treat as previously discussed in other stands. The Callery pear located in the stand will be most effectively treated by first felling or cutting the stem and then immediately (within the hour) treating the stump with herbicide. The Japanese honey suckle can be treated with herbicide via foliar treatment. More detailed recommendations of invasive species management can be found in the recommendations for stand D. As this stand is considered a cultural resource and the invasive species are still manageable this would be a good place to start an invasive treatment program for the property.

PARCEL D (SHIRLEY'S HILL AND NEW SITE)

Descriptions and Recommendations: Invasive Species Management / Site Clean Up/ Recreation & Jogging Path

Acres:	26 (26.3)
Forest Type:	Pioneer Forest
Species Present:	Black Locust, Black Cherry, Hackberry, Black Walnut, Grape Vine, Tree of Heaven*, Sweet Cherry*, White Mulberry*, Eastern Red Cedar, Wineberry*, Stilt Grass*, Amur Honey Suckle (Bush)*, Japanese Honey Suckle*, Sassafras, Multiflora Rose*, Ash Snags, Wing Stem, Spice Bush, Blackhaw, Little Leaf Linden*, Sycamore, Siberian Elm*, English Ivy, Limited Chinquapin Oak. *Denotes invasive species
Age:	40-60
Stand History:	Evidence on the ground suggests that portions of the site was a barrow quarry and other portions were in agricultural use.
Size:	Tree Size is highly variable throughout the stand. Ranging from 4-30 inches DBH (Diameter at Breast Height)
Tree Quality:	Poor to Fair
Stocking/Density:	The Stand is severely under stocked with many invasive species present.
Site Quality & Soils:	Please see accompanying soil map and descriptions
Cultural Resources:	There are some old foundations in the new parcels that may require some examination to determine if they have any cultural significance.

Recommendations: The first step to take in this area is to start controlling the invasive species in the stand. The mature invasive trees (large tree of heaven, large callery pear, and white mulberry) in this stand will be easier to control initially than the invasive brush. I recommend using a "hack and squirt" method for control of these invasives. Hack and squirt is a low cost, low labor control method where you cut slightly into the inner bark around the base of the tree and apply concentrated herbicide into the fresh wound. This method allows you to kill large invasive trees without cutting them down and physically removing them off site. This method of control is most effective when done in early fall while the trees still have leaves on them. It is also helpful if conditions are slightly more drought like this will help increase the amount of herbicide the tree takes into the root system increasing the likely-hood of killing the main root ball. Typically the best herbicides to use for this treatment method are triclopyr based. Again while using herbicide it is extremely important to know exactly what you are targeting before

purchasing chemical controls and to strictly follow label directions and precautions while using herbicides.

For the invasive brush I suggest a targeted approach focusing on treating one area of invasive brush at a time. Due to the amount of invasive brush in the stand, I recommend initially using mechanical methods to cut and mulch or cut and remove the targeted species from an area. After the initial treatment you will need to follow up with selective herbicide treatments. Species that are most suited to this treatment method are multiflora rose, Amur honeysuckle, Japanese honey suckle, oriental bittersweet, autumn olive, and wine berry. The method described above tends to be labor intensive which is why it will be helpful to focus on the most heavily affected areas to start with and go from there. This will help you from becoming overwhelmed with the process.

You have a couple options for mechanical treatment in this area. Your best and also most costly option is to use a forestry mulcher or masticator. You can either rent a skid steer with a mulcher attachment or employ a contractor who has a mulcher. Using a mulcher has several benefits. The first being that you may be able to treat a larger area more quickly. Forestry mulchers are fast working efficient machines that process heavy brush and small trees into mulch and leave a relatively clean site in their wake. By using a mulcher you will also reduce the wildfire risk to this stand because you will be greatly reducing the amount of ladders fuels in this site. One down side to using a mulcher is that while using it you are more than likely going to be cutting more than just invasive species, however due to the current conditions a mulcher truly is your best option. The alterative to using a mulcher is to use either hand tools or brush cutters to do the initial treatment. This method will be cheaper but will be much more labor intensive and take much longer. One advantage of this method is that it will be much easier to cut and target just the invasive species. When you are ready to start either method of treatment I would be happy to meet you or your contractor on site to help with identification of which species in this stand are invasive.

As previously mentioned after your initial mechanical treatment it will be necessary to follow up with selective herbicide treatments. Cutting all these invasives out of the stand will act as a disturbance and will cause both rapid re-sprouting and germination of invasive plants. The first selective chemical treatment should occur during the first growing season after your initial cutting. The method of application and at this point should be a glyphosate based foliar application via backpack sprayers. **While using herbicide it is extremely important to know exactly what you are targeting before purchasing chemical controls and to strictly follow label directions and precautions while using herbicides.** Because many of the invasive species are well established and have well established seed banks in the soil, it will be important to follow up with subsequent herbicide treatment as new invasive growth occurs. As the seed bank for these invasives become more and more depleted, the time between necessary treatments will increase. Once you have treated most of the stand and have controlled most of the invasives you will want to start monitoring for new invasive growth and apply treatment early. Early detection and treatment are the two most useful tools for control any invasive plants.

Working towards control of these two categories of invasive species now will greatly limit the damage they are currently inflicting one your timber stand. After you have greatly limited or eradicated these invasives from the stand you can start to re-evaluate the stand conditions and start a timber stand improvement regime.

There is going to be large portions of the stand to will need to be allowed to naturally regenerate trees due to the high amount of invasive species currently on the site. These areas should be allowed to grow up and naturally thin themselves over the next 10-20 years. It will be very important to closely monitor these areas for invasive species and eliminate them early so they do not become a problem again. There may also be portions of the stand that may need be planted with clusters of more desirable hardwood species.

There are several old dump sites in this area that should be cleaned up as you gain access to stand. Long term this area could make a good site for a forested recreation area (walking trail / picnic area). However, the primary goal for this stand in the next ten years is to just get the invasive species under control.

As with stand B after you have started to gain control of the invasive species in the stand it will probably be necessary to establish more desirable species in the area. This can also be done by planting clusters of sheltered hardwood seedlings to help speed up natural regeneration.

COST-SHARE ASSISTANCE PROGRAMS

Cost-share assistance programs may be available to help defray reforestation project costs. Programs generally may pay between 35 percent and 75 percent of the costs involved in certain projects. Funds are available on a first-come, first-served basis and must be approved prior to the start of any management work. Please check with your local Virginia Department of Forestry representative for availability of programs and funds.

CULTURAL AND HISTORIC RESOURCES

Cultural resources refer to landscapes, structures, archeological artifacts and vegetation that represent a culture or society of historic value. Federal and state laws protect some archeological, cultural and historic sites from disturbances, destruction or removal. It is critical to understand where such sites may be located prior to ground-disturbing forest management activities.

Historic and cultural resources are a vital link to past land-use practices in Virginia. The Department of Historic Resources offers programs which survey, catalog and encourage the preservation of historic resources. This Department maintains records of historic sites and these records are available to the general public. More information can be found at www.dhr.virginia.gov or by calling their office at (804) 367-2323.

THREATENED OR ENDANGERED SPECIES

While I have found no evidence while walking the property of any threatened or endanger species. The attached T&E lists do not mean those species are present in just so you can keep an eye out for them. Information in this plan concerning the presence of Threatened and Endangered (T&E) species has been determined through observation and/or review of T&E species maps. This information does not substitute for a through exam completed by trained T&E specialists. For more information regarding threatened and endangered species or any regulations involved with them, please contact your local Virginia Department of Game and Inland Fisheries office or the Department of Conservation and Recreation, Natural Heritage office.

FOREST HEALTH AND PROTECTION

A healthy forest is a forest that possesses the ability to sustain the unique species composition and processes that exist within it. Active management of the forest helps to maintain and improve its productive capacity, taking into account all the factors that influence the resource elements addressed in the Forest Stewardship Plan. Silviculture harvest practices and the use of prescribed fire as a tool can reduce risk from wildfire, pests and invasive species, and ensure long-term forest health and vigor. Forest health protection issues are often directly related to the active management of insects and diseases, invasive plants and wildfire. Annual inspections for signs of insects, diseases or invasive plant infestations should be completed by the landowner.

Although I found no evidence of forest pest or diseases, continued monitoring is the best preventative measure to ensuring forest health. If any unusual problems are found, please contact the Virginia Department of Forestry for an examination.

FIRE

Prescribed fire, also known as "controlled burn," refers to the controlled application of fire by a team of fire experts under specified weather conditions that help restore health to fire-adapted environments to obtain specific management objectives. Prescribed burning is a critical management tool that enhances and benefits forests, grasslands and wildlife habitats. Prescribed fire is an effective tool in site preparing harvested areas for replanting tree seedlings as well as reducing excessive amounts of hazardous fuel build up and catastrophic damage of wildfire on our lands and surrounding communities. Prescribed fire is one of the most effective tools we have in preventing the outbreak and spread of wildfires.

Protection of your property from wildfire is essential. Wildfire rapidly destroys valuable timber, wildlife and property. From February 15 through April 30, open air fires are not permitted within 300 feet of woodland, brushland or field containing dry grass or other flammable material between midnight and 4:00 p.m. The number one cause of wildland fire in Virginia is debris burning. In other words, MOST of the fires that occur could have been prevented. In the case of an emergency, please report all woods fires to your local County Fire Dispatch Center at 9-1-1. If you feel that the situation does not warrant a fire department response, you may call a Virginia Department of Forestry representative at (540)-333-8160.

CARBON CYCLE

All forest plants and soils "store" carbon, so active forest management influences the natural cycles of that storage in both living and dead plant material. The removal of carbon from the atmosphere is the process called carbon sequestration. Carbon sequestration is the process by which atmospheric carbon dioxide is consumed by trees, grasses and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage and roots) and soils. Sustainable forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved soil and water quality. Planting new trees and improving forest health through thinning and prescribed burning are some of the ways to increase forest carbon in the long run. Harvesting and regenerating forests can also result in net carbon sequestration in wood products and new forest growth.

WETLANDS

Wetlands include areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands are also highly diverse and productive ecosystems with emphasis on supporting timber production, water quality protection, wildlife habitat and more. It is important for you to

be aware of and understand the laws and regulations related to forestry practices before engaging in wetland management activities on your land. Chapter 9 of the publication "Virginia's Forestry Best Management Practices for Water Quality Technical Manual, 2011" offers many of the guidelines for forestry activities within a wetland. The publication can be found on the web at: http://www.dof.virginia.gov/print/water/BMP/Technical/BMP-Technical-Guide.pdf. Your local Virginia Department of Forestry forester can provide information on forestry practices permitted in wetlands.

BIOLOGICAL DIVERSITY

Biodiversity is the variety of life (including diversity of species, genetic diversity and diversity of ecosystems) and the processes that support it. Landowners can contribute to the conservation of biodiversity by providing diverse habitats. It is important to select management options that offer the greatest opportunities for promoting wildlife habitats and conserving biodiversity while fulfilling other land management objectives. Some of these options include, but are not limited to, the conservation of wildlife habitats and biodiversity by:

1. Managing stand-level habitat features.
2. Promoting aquatic and riparian areas.
3. Managing landscape features.
4. Conserving rare species and communities.
5. Protecting special features and sites.

AGROFORESTRY/SILVOPASTURE

Agroforestry intentionally combines agriculture and forestry to create integrated and sustainable land-use systems. Agroforestry takes advantage of the interactive benefits from combining trees and shrubs with crops and/or livestock. In the United States, agroforestry is commonly divided into five main practices: Windbreaks, Alley Cropping, Silvopasture, Riparian Forest Buffers and Forest Farming.

Silvopasture combines trees with forage and livestock production. The trees are managed for high-value saw logs while providing shade and shelter for livestock and forage, reducing stress and sometimes increasing forage production. Silvopasture is increasingly popular in the southeastern region of the United States as a way to supplement timber income on small pine plantations and some hardwood stands. However, there can be problems with combining the two management schemes if it is not done correctly or actively managed. This management system requires active rotational grazing to avoid damage to the standing trees and allowing the forage to recover. Before any new silvopasture system is established, you should thoroughly explore the associated economic and environmental considerations along with local land use, zoning, cost-share programs and tax regulations.

HIGH CONSERVATION VALUE FORESTS

These are forests of outstanding and critical importance due to their environmental, social, biodiversity, or landscape values. High Conservation Value Forests are considered critically important because they contain a unique combination of values. These can be social, cultural, biodiversity and environmental values.

Social or cultural values are aspects of a forest that are critical to the surrounding community's identity. They can range from significant historical features, such as sacred sites or burial grounds, to the forest's role within the community — for example, whether local residents have traditionally depended on the forest for berries, firewood or other products.

Biodiversity values are critical to preserving local flora and fauna. Such values could include rare ecosystems or habitats, or unusual communities of plant or animal species. Keep in mind that these ecosystems and species need not be on state or Federal Threatened or Endangered Species lists — they may just be considered rare regionally or locally.

Environmental values can benefit the whole community. Some examples are forests whose presence helps protect local watersheds or prevent erosion in vulnerable areas.

When forestry professionals and other experts evaluate a forest as a potential HCVF, they look at the entire landscape — not just a single stand of trees — and consider all of these values.

Places that combine and contain these features are rare, so it's especially important to protect them. *(American Forest Foundation)*

INTEGRATED PEST MANAGEMENT

A pest control strategy may use a variety of complementary strategies including mechanical devices, physical devices, genetic, biological or cultural management and chemical management. *(U.S. EPA)*

Integrated Pest Management (IPM) combines several appropriate pest control tactics into a single plan to reduce pests and their damage to an acceptable level. Using many different tactics to control a pest problem causes the least disruption to the living organisms and non-living surroundings at the treatment site. Relying only on pesticides for pest control can cause pests to develop resistance to pesticides, can cause outbreaks of other pests, and can harm surfaces and non-target organisms. With some types of pests, using only pesticides achieves very poor control.

To solve pest problems, first:

- Identify the pest or pests and determine whether control is warranted for each,
- Determine pest control goals,
- Know what control tactics are available,
- Evaluate the benefits and risks of each tactic or combination of tactics,

- Choose the most effective strategy that causes the least harm to people and the environment,
- Use each tactic in the strategy correctly, and
- Observe local, state, and Federal regulations that apply to the situation.

The best strategy for each situation depends on the pest and the control needed.

(Michael J. Weaver, Patricia A. Hipkins, Virginia Tech Pesticides Program, 2013)

Non-Native Invasive Plant Species Control Treatments

Timing, Methods and Herbicide Rates

Forestry Topic 31 www.dof.virginia.gov October 2018

This is a list of management tactics for major invasive plants, not a comprehensive control plan. For recommendations specific to your property, consult a professional forester or land resource manager. Follow all label prohibitions, precautions and safety requirements during herbicide transport, storage, mixing and application.

	INVASIVE PLANT	CONTROL TIMING	CONTROL METHOD	HERBICIDE RATES *	NOTES
GRASSES	Japanese Stiltgrass	Prior to seed maturity	Manual – hand pull		Remove all roots
		Prior to seed maturity	Mechanical – mow/cut repeatedly		To reduce seed formation
		Late spring – late summer	Foliar spray	Sethoxydim 1.5% or Glyphosate 0.5%-2%	Several years needed to control seed bank
	Wavyleaf Grass	Prior to seed maturity	Manual – pull small areas		Follow-up treatment required
		Late May – early June, again in late June – early July	Foliar spray	Glyphosate 2%, Clethodim 1%	Several years (as needed); avoid plants that have set seed
HERBS/FORBS	Garlic Mustard	Late spring – early summer, prior to any seedpods maturing to brown	Manual – hand pull and remove taproot		Do not leave flowering plants on ground, seeds will form; bag/ remove flowering plants
		March – June, before seedpods	Mechanical – mow or cut		To reduce seed formation
		Late fall – winter is best, but susceptible any time	Foliar spray on evergreen leaves	Glyphosate or Triclopyr 2%	Dormant season timing protects many other species
VINES	Gen. Recommendations for All Vines	All year when soil is moist	Manual – hand pull small vines		Remove as many roots as possible to prevent resprouts
		Any	Manual or mechanical – cut to "treatable" height		Follow-up with foliar herbicide applied to resprouts
		June – October, through winter for evergreen species	Foliar spray	Glyphosate 2%-3% or Triclopyr 2%-5%	Several years (as needed)
		June – February	Basal spray	Triclopyr ester 20%-25%	Follow-up usually required
		June – August	Foliar spray	Metsulfuron 2-4 oz./acre	Several years (as needed)
		June – February, late summer – fall ideal	Cut stump	Glyphosate or Triclopyr ester 20%-25%	Follow-up usually required; highly selective and uses minimal herbicide
	Japanese Honeysuckle	Before seed formation	Foliar spray	Glyphosate 2%-3% or Triclopyr 2%-5%	Treat evergreen leaves on warm days in winter

* Rates are listed as common herbicide formulations. Application rates may vary with specific products so always follow label instructions.

Non-Native Invasive Plant Species Control Treatments

	INVASIVE PLANT	CONTROL TIMING	CONTROL METHOD	HERBICIDE RATES *	NOTES
VINES, continued	Porcelain-berry	June to October, late summer – early fall ideal	Foliar spray	Triclopyr 2%-3%	Manual ineffective due to extensive root system
	Oriental Bittersweet	All year, late summer – fall ideal	Injection or hack-n-squirt	Triclopyr amine or Glyphosate undiluted	Vines more than 1 inch in diameter
	Mile-a-Minute	May – October	Manual/mechanical – hand pull, mow or cut repeatedly		Protect skin from thorns
		May – July	Foliar spray	Glyphosate 1% or Triclopyr 1%-2%	Likely to injure other plants
	Kudzu	All year	Manually remove all root crowns		
		All year	Mechanical – mow and cover with plastic sheeting		Leave sheeting in place two years
		July – September	Mechanical – cut or mow to ground		Many, many years needed
		June – October	Foliar spray	Picloram 3%	*Restricted use pesticide
		July – September	Foliar spray	Metsulfuron 3-4 oz./acre, Triclopyr 4%, Clopyralid 1.3 pt./acre, Aminopyralid 7 oz./acre	Repeat in successive years
		June – February	Basal spray	Triclopyr ester 20%	Woody stems
		June – February	Injection or hack-n-squirt	Imazapyr, Triclopyr amine or Glyphosate undiluted	Vines more than 1 inch in diameter
SHRUBS	Gen. Recommendations for All Shrubs	When soil is moist	Manual – hand pull small plants		Roots left in ground resprout
		When fruit is not present	Mechanical – cut or mow		Follow-up treatment required
		June – February	Foliar spray	Imazapyr 1% or Triclopyr 2%	Several years (as needed)
		June – February	Cut stump	Imazapyr 5%-10% or Glyphosate 20%	Selective, minimal herbicide
		June – February	Basal spray	Triclopyr ester 20%	
	Multiflora Rose	See General Recommendations for all shrubs			
		June – October	Foliar spray	Glyphosate 2%-4% or Triclopyr 1%	
	Autumn Olive	See General Recommendations for All Shrubs			
	Chinese Privet	See General Recommendations for All Shrubs			
TREES	Gen. Recommendations for All Trees	June-February	Injection or hack-n-squirt	Triclopyr or Imazapyr undiluted	Small to large trees
		July – February	Basal spray	Triclopyr ester 20%-25%	Saplings
	Tree-of-Heaven	See General Recommendations for All Trees			Follow-up usually required
		Summer – fall	Foliar spray	Triclopyr 2%	Seedlings, saplings, resprouts

* Rates are listed as common herbicide formulations. Application rates may vary with specific products so always follow label instructions.

Virginia Department of Forestry
900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903
Phone: (434) 977-6555
www.dof.virginia.gov

VDOF FT0031; 10/2018

tree-of-Heaven Simaroubaceae *Ailanthus altissima*

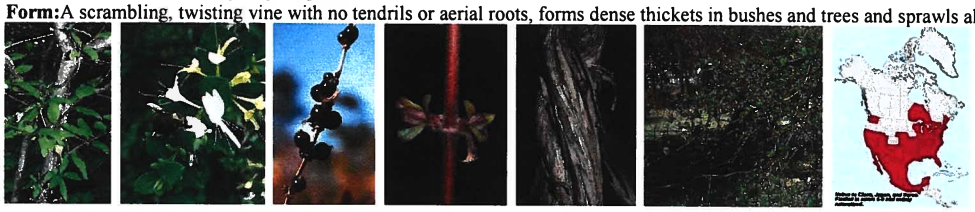
Leaf: Alternate, pinnately compound, 1 to 3 feet long, with 11 to 41 leaflets, leaflets are 2 to 6 inches long, pointed at the tip with large, glandular teeth near the base, green above and below.
Flower: Species is dioecious; small yellow-green, in long (6 to 12 inches) clusters, males have a disagreeable odor, appearing in late spring to early summer.
Fruit: An oblong, twisted samara, 1 to 1 1/2 inches long with the seed in the center, hanging in long clusters, ripens in late summer and disperse through the winter.
Twig: Stout, yellow to red-brown, with fine velvety hairs when young, easily broken with a large reddish brown pith; buds are relatively small and half-spherical sitting above large, heart-shaped leaf scars; terminal bud is absent. Strong odor (some are reminded of peanut butter) when broken.
Bark: Thin, light brown to gray, resembles the skin of a cantaloupe when young, later turning darker gray and rough.
Form:A short to medium sized tree to 70 feet with heavy, open branches. Lower branches on larger trees tend to droop. Often grows in clumps.

Amur honeysuckle Caprifoliaceae *Lonicera maackii*

Leaf: Opposite, simple, ovate, 2 to 3 inches long, entire margin, acuminate tip; green above, paler and slightly fuzzy below.
Flower: Species is monoecious; white changing to yellow, 3/4 to 1 inch in length, 4 upper petal lobes fused, very fragrant, appearing in late spring.
Fruit: Juicy red berry, 1/4 inch in diameter, appearing in late summer often in great abundance, persists into the winter.
Twig: Slender, glabrous, grayish brown, hollow pith but solid brown at the nodes; opposite, small pointed, light brown buds.
Bark: Develops long, deep fissures, somewhat scaly ridges, grayish brown.
Form: An erect shrub, multi-stemmed, branches often arching, up to 20 feet tall, 15 foot spread.

Japanese honeysuckle Caprifoliaceae *Lonicera japonica*

Leaf: Opposite, simple, ovate to oval, 1 to 2 inches long, entire margin, sometimes lobed, semi-evergreen, light green and somewhat pubescent.
Flower: Fragrant, 1/2 to 1 inch long, white or yellowish-white long petals, appearing in late spring.
Fruit: Small (1/4 inch diameter), black berry, often in pairs, ripen in fall and persist into early winter.
Twig: Slender, initially pubescent, light brown in color developing scaly, thin bark, hollow pith; buds small.
Bark: Long, shreddy peeling strips, light red-brown to straw-colored.
Form:A scrambling, twisting vine with no tendrils or aerial roots, forms dense thickets in bushes and trees and sprawls along the ground.

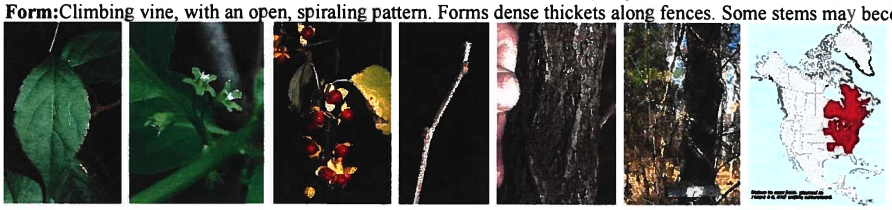


autumn-olive Elaeagnaceae *Elaeagnus umbellata*

Leaf: Alternate, simple, 1 to 3 inches long, 1 to 1 1/2 inches wide, lanceolate in shape with an entire margin. Leaves are green and distinctly scaly above, silvery and scaly below.
Flower: Bell-shaped, 1/2 inch long, very fragrant, lacking petals, yellow-white, appearing in spring.
Fruit: Berry-like achene, red covered with silver scales, 1/4 to 1/3 inch long, sweet and juicy, matures in late summer.
Twig: Young branches are silvery and scaly, and may bear thorns, later developing a light brown color; buds are small, silvery-brown and rounded, covered with 4 scales.
Bark: Smooth and gray when young, becoming split and furrowed later.
Form:A shrub or very small tree to 15 feet, rounded in outline.

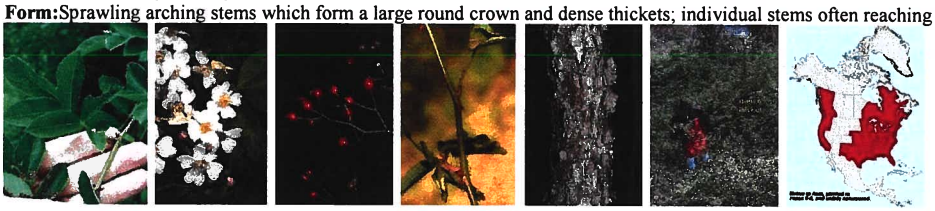
Asian bittersweet Celastraceae *Celastrus orbiculatus*

Leaf: Alternate, simple, ovate to nearly round, 2 to 4 inches long, very often with a blunt tip, finely serrated, somewhat rounded teeth, green above and slightly paler below.
Flower: Inconspicuous, pale yellowish-green, appearing from leaf axils in late spring.
Fruit: Very attractive, capsules in clusters which when open expose a bright red seed surrounded by yellow scales, 1/3 inch across, appear from leaf axils; ripen in the fall and are visible throughout the winter.
Twig: Thin, light brown, with small pointy buds at nearly right angles to the stems; no tendrils or aerial roots present.
Bark: Silvery gray-brown, initially smooth, later corky with diamond-shaped patterns, much later becomes finely scaly.
Form: Climbing vine, with an open, spiraling pattern. Forms dense thickets along fences. Some stems may become several inches in diameter.



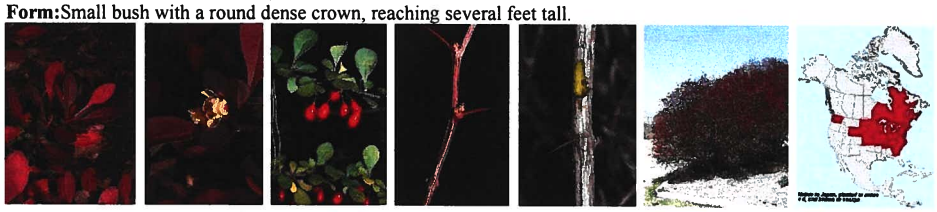
multiflora rose Rosaceae *Rosa multiflora*

Leaf: Alternate, pinnately compound leaf, 3 to 5 inches long, 5 to 11 serrated leaflets, comb-like stipules along base of petiole, dark green above and paler below.
Flower: White, 5 wedge-shaped petals, 2 inches across, occurring in clusters, fragrant, appearing in early summer.
Fruit: Red to reddish brown, 1/4 inch, oblong, fleshy "hip", ripens in late summer and persist through the winter.
Twig: Green or greenish-red, usually with paired, curved prickles, long and arching stems; buds red, pointed.
Bark: Brown, finely shreddy at base.
Form: Sprawling arching stems which form a large round crown and dense thickets; individual stems often reaching high into the air when supported.



Japanese barberry Berberidaceae *Berberis thunbergii*

Leaf: Alternate, simple, entire margin, spatulate or obovate, 1/2 to 1 1/2 inches long, bright green above, paler and somewhat glaucous below.
Flower: Pale yellow, 1/3 inch across, usually in small clusters, appearing in April to May.
Fruit: Shiny red, egg-shaped berry, 1/3 inch long, ripening in the fall and persisting into the next spring.
Twig: Slender, angled or grooved and zigzagged, brown, buds small, thorns at each node, yellow inner bark.
Bark: Gray-brown, finely shreddy.
Form: Small bush with a round dense crown, reaching several feet tall.



Making Good Use of Volunteer Resources for Invasive Plant Control

July 16, 2015 in Invasive Plants

How conservation non-profits can recruit and retain volunteers for exotic invasive plant control projects

by Bruce Wenning

Many non-profit conservation organizations struggle with well-intentioned ideas and plans about how to rid their lands of exotic invasive plants. Some have enlisted interested staff with a few dedicated, but sporadic volunteers to help with the removal of a particular invasive from an ecologically critical parcel or from a highly visible area. Unfortunately, most organizations lack the available in-house staff and the extra time and money required to effectively complete such projects for the long-term. Similarly, most hardy volunteers do not have the life style to give forty hours per week of continuous labor to such projects.

To better understand the potential problem at hand at your organization, take a survey of the invasive plant group or groups that need to be removed or reduced. Most invasive plant removal projects tend to fall into two time related categories which are based on the *abundance* of the targeted invasive species and its *distribution pattern* in the infested area. Start with short-term projects first then larger projects will feel less overwhelming.

Short-Term Projects

The first category is a short-term time commitment project and frequently encompasses invasive plants of all kinds (herbaceous and woody) infesting small areas (< 1/2 acre) such as neglected gardens and fields; building and parking lot edges; pond, lake, and stream buffer zones; pine wood lots vs. abandoned apple orchards; specific lengths of trails, roads, and stonewalls to mention a few.

For most conservation organizations with limited resources directed at invasive plant control projects, short-term projects, with sporadic volunteer and staff help, take one year or less to complete. Short-term control projects become quite popular with in-house staff and volunteers.

Long-Term Projects

The second category is long-term and involves a more scheduled and extended time commitment for invasive plant removal because the targeted invasive is more abundant and/or distributed over a wider range (e.g. dense glossy buckthorn population infesting an area greater than one acre). This type of control project involves additional criteria for completion such as the hauling and proper stacking of the removed targeted invasive into piles for transport out of the work area to a centralized location for pick up and then disposal off site or woodchip processing on site. In other words, more project planning for equipment needed, volunteer and paid staff scheduling, and specified work dates and times are involved.

These and other work tasks associated with larger removal projects tend to complicate the schedules and mindset of budget conscious administrators who want definite start and finish times for work projects. Again, the extra labor, time and money required for these long-term control projects tend to strain existing budgets and the busy schedules of paid staff. It's not uncommon that well-intentioned, long-term control projects become delayed or even abandoned because of the frustration generated by the lack of in-house resources.

Therefore, to be on the path to success at removing exotic invasive plants your conservation organization must develop and maintain a strong or sustainable *volunteer program* that specifically supports your organization's mission statement, strategic plan, and invasive plant management goals. If your organization does not have a definite invasive plant management plan as part of its strategic plan, it must make additions or corrections into the strategic plan for a *permanent* volunteer invasive plant management program for the sole purpose of saving native plant germination, growth, and sustainability. Remember, exotic invasive plants are pests on the native landscape, slowly and effectively weakening native plant establishment and sustainability.

Crafting Your Volunteer Exotic Invasive Plant Management Program

It's important to insert the terms "ongoing" and "monitoring" into your written invasive plant management plan. Also, make sure that the terms are defined.

Organize for Ongoing Efforts

For long-term projects (greater than one year), the invasive plant management goals must include and *embrace* the concept of having no immediate timeline for completion. In other words, the goal timeframe must be termed "ongoing." Ongoing means that you and your well-trained and enthusiastic volunteers return to the designated project at

least four times a year (preferably six or more times a year) until the targeted invasive plant population is removed or reduced by 90% of its total population in *your chosen area of infestation*.

Inserting the term *ongoing* into project written descriptions relieves the host organization from unattainable completion dates (including conflicts with administrators) and allows more time for the continuous recruitment of interested volunteers, because volunteers have their own lives and come and go at will. It also implies to the public and your membership that a definite, working invasive plant management plan is in continuous operation as part of your organization's strategic plan for native plant conservation. Eventually, a strong and frequently small number of volunteers will emerge to help your organization with the daunting task of managing the conservation of native plant populations from the encroachment of exotic invasive plant populations.

Plan for Continued Monitoring

Monitoring in the profession of pest control implies that pest surveillance must be continuous or ongoing for control to be effective. We all know this from personal experience!

Inserting the term "monitoring" into project written descriptions and in management practices also strengthens the dedication staff and volunteers have for the ongoing project and shows that there are more important pest control tasks in exotic invasive plant control programs than just removing invasive plants from a designated site. Monitoring (visually inspecting) for newly germinating invasive plants is a necessary pest control component for saving native plant populations from encroaching invasive plants. Monitoring for invasive plants during and after project completion *must be ongoing*. Monitoring for newly emerging invasive plants in the area of removed invasive plants as well as in areas not worked can be a task for trained volunteers that will make your ongoing program a success. Monitoring is always ongoing whether it is checking for aphids on garden plants or for weeds in your prized rose garden.

Competing for grant money or donations to supplement existing invasive plant control programs or to start a new program should not be mutually exclusive. In other words, developing a strong volunteer program and competing for grant money should be done simultaneously. Do everything you can for saving your native plant populations on your site and reduce the spread of exotic invasive plants beyond your property line.

Developing Your Volunteer Exotic Invasive Plant Management Program

Conduct a survey. First, your organization needs to *survey* (identify) the particular exotic invasive plant or plants that need to be removed for the purpose of conserving

the surrounding native plant populations. [Based on my experience, there will be high interest and support for removing invasive plants, but few, if any interested paid staff will participate more than once on scheduled work days. It will prove to be too time consuming and laborious. Grounds personnel are usually the ones that participate]. Conducting an invasive plant survey of woody and herbaceous plants will help shape the control strategies needed and volunteer deployment. Keep in mind that not all control options are suitable and legal for volunteers. You may not want volunteers operating wood chippers and chainsaws, and herbicide use is restricted to trained and licensed grounds staff.

Develop logistics. Second, all organization staff, including Human Resources, should meet to determine the logistics for the development and need for a *volunteer* exotic invasive plant management program based on your exotic invasive plant survey. The meeting or meetings should define the *goal*, which is to preserve native plant populations both woody and herbaceous. Human Resources can advise you about volunteer liability issues and waiver agreements.

Put someone in charge. Third, define *who* will develop and coordinate the volunteer program and work with the volunteers. Almost all conservation organizations have a grounds department or grounds personnel. An interested person from grounds should be responsible for program development, coordination in the field, and for follow up progress reports to the organization. He or she should be in communication with other departments within the organization via e-mail reports and/or basic staff meetings about program developments, needs, problems, and progress.

Progress reports of work done help people in the organization connect with the visual change presented in the landscape after a volunteer group has been working in a specified area. The landscape being worked will show a new openness in combination with new plant refuse piles. Visiting members may inquire at the front office about what is going on and why. This is the best time to educate members, face to face, about the dangers of exotic invasive plants and the importance of native plant conservation.

Keep your organization's membership informed. They can read the progress reports written in your newsletter. Exotic invasive plant fact sheets produced in-house can be very useful tools for educating volunteers and membership about the dangers of these types of plants and also confirm your organization's commitment to this volunteer program.

In-house produced fact sheets on the exotic invasive plant targeted for removal should be written by knowledgeable staff using science-based resources or downloaded and

printed off from reputable science-based websites such as www.invasive.org or The Nature Conservancy.

The processing or removal of invasive plant refuse piles is also an important component to your overall volunteer program and needs to be carried out as part of your defined exotic invasive plant management plan. The logistics for this should be worked out by in-house staff.

If your conservation organization is a small one and has limited grounds staff, you could make the volunteer coordinator position a volunteer job; however, an administrator would work closely with this person.

A word of caution. If an administrator or other non-grounds staff becomes appointed as the volunteer coordinator, that individual must have a *good working relationship with* existing grounds personnel. Good communication is the key. For example, if the volunteer coordinator changes work times or work locations without prior communication of the change to grounds people, resentment between the grounds personnel and coordinator can damage the continuity of the program. Most likely, the grounds personnel will feel less appreciated and less respected.

Often breakdown in communication can be traced to secrecy between groups or real or perceived favoritism of one group over another. Staff competition for personal recognition within the organization can play out to the point of hurting the entire volunteer program. To be fair, you also want to avoid the situation in which the grounds personnel override the volunteer coordinator. Communication must be transparent! It may be necessary to have your immediate department or organization take a seminar about the strategies of managing people in the work environment, particularly managing difficult people. See Resources below.

Define volunteer roles. Fourth, your organization's staff needs to produce a volunteer announcement, schedule a volunteer orientation meeting and present a volunteer job description. Specifically focusing on invasive plant removal clearly states the ecological problem at hand and the skills and abilities needed of potential volunteers to manage the problem. Without volunteer help to remove these problem plants, the preserve, arboretum or sanctuary's exotic invasive plant populations will only get worse and continue threatening, overtaking, and encroaching on various native plant populations on the property and beyond its property line. Neighbors of such organizations will be delighted to find out that the invasive plants are being managed by staff and organized volunteers. Some of these neighbors may be potential volunteers!

Volunteer Announcement: how to get the word out

Volunteer recruitment can be done in many ways: (1) word of mouth; (2) Board of Directors; (3) local newspaper ads or articles (This avenue was the most successful for me when I worked at Mass Audubon.); (4) websites and the many social media sites in existence (facebook, twitter, etc.); (5) flyers and posters posted at local businesses; (6) networking with similar like-minded organizations; (7) posting ads at local colleges, libraries, and schools; (8) posting ads that other conservation organizations use to recruit volunteers; (9) set up a booth representing your organization and volunteer needs at fairs and professional conferences; (10) give a free talk at the local library or garden club about your volunteer program and the biology of invasive plants; or (11) advertise in your own organization's newsletter.

These announcements should include all the vital details. Include a volunteer description and give the date, time, and location of the Volunteer Orientation Meeting. Describe the work needing to be done and indicate why it is important for native plant conservation at your organization.

Volunteer Job Description. A volunteer job description is the best way to inform people about your plan. It should be developed carefully and then written and posted in all announcements. It should also be passed out to all potential volunteers at the orientation meeting.

Here is a sample volunteer job description. You can develop one that fits your situation.

The Native Woodlands Wildlife Sanctuary (NWWS), 1234 Country Road, Any Town, Any State, Zip Code – Phone #

Point Person: (include contact information)

The Native Woodlands Wildlife Sanctuary is seeking able-bodied conservation volunteers of all ages (or list age range) to help with the ongoing removal (pulling by hand or mechanical pulling device) of the exotic invasive shrub, glossy buckthorn, *Rhamnus frangula*. Less able-bodied people can assist with monitoring (visually inspecting) for newly emerging shrubs. Our goal is to remove this spreading shrub from selected sites on the sanctuary where it is threatening native plant populations and reducing and/or weakening native plant germination, growth, and sustainability.

Conservation minded volunteers are needed to assist staff with the management of this highly invasive shrub. If you are interested, we are having an orientation meeting on July 15, 2015, from 9 a.m. to 12 noon in the main lecture hall. ALL INTERESTED VOLUNTEERS MUST ATTEND THIS MEETING. Please contact_____ at phone # _____ or e-mail at _____ to register.

Conducting a Volunteer Orientation Meeting

This meeting informs potential volunteers that have responded to your advertisement about the *specifics* of the program and should be scheduled during the hours of the actual volunteer program. For example, if you need volunteers to pull glossy buckthorn on Wednesday morning from 9 a.m. to 12 noon, then hold your orientation meeting for volunteer recruitment *at that time*. Potential volunteers that have that time available in their schedules will more than likely make time for you.

The Orientation Meeting is the time when you can review the biology of invasive plants needing removal and explain why it is important to protect native plant populations from these invasive plants. You can also give a property tour and show potential volunteers what these exotic plants look like and the damage they do. Take time to demonstrate how hard or easy it is to hand pull them and how to use a Weed Wrench® or other plant pulling device.

As part of an Integrated Pest Management (I.P.M.) program you can explain that woody plants that are hard to hand pull or are difficult to mechanically pull must be cut one inch from the ground so that pesticide licensed staff can apply an appropriate herbicide to the freshly cut stump. Brush hauling and brush pile stacking can be reviewed as well as other labor tasks pertinent to your site and program goals. It is a very physical endeavor and not all volunteers will perform at the same level of physical exertion.

Both potential volunteers and the host organization need to know *the program expectations and physical skills needed* for the program to be effective. Many people will be interested in the cause but will not have the physical capability to participate in more rigorous tasks. Those people can still participate by doing less strenuous tasks. It's up to you to place these types of volunteers where applicable. Some potential volunteers just won't work out.

At your orientation meeting, potential volunteers find out if they can or cannot participate. Volunteers also need to know the volunteer work dates, times, locations and work time commitment for the host organization to reach its goal. Remember, long-term projects (> 1 year) should be defined as *ongoing.* Once the program is underway, volunteer work dates can be placed in the organization's newsletter. You can also update volunteers through periodic e-mails and personal phone calls.

Your Small, Dedicated Volunteer Group or Groups

There are many types of people who volunteer. You might get youth, middle-aged or older adults, or individuals with special needs. You may get people interested in a short-term commitment as well as long-term commitment types. Individuals may be motivated for personal reasons, or their interest may come from a community service program run by the local schools, religious organizations, or Boy Scout and Girl Scout programs. At

Mass Audubon, I was very successful at recruiting and maintaining Eagle Scouts, individuals and families, and members of religious organizations as volunteers. Over time, a small and very dedicated invasive plant volunteer group emerged that returned year after year to help with invasive plant removal.

Some Extra Points to Consider to Retain Volunteers

1. Treat every volunteer as an equal. Always work with them. There is no bad motivation when people volunteer. They just have different levels of ability and motivation. All are valued and all are welcomed.
2. Structure the event. Provide a checklist of tasks and include the reason why these tasks are important. You need to be available for volunteers needing direction and finding out their interests. Remember, volunteers are helping you for free! Be on their side.
3. Observe volunteer's behaviors. Some like doing things for a short time, some for a long time. As a supervisor, you need to adjust to their levels of motivation and ability. If someone wants to use a Weed Wrench® for only five shrubs, that's okay. If the task is too difficult, have another task ready for that person. Don't let volunteers be idle or they will feel left out of the event. You must help them connect to your organization. Make them feel useful by providing them with other work task choices. Focus on their interests and skill levels. Do not be judgmental and compare who is better than whom. Competing against one another is out. I used to frequently say to my volunteer groups that pulling out buckthorn is not a race about who can pull more. *It is a task that helps native plants survive*. You need to create an atmosphere of "no competition," where everyone's ability is contributing to the goal! I frequently found myself stating this with every short-term group that volunteered for me at Mass Audubon. It worked! I got a few people who expressed to me that they liked feeling included and not judged. Again, focus on your volunteers' interests and skill levels. Be a careful listener!
4. Have food and beverage breaks during the volunteer work day. Everyone breaks at the same time. I found that volunteers take the time to socialize and get to know one another. You need to provide this kind of structure so volunteers feel it is more than just a work event. Volunteering is a social event too!
5. Have name tags and/or special tee-shirts made for volunteers. Give volunteers something that identifies them as a part of your organization. It is now their organization!
6. Include your volunteers in your organization's holiday parties and other special events. These events are usually reserved for paid employees, but need to include the volunteer staff so they get the signal that they are a part of the organization and greatly appreciated. I used to have a separate "greenhouse party" for volunteers at Mass Audubon just before Thanksgiving to show my personal appreciation for their efforts. Volunteers were always invited to our sanctuary holiday party.
7. Break up work groups by age and ability. Weaker people work with stronger people. Older people work with younger people. Mixing up ages and abilities helps with the socialization process. This especially works well with large, long-term invasive plant projects.
8. Do not view volunteers as your personal servants. Volunteers continue to volunteer because they feel respected, needed, and valued. If you frequently lose volunteers, you may need to go through some self evaluation. Ask your departed volunteers why they

did not stay. Did the organization or volunteer program or supervisor meet their expectations? Did they have personal problems with the work tasks or other volunteers? When we lost a few volunteers at Mass Audubon they said that the organization was great, but they had physical difficulty with pulling and stacking buckthorn. We still included them in all staff parties because they volunteered for a long-term project and contributed to native plant conservation goals for the organization.

9. Be flexible with your long-term volunteers. Some have other commitments and may skip one or many volunteer events or work days. Assure them that they are not out of the volunteer program. We (the organization) adapts to them. Let them know that you appreciate their efforts and allow flexibility. This approach works for short-term projects too.
10. In addition to invitations to holiday parties and the like, you can show your appreciation by holding a once a year Volunteer Appreciation Party where you can provide food and citations. Thank everyone all in the same event at the same time and hope that all your volunteers are present.
11. Have your volunteers sign a volunteer work log for each session to keep track of the hours they donate to the project. This will also give you a better idea about the time required, in person hours, for you to reach your goal.
12. As your program becomes more successful, you may want to write down the details learned in a volunteer handbook for your own organization.

Keep It Local

In closing, aim your efforts towards the people in your community. Local people have more concern for conservation projects close to where they live. Exotic invasive plant control projects are a direct way to save native plant life. Volunteering at conservation organizations in your community or region is the best way to start learning and doing real conservation work. Check out Mass Audubon, The Trustees of Reservations, New England Wildflower Society, Lands Sake in the Town of Weston, and other non-profit conservation organizations for invasive plant control volunteer opportunities. Local garden clubs may have their own invasive plant projects too. Check around if you want to be a volunteer. Non-profit conservation organizations will be grateful!

Resources

SkillPath Seminars. www.SkillPath.com (800) – 873-7545

I have attended two SkillPath seminars and found them to be very informative. If you are involved with volunteers at your organization check into the seminar they offer called "Dealing Effectively with Unacceptable Employee Behavior." I took it, and it was excellent. SkillPath offers many publications to help with managing organizations. The SkillPath book, *Coping with Supervisory Nightmares* by Michael and Deborah Singer Dobson, is a valuable reference for managing employees, paid or volunteer.

About the author

Bruce Wenning is the horticulturist at The Country Club, Brookline, MA, and has managed volunteers for invasive plant projects for more than 15 years. When he worked at Mass Audubon, Habitat Sanctuary, Belmont, MA he developed and coordinated the Save Our Sanctuary **(S.O.S.)** Invasive Exotic Plant Management Volunteer Group. From 1998 to 2006 the Habitat sanctuary grounds department recruited and worked with approximately 110 volunteers and removed close to 9,000 buckthorn plants covering about 25 plus acres.

Tract Overview

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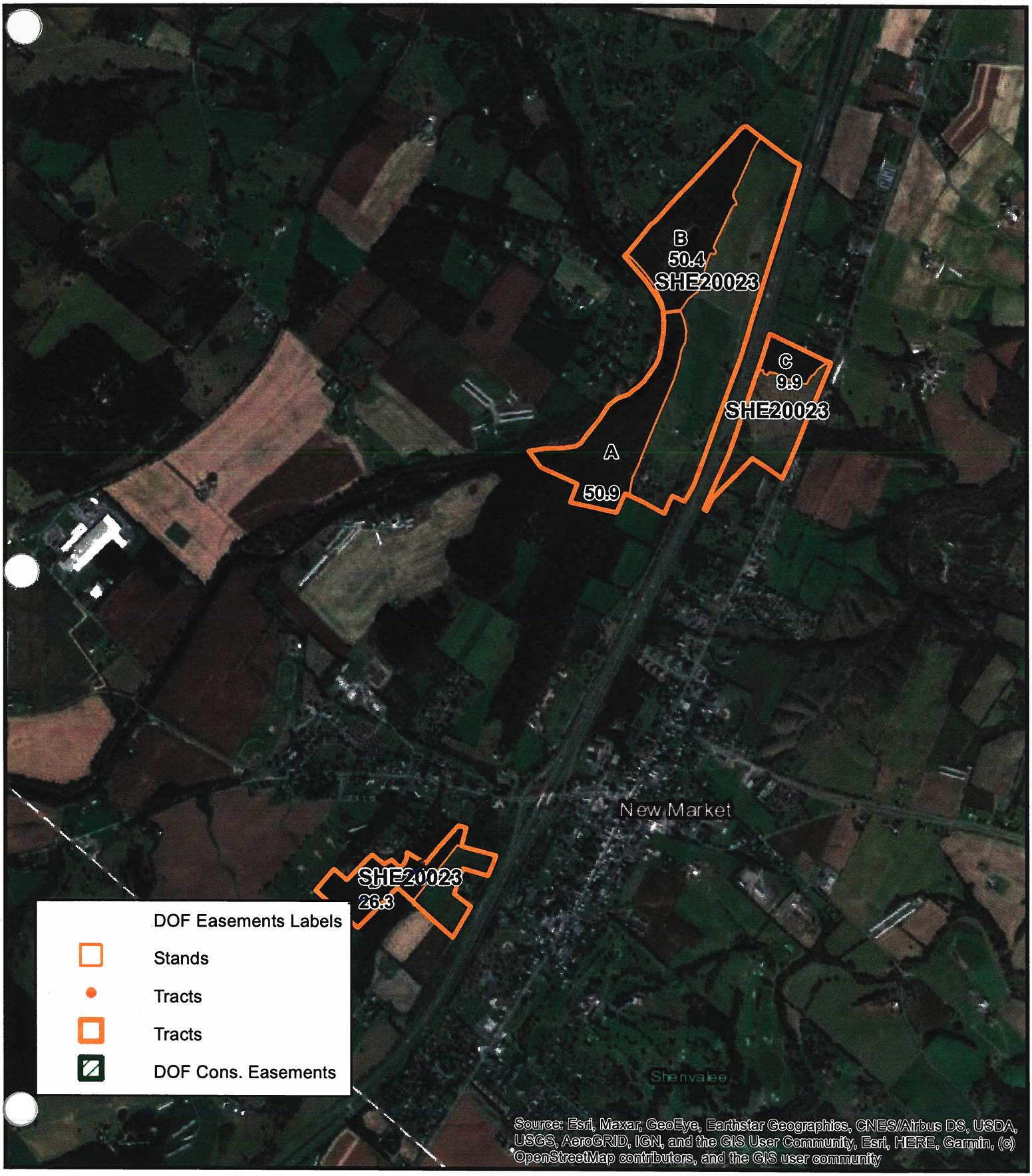
4/22/2021



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Feet
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Southern Piece

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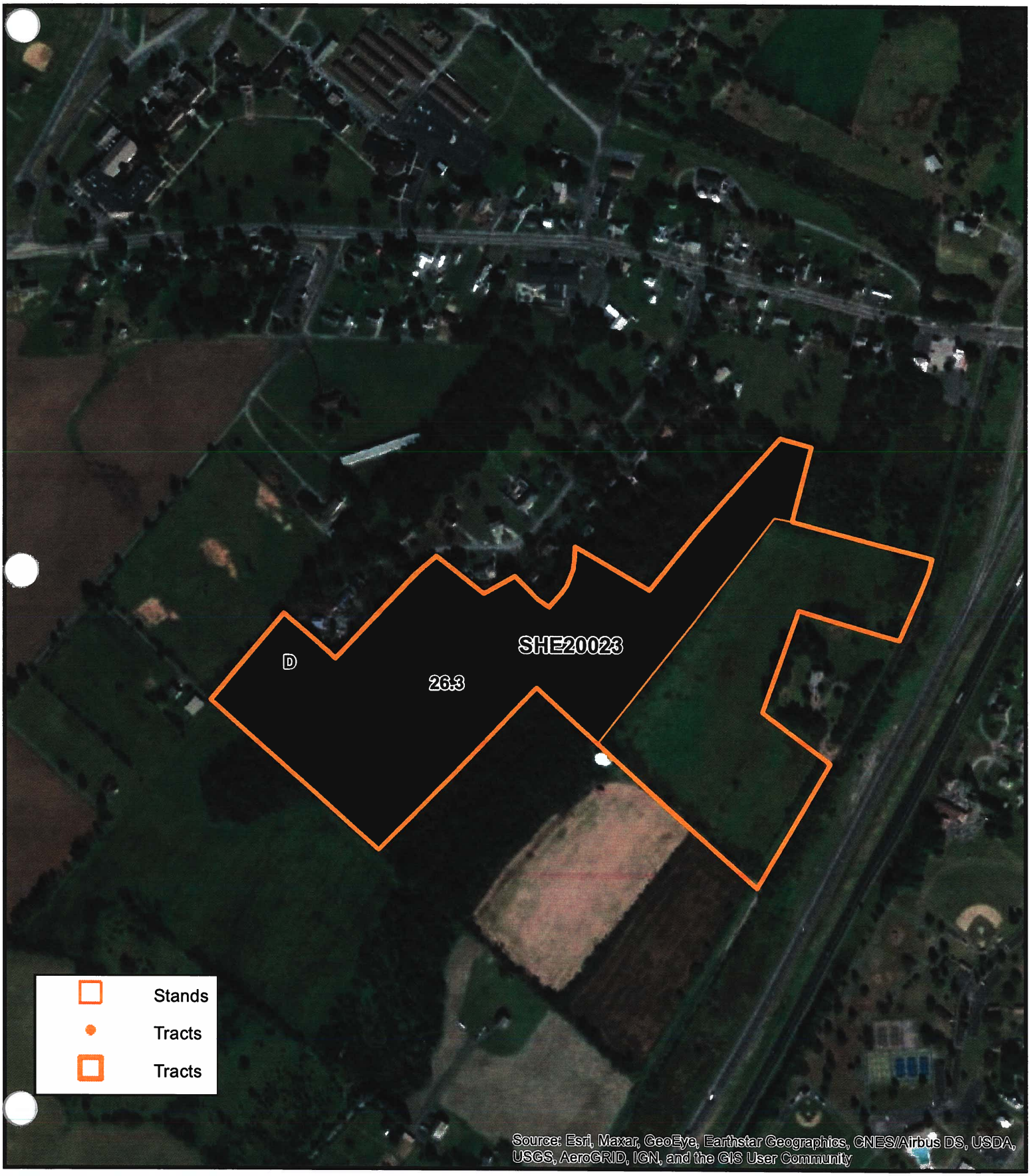
4/22/2021



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Northern Piece

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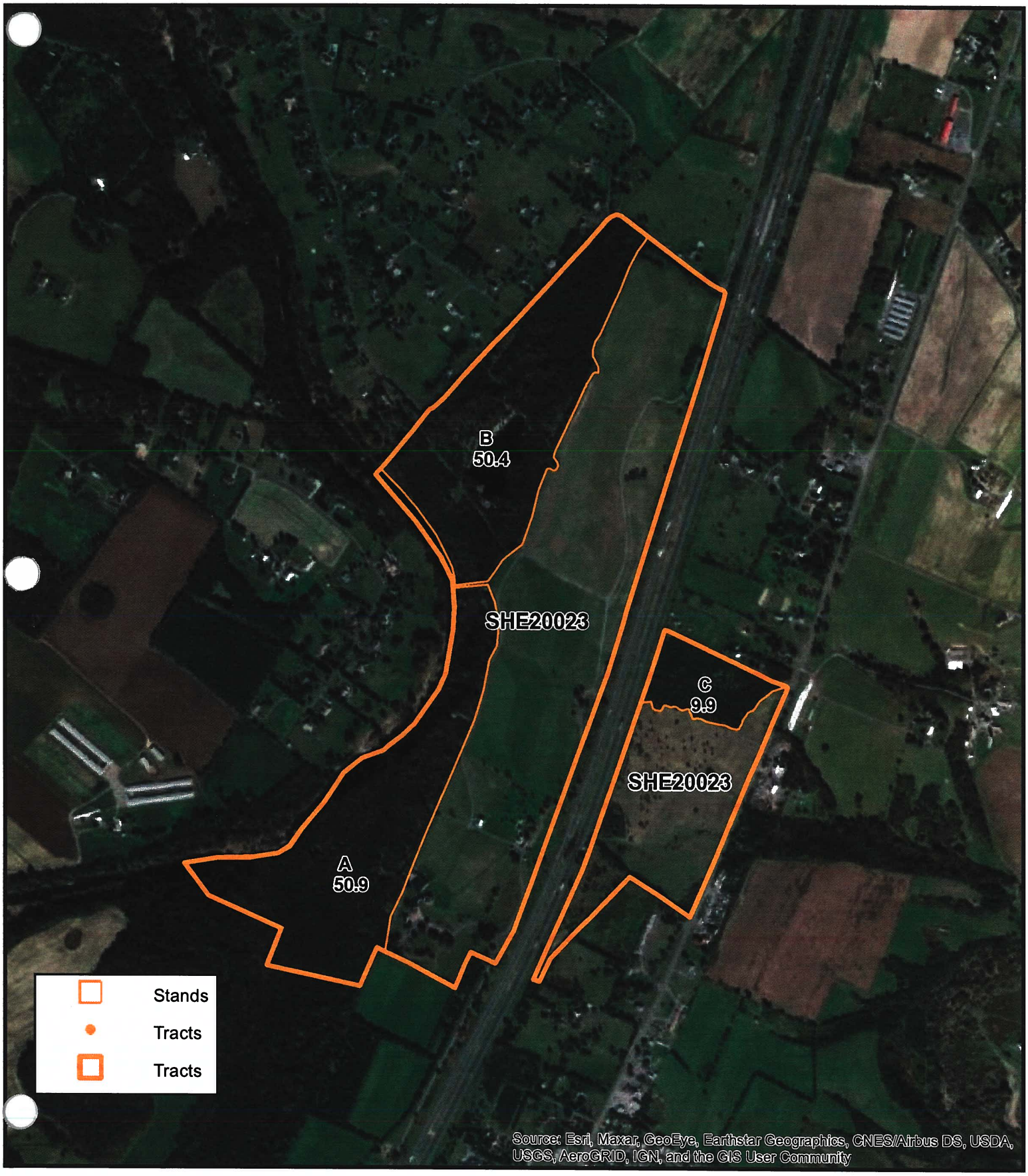
4/22/2021



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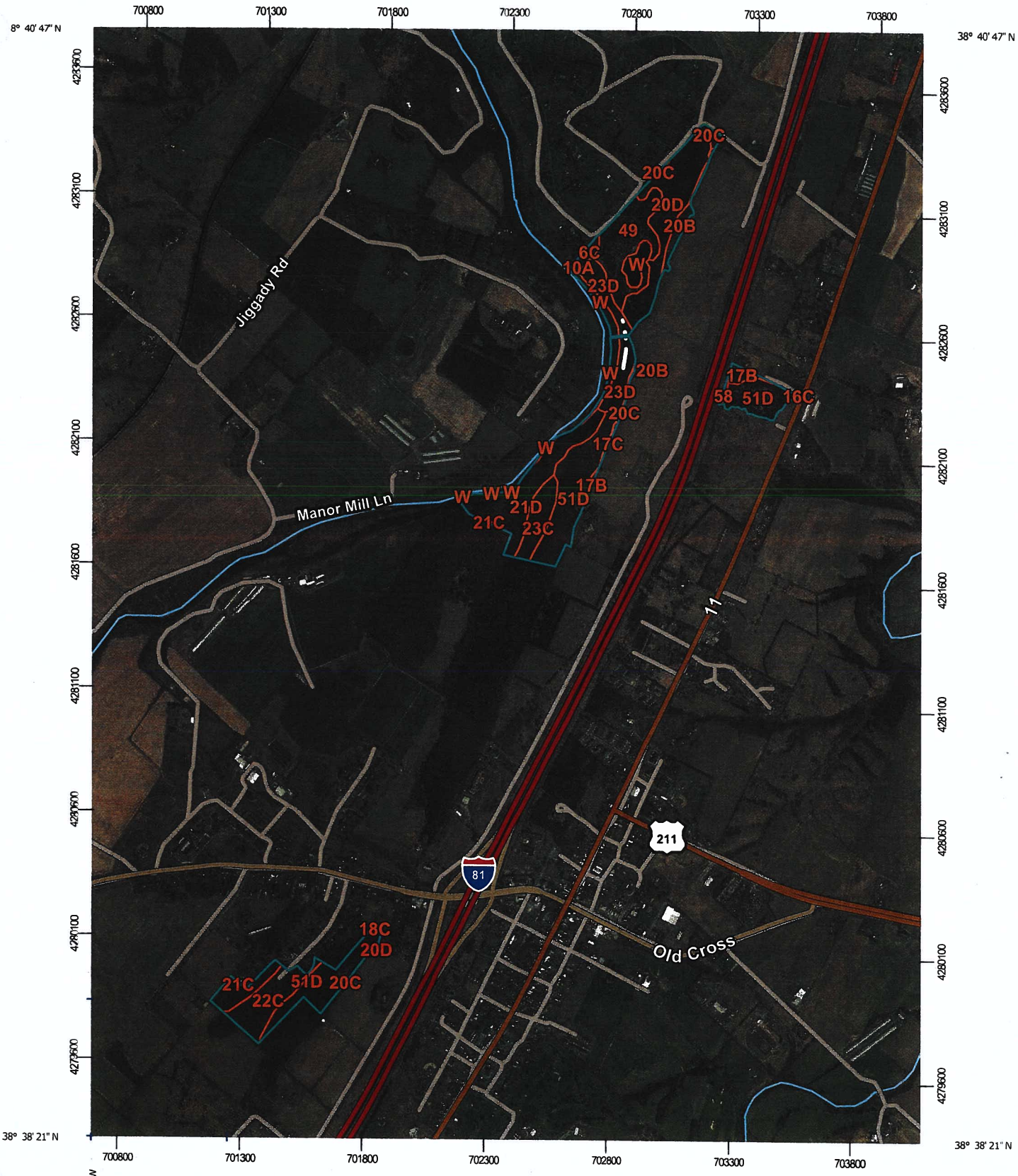
Soil Map—Shenandoah County, Virginia
(SHE20023_stands)



Map Scale: 1:21,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 300 600 1200 1800

Feet
0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Shenandoah County, Virginia
Survey Area Data: Version 14, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 25, 2014—Mar 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6C	Braddock cobbly loam, 7 to 15 percent slopes	1.2	0.9%
10A	Caverns sandy loam, 0 to 2 percent slopes, rarely flooded	0.3	0.2%
16C	Edom silty clay loam, 7 to 15 percent slopes	0.0	0.0%
17B	Endcav silt loam, 2 to 7 percent slopes	1.7	1.2%
17C	Endcav silt loam, 7 to 15 percent slopes	0.6	0.4%
18C	Endcav silt loam, 7 to 15 percent slopes, rocky	0.1	0.1%
20B	Frederick and Poplimento silt loams, 2 to 7 percent slopes	2.8	2.0%
20C	Frederick and Poplimento silt loams, 7 to 15 percent slopes	1.6	1.2%
20D	Frederick and Poplimento silt loams, 15 to 25 percent slopes	19.2	14.0%
21C	Frederick and Poplimento gravelly silt loams, 7 to 15 percent slopes	4.8	3.5%
21D	Frederick and Poplimento gravelly silt loams, 15 to 25 percent slopes	17.7	12.9%
22C	Frederick and Poplimento silt loams, 7 to 15 percent slopes, rocky	10.4	7.6%
23C	Frederick and Poplimento silt loams, 2 to 15 percent slopes, very rocky	6.5	4.7%
23D	Frederick and Poplimento silt loams, 15 to 35 percent slopes, very rocky	10.2	7.4%
49	Pits and Dumps	15.9	11.5%
51D	Rock outcrop-Carbo complex, 2 to 25 percent slopes	36.9	26.8%
58	Udorthents-Urban land complex	0.3	0.2%
W	Water	7.4	5.3%
Totals for Area of Interest		**137.6**	**100.0%**

Forestland Productivity

This table can help forestland owners or managers plan the use of soils for wood crops. It shows the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National Forestry Manual.

Report—Forestland Productivity

Forestland Productivity–Shenandoah County, Virginia				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac/yr	
6C—Braddock cobbly loam, 7 to 15 percent slopes				
Braddock	Eastern white pine	95	172.00	Eastern white pine, Yellow-poplar
	Northern red oak	80	57.00	
	Yellow-poplar	90	86.00	
10A—Caverns sandy loam, 0 to 2 percent slopes, rarely flooded				
Caverns	Northern red oak	75	57.00	Eastern white pine, Shortleaf pine, Yellow-poplar
	Virginia pine	65	100.00	
	Yellow-poplar	93	100.00	

Forestland Productivity–Shenandoah County, Virginia				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac/yr	
16C—Edom silty clay loam, 7 to 15 percent slopes				
Edom	Northern red oak	80	57.00	Eastern white pine, Norway spruce, Virginia pine, Yellow-poplar
	Yellow-poplar	90	86.00	
17B—Endcav silt loam, 2 to 7 percent slopes				
Endcav	Eastern white pine	90	172.00	Black walnut, Eastern white pine, Yellow-poplar
	Northern red oak	85	57.00	
	Yellow-poplar	90	86.00	
17C—Endcav silt loam, 7 to 15 percent slopes				
Endcav	Eastern white pine	90	172.00	Black walnut, Eastern white pine, Yellow-poplar
	Northern red oak	85	57.00	
	Yellow-poplar	90	86.00	
18C—Endcav silt loam, 7 to 15 percent slopes, rocky				
Endcav	Eastern white pine	90	172.00	Black walnut, Eastern white pine, Yellow-poplar
	Northern red oak	85	57.00	
	Yellow-poplar	90	86.00	
20B—Frederick and Poplimento silt loams, 2 to 7 percent slopes				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	

Forestland Productivity–Shenandoah County, Virginia				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
20C—Frederick and Poplimento silt loams, 7 to 15 percent slopes				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	
20D—Frederick and Poplimento silt loams, 15 to 25 percent slopes				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	
21C—Frederick and Poplimento gravelly silt loams, 7 to 15 percent slopes				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	

Forestland Productivity–Shenandoah County, Virginia				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac/yr	
21D—Frederick and Poplimento gravelly silt loams, 15 to 25 percent slopes				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	
22C—Frederick and Poplimento silt loams, 7 to 15 percent slopes, rocky				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	
23C—Frederick and Poplimento silt loams, 2 to 15 percent slopes, very rocky				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	

Forestland Productivity–Shenandoah County, Virginia				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
23D—Frederick and Poplimento silt loams, 15 to 35 percent slopes, very rocky				
Frederick	Black locust	80	57.00	Black walnut, Eastern white pine, Scotch pine, Yellow-poplar
	Black walnut	76	57.00	
	Northern red oak	76	57.00	
	White oak	76	57.00	
	Yellow-poplar	86	86.00	
Poplimento	Northern red oak	80	57.00	Black walnut, Eastern white pine, Yellow-poplar
	Yellow-poplar	90	86.00	
49—Pits and Dumps				
Pits	—	—	—	—
51D—Rock outcrop-Carbo complex, 2 to 25 percent slopes				
Rock outcrop	—	—	—	—
Carbo	Eastern white pine	80	143.00	Black walnut, Virginia pine, Yellow-poplar
	Virginia pine	55	86.00	
	Yellow-poplar	80	72.00	
58—Udorthents-Urban land complex				
Udorthents	—	—	—	—
Urban land	—	—	—	—
W—Water				
Water	—	—	—	—

Data Source Information

Soil Survey Area: Shenandoah County, Virginia
Survey Area Data: Version 14, Jun 5, 2020

Component Text Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the selected area. The component descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit. A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the associated soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas (components) for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The "Map Unit Component Nontechnical Descriptions" report gives a brief, general description of the soil components that occur in a map unit. Descriptions of nonsoil (miscellaneous areas) and minor map unit components may or may not be included. This description is written by the local soil scientists responsible for the respective soil survey area data. A more detailed description can be generated by the "Map Unit Description" report.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Component Text Descriptions

Shenandoah County, Virginia

Map Unit: 6C—Braddock cobbly loam, 7 to 15 percent slopes

Description Category: GENSOIL

Braddock: 75 percent

The Braddock component makes up 75 percent of the map unit. Slopes are 7 to 15 percent. This component is on high stream terraces on river valleys. The parent material consists of alluvium derived from sandstone and crystalline rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map Unit: 10A—Caverns sandy loam, 0 to 2 percent slopes, rarely flooded

Description Category: GENSOIL

Caverns: 75 percent

The Caverns component makes up 75 percent of the map unit. Slopes are 0 to 2 percent. This component is on stream terraces on river valleys. The parent material consists of alluvium derived from shale sandstone and limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria.

Map Unit: 16C—Edom silty clay loam, 7 to 15 percent slopes

Description Category: GENSOIL

Edom: 90 percent

The Edom component makes up 90 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of residuum derived from calcareous sahle. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 70 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 17B—Endcav silt loam, 2 to 7 percent slopes

Description Category: GENSOIL

Endcav: 90 percent

The Endcav component makes up 90 percent of the map unit. Slopes are 2 to 7 percent. This component is on hills on uplands. The parent material consists of weathered from limestone and calcareous shale. Depth to a root restrictive layer, bedrock, lithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map Unit: 17C—Endcav silt loam, 7 to 15 percent slopes

Description Category: GENSOIL

Endcav: 75 percent

The Endcav component makes up 75 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of weathered from limestone and calcareous shale. Depth to a root restrictive layer, bedrock, lithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 18C—Endcav silt loam, 7 to 15 percent slopes, rocky

Description Category: GENSOIL

Endcav: 80 percent

The Endcav component makes up 80 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of weathered from limestone and calcareous shale. Depth to a root restrictive layer, bedrock, lithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 20B—Frederick and Poplimento silt loams, 2 to 7 percent slopes

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 2 to 7 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 2 to 7 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map Unit: 20C—Frederick and Poplimento silt loams, 7 to 15 percent slopes

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 20D—Frederick and Poplimento silt loams, 15 to 25 percent slopes

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 21C—Frederick and Poplimento gravelly silt loams, 7 to 15 percent slopes

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map Unit: 21D—Frederick and Poplimento gravelly silt loams, 15 to 25 percent slopes

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map Unit: 22C—Frederick and Poplimento silt loams, 7 to 15 percent slopes, rocky

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 7 to 15 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 23C—Frederick and Poplimento silt loams, 2 to 15 percent slopes, very rocky

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 2 to 15 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 2 to 15 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 23D—Frederick and Poplimento silt loams, 15 to 35 percent slopes, very rocky

Description Category: GENSOIL

Frederick: 45 percent

The Frederick component makes up 45 percent of the map unit. Slopes are 15 to 35 percent. This component is on hills on uplands. The parent material consists of weathered from dolomitic limestone with thin lenses of interbedded shale and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Description Category: GENSOIL

Poplimento: 30 percent

The Poplimento component makes up 30 percent of the map unit. Slopes are 15 to 35 percent. This component is on hills on uplands. The parent material consists of formed in material weathered form limestone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map Unit: 49—Pits and Dumps

Description Category: GENSOIL

Pits: 100 percent

Generated brief soil descriptions are created for major soil components. The Pits is a miscellaneous area.

Map Unit: 51D—Rock outcrop-Carbo complex, 2 to 25 percent slopes

Description Category: GENSOIL

Rock outcrop: 55 percent

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Description Category: GENSOIL

Carbo: 35 percent

The Carbo component makes up 35 percent of the map unit. Slopes are 2 to 25 percent. This component is on hills on uplands. The parent material consists of residuum from limestone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 58—Udorthents-Urban land complex

Description Category: GENSOIL

Udorthents: 55 percent

The Udorthents component makes up 55 percent of the map unit. Slopes are 0 to 30 percent. Depth to a root restrictive layer is greater than 60 inches. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria.

Description Category: GENSOIL

Urban land: 30 percent

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Map Unit: W—Water

Description Category: GENSOIL

Water: 100 percent

Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Data Source Information

Soil Survey Area: Shenandoah County, Virginia
Survey Area Data: Version 14, Jun 5, 2020

VaFWIS Search Report Compiled on 4/22/2021, 8:51:09 AM

Help

Known or likely to occur within a **3 mile radius around point 38,39,21.8 -78,40,44.3** in **165 Rockingham County, 171 Shenandoah County, VA**

View Map of Site Location

570 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 31) (31 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
050023	FESE	Ia	Bat, Indiana	Myotis sodalis
101005	FE	Ia	Bee, rusty patched bumble	Bombus affinis
050035	FESE	IIa	Bat, Virginia big-eared	Corynorhinus townsendii virginianus
050022	FTST	Ia	Bat, northern long-eared	Myotis septentrionalis
070001	FTST	IIc	Isopod, Madison Cave	Antrolana lira
050020	SE	Ia	Bat, little brown	Myotis lucifugus
050027	SE	Ia	Bat, tri-colored	Perimyotis subflavus
060006	SE	Ib	Floater, brook	Alasmidonta varicosa
050009	SE	IIa	Shrew, American water	Sorex palustris
030062	ST	Ia	Turtle, wood	Glyptemys insculpta
040096	ST	Ia	Falcon, peregrine	Falco peregrinus
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus
100155	ST	Ia	Skipper, Appalachian grizzled	Pyrgus wyandot
060081	ST	IIa	Floater, green	Lasmigona subviridis
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
030012	CC	IVa	Rattlesnake, timber	Crotalus horridus
040092		Ia	Eagle, golden	Aquila chrysaetos
040306		Ia	Warbler, golden-winged	Vermivora chrysoptera
050024		Ia	Myotis, eastern small-footed	Myotis leibii
100248		Ia	Fritillary, regal	Speyeria idalia idalia
020027		Ic	Salamander, Cow Knob	Plethodon punctatus
040213		Ic	Owl, northern saw-whet	Aegolius acadicus
040052		IIa	Duck, American black	Anas rubripes
040036		IIa	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040320		IIa	Warbler, cerulean	Setophaga cerulea
040140		IIa	Woodcock, American	Scolopax minor
060071		IIa	Lampmussel, yellow	Lampsilis cariosa
040203		IIb	Cuckoo, black-billed	Coccyzus erythropthalmus
110281		IIb	PSEUDOSCORPION, CAVE	Chitrella superba
100329		IIc	Beetle, Avernus cave	Pseudanophthalmus avernus
100340		IIc	Beetle, mud-dwelling cave	Pseudanophthalmus limicola

To view **All 570 species** View 570

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.; b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.; c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Anadromous Fish Use Streams

N/A

Impediments to Fish Passage

N/A

Threatened and Endangered Waters (47 Reaches - displaying first 20) View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					View Map
Smith Creek (028359)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (029929)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (030104)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (030121)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (030123)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (030219)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (031729)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (031810)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (031868)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (031900)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (032748)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (035303)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (035376)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (036360)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (036626)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (036681)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (036931)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (037540)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (038045)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (038171)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (039371)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (039934)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (042666)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes

To view **All 47 Threatened and Endangered Waters records** View 47

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (4 Reaches) View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Holmans Creek (20700062)	ST	030062	ST	Ia	Turtle, wood	Glyptemys insculpta	Yes
orth Fork Shenandoah River (20700062)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Smith Creek (20700062)	SE	030062	ST	Ia	Turtle, wood	Glyptemys insculpta	Yes
		060006	SE	Ib	Floater, brook	Alasmidonta varicosa	
tributary (20700062)	ST	030062	ST	Ia	Turtle, wood	Glyptemys insculpta	Yes
tributary (20700062)	ST	030062	ST	Ia	Turtle, wood	Glyptemys insculpta	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Virginia Breeding Bird Atlas Blocks (5 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
42183	Hamburg, CW	1		III	Yes
41184	New Market, CE	3		IV	Yes
41183	New Market, CW	1	ST	I	Yes
41186	New Market, SE	65		III	Yes
41185	New Market, SW	1	ST	I	Yes

Public Holdings: (1 names)

Name	Agency	Level
George Washington National Forest	U.S. Forest Service	Federal

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
165	Rockingham	453	FESE	I
171	Shenandoah	427	FESE	I

USGS 7.5' Quadrangles:
Tenth Legion
New Market
Hamburg

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
PS57	North Fork Shenandoah River-Long Meadow	69	FESE	I
PS58	North Fork Shenandoah River-Holmans Creek	66	FESE	I
PS62	Smith Creek-Gap Creek	69	FESE	I

Compiled on 4/22/2021 8:51:10 AM V1090908.0 report=V searchType= R dist= 4828.032 pos= 38.39.21.8 -78.40.44.3