SAVAGE RIVER STATE FOREST
ANNUAL WORK PLAN

FISCAL YEAR 2019

FSC
www.fsc.org
FSC® C016194

The mark of responsible forestry

SUSTAINABLE FORESTRY INITIATIVE

Good for you. Good for our forests.®

SFI-00050

STATE OF MARYLAND
LICENSED FORESTER
NO. 735
SCOTT JOSEPH CAMPBELL
BOARD OF FORESTERS

Prepared: Scott J Campbell (Forest Manager) 8/9/18 Date

Reviewed: (Regional Forester) 3/22/19 Date

Reviewed: (Land Acquisition & Planning) Date

Approved: (Environmental Specialist) 3.27.19 Date

Savage River State Forest
FY-19
Annual Work Plan

Page ***Contents***

XIII. Literature Cited

I. State Forest Overview

Savage River State Forest is approximately 55,155 acres in size and is situated in the northeastern quadrant of Garrett County in Western Maryland. It is a second growth mixed hardwood forest dominated by oak species, sugar and red maple, black cherry, hickory and ash. Owing to high rainfall and certain topographic features, Savage River State Forest contains many excellent quality growing sites stocked with superior quality trees. The forest contains approximately 4,000 acres of conifer plantations that were established in the 1940's following state acquisition. Red pine is the dominant tree species within these plantations but other conifers include white pine, Norway spruce, larch, and Scotch pine. These plantations were established as nurse crops to rehabilitate abandoned and depleted farm fields, with the long-term goal of conversion back to native hardwoods as appropriate.

Savage River State Forest has been intensively managed over the last nine decades. Forest harvest and grooming operations are undertaken to thin overstocked stands, to effectively deal with public safety concerns, to harvest mature or diseased/dying trees, to improve habitat for certain wildlife species, to assist and provide for certain research needs, to address aesthetic concerns and to increase the proportion of age/height diversity of forested stands.

II. Annual Work Plan Summary

The FY-2019 Annual Work Plan for Savage River State Forest was formulated in 2017. It contains projects to be undertaken in the areas of Special Projects, Maintenance and Operations, Recreation, Watershed Protection, Ecosystem Restoration / Protection, and Wildlife Management. In addition to the routine operations and management of the State Forest, the FY-19 Annual Work Plan for Savage River State Forest details 16 land management projects that will be the focus of the State Forest management staff for FY-19. All projects and proposals within this Plan have been developed to meet one or more of the Land Management Guidelines and Objectives outlined in the Savage River State Forest Sustainable Management Plan including:

Forest Economy*: management activities intended to maintain an economically sustainable forest and contribute to the local economy through providing forest-related employment and products.*

Forest Conservation*: management activities with a purpose to protect significant or unique natural communities and elements of biological diversity, including Ecologically Significant Areas, High Conservation Value Forests and old growth Forests. Old growth forest management serves to restore and/or enhance old growth forest structure and function.*

Water Quality*: management activities designed to protect or improve ecological functions in protecting or enhancing water quality.*

Wildlife Habitat*: management activities with a purpose to maintain and enhance the ecological needs of the diversity of wildlife species and habitat types.*

Recreation and Cultural Heritage*: management activities with a purpose to maintain and enhance areas that serve as visual, public camping, designated trails, and other high public use areas.*

A. Special Management Projects Include:

1. Continued Development of the Certified, State Forest Sustainable Forest Management Plan - with special focus on addressing items identified as in need of improvement as a result of the 2016 FSC/SFI Certification Audits.

2. Forest Stand Delineation, Inventory and Monitoring – Completion of the project to re-inventory and redefine stands on the entire forest. This critical project will continue in FY-19. To date, 100% of the data collection in harvestable stands is completed. Areas of HCVF including wildlands, ecologically significant areas, old growth, old growth ecosystem management areas and areas that preclude timber harvest operations will be inventoried secondarily to the harvestable areas. The project will allow a thorough analysis of this complete data set from which further management plans will be derived. Inventory work will continue in the form of follow-up monitoring protocols associated with the initial inventory and certification requirements.

3. Non-Native Invasive Species (NNIS) Inventory and Control Work - The Sustainable Forest Management Plan calls for various responses to NNIS and the Forest Inventory Project has allowed for a broad view of the problem forest wide.

. **B. Land Management Projects Include:**

1. Continuation of the ecosystem restoration project involving control of invasive, exotic plants forest wide.

2. Continuation of the ecosystem restoration efforts involving control of invasive, exotic forest pests, particularly the Hemlock wooly adelgid.

3. 11 Silvicultural projects including:
6 Intermediate Harvests on 302 acres; 48 of which include interfering vegetation control.
2 Regeneration Harvests on 93 acres.
3 Non-commercial interfering vegetation control projects on 141 acres.

4. Six noncommercial silvicultural practices to promote regeneration including:
*Three projects to control interfering and undesirable tall woody vegetation to promote seedling establishment on 141 acres.
*Three projects to control interfering and undesirable ferns and grasses to promote seedling establishment on 141 acres.

Forest harvest operations are undertaken to utilize mature and dead/dying/diseased trees; to thin overstocked stands; to improve and diversify wildlife habitat; to effectively correct public safety concerns and issues; to reduce the forests vulnerability to insect attack, disease or wildfire

hazard; to facilitate certain approved research needs; to improve certain aesthetic aspects of an area; and to improve the proportions of age class and species diversity within stands and management blocks. This forest has been intensively managed for over 100 years, utilizing both even and uneven-aged techniques via selective removals and regeneration harvests. Early records indicate that as cut over land was acquired, foresters culled the forest, removing the poorly formed and damaged timber left behind in the wake of the cut and run practices employed by early timber speculators. By removing these undesirable trees, newly forming seedlings were released from competition and were thus cultured into the future growing stock of trees that we enjoy today. The benefits of this work have been significant including improved wildlife habitat diversity, improved forest health and more abundant mast production, improved utilization of gypsy moth damaged trees, reduced forest fire hazard, and the considerable financial contribution of management to the state and local economies as well as to those employed in the forest products industry.

The FY-19 Annual Work Plan outlines eight harvests on 395 acres, producing a harvest of approximately 1,200,000 board feet of sawtimber and accounting for an estimated $250,000 worth of raw wood products entering local markets. Much of the silvicultural work laid out in this work plan is focused on initiating seedling development to better ensure regeneration successes in future harvests. Much of the value of the harvests in the work plan will be directed back into the forest providing the essential investment in pre-harvest cultural work that will safeguard the long term sustainable management of these important forest resources.

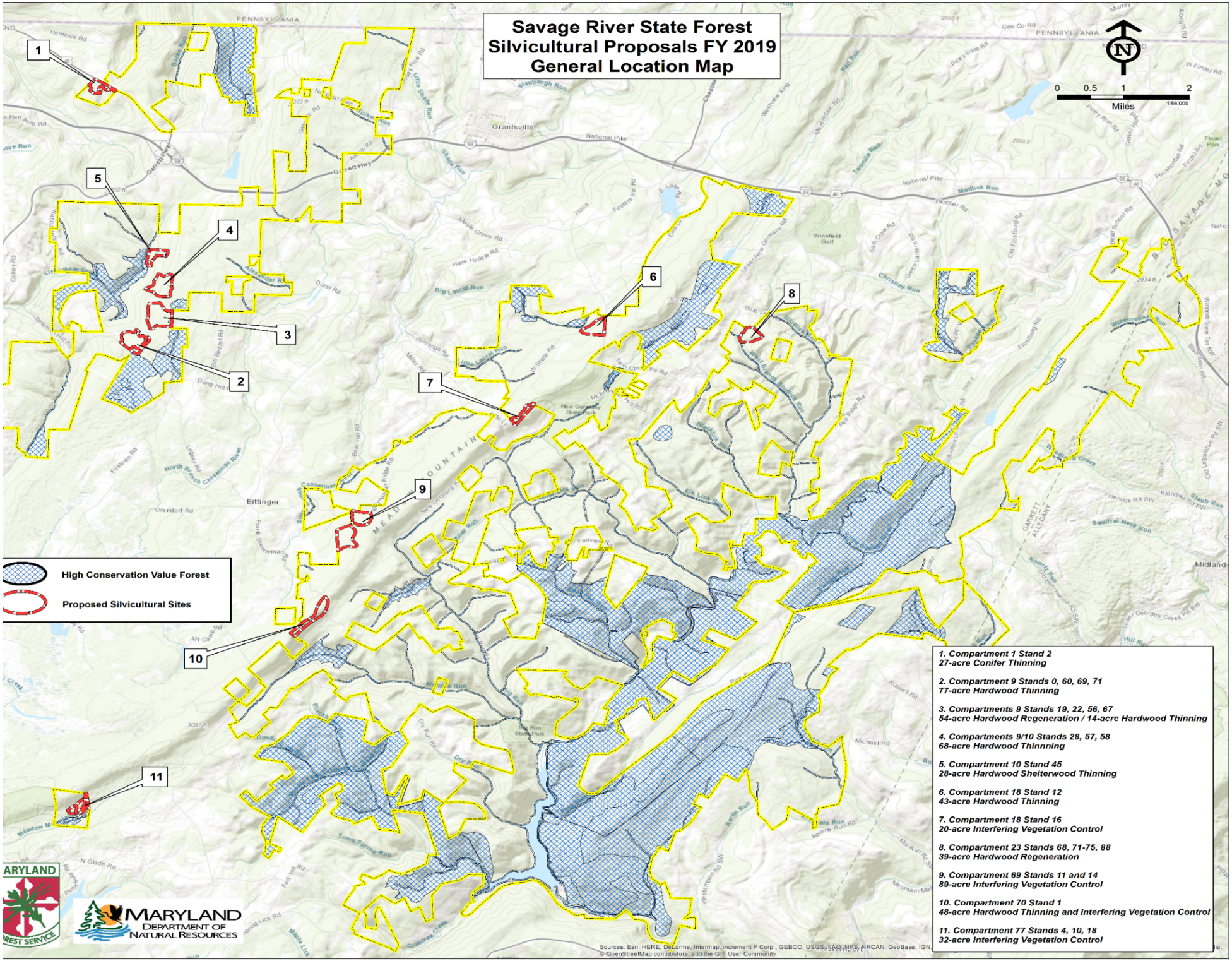
The cultural operations and management projects outlined within the FY-19 Annual Work Plan are selected to provide significant contributions to the sustainability of forest resources found within the State Forest and the ecosystems associated with it.

III. General Location Map for FY-19 Land Management Project Proposals

Approximately 536 Acres

Map Key

1. Compartment 1 Stand 2	*27-acre Conifer Thinning*
2. Compartment 9 Stands 0, 60, 69, 71	*77-acre Hardwood Thinning*
3. Compartment 9 Stands 19, 22, 56, 67	*54-acre Hardwood Regeneration / 14-acre Hardwood Thinning*
4. Compartment 9/10 Stands 28, 57 and 58	*65-acre Hardwood Thinning*
5. Compartment 10 Stand 45	*28-acre Shelterwood Harvest*
6. Compartment 18 Stand 12	*43-acre Hardwood Thinning*
7. Compartment 18 Stand 16	*20-acre Herbicide Treatment of Interfering Vegetation*
8. Compartment 23 Stands 68, 71-75, 88	*39-acre Regeneration Harvest*
9. Compartment 69 Stands 11 and 14	*89-acre Herbicide Treatment of Interfering Vegetation*
10. Compartment 70 Stands 23 and 24	*48-acre Hardwood Thinning and Treatment of Interfering Vegetation*
11. Compartment 77 Stand 13	*32-acre Herbicide Treatment of Interfering Vegetation*


Savage River State Forest
Silvicultural Proposals FY 2019
General Location Map
N
0 0.5 1 2
Miles
1:56,000
High Conservation Value Forest
Proposed Silvicultural Sites
1. Compartment 1 Stand 2
27-acre Conifer Thinning
2. Compartment 9 Stands 0, 60, 69, 71
77-acre Hardwood Thinning
3. Compartments 9 Stands 19, 22, 56, 67
54-acre Hardwood Regeneration / 14-acre Hardwood Thinning
4. Compartments 9/10 Stands 28, 57, 58
68-acre Hardwood Thinnning
5. Compartment 10 Stand 45
28-acre Hardwood Shelterwood Thinning
6. Compartment 18 Stand 12
43-acre Hardwood Thinning
7. Compartment 18 Stand 16
20-acre Interfering Vegetation Control
8. Compartment 23 Stands 68, 71-75, 88
39-acre Hardwood Regeneration
9. Compartment 69 Stands 11 and 14
89-acre Interfering Vegetation Control
10. Compartment 70 Stand 1
48-acre Hardwood Thinning and Interfering Vegetation Control
11. Compartment 77 Stands 4, 10, 18
32-acre Interfering Vegetation Control
MARYLAND DEPARTMENT OF NATURAL RESOURCES
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN,
© OpenStreetMap contributors, and the GIS User Community

IV. Special Projects - Forest Resource Management and Planning

A. Continued Development of the Certified State Forest Sustainable Forest Management Plan.

(This work done with special focus on addressing items identified as in need of improvement as a result of 2017 FSC/SFI Certification Audits.)

Beginning in 2011, the Forest Service began revising the long term sustainable management plans for all three of the State Forests in the Western Region. The initial framework follows the sustainable management plan format established for the State of Maryland's Chesapeake Forest on the Eastern shore. The Department's goal is to have the updated sustainable forest management plans receive dual third party certification under both the Forest Stewardship Councils (FSC) and Sustainable Forestry Initiatives (SFI) standards and guidelines.

Throughout the course of the last five years, broad resource assessments were carried out identifying the various management units and features located on the forests including identification and mapping of High Conservation Value Forest Areas (HCVF), much of which was formerly identified as the State Forests "Special Management Zone". Within the HCVF are located a broad range of Ecologically Significant Areas (ESA). These areas typically contain rare, threatened or endangered species and their critical habitats. By spring of 2011 initial drafts of the Forest's Sustainable Management Plan were developed and shared with stakeholders for initial comment and review. The plans were submitted to both the FSC and SFI organizations in the spring of 2011, at which point audits have been completed on all three of the western state forests. Following the audits, draft plans and audit findings were presented to the State Forests Citizen Advisory Committees for review and comments. The Draft Sustainable Management Plans were made available for public comment fall of 2011.

Each year the State Forests Management Program is audited for compliance to the standards set forth by the Certifying Organizations. Any shortcomings in the programs identified during the audits are identified in a Corrective Action Reports (CARs) and/or observations identified as being in need of improvement in order to be "certified" as sustainably managed forest lands under the internationally recognized FSC and SFI standards. These corrective actions vary from simple formal documentation of routine practices, to more complex policy and procedure development involving various stakeholders and partners. The program requires that all of these items be addressed before the next annual audit, with some needing more immediate attention. The 2016 audit resulted in no CARs or observations that are to be addressed by the next audit. (See Appendix 1 for brief summary of audit findings). State Forest staff time and field operations are adjusted and redirected to assist in addressing any Corrective Action items in the course of the next year.

B. Forest Stand Delineation, Inventory and Monitoring

A critical part of developing long term sustainable management plans is the availability of up-to-date forest inventory data. To this end, the State Forest's staff has been fully engaged in revising the forest stand delineation on the forests. The process continues to consume considerable staff resources as this project is taking shape. This ambitious undertaking has involved collecting detailed inventory data on both overstory and understory conditions over the entire State Forest. The data has been collected and analyzed using the SILVAH Inventory System developed by the US Forest Service.

The project involves collecting information on approximately 35,000 sample points. As the data must be collected during the growing season between hard frosts, the working window is five months. The work force of skilled technicians available generally consists of college students who can only offer three months of work before returning to school. To this end, the project is expected to take 4-6 years to complete and will cost approx. $40,000/yr. The Assistant Forest Manager and the full time Forest Technician lead and manage this special project on top of their full work load implementing the Annual Work Plan on the forest. The stand delineation and inventory project has resulted in the shifting of the forest technician's normal duties for the equivalent of approximately six months each year to serve as crew leader for the project, provide project planning, and processing data. Staff assignments and field operations have been adjusted to assure the timely and accurate completion of this important field level assessment that will serve as the basis from which we will draw management decisions from for the next 10-15 years.

With the close of the sixth inventory season in FY-17, 100% of initial data collection has been completed on the harvestable areas of the forest. FY-19 will commit time and resources to do final processing of this data from which we continue to draw upon for management planning direction as well as completing a general inventory of the remaining High Conservation Value Forest. The demand for this important data set is increasingly evident as special projects evolving out of demands placed by Forest Certification Standards are utilizing portions of this work in progress/partial data set for project planning. Examples include the NNIS Inventory and Control Project in the ESAs of the Forest, as well as the Fiscal Year Work Plans.

What had historically been carried out on a 10-year interval offering a snap shot in time view of the forest, has evolved into an annual sampling approach that gives a more frequent look at overall forest condition throughout the years. This approach will allow a much closer watch on developing forest conditions and allows for a more rapid and timely response. This approach is especially valuable in light of the numerous and frequent introductions of foreign insects, diseases, and invasive plants that can rapidly disrupt forest systems. The initial Stand Delineation and Inventory Project will be continued as a Forest Monitoring program as required under certification in order to allow for documented observations of changing conditions throughout the forest. Program focus will include: monitoring of developing regeneration sites allowing for the timely response to the investment in intensive silvicultural work such as herbicide control of invasive and interfering plants and prescribed fire; NNIS monitoring and control work (beyond the special project area identified in this AWP below); silvicultural results with respect to management objectives and outcomes and recreation/visitor impacts, etc.

V. Maintenance and Operations

Aside from the detailed cultural work planned for the State Forests, the following is a partial list of projects that are often on-going from year to year and are an integral part of State Forest operations: Routine maintenance projects include building repair and maintenance, vehicle maintenance, mowing at the office facility, snow removal, repair and replacement of fire rings and tables at the camp sites, brush hogging trails, and repair of road surfaces.

A. Maintenance and Management of Roads and Trails

There are approximately 101 miles of trail and hardened road surface on the forest and approximately 1/3 of the mileage is maintained each year. Maintenance in these areas includes brush hogging, mowing, and rehabilitation of road surfaces. Herbicide usage has been integrated into the road maintenance regime in order to control growth in areas where mechanical control methods are not feasible (i.e. steep slopes, narrow paths, rocky areas). The use of herbicide along forest roadways can also reduce operational costs for the maintenance staff by controlling unwanted vegetation along these travel corridors for several years, when applied properly.

B. Boundary Line Maintenance

Savage River State Forest currently has 336 miles of boundary line, including interior lines, exterior lines and road frontage. Boundary maintenance is critical to the management of all public lands. In order to keep up with this effort, State Forest staff maintain approximately 60 miles of line each year. In addition to routine marking and painting, considerable effort is spent on researching, relocating, or establishing missing and/or new line, as well as addressing boundary conflicts. As conflicts arise, every effort is made to resolve the issue in a timely and professional manner. Often, this work leads to the need for a licensed surveyor and legal recourse in order to resolve the issue. With the assistance of Land Planning and Acquisition staff, a minimum of five miles of previously unpainted and/or missing boundary line are to be reestablished until the entire forest boundary is demarcated.

C. Campground Operation and Maintenance

There are 71 primitive camp sites that are maintained on a regular schedule throughout the year. Major campsite maintenance coincides with major holidays, the end of winter and at the traditional end of the camping in late summer/early fall. The campsites are also frequented during the white-tailed deer firearms seasons in the fall and winter, during spring turkey season in early spring and during the opening weekend of trout season in late winter/early spring. Maintenance and operation of these primitive campsites includes: managing group site reservations; maintenance of information / bulletin boards; camper contacts to insure policies are understood; self-registration fee collections and deposits; weekly site inspection and cleaning; hazardous tree evaluation and removals; grass mowing (typically the week before the summer holidays and otherwise as needed); maintenance and replacement of picnic tables, lantern posts, and fire rings; and site impact monitoring.

D. Rifle Range Maintenance and Management

There is a 100-yard shooting range on the forest that is open to the public year round located at 3250 New Germany Road. Maintenance is ongoing and includes replacing backstops as well as the backstop stands, trash clean-up, mowing and weed eating around the facility, plowing the entrance road, restocking range permits, collecting range fees and posting range closures when necessary. Prior to and during the various hunting seasons, range use increases appreciably resulting in more frequent maintenance visits. Typically, at the conclusion of spring turkey season, the backstops and stands from the previous year are replaced, depending on the severity of damage.

The shooting range is open daily from 8 a.m. to dusk and offers hunters an ideal location to sight in weapons. The range features ten stations with distances ranging from 25 to 100 yards. Hunters can pay the $5.00 daily fee at the range using envelopes provided. The annual pass costing $25 and the family pass costing $50 are available at the Forest Headquarters Office. Rules and regulations are posted at the range, with the only restrictions being no fully automatic weapons and no clay pigeons.

VI. Recreation

A. Recreation Opportunities (See map on page 12)

1. Hiking, Biking and Horseback Riding Trails

Savage River State Forest has over 70 miles of trails open to hikers, mountain bikers and horseback riders of any ability. Not all trails are open to all recreational pursuits and it is recommended that before engaging in any activities visit or contact the state forest headquarters to become aware of any trail restrictions. A backpacking permit must be obtained at the forest headquarters or at any of the self-registration areas. Trail guides featuring a topographic map and trail descriptions can be purchased at the forest headquarters.

2. Off Road Vehicles

Snowmobile and off-road vehicle operators can enjoy many miles of scenic trail along the Meadow Mountain Trail, East Shale Road, Margraff Plantation, Negro Mountain Trail and the newly constructed St. John's Rock ORV Trail. Unlike the aforementioned trails, the St. John's Rock ORV Trail is the first trail on Department lands ever designed specifically for ORV enthusiasts. Features include a multi-site primitive campground designed to support ORV riders, children's riding trails within the campground, technical spur loops and hare scramble style trail sections for all terrain vehicles and motorcycles, a full-size rock crawl area for jeeps and four-wheel drive vehicles, and miles of forest access roads for all purpose riding opportunities. The total trail system is approximately 13 miles in length with varying challenges for riders of all skill levels.

Be sure to display a current Department of Natural Resources ORV permit, available at the forest headquarters or online at www.dnr.maryland.gov.

3. Hunting

Hunting is permitted throughout the forest except where posted with safety zone signs. The 55,000 acres of Savage River State Forest includes two state park areas (New Germany and Big Run) where hunting is prohibited. The forest boundaries are marked with yellow paint on trees - a yellow bar as you enter the forest and a yellow dot as you exit the forest. Hunting on or crossing private land within or near the State Forest requires the written permission of the land owner. Parking is permitted along roadways as long as traffic is not blocked. Hunters must have a valid Maryland Hunting License and should refer to the current Hunting & Trapping guide for season dates and specific regulations.

Several access roads are opened every fall to accommodate hunters. These gated roads are opened beginning in September and remain open through January 31. A copy of the road-opening schedule is available in the Forest Headquarters Office. Opened roads can be used by all hunters and allow for vehicular traffic. Due to the nature of these roads, the use of four-wheel drive is recommended. Handicapped hunter access roads are also available. More details about handicapped accessibility appear in this brochure and on the current road-opening schedule.

Hunter Safety Classes, required for the purchase of a license, are taught periodically through the Department of Natural Resources. These classes are usually offered in the county at one of the local State Parks.

4. Trapping

Trapping is permitted both on land and in the water. A permit can be issued for trapping on Savage River State Forest at the Regional DNR Wildlife Office in Flintstone. Trappers are required to obtain a certificate of trapper education from the Department of Natural Resources. Trapper education courses are held statewide. Refer to the current Hunting & Trapping Guide for complete regulations. A valid hunting license is required when applying for a trapping permit.

5. Fishing

Anglers with a Freshwater Fishing License have the opportunity to catch multiple species of fish in the Savage River Reservoir including walleye, large-mouth bass, smallmouth bass, yellow perch, bluegill and several trout species. Anglers with a trout stamp can fish the Savage River for wild brook trout and stocked brown and rainbow trout. For regulations and creel limits consult the Maryland Freshwater Sportfishing Guide or contact the Western Maryland Fisheries Office at (301) 334-8218.

6. Paddling

The Savage River Reservoir provides excellent paddling opportunities. Three public boat launches offer convenient access at Dry Run Road, Big Run State Park and ¼ mile north of the dam breast on Savage River Road.

7. Winter Recreation

Cross-country skiers and snowshoers of all abilities can enjoy a winter wonderland on New Germany and Mount Aetna trails. The Asa Durst Trails are recommended for a backcountry

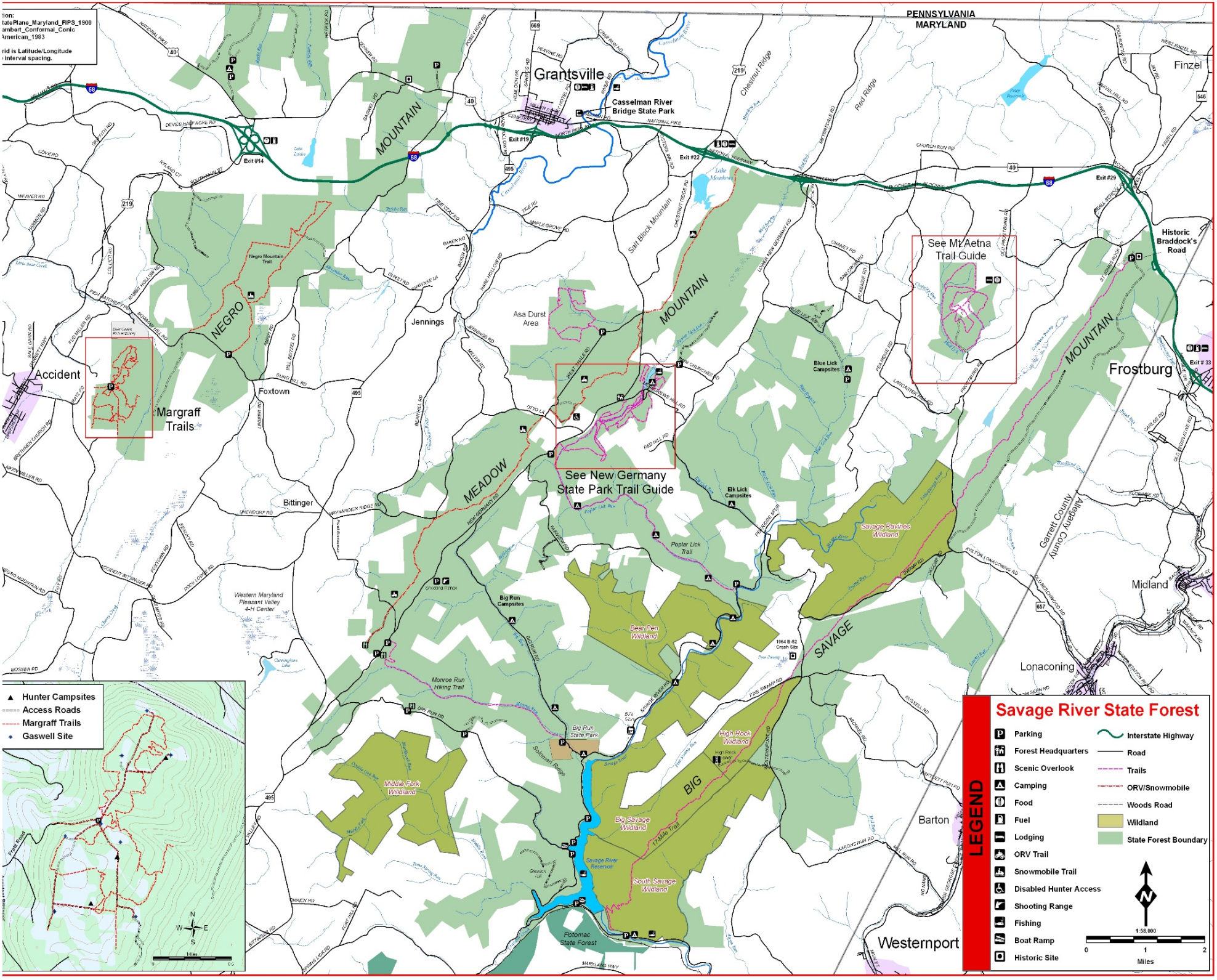
snowshoe experience. Snowshoers must be careful to walk beside and not on cross-country tracks as it disrupts them.

8. Geocaching

Currently, 28 goecaches are located throughout Savage River State Forest for those interested in testing their navigational and tracking skills. All geocaches must reviewed and approved by the staff before being placed anywhere on the forest. Applications and general rules for geocache placement are available at the state forest headquarters.

9. Maps

Brochures and maps are available at the Savage River State Forest Headquarters Office located at 127 Headquarters Lane, Grantsville, Maryland 21536.


PENNSYLVANIA
MARYLAND
Grantsville
Casselman River Bridge State Park
Finzel
Historic Braddock's Road
See Mt Aetna Trail Guide
Frostburg
Accident
Margraff Trails
Foxtown
Jennings
Asa Durst Area
Negro Mountain Trail
NEGRO MOUNTAIN
Salt Block Mountain
Chestnut Ridge
Red Ridge
Blue Lick Campsites
See New Germany State Park Trail Guide
Elk Lick Campsites
MEADOW
Bittinger
Western Maryland Pleasant Valley 4-H Center
Big Run Campsites
Poplar Lick Trail
Savage Ravines Wildland
Bear Pen Wildland
1964 B-52 Crash Site
SAVAGE
Monroe Run Hiking Trail
Big Run State Park
High Rock Wildland
Middle Fork Wildland
Big Savage Wildland
17 Mile Trail
BIG
Savage River Reservoir
South Savage Wildland
Potomac State Forest
Garrett County
Allegany County
Midland
Lonaconing
Barton
Westernport
Hunter Campsites
Access Roads
Margraff Trails
Gaswell Site
Front Road
LEGEND
Savage River State Forest
Parking
Forest Headquarters
Scenic Overlook
Camping
Food
Fuel
Lodging
ORV Trail
Snowmobile Trail
Disabled Hunter Access
Shooting Range
Fishing
Boat Ramp
Historic Site
Interstate Highway
Road
Trails
ORV/Snowmobile
Woods Road
Wildland
State Forest Boundary
1:58,000
0 1 2
Miles

B. Recreation Proposals

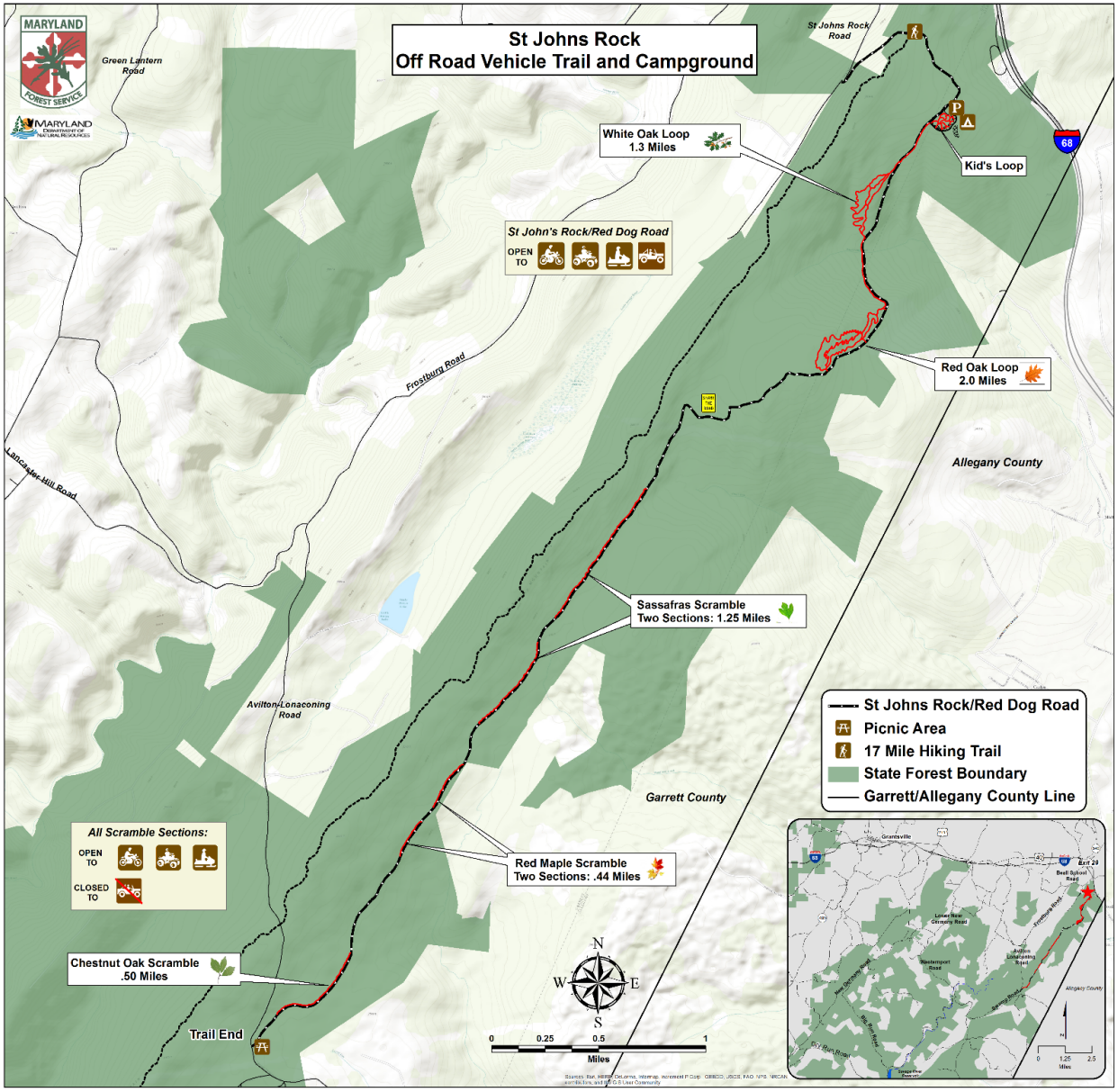
National Recreation Trails Grant Requests: To Enhance Recreation and Trails Opportunities for Visitors of Public Land.

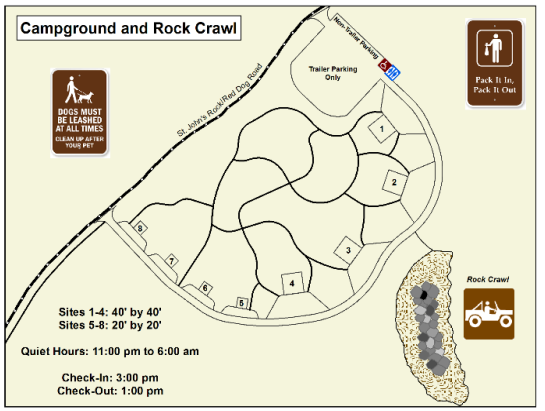
Savage River State Forest has submitted one National Recreation Trails Grant Request to fund enhancements to various recreation trails on the forest:

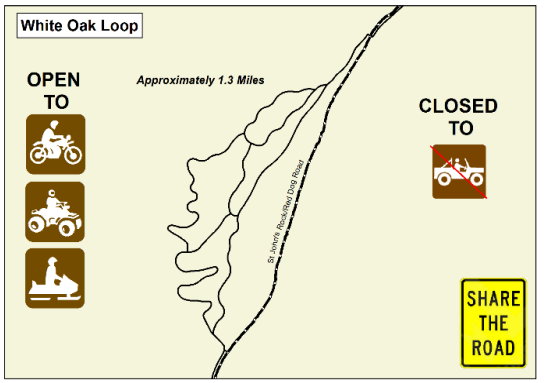
1. St. John Rock Road, ORV Trail Maintenance – $37,500

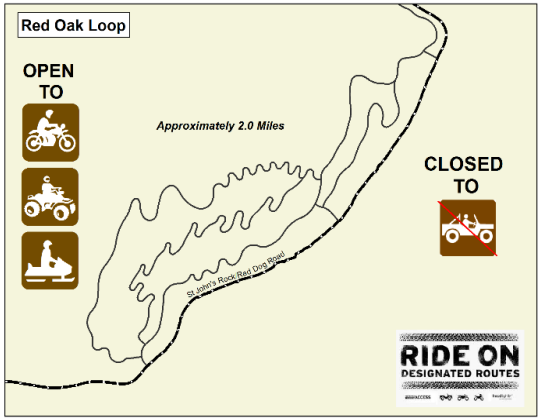
This project will provide seasonal maintenance personnel (2) to maintain the newly developed 13-mile long St. John Rock Road and Red Dog Road ORV Trail. Hiring these seasonal employees will benefit trail users by maintaining the surface of the trail and providing a safety backup on weekends. Operating the ORV trail will require regular maintenance and upkeep. The grant will fund five elements of trail upkeep including:

1) Maintenance of water control devices.
2) Monitoring use and providing public outreach.
3) Clean up of litter and debris.
4) Providing protection to environmentally sensitive areas adjacent to the trail
5) Maintaining closure of existing illegal trails and deterring new trails from being developed.


St Johns Rock
Off Road Vehicle Trail and Campground
MARYLAND FOREST SERVICE
MARYLAND DEPARTMENT OF NATURAL RESOURCES
Green Lantern Road
St Johns Rock Road
White Oak Loop
1.3 Miles
Kid's Loop
St John's Rock/Red Dog Road
OPEN TO
Frostburg Road
Red Oak Loop
2.0 Miles
Lancaster Hill Road
Allegany County
Sassafras Scramble
Two Sections: 1.25 Miles
Avilton-Lonaconing Road
Garrett County
All Scramble Sections:
OPEN TO
CLOSED TO
Red Maple Scramble
Two Sections: .44 Miles
Chestnut Oak Scramble
.50 Miles
Trail End
St Johns Rock/Red Dog Road
Picnic Area
17 Mile Hiking Trail
State Forest Boundary
Garrett/Allegany County Line
N
W
E
S
0
0.25
0.5
1
Miles


Campground and Rock Crawl
DOGS MUST BE LEASHED AT ALL TIMES
CLEAN UP AFTER YOUR PET
Pack It In, Pack It Out
Trailer Parking Only
Rock Crawl
Sites 1-4: 40' by 40'
Sites 5-8: 20' by 20'
Quiet Hours: 11:00 pm to 6:00 am
Check-In: 3:00 pm
Check-Out: 1:00 pm


White Oak Loop
OPEN TO
Approximately 1.3 Miles
CLOSED TO
SHARE THE ROAD


Red Oak Loop
OPEN TO
Approximately 2.0 Miles
CLOSED TO
RIDE ON
DESIGNATED ROUTES

2. Meadow Mountain Trail Construction (Continental Divide Loop Trail)

In fiscal year 2011, the forest was asked to participate in a large bike trail effort that would begin in Pennsylvania, travel along Meadow Mountain Trail, cross the University of Maryland 4-H property and continue south into Oakland, MD and then travel north through the Youghiogheny Wild and Scenic Corridor back into Pennsylvania. This project is currently referred to as the Continental Divide Loop Trail which is being spearheaded by Garrett Trails, a non-profit volunteer group dedicated to the development of sustainable trails that provide access to the economic, historic and environmental resources of Garrett County.

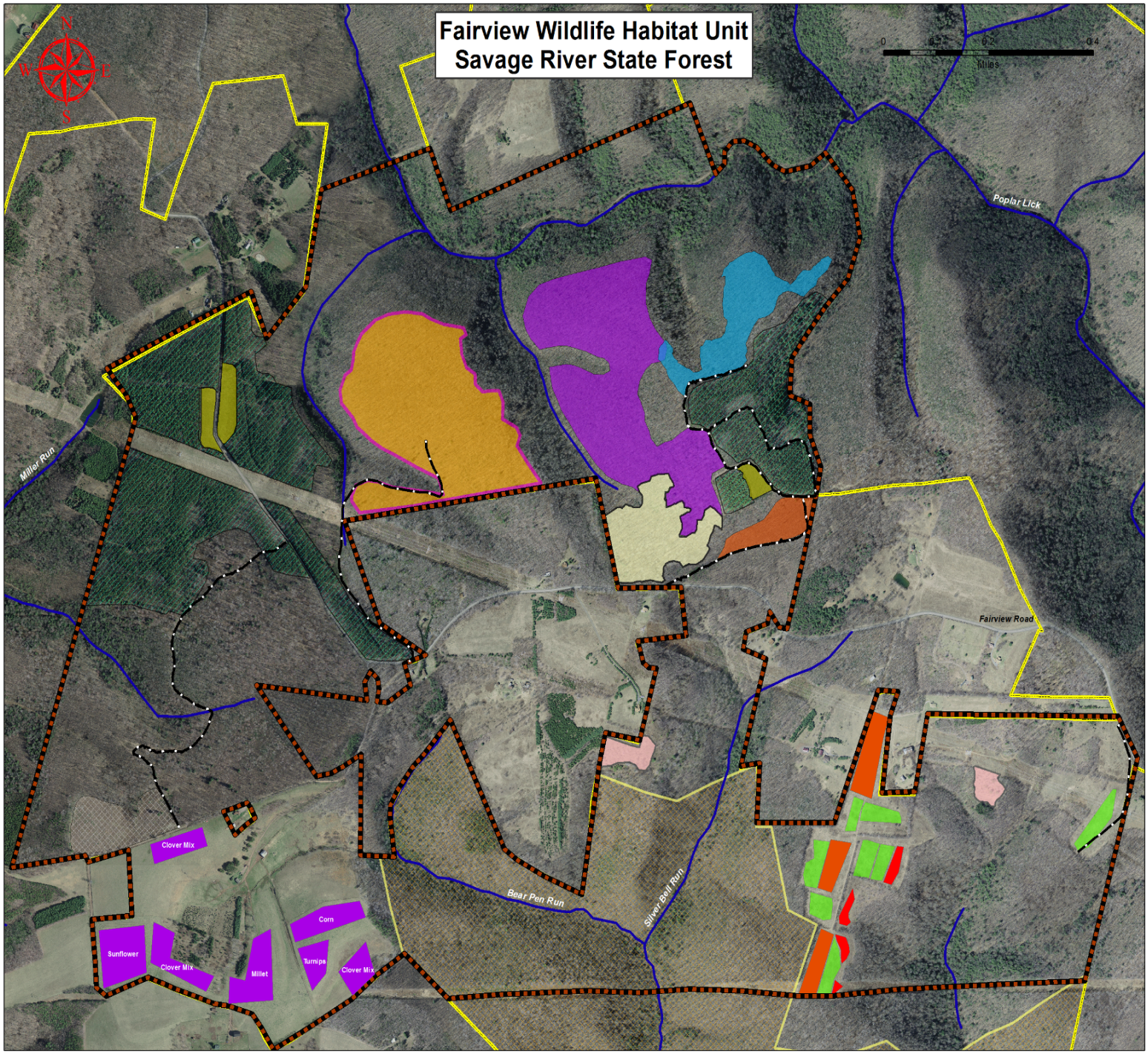
The southern section of the bike trail from State Route 495 to Frank Brenneman Road was completed in mid-2016. Funding was secured to continue construction of the trail northward beginning at Frank Brenneman Road and ending at New Germany Road just south of West Shale Road following existing forest access roads. Groundbreaking occurred in July 2017 and this phase of construction extended from Frank Brenneman Road to Otto Lane adding approximately 7.5 miles of resurfaced trail to the ongoing project, which when completed, will extend to the northern terminus of East Shale Road totaling over 12 miles of riding surface on the state forest.

VII. Wildlife Habitat Management Projects

A. General Wildlife Habitat Maintenance

Approximately 36.75 acres of wildlife specific projects have been implemented throughout the state forest. These projects are located in the Margraff tract, Keyser's Ridge, Collier Place, West Shale Road, Gleason Hill, Fairview Road and Kyle's field. General practices include liming and fertilizing as well as planting of cover and grain crops, where appropriate. Plantings include millet, oats, turnips (*Brassica spp*.) and clover. Efforts are concentrated on planting and maintaining clover cover, which is required to be mowed multiple times in a growing season to prevent weeds from overtaking the site.

The majority of the habitat management work has been concentrated on the "Round's Farm", a 109-acre acquisition located off Fairview Road in Compartment 29A. The parcel was added to the Fairview Wildlife Management Unit that was designated in 2011. Approximately 21 acres of existing fields have been planted with seven acres of clover mix, four acres of millet and three acres of corn. The remaining five acres have been planted with sunflowers as part of an ongoing management strategy to increase mourning dove (*Zenaida macroura*) hunting opportunities by expanding upland feeding grounds. An initial two-acre sunflower field was planted within the Margraff Plantation of the forest. These areas will be listed in the official DNR dove field publication which will outline hunting regulations specific to the area. Information is also available on the Maryland DNR Wildlife and Heritage Service web page: http://dnr.maryland.gov/wildlife/Pages/default.aspx. If the planting endeavor is successful in attracting significant amounts of mourning doves as well as hunters, the plantings may be conducted throughout the wildlife habitat management units on the forest.



Fairview Wildlife Habitat Unit (1135.8 Acres)
Fairview Salvage 2012 (51.7 Acres)
Fairview Salvage 2009 (49.5 Acres)
Poplar Lick Salvage 2009 (14.9 Acres)
Hardwood Clearcut 2009 (15.0 Acres)
Hardwood Clearcut 1991 (5.6 Acres)

Aspen Cuts (6.6 Acres)
Pine Clearcut 2003 (9.6 Acres)
Wildlands
Red Spruce Planting Site
Field
Plantations
2017 Plantings

Orchard
Foodplot
Warm Season Grass
Streams
Forest Access Roads
Garrett Roads
SRSF Boundary

VIII. Ecosystem Restoration / Protection Projects

A. Non-Native Invasive Species (NNIS) Control

Across the State, a biological invasion of non-native plants is spreading into our fields, forests, wetlands and waterways. Referred to in a variety of ways including exotic, non-native, alien, or non-indigenous, invasive plants impact native plant and animal communities by displacing native vegetation and disrupting habitats as they become established and spread over time. Early Detection and Rapid Response (EDRR) to control the spread of problematic species is important for the conservation of native flora and fauna. Control efforts often require considerable resources (labor, time and money).

As in many cases, the introduction of these widespread and invasive plants cannot be prevented. It is important to evaluate and plan control efforts in order that such efforts contribute meaningfully to the success of forest conservation plans. EDRR efforts targeting NNIS discovered during the forest wide inventory have been successful in identifying and controlling a number of NNIS populations. Species-specific management plans have been developed for two notable species including Japanese knotweed and Yellow Archangel (See Appendix 1 and 2).

The State Forest staff has treated and/or is monitoring several plant colonies or sites including: five tree-of-heaven sites, ten Japanese knotweed sites, two mile-a-minute weed sites and one yellow archangel site (See corresponding map for locations).

1. Japanese knotweed (*Fallopia japonica*). Several areas of Savage River State Forest have become infested with the invasive plant Japanese knotweed (*Fallopia japonica*). Seven treatment areas have been delineated and six of them will be treated and monitored to determine the most effective course of action for suppressing and ultimately eradicating the plant from these areas of the forest. Knotweed growth below the Savage River Reservoir has reached a critical level and will not be treated at this time due to the overwhelming investment that would be required to reach any reasonable level of control. As more effective treatment methods become available for large areas, this area will be reevaluated in regard to implementing a control plan.

The initial treatments occurred in the first week of June, 2011. Treatments in all areas of the forest involve a two-step process that includes both mechanical and chemical means of control. First, the knotweed is cut and allowed to grow back for 8 weeks, reaching only 2 to 4 feet in height. Second, the new growth is treated with a 2% solution of glyphosate as the active ingredient. Treatment of these areas has been repeated on a yearly basis and will continue until the plant has been eradicated from the target areas.

2. Yellow archangel (*Lamiastrum galeobdolon).* Dry Run, a tributary of the Savage River and Savage River Reservoir has been infested with the aggressively growing, non-native invasive perennial, yellow archangel (*Lamiastrum galeobdolon).* The infestation of the area most likely originated from a private residence which was abandoned and the once maintained yard area was neglected, allowing the plant to escape to the adjacent property. After establishing a colony at the head of the watershed, the plant quickly enveloped the drainage from the private residence to the high water mark of the Savage River Reservoir, encompassing nearly 15 acres of forest land.

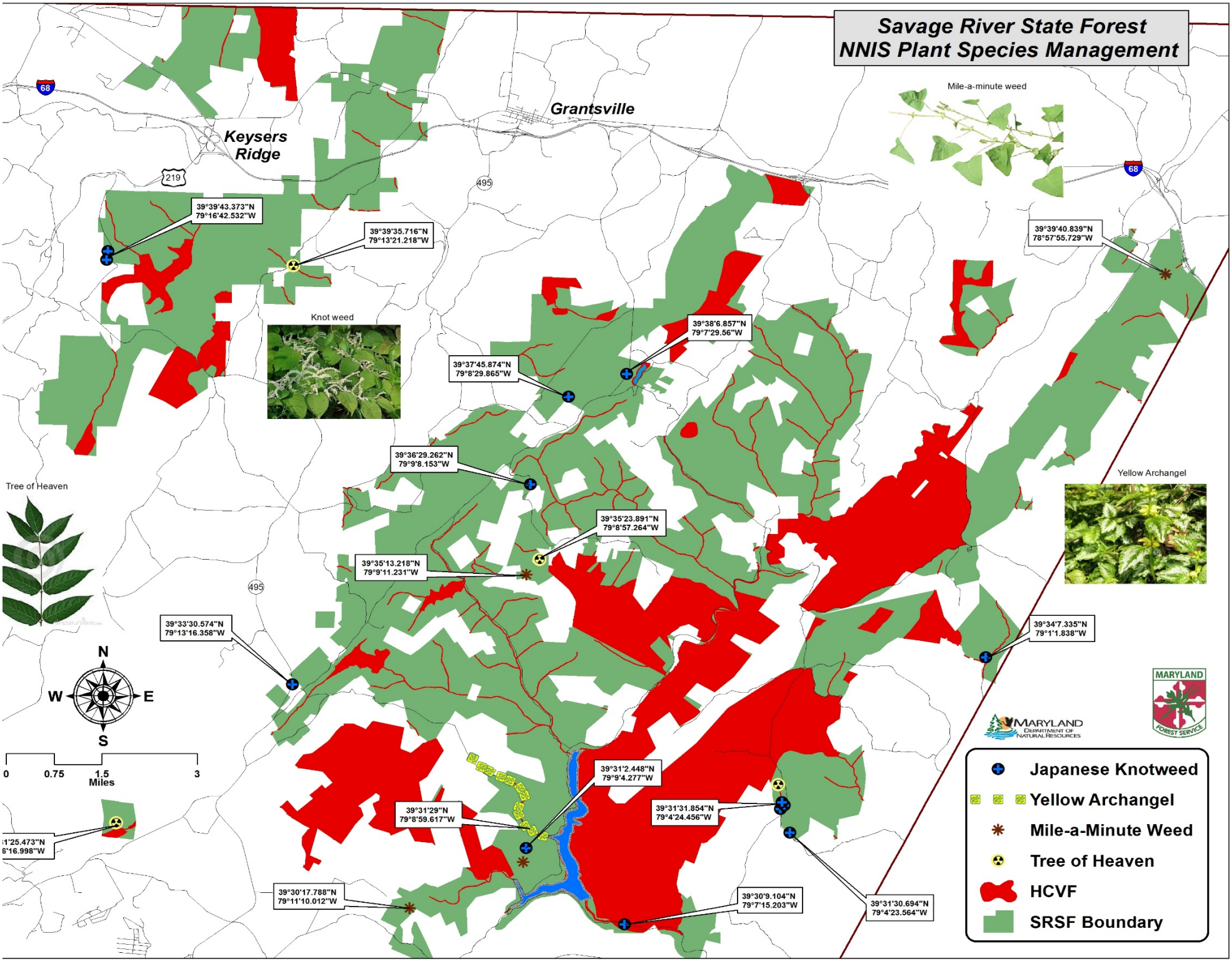
The plant grows quickly and out-competes native vegetation for resources. Yellow archangel spreads in several ways; by seed, by stem fragments, and by rooting at the nodes of the stem. This makes the plant very difficult to control and requires multiple applications of herbicide and diligent monitoring to limit the spread of the plant in natural forest environments. There is no projected end date for the herbicide treatments due to the persistent nature of this plant and efforts will be made annually until the spread of the plant is contained or the plant is eradicated. Successful eradication of this plant is anticipated given the relatively confined area of infestation. Site monitoring will continue after the eradication of the plant for at least 5 years.

3. Mile-a-Minute Weed (*Persicaria perfoliata*) A small patch of mile-a-minute weed (*Persicaria perfoliata*), another aggressive non-native invasive, was discovered in Compartment 29A. The area was treated in FY 15 with a 2% glyphosate solution, but a field survey revealed that the initial treatment was unsuccessful. Herbicide treatment of triclopyr was applied for two consecutive years and monitoring of the site will continue into FY 19 and beyond until the plant has been eradicated. A previously discovered patch of mile-a-minute weed in Compartment 38 near the St. Johns Rock ORV Trail that was seemingly removed during the excavation for the trail campground reemerged and has been treated. Monitoring of the area will continue and the site will be treated as necessary in order to eradicate this plant from the site.

4. Tree-of-Heaven (*Ailanthus altissima*) Individual stems of the exotic invasive tree-of-heaven (*Ailanthus altissima*) have been identified in several areas of the forest. Control measures including both mechanical and chemical have been implemented to remove this species from the limited areas in which it is present.

These plant colonies are now part of our long term monitoring program, with follow-up treatments planned as necessary in the interest of preventing these species from establishing themselves in the otherwise natural forest communities in which they were found.

Savage River State Forest
NNIS Plant Species Management



B. Wolf Swamp Hemlock Wooly Adelgid (*Adelges tsugae*) Treatment

Hemlock Wooly Adelgid has been identified as a significant forest pest on the State Forest. As part of a State Wide HWA Management Plan developed to address the impact of the pest, an aggressive management effort is being made to protect what have been identified as high priority Hemlock stands.

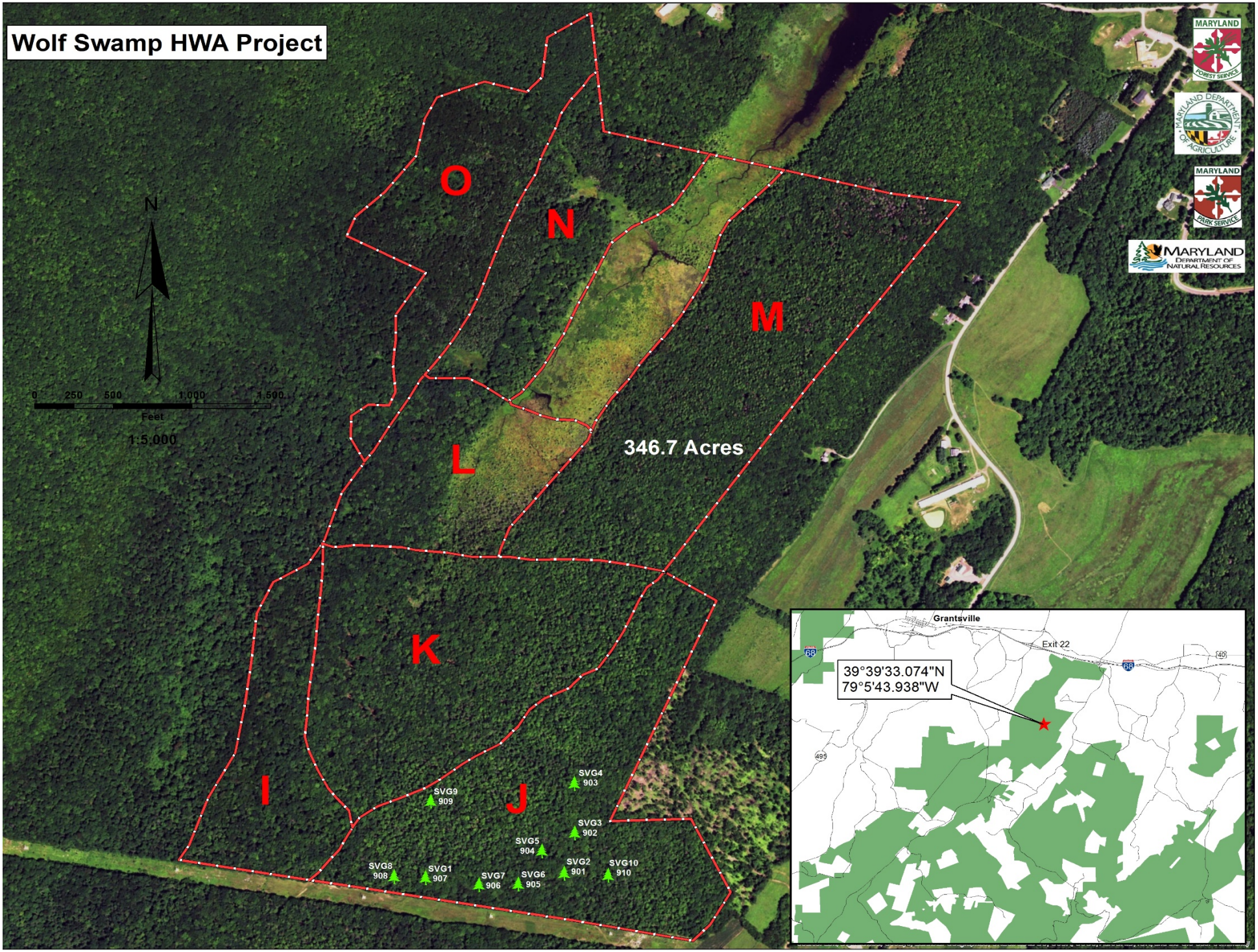
In an ongoing, cooperative effort with Maryland Department of Agriculture, and the Maryland State Park Services/Maryland Conservation Corps and the State Forest, 284 acres of the Wolf Swamp ESA have been treated with soil drench/soil injection and individual tree injection treatments of Imidacloprid based HWA insecticide. Planning has begun to continue the treatment regime to include an additional 346 acres of the ESA located north of the initial treatment project. Approximately 138.5 acres were treated in May 2017 and a second treatment project is scheduled to begin in early October 2017.

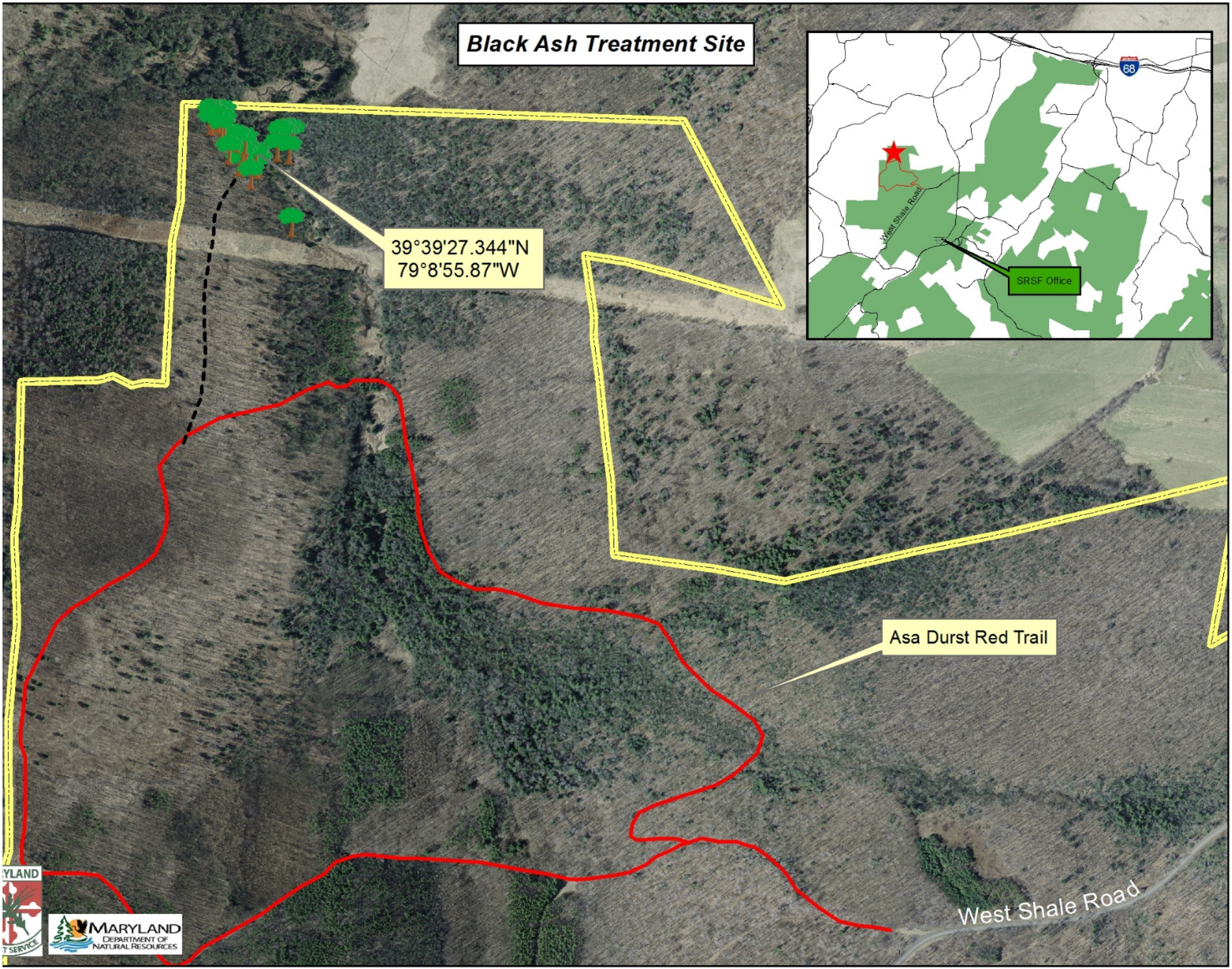
This undertaking began in October 2015, and will continue as resources are available or the area is fully treated (See Wolf Swamp HWA Treatment Map, p. 17).

C. Compartment 17: Emerald Ash Borer Treatments for Black Ash (*Fraxinus nigra*)

During the data inventory process, an isolated population of black ash (*Fraxinus nigra*) was discovered in Compartment 17 of the Savage River State Forest in an area referred to as the Asa Durst Place (See map, p.18). The small stand includes 34 individuals that have escaped infestation by emerald ash borers. In an effort to maintain this uncommon species within the state forest, efforts will be made to prevent mortality caused by the non-native insect pest as well as preserving the seed source.

A re-inventory of the stand was conducted and a GPS position was recorded for each specimen and diameter measurements were recorded as well as an overall relative rating of condition (good, fair, poor). Treatment efforts will be via stem injection and will focus on trees deemed to be in good and fair condition. The insecticide emamectin benzoate marketed as Tree-Äge was administered providing an estimated two years of protection from EAB. Initial treatments occurred in the fall of 2016 and follow up treatments will be conducted in late summer 2017 to maintain this rare species on the forest landscape (See Map, p.18).


Wolf Swamp HWA Project
N
0 250 500 1,000 1,500
Feet
1:5,000
O
N
M
L
K
I
J
346.7 Acres
SVG4 903
SVG9 909
SVG3 902
SVG5 904
SVG8 908
SVG1 907
SVG7 906
SVG6 905
SVG2 901
SVG10 910
Grantsville
Exit 22
39°39'33.074"N
79°5'43.938"W
MARYLAND FOREST SERVICE
MARYLAND DEPARTMENT OF AGRICULTURE
MARYLAND PARK SERVICE
MARYLAND DEPARTMENT OF NATURAL RESOURCES


Black Ash Treatment Site
39°39'27.344"N
79°8'55.87"W
West Shale Road
SRSF Office
68
Asa Durst Red Trail
West Shale Road
MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

IX. Monitoring and Research Projects

A. Monitoring

All silvicultural operations taking place on Savage River State Forest will be monitored on a weekly basis, and more frequently when adverse weather conditions arise to ensure that all Best Management Practices specifications are being followed. Regeneration harvests will be monitored five and ten years after harvest. Non-native invasive species will be monitored yearly and herbicide treatment regimens will be implemented as necessary to eradicate these species from the forest ecosystem. Management documents outlining specific treatments and monitoring schedules have been drafted for the individual species.

B. Research Projects *(Full descriptions of each project are available at the State Forest Headquarters)*

1. Chestnut Blight: Evaluating the potential of "Super Donor" strains of Cryphonectria parasitica to control chestnut blight infections. West Virginia University.

Researchers from West Virginia University are continuing an ongoing study involving chestnut blight (*Cryphonectria parasitica*) and the organisms that inhabit the resulting cankers. The purpose of this experimentation is to release two "Super Donor" strains of C. *parasitica* that have the unique ability to transmit the disease controlling hypoviruses to virulent strains regardless of their vegetative compatibility type.

The "Super Donor" strains were constructed using a Cre-*lox* system and classical mating. Cre-*lox* recombination is a site-specific recombinase technology, used to carry out deletions and insertions at specific sites in the DNA of cells. No foreign genes were incorporated and the absence of any selectable marker verified. This modification resulted in the elimination of most genes that control vegetative compatibility thereby allowing hypovirus transmission among incompatible strains (MacDonald and Nuss, 2016). The initial release of the virus was conducted in mid July 2016. A second APHIS permit for additional introductions of the virus to the original study area of Russell Road as well as an additional site located of Jacobs Road in Compartment 42 was applied for in May 2017 and treatments commenced in July and August of 2017. An on-site review was conducted by APHIS risk assessment personnel to ensure that all standards of protocol for such a release were adhered to throughout all phases of the ongoing study.

The study site is an eight-year-old hardwood salvage harvest located off Russell Road.

2. Eastern Hemlock: Target-tree Release to Improve the Sustainability of Eastern Hemlock (Tsuga canadensis) in the Southern Appalachian Mountains. US Forest Service Southern Research Station and North Carolina State University.

This project will develop and validate a silvicultural tool that improves the health and sustainability of eastern hemlock, an ecologically keystone species in the southern Appalachians threatened by HWA. Individual or small clusters of "target" trees (i.e., suppressed or intermediate eastern hemlocks with moderate to good crown health) will be released by removing or girdling other stems competing for sunlight directly above and adjacent to the target trees. Increased sunlight is expected to improve hemlock crown health via improved carbon

balance, enhanced foliage production, and reduced HWA settlement rates relative to unreleased trees. Treatments will be replicated at a number of southern Appalachian sites and will evaluate release by girdling versus felling and variations on the size of the resulting canopy gap. Operationally, the tool is expected to prolong hemlock health and survival and increase the efficacy of existing HWA management tools (e.g. biological and chemical control) when integrated with them (Jetton, Robert M., Mayfield, Albert E., Keyser, Tara, and Rhea, James 2017). The project will involve fifteen treatment sites; 10 located in the northern end of Wolf Swamp in Compartment 16 and five located along an unnamed tributary of Elk Lick Run in Compartment 26.

3. Northern Long-eared Bats: Bat monitoring and Habitat Use by Northern Long-eared Bats (Myotis septentrionalis) in Western Maryland. University of Maryland Center for Environmental Science.

Since its detection in 2006, white-nose syndrome (WNS) has caused significant declines in many bat populations in the eastern United States (Turner et al. 2011). The northern long-eared bat (*Myotis septentrionalis*) is one of the bat species most affected by WNS and was listed as federally threatened in 2015 due to precipitous population declines (USFWS 2015, Ingersoll et al. 2013). Suitable roosting habitat is a critical requirement for bats (Kunz and Lumsden 2003); therefore, protecting and managing northern long-eared bat roosting habitat is vital for counteracting population declines caused by WNS. Roost site selection of northern long-eared bats has been well-studied (e.g., Foster and Kurta 1999, Menzel et al. 2002, Henderson and Broders 2008), but relatively few studies have identified roost sites in western Maryland. To identify roost sites, bats will be captured, radio transmitters attached, and telemetry used to locate roost locations in several study areas (Dan's Mountain State Park, Savage River State Forest and Green Ridge State Forest) in western Maryland. To determine habitat characteristics that influence northern long-eared bat roost selection, habitat variables measured and compared at roost locations to variables measured at random suitable roost trees.

This project site has provided positive results in terms of the number of bat captures as well as in the species diversity of the netted specimens. A continuation has been requested and granted for this research project through August 2017.

4. Black Cohosh: Ecological and Chemotypic Analysis for Improved Growth and Management of Naturally Occurring Black Cohosh (Actaea racemosa) Populations in Western Maryland. Frostburg State University, Allegany College of Maryland, US Botanical Safety Lab, Institute for Bioscience and Biotechnology Research, USDA and University of Maryland.

Black cohosh (*Actaea racemosa* L.) is a perennial herb native to deciduous woodlands in eastern North America with an extensive history of traditional use, most commonly for rheumatoid arthritis and female reproductive issues. Modern clinical research has maintained this herb's relevance into the 21st century with a majority of authentic black cohosh raw material still harvested from naturally occurring populations in Appalachian woodlands for use in botanical supplements. Increased use and interest in black cohosh have led to increased wild harvesting, reports of adulteration, and stress on this important natural resource. In an effort to study this

significant medicinal plant as part of an ecosystem, and to understand factors that would contribute to the more effective growth and maintenance of black cohosh, key chemical, physiological, and ecological aspects of two occurring populations in western Maryland were surveyed.

Rhizomes were harvested from six populations of naturally occurring black cohosh in two state forests located in the Allegheny Plateau and Ridge and Valley physiogeographic provinces of Maryland. The concentrations of five medicinal compounds found in black cohosh extracts, actein, 23-epi-26-deoxyactein, cafeic acid, ferulicacid, and N-methylserotonin, were compared with plant reproductive status as well as accompanying overstory and under story species, soil moisture, and soil pH at each site. Compound levels showed a complex dependence on physiography but were independent of reproductive state. The findings provide clues to guide efforts at effective growth and management of wild populations of black cohosh and other threatened medicinal plants (Vickers, Brosi, Howell, Kaur, Puthoff, and Eisenstein, 2015).

5. ***Allegheny Wood Rat: Identifying and Targeting Intervention Strategies for Allegheny Woodrat (Neotoma magister) Recovery. Frostburg State University.***

Allegheny woodrats (*Neotoma magister*) are experiencing a protracted decline in the northern half of their range. These declines are rooted in part, in the concomitant loss of American chestnut trees as well as other mast producing species and gypsy moth impacts on oaks. In addition, limited availability of hollow trees for den sites outside of the wood rats primary foraging areas may increase interactions with raccoons, which host a pathogenic roundworm (*Baylisascaris procyonis*) known to cause woodrat mortality. The relationships between woodrat population dynamics, abiotic forest conditions and biotic pathogen loads have been speculated, but there are few studies to address the speculations.

The research project is two tiered and will (1) Determine interactions between woodrat populations and forest dynamics using dendrochronology, mast production data and inventories; (2) Evaluate the occurrence and distribution of raccoons using remote camera, raccoon latrine prevalence and incidence of roundworm parasite load in raccoon feces. This study will be used to target areas of highest need for management intervention. Forest inventories will determine locations where supplemental plantings of mast species will be most beneficial. Evaluation of raccoon activity patterns and parasite load will result in areas of greatest need of antiparasitic bait stations (Brosi, 2016).

6. ***Monarda didyma (Bee Balm, Oswego tea) and Quercus spp. (oaks) seed collection. National Plant Germplasm System.***

The mission of the National Plant Germplasm System (NPGS) is to preserve genetic diversity of plants and its associated information. The NPGS consists of numerous gene bank facilities across the United States that preserve the genetic profiles of plants. A single site visit will be performed in October 2017. The goal is to sample seeds from approximately 50 specimens of *Monarda didyma* along with two herbarium specimens. Germplasm will be collected as seeds and the specimens will be harvested in the areas of Fairview Road, Big Run Road and Savage River Road within the Savage River State Forest.

Quercus collections are meant to support research being done at USDA Research Station in Fort Collins on improving storage capability of Quercus for long term seed storage

conservation. 500 acorns will be collected per species targeting several trees within a population to reduce the impact on that site. As small sampling of the seed will be germinated for planting at the U.S. National Arboretum for documentation and conservation purposes.

Seeds will be deposited into the National Plant Germplasm System and herbarium specimens at the National Arboretum. Collection gaps have been identified throughout the eastern United States, warranting ex situ collections that may result in attaining additional genetic diversity. Germplasm will be curated on behalf of the United States Government and will be available to all qualified scientists/organizations, domestic and foreign, which are eligible to receive it. Collections will be documented with complete "passport" data (description, locality of collection, including latitude and longitude, etc.). A report providing the passport data will be provided upon completion of collection (Conrad, 2017).

7. *Red Spruce (Picea rubens): Evolutionary Responses to Climate Change at Range Limits*

The species of focus in this study is red spruce (*Picea rubens*) – a foundation tree species of ecological and economic importance whose current distribution is characterized by distinct zonation into northern core, central margin, and southern trailing-edge populations in eastern North America. During post-glacial range expansion, these geographic regions varied in proximity to the northward-shifting range. This project will use fossil pollen extracted from sediment cores from focal parts of the distribution to sequence “ancient” DNA (aDNA) and to reconstruct ecophysiology using carbon isotopes (δ13C) during the past ~11,700 years.

Contemporary DNA and aDNA will be used to reveal how population demographics such as effective population size and local migration changed during shifting range limits, whereas δ13C values will indicate past and present ecophysiology. Genome-wide SNP data for modern populations will be used to elucidate the genetic basis of local adaptation to climate in different parts of the range, and climate adapted genomic regions will be projected onto spatially explicit landscapes using novel modeling techniques to explore how pre- and mal-adaptation of populations varies across space and through time with proximity to range limits. Research endeavors will be conducted on the southern portion of Wolf Swamp. Suitable stands of red spruce will be located and samples of both twigs and cones will be collected (Fitzpatrick, 2017).

X. Silvicultural Proposals

COMPARTMENT 1 - Stand 2 **FY-19**

Description/Resource Impact Assessment

Location: This area is located along the south side of State Route 40 in Compartment 1 in Stand 2 of the Savage River State Forest. The access road entrance is located approximately 1.3 miles west of the Route 40 / Route 219 intersection at Keyser's Ridge.

Forest Community Type and Condition: This 27-acre site contains an overstocked mixed mature conifer stand that is approximately 68 years old with an average merchantable diameter of 17.2 inches. The over story is dominated by Norway spruce (50%), red pine (32%), black cherry (6%) and red oak (5%). The stocking in this stand is at 83% relative density with a basal area of 151 ft^2/acre. Desirable regeneration is scarce in the understory due to the interfering elements that are listed below.

Interfering Elements: Deer browse pressure in this area is estimated to be moderate and must be addressed when considering regeneration efforts on this site. Interfering understory plant competition is sufficient to cause significant interference with regeneration efforts with 97% of the site containing some form of significant interference. Tall woody interference is found throughout 81% of the stand and is dominated by sweet birch and striped maple. Problematic levels of ferns and grasses are found on 69% of site. Non-native invasive species (NNIS) including multiflora rose, Japanese stilt grass, Japanese barberry and garlic mustard were found in this stand during the inventory. Stand regeneration is not the primary silvicultural focus for this stand and no effort will be made to control the interfering vegetation present in the stand at this time. Non-native and invasive species will be controlled via appropriate methods where practical.

Historic Conditions: State Forest records show this stand was last thinned in 1989. No evidence of fire was observed during the recon and there is no indication of significant forest pests at this time.

Rare, Threatened and Endangered Species: At this time, the Forest Manager knows of no rare, threatened or endangered species on the site or any species that would be impacted by the silvicultural prescription.

.

Habitats and Species of Management Concern: At this time, the Forest Manager knows of no habitats or species of management concern on the site or any species that would be impacted by the silvicultural prescription.

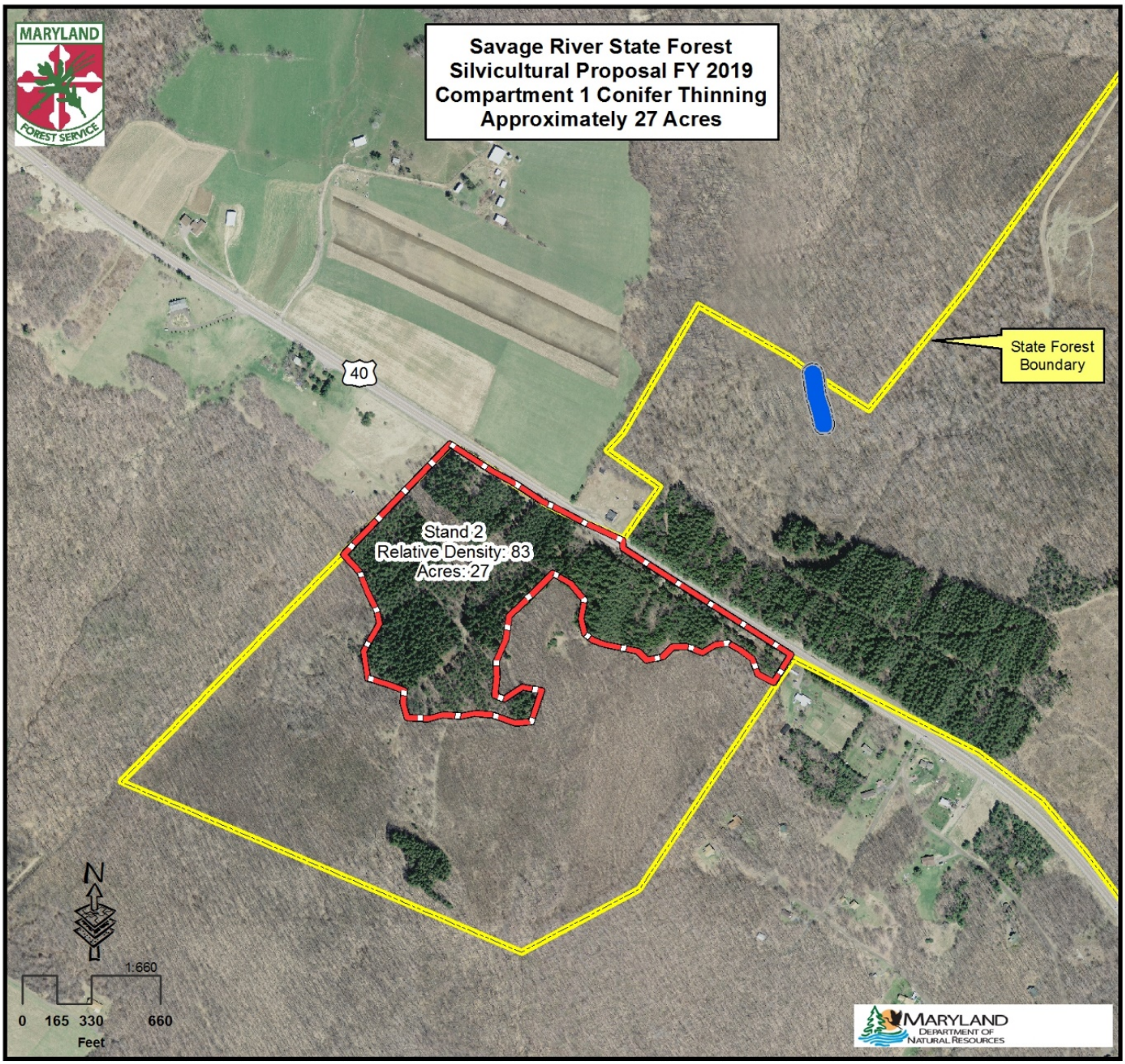
Water Resources: This stand drains south into Mill Run within the Youghiogheny River Watershed. The proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

Soil Resources: The dominant underlying soil types is Calvin, Ungers and Lehew channery loams (CnC2). This soil type is generally moderately deep over bedrock and well drained. Degree of slope ranges from 0-20% throughout the site. Equipment limits range from slight to moderate for slopes exceeding 15% and severe for slopes over 35%. Hazard of erosion is slight in general but is considered moderate on steeper slopes. The site has good productivity for woodland management, with a site index of 65-75 for upland oaks.

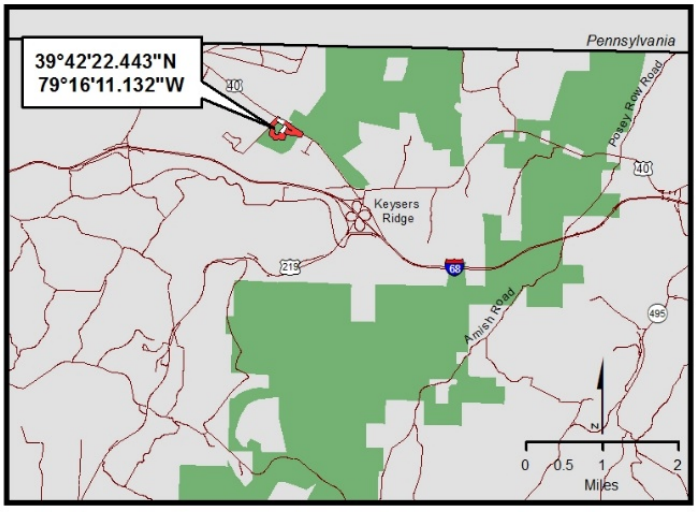
Recreation Resources: No developed recreational resources are located within the stand. The access road for the stand is primarily utilized for hunting access. Hunting opportunities may be disrupted for the duration of the harvest activities and access to the site may be limited depending on the timing of the harvest.

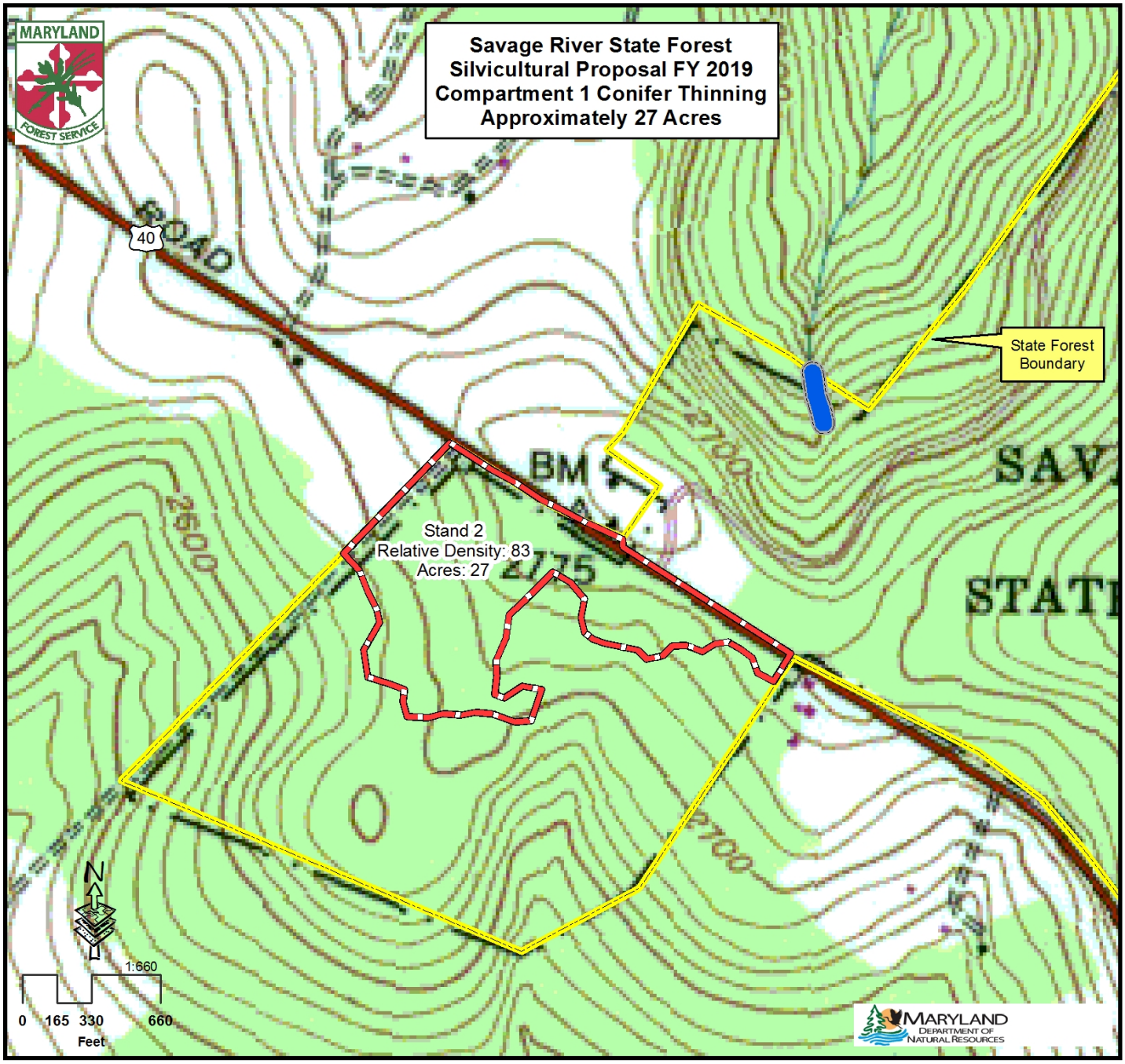
Management and Silvicultural Recommendations

The planned silvicultural treatment for this site is a commercial thinning. The objective of this thinning is simply to reduce stocking levels in order to lessen competition among the remaining trees thereby, increasing the health, vigor and growth rate of the residual stand as well as maintaining the conifer component on the forest landscape. Approximately 1/3 of the basal area of the stand will be removed reducing the basal area to approximately 100 ft^2 /acre and relative density to 60%. Removals will focus on unacceptable growing stock as well as select trees that have reached maturity. In response to the ongoing mortality caused by emerald ash borer infestation, all white ash trees within the stand will be selected for harvest. The anticipated harvest will yield approximately 7,500 board feet/acre.

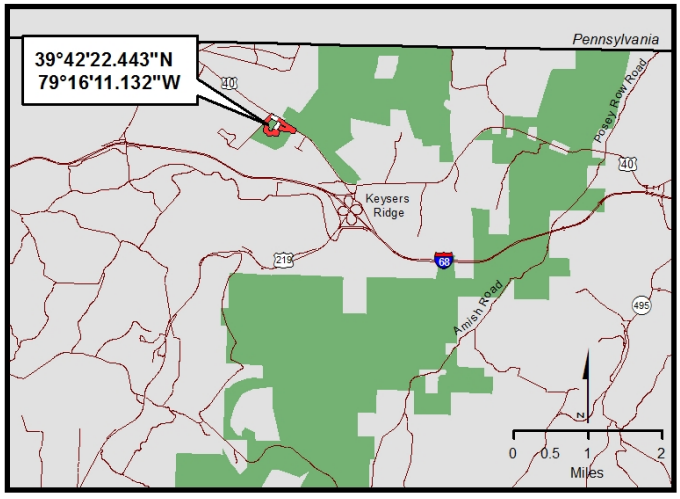


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 9 - Stands 0, 60, 69, 71 **FY-19**

Description/Resource Impact Assessment

Location: This site is located approximately 0.7 miles northeast of Bowman Hill Road along the Negro Mountain Snowmobile Trail. Access to the trail is off Bowman Hill Road, approximately 0.75 miles northwest of the intersection of Bowman Hill Road and Amish Road in Compartment 9 Stands 0, 60, 69, and 71 of the Savage River State Forest.

Forest Community Type and Condition: This 77-acre site contains a medium sawtimber mixed oak stand that is approximately 103 years old, with an average merchantable diameter of 14.0 inches. The overstory consists of northern red maple (36%), red oak (35%), black cherry (18%) and yellow poplar (4%). This stand is overstocked at 89% relative density and has an average basal area of 154 ft^2 /acre. Overall oak regeneration occupies 5% of the site, with 5% considered established or competitive. Desirable regeneration present in this stand is lacking in part due to the presence of the interfering elements explained in the following section.

Interfering Elements: Interfering understory plant competition is sufficient to cause significant interference with regeneration efforts with 98% of the site containing some form of significant interference. Tall woody interference occupies approximately 70% of the stand consisting primarily of witch hazel and striped maple. Low woody interference occupies approximately 45% of the site, with witch hazel making up the majority. Problematic levels of fern and grasses occupy 89% of the stand. Grasses were found at minimal levels and do pose a problem for future regeneration efforts at the present time. Non-native invasive species (NNIS) were not observed within this stand. In addition, deer browse pressure in this area is estimated to be moderate and must be addressed when considering regeneration efforts on this site.

Historic Conditions: State Forest records indicate that no previous silvicultural work had been implemented on this site since 1965. The stand located immediately to the west of the proposal was thinned in 2012. No evidence of fire was observed during the stand inventory and no sign of significant insect infestation or disease was observed at the time of the reconnaissance.

Rare, Threatened and Endangered Species: At this time, the Forest Manager knows of no rare, threatened or endangered species on the site, or any species that would be impacted by the silvicultural prescription.

.

Habitats and Species of Management Concern: The management unit for this harvest proposal includes a section of a wetland of special state concern that is an extension of the Amish Road Swamp, which is a documented Ecologically Significant Area (ESA). The highlighted area within the harvest map depicts the perimeter of the recommended 300' established buffer that will be excluded from all silvicultural activities. Further on site evaluations will be made during the implementation of the harvest to avoid impacting outlying areas of the wetland environment and establishing additional buffers where appropriate.

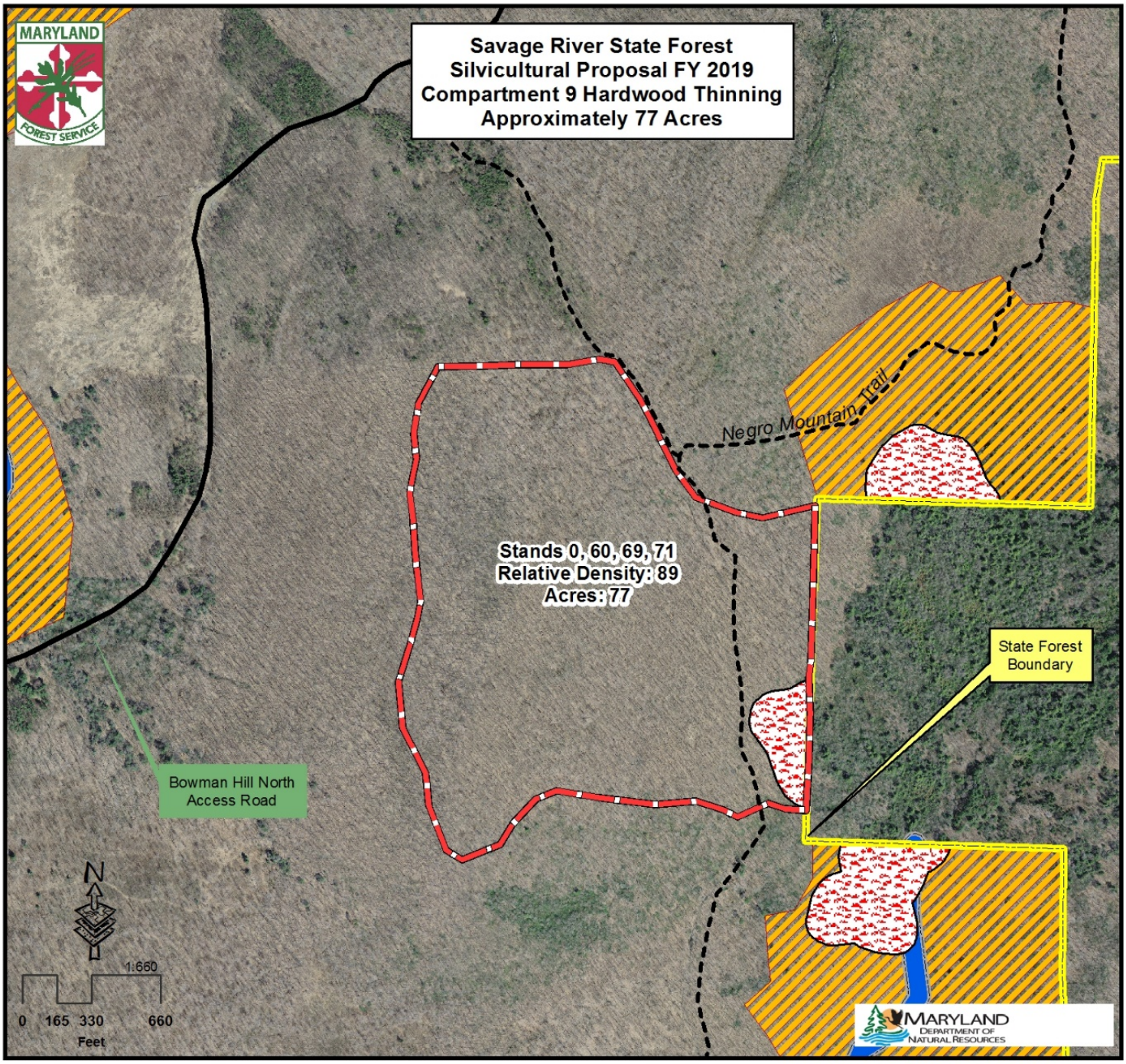
Water Resources: This stand drains south into an unnamed tributary of the North Branch of the Casselman River, within the Youghiogheny River Watershed. The proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

Soil Resources: Underlying soil is mapped as Dekalb and Leetonia very stony sandy loams 0 to 15 percent slopes (DlC). These soils are generally moderately deep over bedrock and are well drained. Equipment limitations are slight on slopes less than 15 percent. Hazard of erosion and windthrow is slight. The site has fair productivity for woodland management, with a site index of 55-65 for upland oaks. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

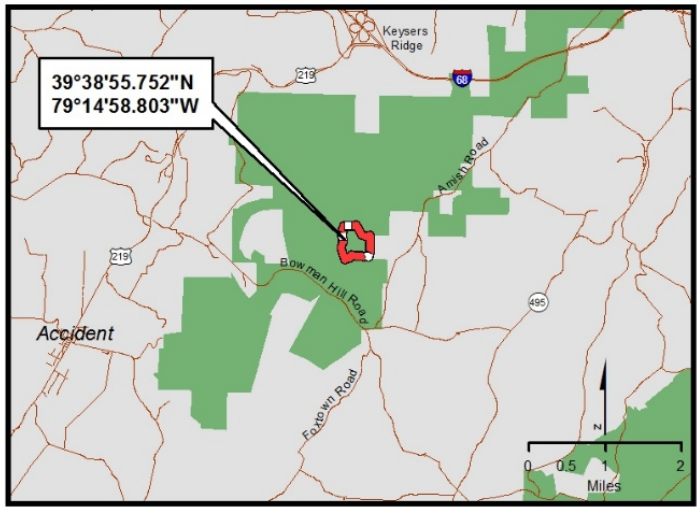
Recreation Resources: The forest access road that will be utilized as a haul road for the timber harvest serves as part of the Negro Mountain Snowmobile Trail. The trail crosses through the eastern side of the harvest proposal and access to the trail may be limited and/or suspended for the duration of the harvest depending on the timing of the cutting. Hunting and hiking are also popular activities in this area as the forest road provides a multitude of access points into the state forest. Opportunities to recreate in the area may be limited or disrupted as log trucks and heavy equipment enter/exit the area. Harvest contracts will require that the trail remain clear of any logging debris and any surface disturbance of the trail will be satisfactorily repaired to ensure that access to the trail is not limited or prevented.

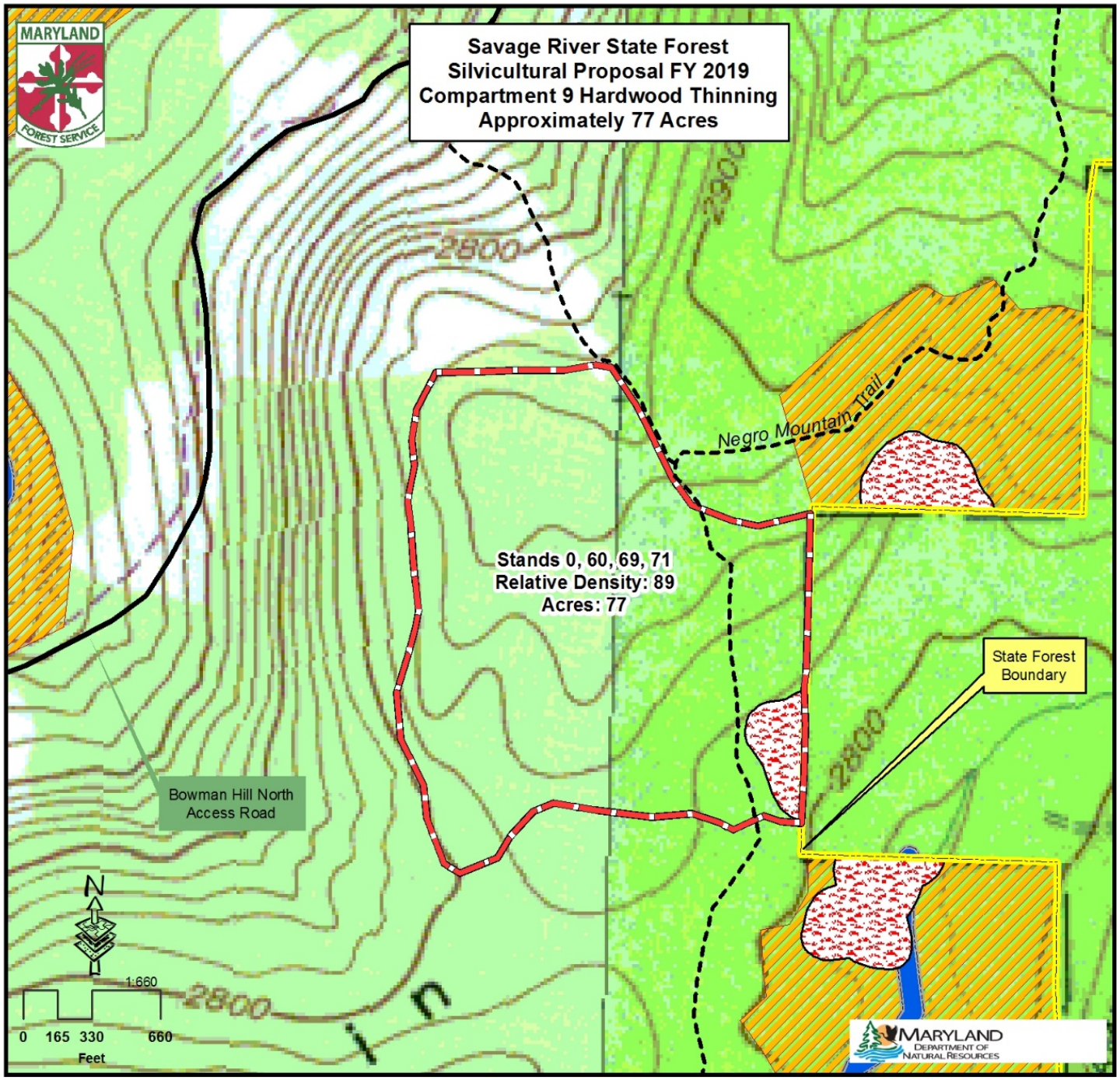
Management and Silvicultural Recommendations

The planned silvicultural treatment for this site is a thinning. The objective of this thinning is simply to reduce stocking levels in order to lessen competition among the remaining trees thereby, increasing the health, vigor and growth rate of the residual stand. The canopy gaps created by the thinning will provide more light to the present oak regeneration aiding it in reaching a successive cohort. The thinning will be carried out as a crown thinning; reducing the basal area to approximately 100 ft^2 /acre and relative density to 60%. Unacceptable growing stock will be the primary focus of removals along with select individual stems that have reached maturity. Retention will favor trees with superior form and seed sources for developing regeneration in the future stand. The harvest will yield approximately 3,000 board feet/acre and eight cords of pulpwood per acre.

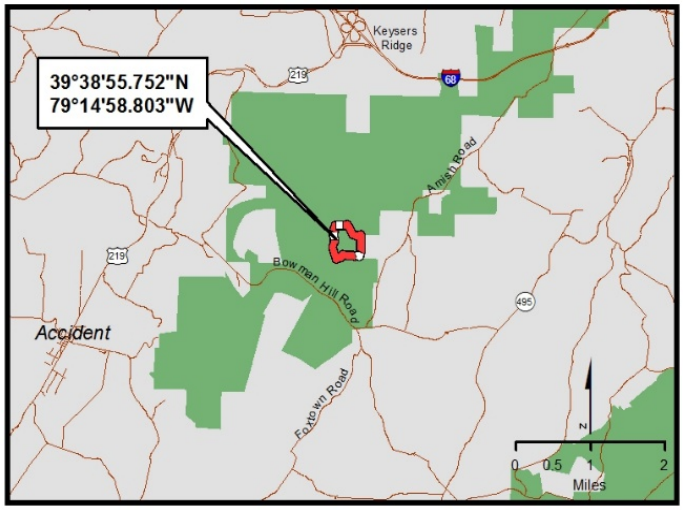


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 9 - Stands 19, 22, 56, 67 **FY-19**

Description/Resource Impact Assessment

Location: This 68-acre harvest proposal is located on the north side of Bowman Hill Road approximately 1.0 mile northwest of the intersection of Amish Road and Bowman Hill Road within Compartment 9, Stands 19, 22, 56, and 67 of the Savage River State Forest.

Forest Community Type and Condition: This 68-acre management unit contains two stands; a 54-acre mixed oak stand that was heavily thinned in 1994 and a 14-acre mixed oak stand which has received no silvicultural treatment according to harvest records. The 54-acre stand has an average basal area of 95 ft^2/acre and an average merchantable diameter of 12.4 inches. The over story is dominated by red maple (47%), red oak (17%), black cherry (12%) and black birch (10%). The relative stand density is 66% of the average maximum stocking and is ideal for individual tree growth. Competitive oak regeneration is found on 17% of the stand and competitive desirable regeneration occupies approximately 18% of the site.

The 14-acre small sawtimber stand has a basal area of 126 ft^2/acre with an average merchantable diameter of 12.5 inches and is overstocked with a relative stand density of 86%. The over story is dominated by red maple (37%), red oak (27%) and black birch (12%). Desirable oak regeneration present in this stand is lacking, approximately 5%, in part due to the presence of the interfering elements explained in the following section.

Interfering Elements: Deer browse pressure across both stands is estimated to be moderate and must be addressed when considering regeneration efforts on this site. Interfering understory plant competition is sufficient to cause significant interference with regeneration efforts with 100% of the larger stand and 93% of the smaller stand containing some form of significant interference. Tall woody interference occupies approximately 97% and 86% of the stands respectively. This interfering vegetation consists primarily of witch hazel and black birch in both stands. Low woody interference occupies approximately 43% and 29% of the sites, with the majority consisting of witch hazel. Interfering fern levels were recorded on 57% of the larger site and 14% of the smaller stand. Non-native and invasive species were not found within the stands.

Historic Conditions: State Forest records indicate that the 54-acre stand was thinned in 1994. The stand to the south of the proposal on the southern side of Bowman Hill Road was harvested in 2000. Records indicate that no silvicultural activities have occurred in the 14-acre stand post 1965. The adjacent stand to the east was thinned in 2006. Neither evidence of fire nor any sign of significant insect infestation was observed during the inventory of the stands.

Rare, Threatened and Endangered Species: At this time, the Forest Manager knows of no rare, threatened or endangered species on the site, or any species that would be impacted by the silvicultural prescription.

Habitats and Species of Management Concern: At this time, the Forest Manager knows of no habitats or species of management concern on site or any species that would be impacted by the silvicultural prescription.

Water Resources: Both stands drain northwest into an unnamed tributary of Bear Creek within the Casselman River Watershed. The proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

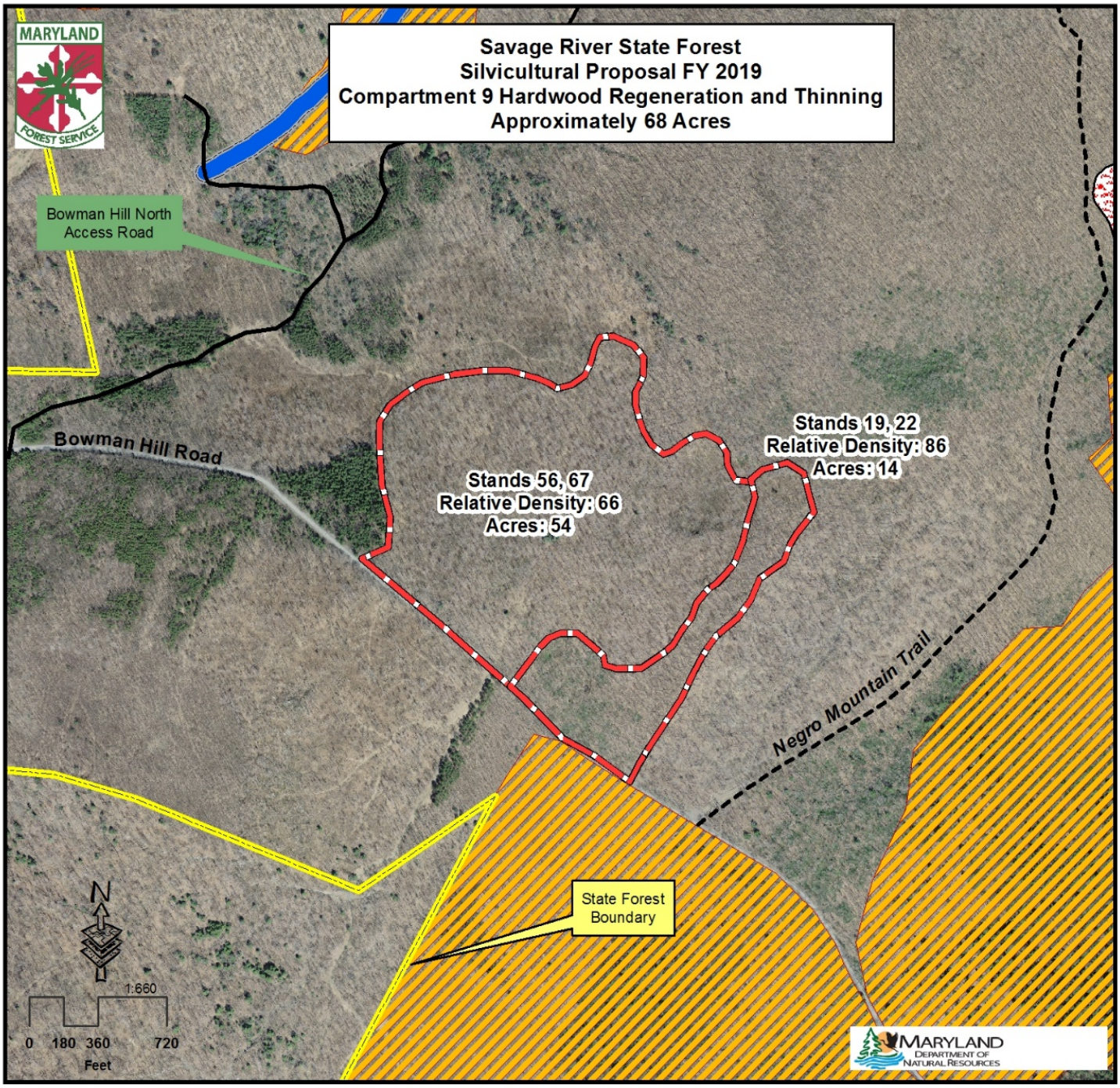
Soil Resources: Underlying soil is mapped as Dekalb and Leetonia very stony sandy loams 0 to 15 percent slopes (DlC). These soils are generally moderately deep over bedrock and are well drained. Equipment limitations are slight on slopes less than 15 percent. Hazard of erosion and windthrow is slight. The site has fair productivity for woodland management, with a site index of 55-65 for upland oaks. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

Recreational Resources: No developed recreational resources are found within the management unit. The main recreational activity performed within this area is hunting. Recreational opportunities may be disrupted for the duration of the harvest activities and access to the site may be limited depending on the timing of the harvest.

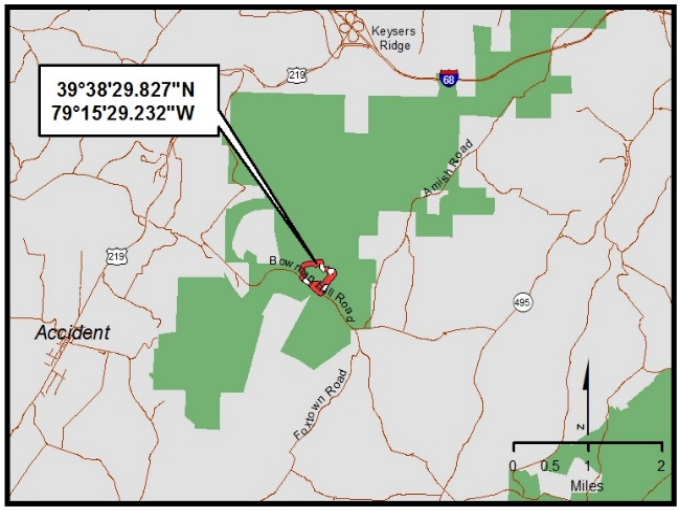
Management and Silvicultural Recommendations

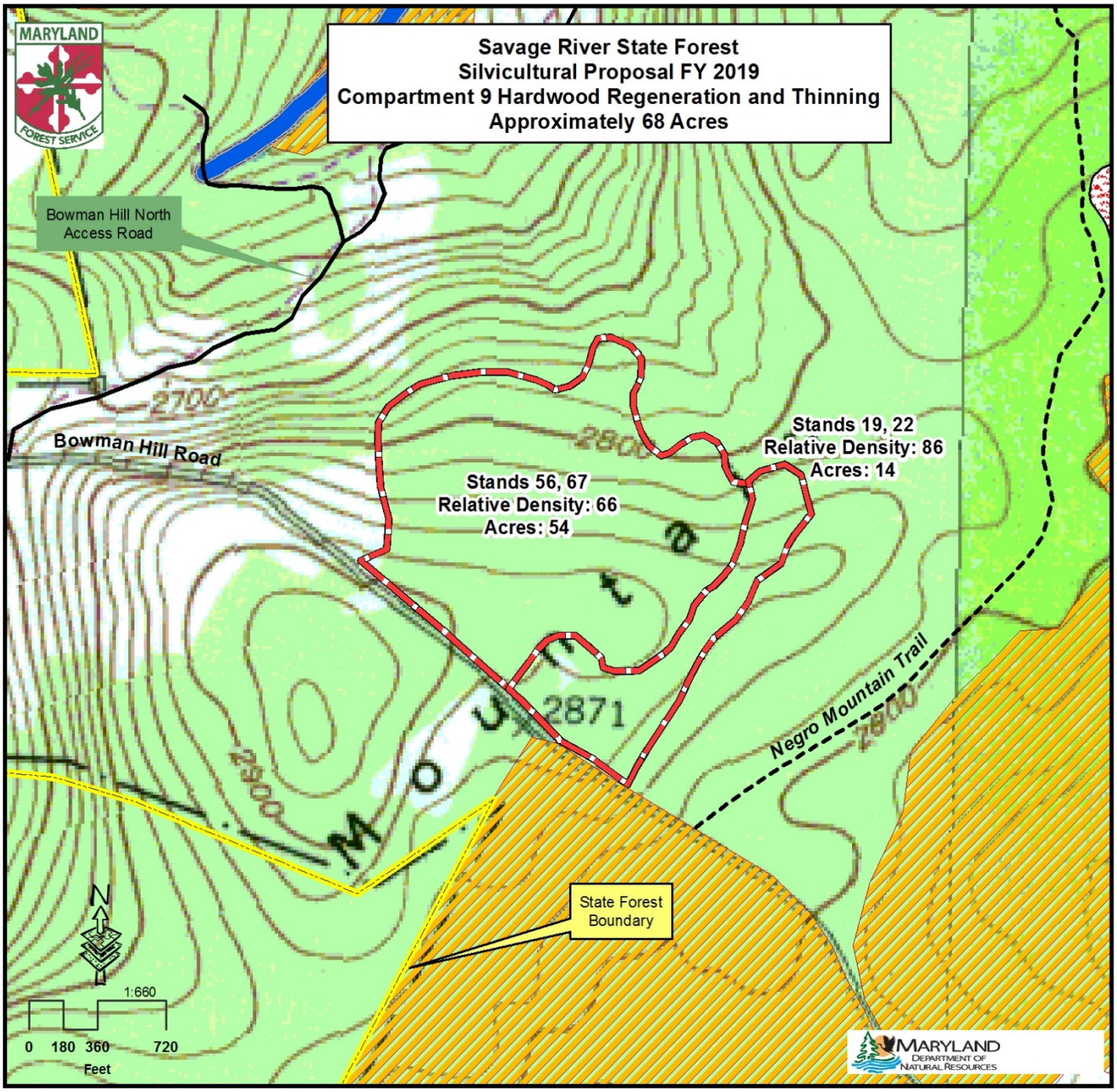
Two silvicultural treatments will be implemented within the management unit; a regeneration harvest will be implemented on the 54-acre site and a commercial thinning will be conducted on the 14-acre stand. On the 54-acre site, the heavy thinning that was conducted in 1994 has effectively served as the seed cut / establishment stage of a shelter wood system providing sufficient desirable advanced regeneration to merit the removal of the overstory. Moreover, the percentage of acceptable growing stock in the stand is not adequate enough to provide a future stand of desirable quality. Given these factors, this stand will be regenerated using a clear cut with variable retention. All trees greater than 4" DBH will be harvested, excepting 4-8 dominant or co-dominant trees per acre selected for mast production/seed sources or wildlife habitat elements including cavities or dens. This harvest will serve as a liberation cut, releasing the established regeneration, allowing the new crop of trees to fully develop into the next stand. Contract specifications will require high slash to remain on the harvest site in order to deter from deer browsing on developing seedlings and stump sprouts.

The planned silvicultural treatment for the 14-acre stand is a commercial thinning given that established regeneration levels are minimal and the stand is overstocked. Thinning the stand will reduce the stocking levels thereby reducing competition and will provide more growing space for the higher quality trees. The crown thinning will reduce the average basal area to 90 ft^2/acre and the relative density to approximately 60% and will yield approximately 1,500-2,000 board feet/acre.

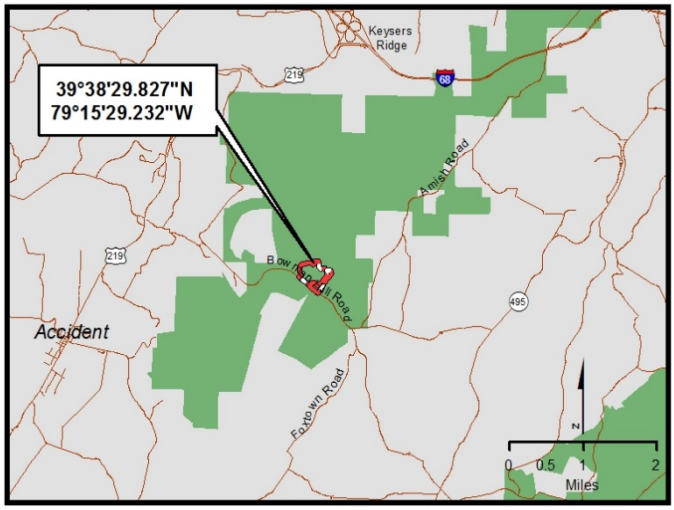


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 9/10 - Stands 28, 57, 58 **FY-19**

Description/Resource Impact Assessment

Location: This 65-acre harvest proposal is situated adjacent to the Bowman Hill North forest access road located on the north side of Bowman Hill Road approximately 1.5 miles northwest of the intersection of Bowman Hill Road and Amish Road within Compartments 9 and 10 Stands 28, 57, 58 of the Savage River State Forest.

Forest Community Type and Condition: This 65-acre site contains a large overstocked sawtimber hardwood stand that is approximately 95 years old, with an average merchantable diameter of 17.1 inches. The over story is dominated by red maple (45%), red oak (39%), black birch (4%) and black cherry (4%). The relative density of the stand is 88% and the average basal area of the stand is 158 ft^2/acre. Sufficient desirable regeneration is lacking throughout the stand, occupying only 1% of the inventory area.

Interfering Elements: Deer browse pressure in this area is estimated to be moderate and must be addressed when considering regeneration efforts on this site. Interfering understory plant competition is sufficient to cause significant interference with regeneration efforts with 99% of the site containing some form of significant interference. Tall woody interference, which occupies approximately 81% of the stand, is primarily sweet birch and witch hazel. Low woody interference occupies approximately 44% of the site with the majority being witch hazel and striped maple. Non-native invasive species were not found on site.

Historic Conditions: State Forest records indicate that no silvicultural work has been done within this stand since 1965. The hardwood stand north of the proposal was thinned in 2001, the stand to the west was thinned in 2016 and conifer stand to the southwest was regenerated in 2014. No evidence of fire was observed during the stand inventory. No sign of significant insect infestation or disease was observed at time of data collection.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species were discovered on the site that would be impacted by the silvicultural prescription.

Habitats and Species of Management Concern: No habitats or species of management concern or any species that would be impacted by the silvicultural prescription were discovered during the proposal review process.

Water Resources: This stand drains west into Little Bear Creek, within the Youghiogheny River Watershed. The proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

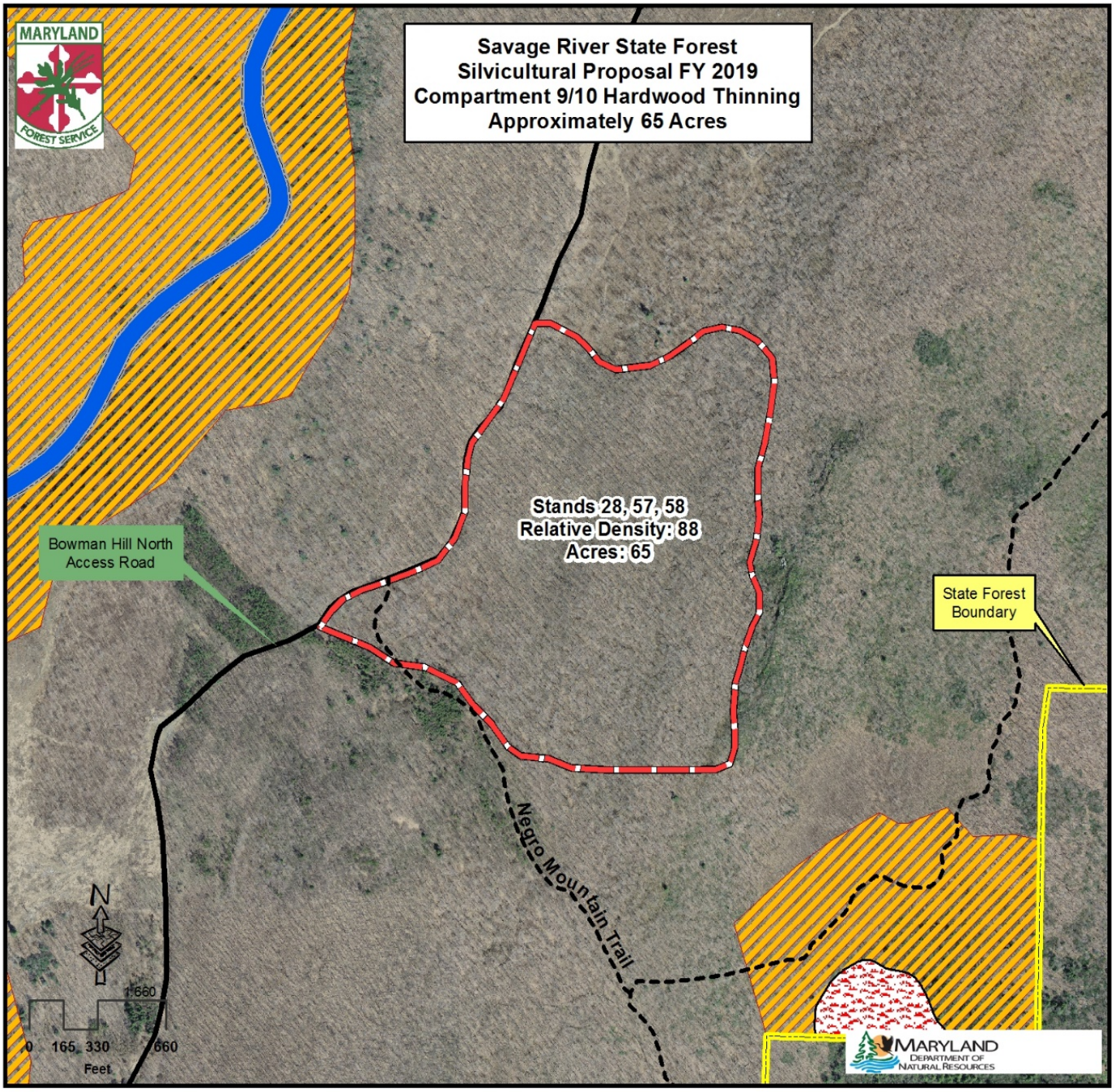
Soil Resources: Underlying soils are mapped as Dekalb and Leetonia very stony sandy loams 0 to 15 percent slopes (DlC) and Dekalb and Gilpin very stony loams 15-25 percent slopes (DgD). These soils are generally moderately deep over bedrock and are well drained. Equipment

limitations are slight on slopes less than 15 percent and severe on slopes over 35 percent. Hazard of erosion and windthrow is slight to moderate. The site has fair to very good productivity for woodland management, with a site index range of 55-85 for upland oaks. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

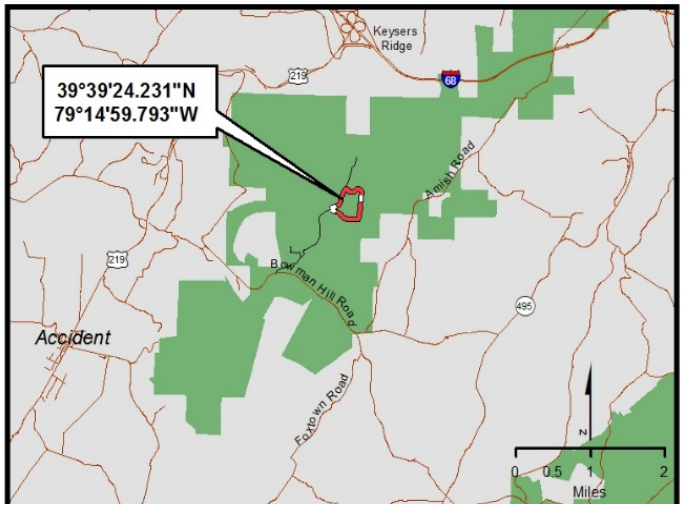
Recreational Resources: The forest access road that will be utilized as a haul road for the timber harvest serves as part of the Negro Mountain Snowmobile Trail and a section of the trail crosses the western tip of the harvest proposal. Access to the trail may be limited and/or suspended for the duration of the harvest depending on the timing of the cutting. Hunting is also a popular activity in this area as the forest road provides a multitude of access points into the state forest. Opportunities to hunt the area may also be limited or disrupted as log trucks and heavy equipment enter/exit the area.

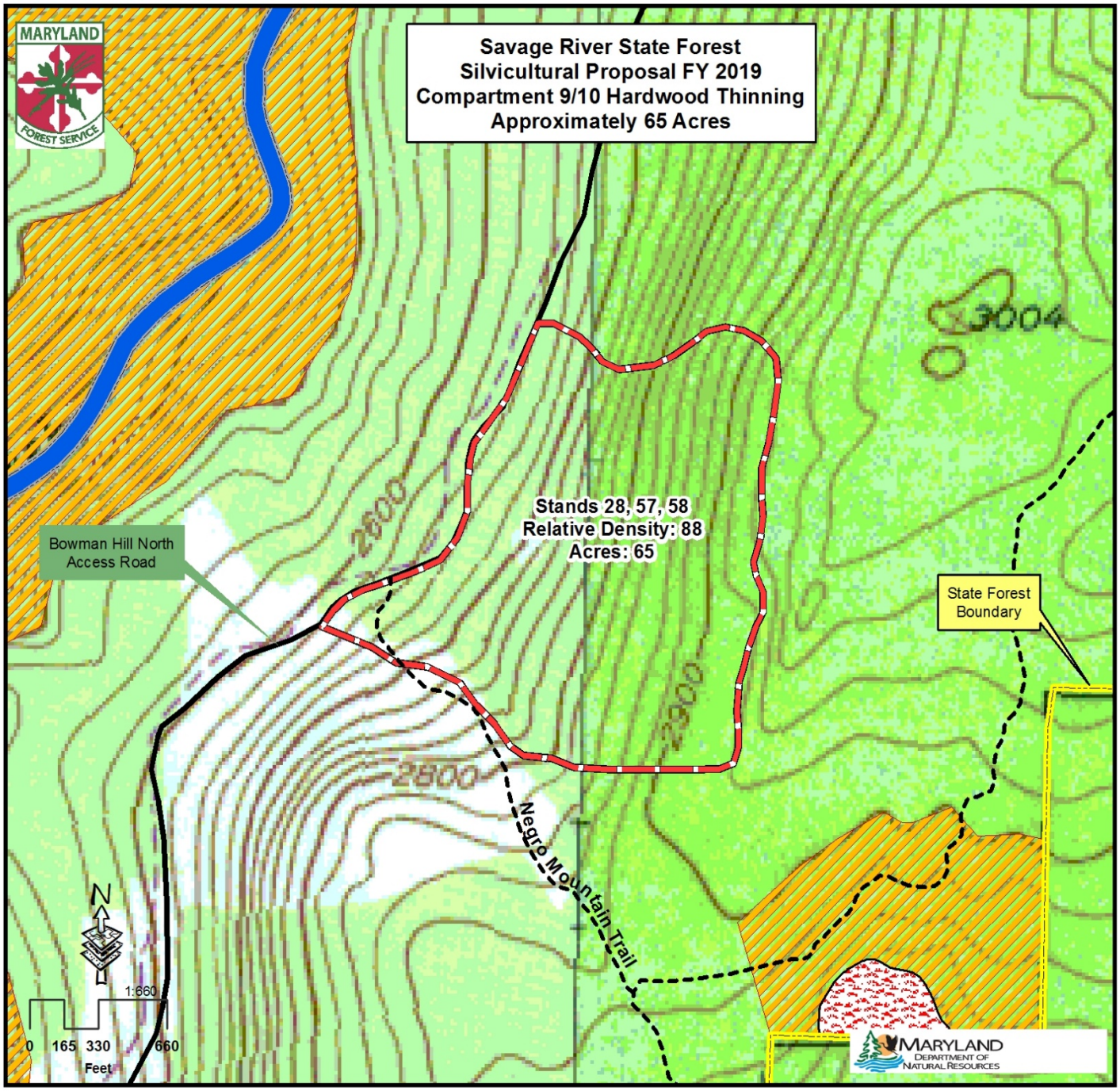
Management and Silvicultural Recommendations

This stand is nearing maturity, but desirable regeneration is not sufficient enough to warrant a regeneration harvest. Therefore, the recommended prescription for this stand is a commercial thinning. Thinning the stand will reduce the stocking levels thereby reducing competition and will provide more growing space for the higher quality trees. Removals will focus on unacceptable growing stock and the crown thinning will reduce the average basal area to 105 ft^2/acre and the relative density to 60%, yielding approximately 3,500-4,000 board feet/acre.

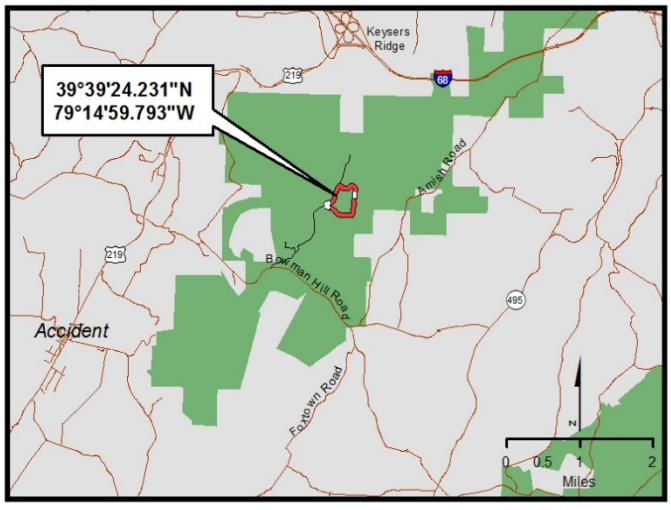


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 10 Stand 45 **FY-19**

Description/Resource Impact Assessment

Location: This harvest proposal is located situated adjacent to the Bowman Hill North forest access road located on the north side of Bowman Hill Road approximately 1.5 miles northwest of the intersection of Bowman Hill Road and Amish Road within Compartment 10 of the Savage River State Forest.

Forest Community Type and Condition: This 28-acre site contains a mature mixed oak stand that is approximately 90 years old with an average merchantable diameter of 17.9 inches. The over story contains northern red oak (53%), red maple (20%), hemlock (7%) and black cherry (4%). This stand is overstocked at 95% relative density and the average basal area of the stand is 169 ft^2/acre. Twenty-five percent of the stand contains established desirable regeneration and total oak regeneration occupies 15% of the site.

Interfering Elements: Deer browse pressure in this area is estimated to be moderate and must be addressed when considering regeneration efforts on this site. Approximately 95% of the site contains some form of interfering. 70% of the stand contains tall woody interference primarily in the form of black birch, American beech and witch hazel. Low woody interference occupies 65% of the stand and populations of problematic ferns are found on 55% of the site. Non-native invasive species were not observed in the stand.

Historic Conditions: State Forest records indicate that this stand was thinned in 1976. The stand immediately to the south of the proposal was harvested in 2006 and the stand to the east was harvested in 2001. No evidence of fire or insect pest activity was observed during the recon.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species or any species that would be impacted by the silvicultural prescription have been found on the site.

Habitats and Species of Management Concern: The harvest proposal is adjacent to the Little Bear Creek Ecologically Significant Area (ESA). The primary features of this ESA include examples of northern hardwood and hemlock forest types, spring seep plant communities, excellent salamander populations, a population of a state rare dragonfly and a sensitive species of fish. All proposed silvicultural activities will occur outside the designated boundaries of this particular HCVF and will have no impact upon its present condition.

Water Resources: This stand drains west into an unnamed tributary of Little Bear Creek that lies within the Youghiogheny River Watershed. The proposed silvicultural treatments will be outside of all HCVF stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

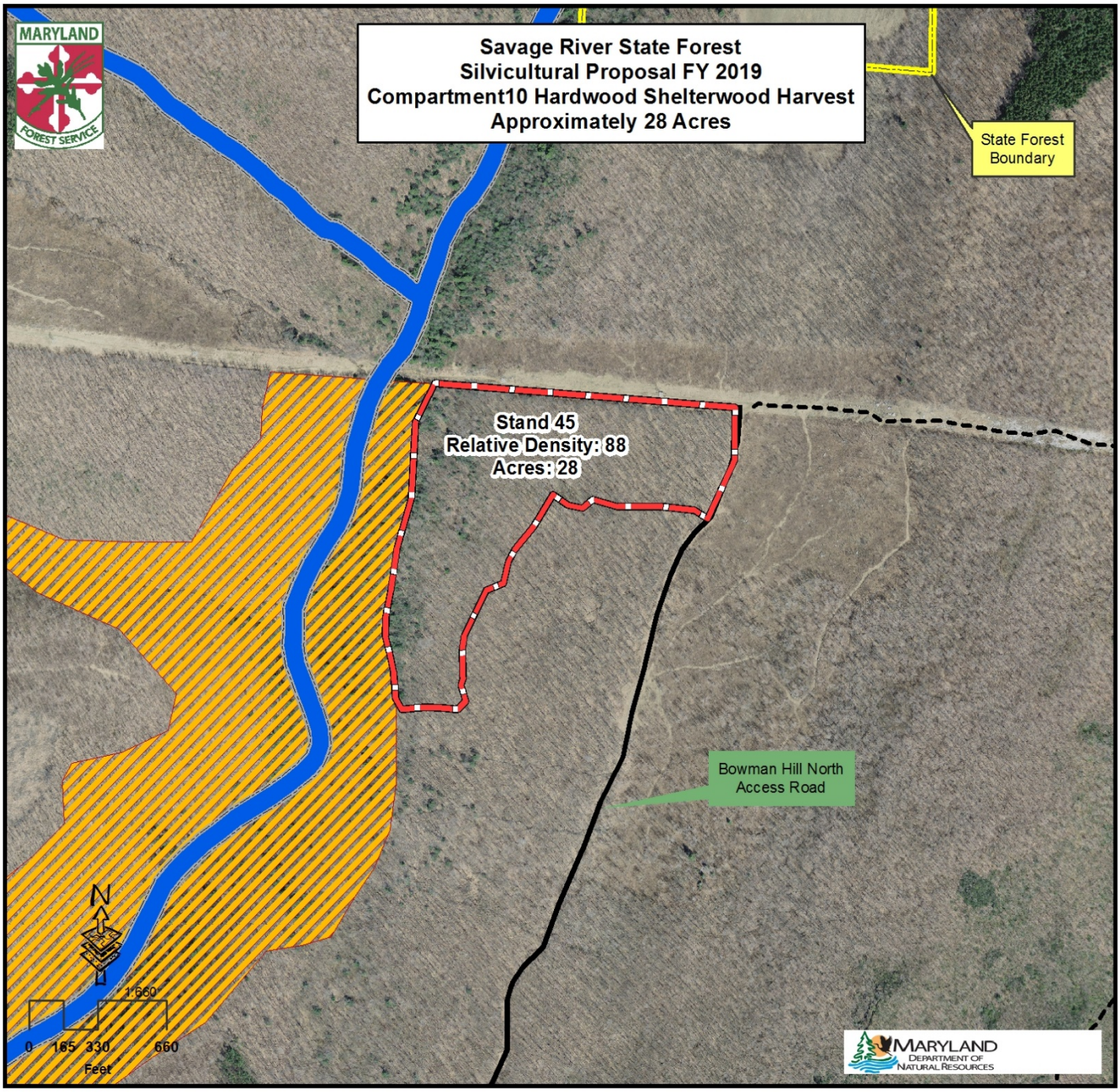
Soil Resources: The dominant soil type of this proposal is Meckesville very stony silt loam 0 to 25 (MdB). These soils are well-drained and have a high potential for erosion on steeper slopes. Degree of slope ranges from 0-8% throughout the site. The site has excellent productivity for woodland management, with a site index of 75-85 for upland oaks. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

Recreation Resources: The forest access road that will be utilized as a haul road for the timber harvest serves as part of the Negro Mountain Snowmobile Trail and a section of the trail crosses the western tip of the harvest proposal. Access to the trail may be limited and/or suspended for the duration of the harvest depending on the timing of the cutting. Hunting is also a popular activity in this area as the forest road provides a multitude of access points into the state forest. Opportunities to hunt the area may also be limited or disrupted as log trucks and heavy equipment enter/exit the area.

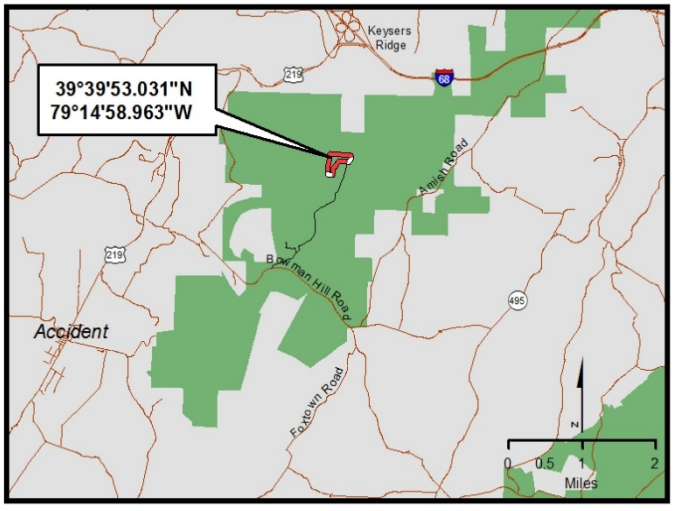
Management and Silvicultural Recommendations

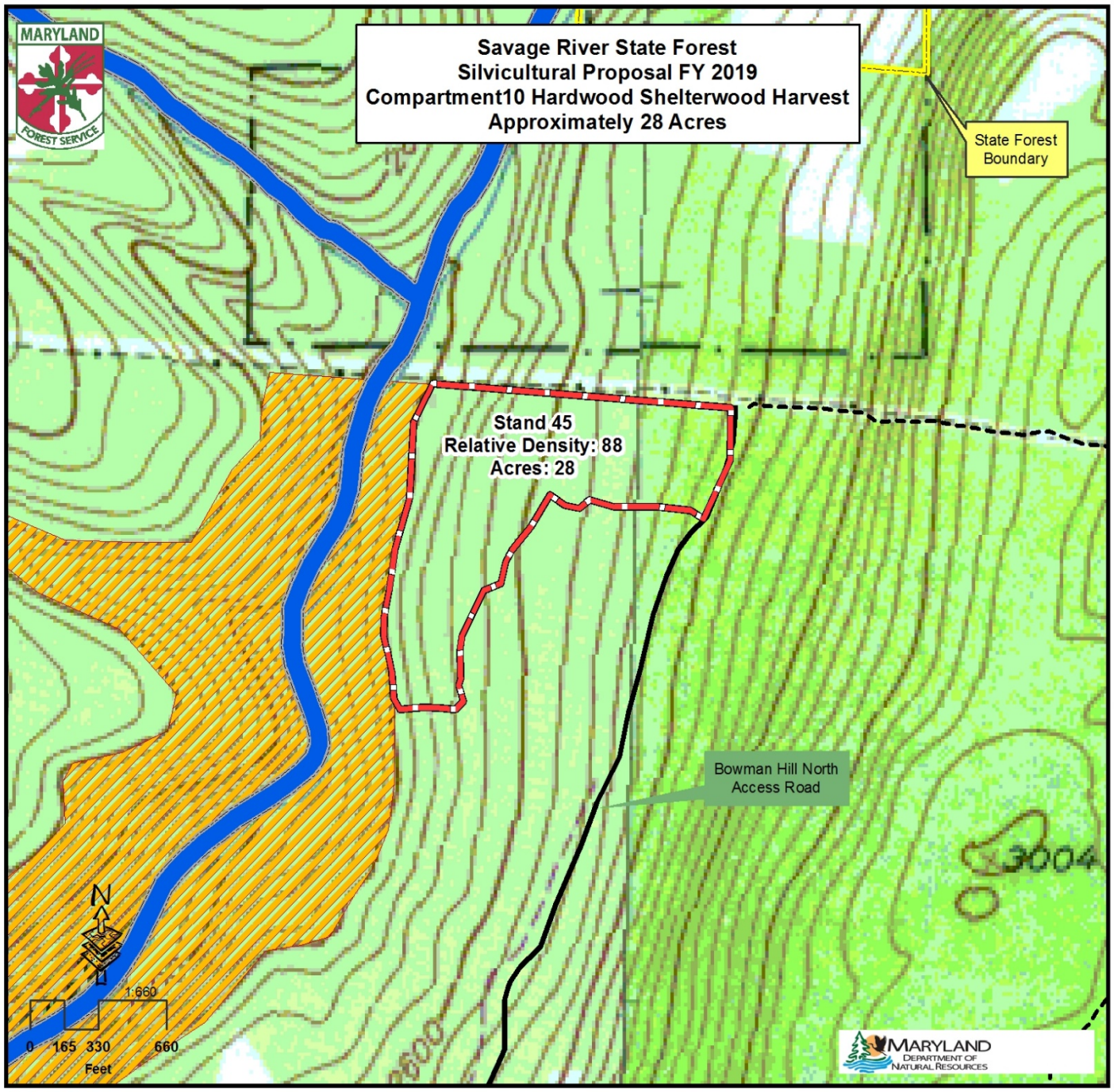
In order to maintain the cohort of established oak regeneration that is present in the stand, the planned silvicultural treatment for this site involves a multi-stage shelterwood sequence. The first stage of this regeneration system will be an establishment cut that will involve thinning the stand in order to provide suitable conditions the desirable regeneration to reach competitive status as well as for seed production and seedling establishment. Retention will focus on the oak species for acorn production and black cherry to provide a mast crop. A crown thinning will be conducted to reduce the residual basal area to approximately 100 ft^2/acre and reduce the relative density of the stand to 60%. This harvest will yield approximately 7,300 board feet/acre.

As described in the interfering elements section, a large percentage of the stand contains undesirable vegetation that has the potential to limit the establishment of desirable regeneration. Despite the presence of these nuisance plants, oak regeneration has become established throughout the stand and is represented in all life stages. Open forest floor areas are colonized with new oak seedlings and established oaks are found amid dense fern patches and low woody interference, surpassing the height of the often growth-limiting species. Treatment in stands with similar interfering elements would warrant pre-harvest herbicide treatments to control the interfering species, but given the presence of several oak cohorts, management will focus on maintaining the future stand without chemical control. Post-harvest monitoring will be conducted to determine if herbicide applications will be necessary to maintain the stand or determine if sufficient desirable regeneration has fully occupied the site allowing for a final removal harvest.

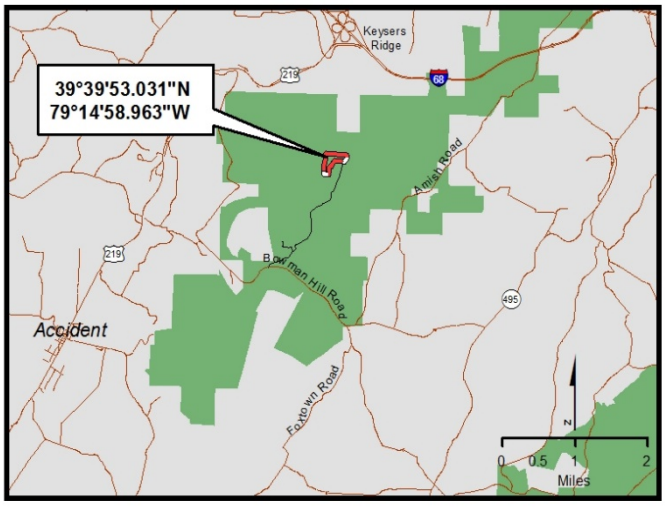


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 18 Stand 12 **FY-19**

Description/Resource Impact Assessment

Location: This harvest proposal is located at the intersection of West Shale Road and New Germany Road in Compartment 18 Stand 12 of the Savage River State Forest.

Forest Community Type and Condition: This 43-acre site contains a small sawtimber mixed oak stand that is approximately 84 years old, with an average merchantable diameter of 12.0 inches. The overstory is comprised of red maple (43%), red oak (27%), chestnut oak (10%), sweet birch (7%) and white oak (5%). This stand is overstocked at 100% relative density and contains 141 ft^2 of basal area/acre. There is very little desirable regeneration present in the understory due in part to the amount of interfering elements noted below.

Interfering Elements: Deer browse pressure in this area is estimated to be moderate to high and must be addressed when considering regeneration efforts on this site. Interfering understory plant competition is sufficient to cause significant interference with regeneration efforts with 100% of the site containing some form of significant interference. Tall woody interference occupies approximately 92% of the stand, is comprised primarily of sassafras and sweet birch. Low woody interference occupies approximately 94% of the site, dominated by mountain laurel. Interfering ferns and grasses do not pose a problem for regeneration. Non-native invasive species (NNIS) were not observed during the stand inventory.

Historic Conditions: State Forest records show this stand was thinned in 1985. No evidence of fire was observed within the stand. No sign of significant insect infestation or disease was observed during the assessment of the stand.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species, or species that would be impacted by the silvicultural prescription were discovered on the site.

Habitats and Species of Management Concern: At this time no habitats or species of management concern have been identified on the site or any species that would be impacted by the silvicultural prescription.

Water Resources: This stand drains west into Laurel Run within the Youghiogheny River Watershed. The proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

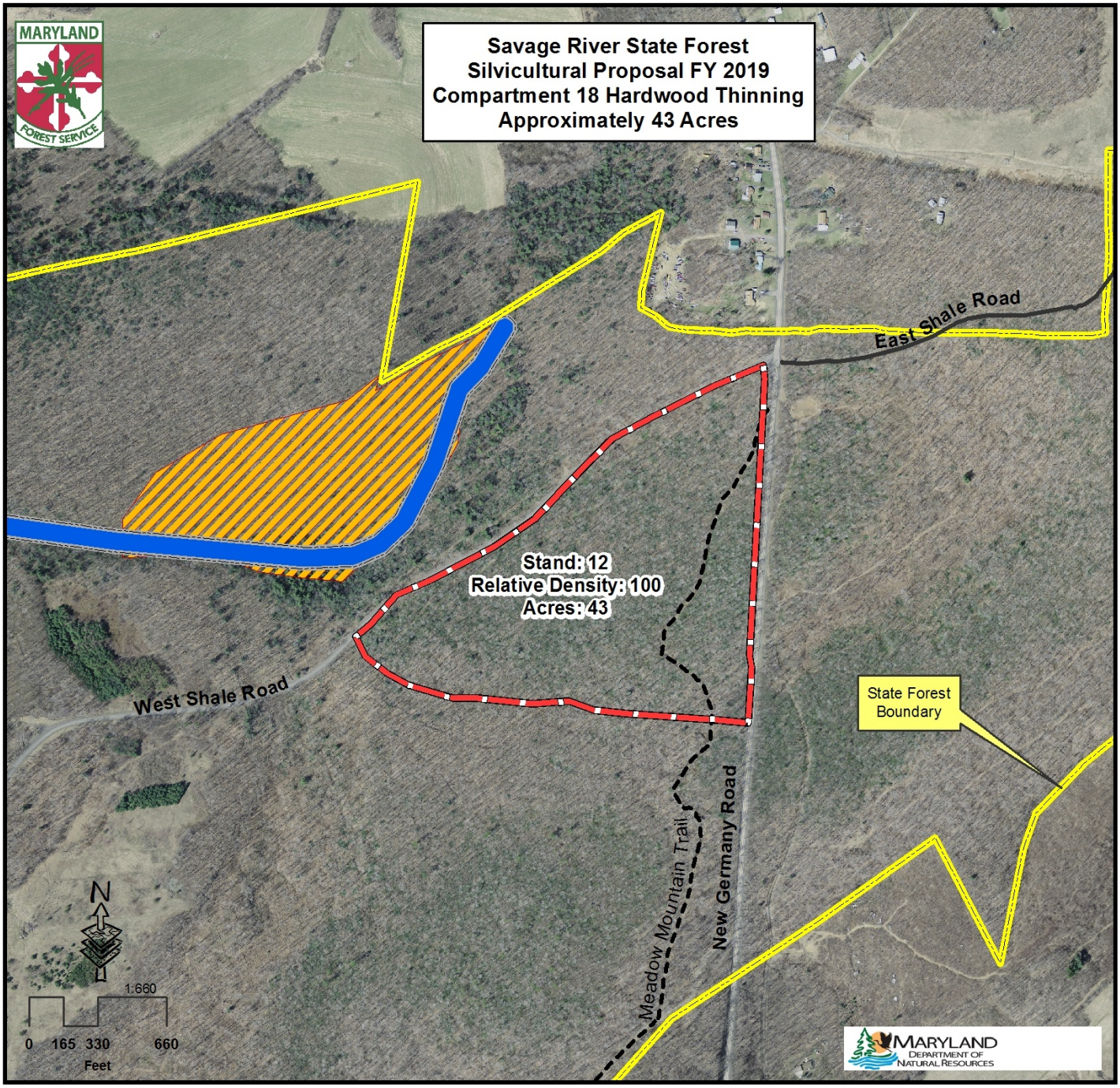
Soil Resources: Underlying soils are mapped as Dekalb and Leetonia very stony sandy loams 0 to 15 percent slopes (DlC). This soil is moderately deep over bedrock and well drained. Equipment limitations are slight on slopes less than 15 percent and severe on slopes over 35 percent. Hazard of erosion and windthrow is slight to moderate. The site has fair productivity for woodland management with a site index range of 55-65 for upland oaks. The productivity of the

site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

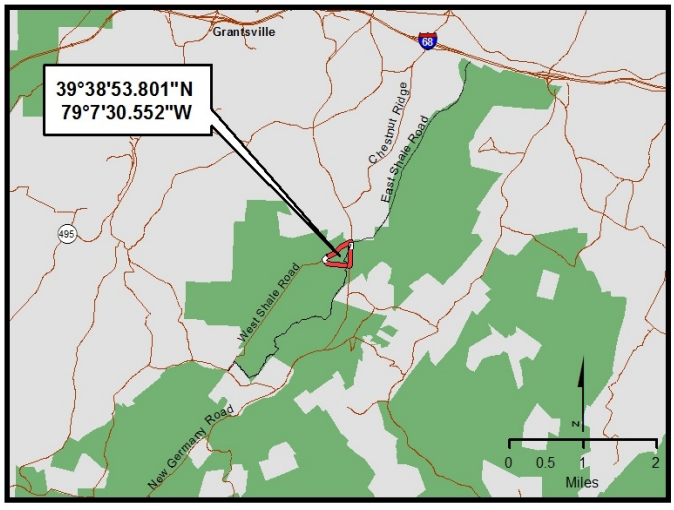
Recreation Resources: A portion of the Meadow Mountain Snowmobile/Bike Trail is located within the proposed harvest site. Access to the trail section may be limited and/or suspended for the duration of the harvest depending on the timing of the cutting. A temporary detour of the trail segment will be implemented if necessary. Hunting is also a popular activity in this area as the forest road provides a multitude of access points into the state forest. Opportunities to hunt the area may also be limited or disrupted as log trucks and heavy equipment enter/exit the area.

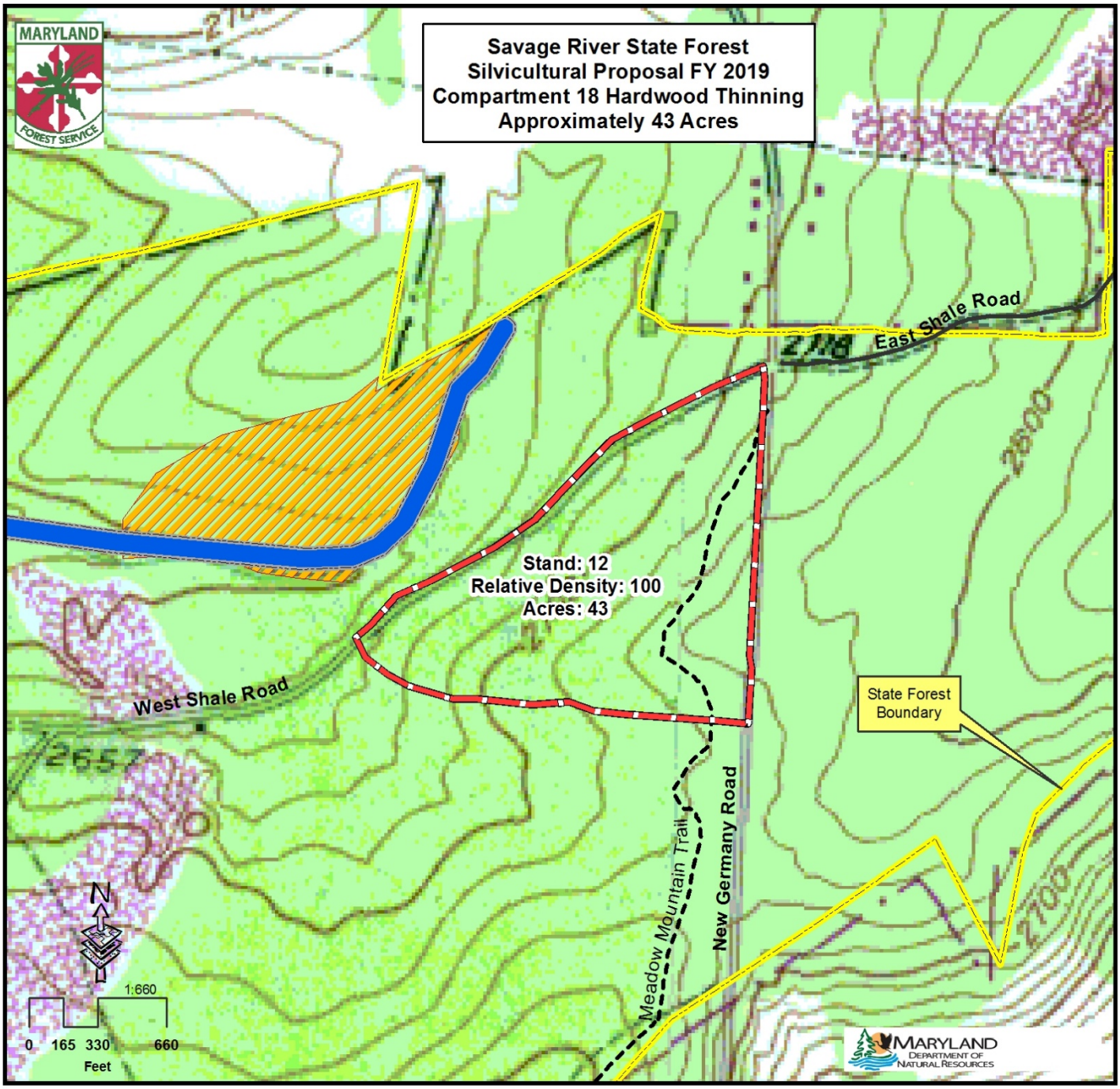
Management and Silvicultural Recommendations

Given that this stand contains insufficient desirable regeneration and is overstocked, the recommended prescription is a commercial thinning. Thinning the stand will reduce the stocking levels thereby reducing competition and will provide more growing space for the higher quality trees. Removals will focus on unacceptable growing stock and the crown thinning will reduce the average basal area to 90 ft^2/acre and the relative density to 65%, yielding approximately 2,000 – 2,500 board feet/acre.

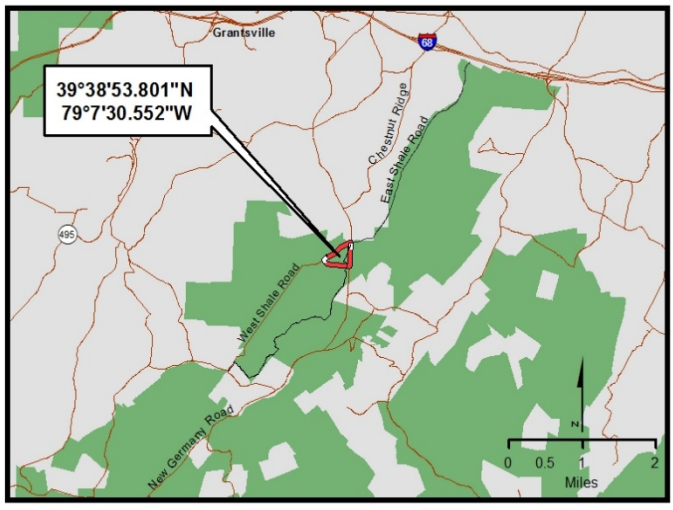


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 18 Stand 16 **FY-19**

Description/Resource Impact Assessment

Location: This stand is situated off West Shale Road and is divided by the West Shale Road Handicapped Hunter Trail located approximately 900' north of the junction of West Shale Road and Otto Lane within Compartment 18 of the Savage River State Forest.

Forest Community Type and Condition: This 20-acre site contains an 80-year-old transitional hardwood stand. The over story consists of red oak (46%), red maple (36%) and black birch (4%) with an average merchantable diameter of 11.3". This stand is stocked at 74% relative density and the basal area averages 101 ft^2/acre. Oak regeneration from all cohorts occupies approximately 10% of the management unit and overall desirable established regeneration is found on 24% of the proposal area.

Interfering Elements: Deer browse pressure in this area is estimated to be moderate and must be addressed when considering regeneration efforts on this site. Significant interfering plant competition is present over the entire site, limiting the establishment of desirable regeneration. Tall woody interference is found over 100% of the stand, which is predominantly black birch and witch hazel. Rhizomatous fern populations occupy 71% of the site A Non-native invasive species (NNIS), Japanese knotweed, was discovered during the inventory and has been treated over multiple growing seasons in an effort to eradicate the population from the stand. No significant insect pests or evidence of forest diseases were observed.

Historic Conditions This stand was previously thinned in 1974. The stand adjacent to the western boundary of the proposal was thinned in 1993. No evidence of recent fire activity was observed within the stand.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species were discovered on the site.

Habitats and Species of Management Concern: At this time no habitats or species of management concern have been identified on the site.

Water Resources: This southern portion of the stand drains south into Poplar Lick, within the Savage River watershed and the remainder of the stand drains north into an unnamed tributary of Laurel Run within the Casselman River watershed. The proposed silvicultural treatments will be outside of all HCVF stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

Soil Resources: The prominent underlying soil type is mapped as Very stony land, rolling (VsD). Degree of slope ranges from 0-15% throughout the site. Equipment limitations are severe due to the extreme rockiness. Hazard of erosion is moderate to severe on steep slopes. The site has low productivity for woodland management, with a site index values ranging from of 45-55

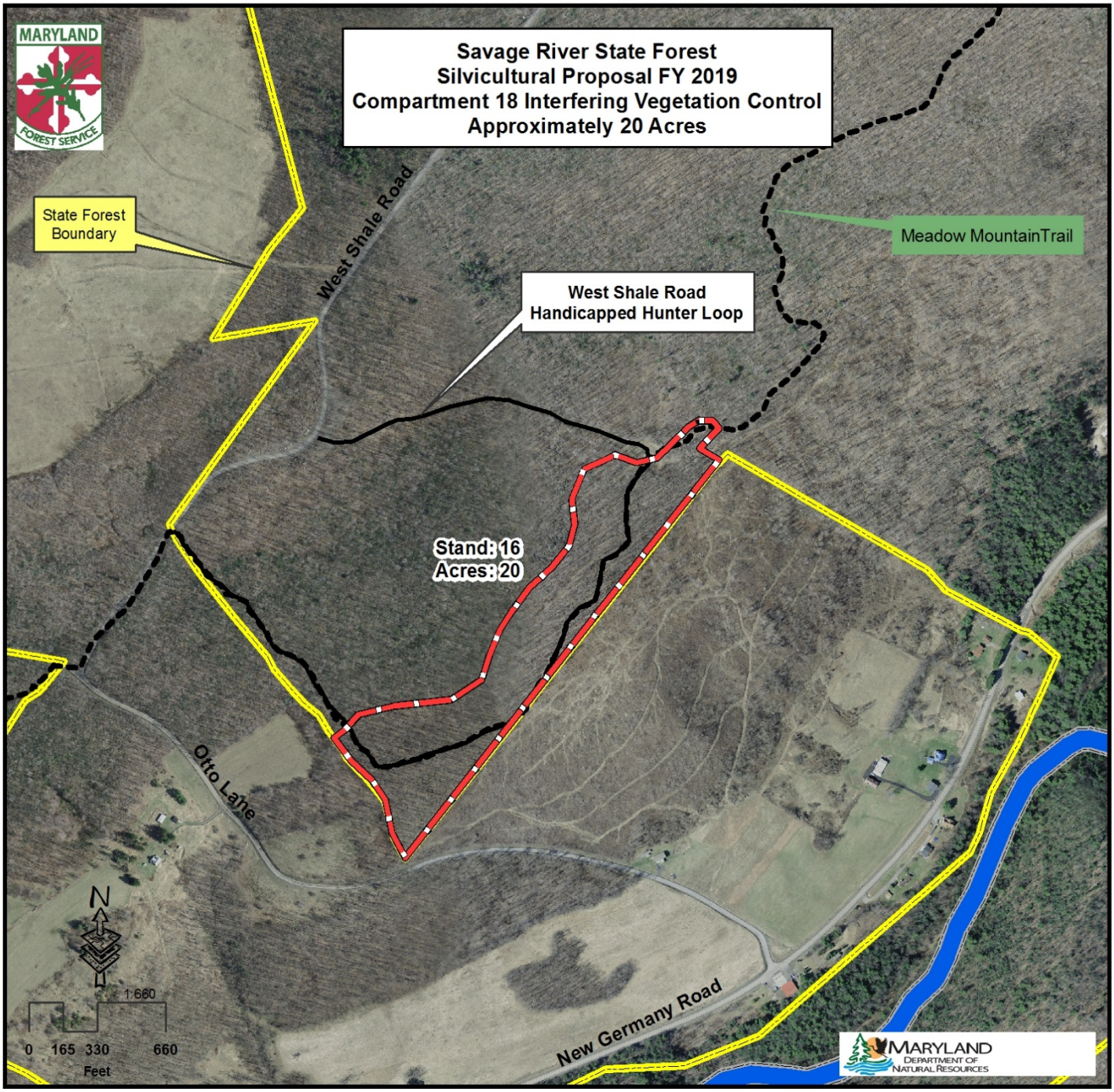
for upland oaks. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

Recreation Resources: The access road that passed through the stand serves as the West Shale Road handicapped hunter road as well as a section of the Meadow Mountain trail that is utilized for snowmobiling, biking, hiking and hunting opportunities. The recommended prescription for this stand does not include any mechanical harvesting of any wood products and therefore will not limit recreation opportunities as the project is being completed.

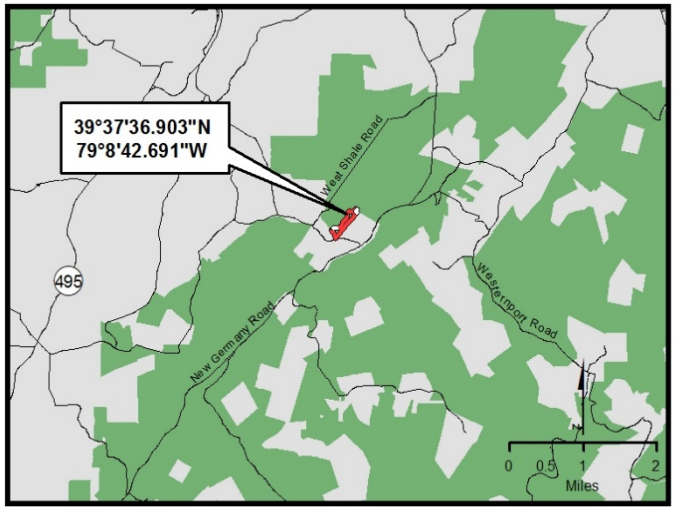
Management and Silvicultural Recommendations

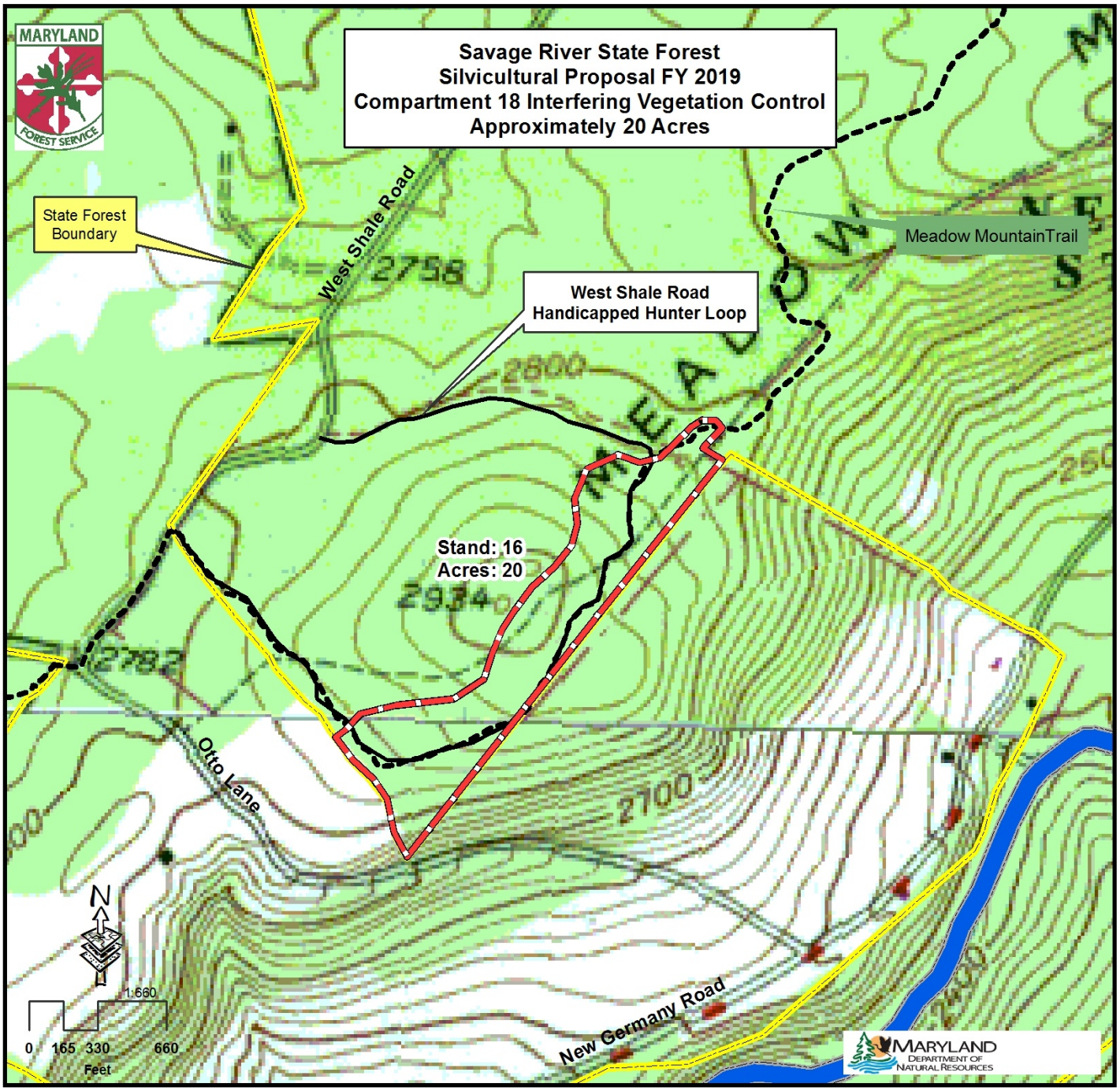
Due to the lack of established desirable regeneration and the overabundance of interfering vegetation in this stand, the planned silvicultural treatment for this stand is to treat and control the interfering understory vegetation using herbicide applications. The interfering woody vegetation in the mid canopy 0.5"- 6" will be controlled using low volume, direct herbicide applications with a suitable herbicide applied to the target trees via one of three methods: cut surface, hack and squirt or basal bark applications. Additionally, the interfering ferns will be treated with appropriate herbicides using broadcast foliar applications. Any remnant NNIS populations that are identified will also be treated at the time of application. The objective of these treatments is to open the forest floor to increased levels of diffuse sunlight necessary for desired seedling establishment and height growth development necessary to provide a future fully stocked stand.

The stand will be monitored for the establishment of desirable regeneration. Depending on the regeneration response to this treatment, a shelterwood harvest may be required to facilitate the growth into a competitive cohort. When the regeneration reaches competitive size and can provide a fully stocked stand a final removal harvest will be implemented.

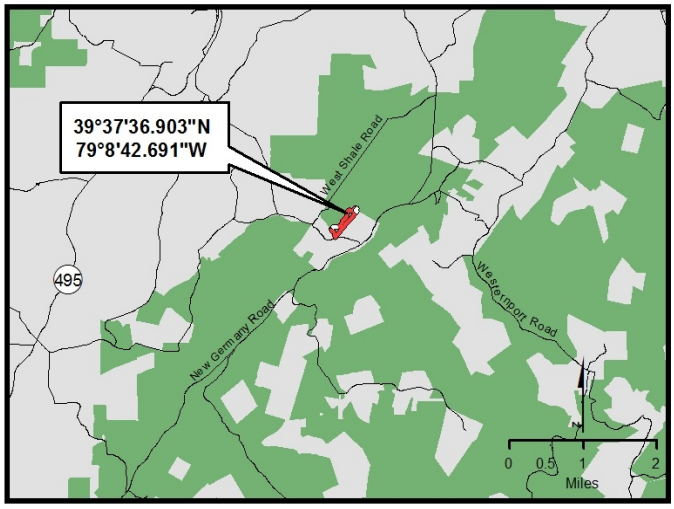


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 23 Stands 68, 71-75, 88 **FY-19**

Description/Resource Impact Assessment

Location: This stand is situated on God Country Road, which is located on the eastern side of Lower New Germany Road, approximately 2.3 miles south of the junction of Avilton-Lonaconing Road and Lower New Germany Road within Compartment 23 Stands 68, 71-75 and 88 of the Savage River State Forest.

Forest Community Type and Condition: This 39-acre site contains an 82-year-old transitional hardwood stand. The over story consists of red maple (50%), black birch (8%), chestnut oak (5%), black cherry (5%), and white oak (3%) with an average merchantable diameter of 11.7". This stand is over stocked at 84% relative density and the basal area averages 128 ft^2/acre. Competitive oak regeneration occupies approximately 10% of the management unit and desirable saplings are found on 19% of the proposal area.

Interfering Elements: Deer browse pressure in this area is estimated to be moderate and must be addressed when considering regeneration efforts on this site. Significant interfering plant competition is present over 90% of the site, limiting the establishment of desirable regeneration. Tall woody interference is found over 70% of the stand, which is predominantly black birch. Fern and grass populations within the site are not a limiting factor for desirable regeneration establishment. A Non-native invasive species (NNIS), Japanese barberry, was discovered during the inventory. No significant insect pests or evidence of forest diseases were observed.

Historic Conditions This stand was thinned heavily in 1993. The stand adjacent to the southern boundary of the proposal was regenerated in 1989. No evidence of recent fire activity was observed within the stand.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species were discovered on the site.

Habitats and Species of Management Concern: At this time no habitats or species of management concern have been identified on the site.

Water Resources: This stand drains south to the West Branch of Blue Lick Run, within the Savage River Watershed. The proposed silvicultural treatments will be outside of all HCVF stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan. All 50' plus 4' extended stream buffers will be thinned to approximately 60 ft^2/acre as afforded by the specifications for streamside management zones.

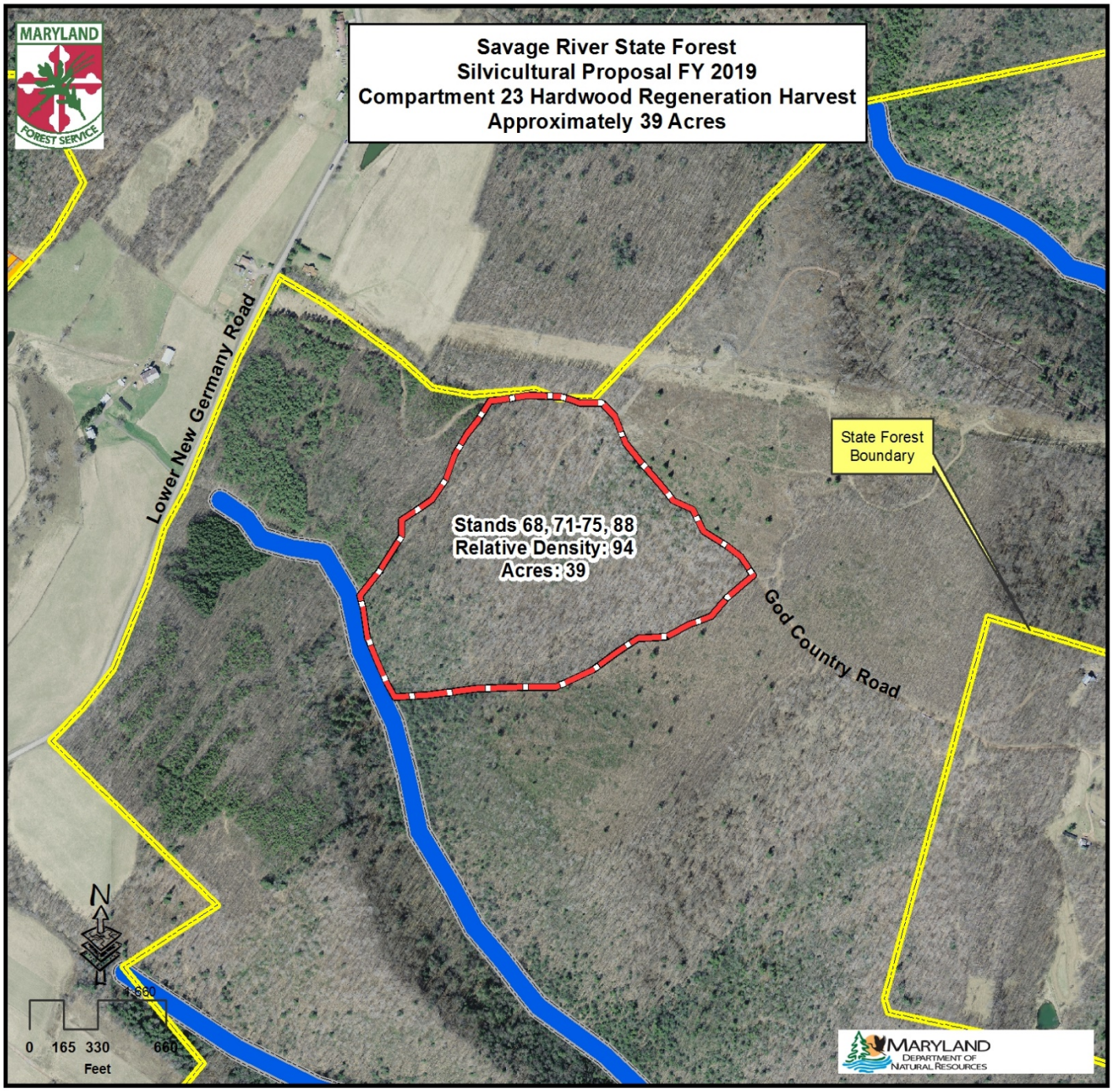
Soil Resources: Underlying soil type are mapped as Calvin, Ungers and Lehew channery loams 10-35 percent slopes (CnD2). These soils are generally moderately deep over bedrock, moderately textured and well drained. Degree of slope ranges from 10-35% throughout the site. Equipment limits range from moderate to severe. Hazard of erosion is moderate to extreme on steeper slopes. The site has very good productivity for woodland management, with a site index

of 75-85 for upland oaks on north aspects. Windthrow hazard is slight and competition is moderate for hardwood regeneration. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

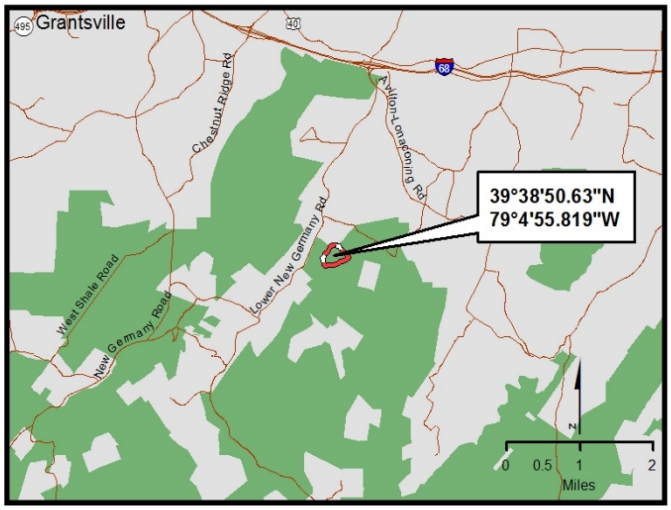
Recreation Resources: No developed recreational resources are located within the stand. Hunting is the main form of recreation that occurs within the management unit. Opportunities for hunting in this area may be limited or disrupted depending on the timing of the harvest activities. The access road that will utilized as a haul road for the silvicultural activity also serves as a driveway to a 50-acre private inholding located at the terminus of God Country Road. Harvesting activities will take place off the roadway and all slash and debris will be removed immediately to ensure that no interruptions occur in regard to landowner ingress/egress on the property.

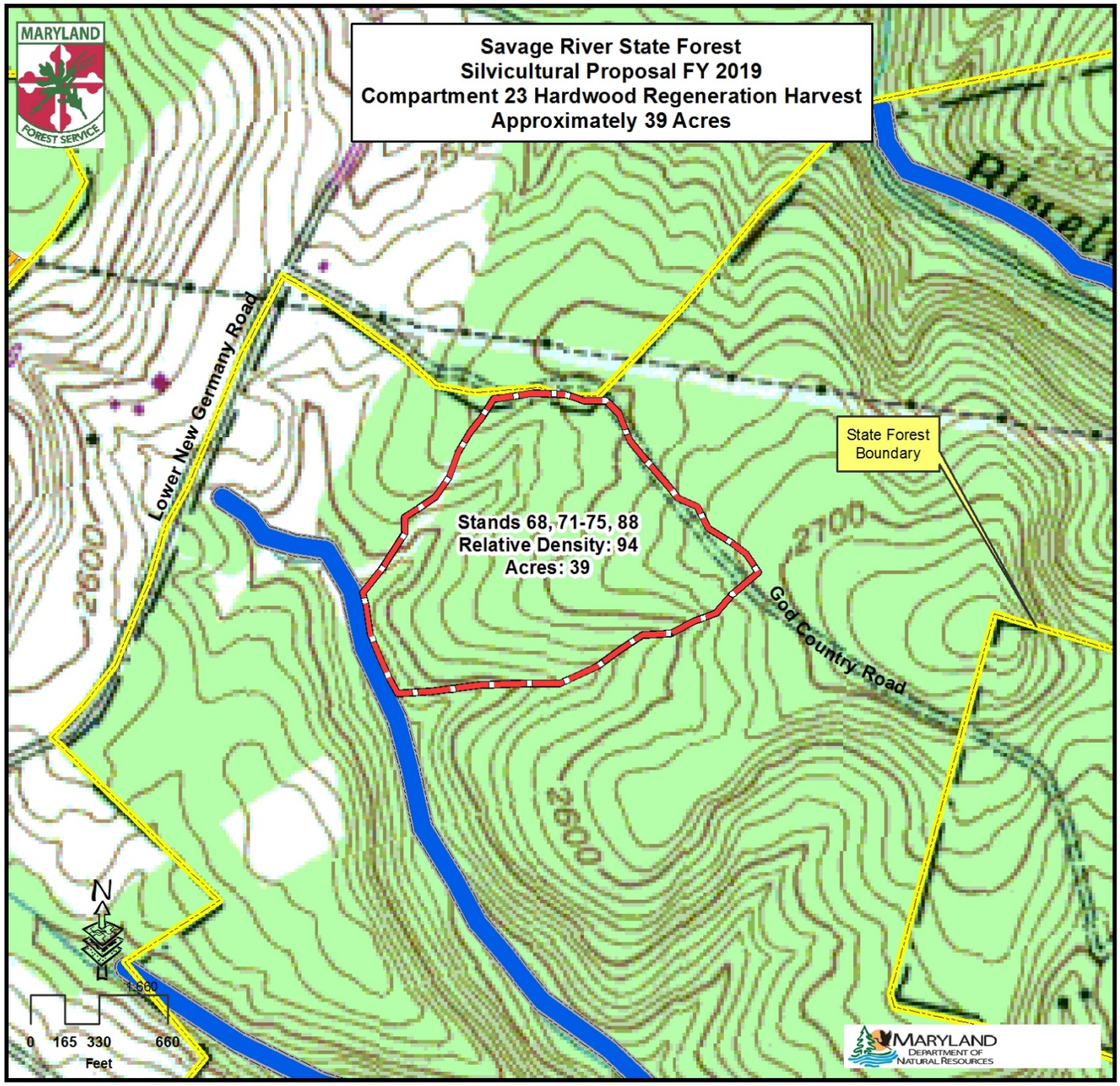
Management and Silvicultural Recommendations

The heavy thinning that was conducted in 1993 has effectively served as the seed cut / establishment stage of a shelter wood system providing sufficient desirable advanced regeneration to merit the removal of the overstory. Moreover, the percentage of acceptable growing stock in the stand is not adequate enough to provide a future stand of desirable quality. Given these factors, this stand will be regenerated using a clear cut with variable retention. All trees greater than 4" DBH will be harvested, excepting 4-8 dominant or co-dominant trees per acre selected for mast production/seed sources or wildlife habitat elements including cavities or dens as well as the retention of all hemlocks and white pine specimens of acceptable quality. This harvest will serve as a liberation cut, releasing the established regeneration, allowing the new crop of trees to fully develop into the next stand. Contract specifications will require high slash to remain on the harvest site in order to deter from deer browsing on developing seedlings and stump sprouts. Harvest yields will be approximately 4,300 board ft/acre.

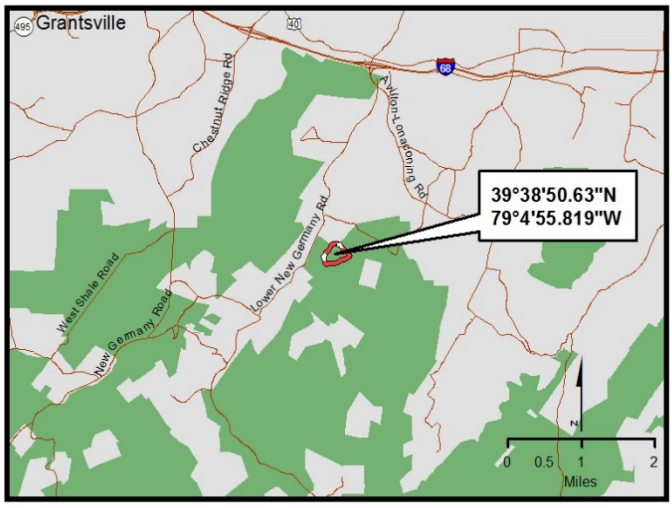


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 69 Stands 11 and 14 **FY-19**

Description/Resource Impact Assessment

Location: This 89-acre proposal is located on the west side of the Meadow Mountain Trail with Stand 14 fronting on Maynardier Ridge Road approximately .75 miles east of the intersection of Maynardier Ridge Road and Bear Hill Road. Stand 14 is situated 500' south of Stand 11 within Compartment 69 of Savage River State Forest.

Forest Community Type and Condition: Stand 11 consists of a small sawtimber northern hardwood stand that is approximately 85 years old, with an average merchantable diameter of 11 inches. Stand composition is dominated by red maple (39%), black birch (21%) and northern red oak (15%). The stand is overstocked at 81% relative density and contains an average basal area of 99 ft^2/acre. Oak regeneration for all cohorts occupies approximately 8% of the management unit and all competitive regeneration is found on 24% of the site. Problematic fern populations were found on 26% of the inventoried area.

Stand 14 is an 82-year old transition stand dominated by northern red oak (43%), red maple (17%) and white oak (9%) with an average merchantable diameter of 13.5". The stand is overstocked at 94% relative density and has an average basal area of 132 ft^2/acre. Only three percent of the cruised area contains oak regeneration from any growth class and 11% contains desirable competitive regeneration or residuals. In order to preserve the current oak regeneration and facilitate growth into a competitive stage within both stands, it is imperative that the interfering vegetation be controlled, specifically the tall woody interference.

Interfering Elements: Stand 11 - Overall, interfering understory plants occupy approximately 99% of the harvest site, which is sufficient to cause significant interference with regeneration efforts. Tall woody interference occupies approximately 89% of the stand and is composed primarily of black birch and witch hazel. Low woody interference including witch hazel and striped maple occupies approximately 57% of the management unit. Non-native invasive species (NNIS) were not found on site during the inventory.
Stand 14 – Interfering vegetation is found across 80% of the stand, with 70% being tall woody interference composed primarily of witch hazel and black birch. Low woody interference and fern levels are not at significant enough levels to contribute to regeneration failure and will not be targeted as part of the silvicultural prescription for the stand.

In addition to interfering vegetation, the presence of white-tailed deer can have a negative influence on the regeneration success of the stand. Over browsing can facilitate failure of desirable seedling establishment and in extreme cases a shift in species composition dominated by undesirable tree species. Field evaluation of the site estimated deer browse impact to be moderate. Monitoring of deer browse impacts will coincide with regeneration surveys to determine if additional measures need to be implemented to reduce deer herbivory and increase the likelihood of regeneration establishment on the site.

Historic Conditions: Both stands were thinned in 1994 and the stand situated between them was regenerated in 1986. No evidence of fire or significant insect infestation or forest disease was observed during the inventory of the stand.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species were discovered within the management unit.

Habitats and Species of Management Concern: No habitats or species of management concern were discovered in Stand 11. A large outcrop exists at the northern end of Stand 14 which houses a unique ecological community and will be afforded a buffer of approximately 150' and all prescriptive activities will occur outside the excluded area.

Water Resources: Both stands drain west towards the Casselman River within the Youghiogheny River watershed. The proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

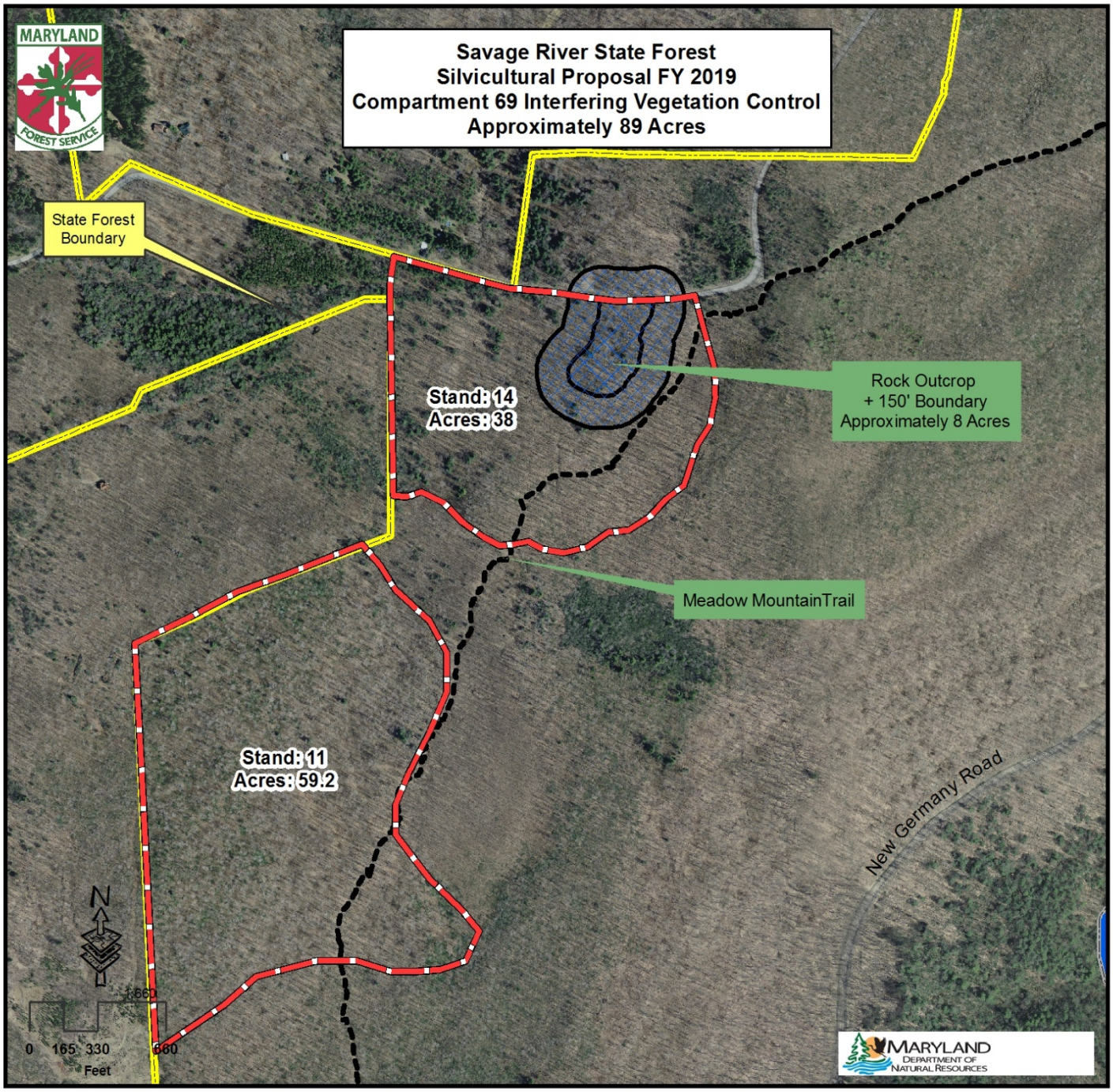
Soil Resources: The dominant soil type present in both stands is mapped as Cookport and Ernest very stony silt loams (CuD). This soil is generally moderately deep and well drained with inclusions of some poorly drained soils. Degree of slope ranges from 8-25% throughout the site. Equipment limits are moderate due to a water table that is fairly close to the soil surface in late winter and early spring. Hazard of erosion is slight to moderate. The site has very good productivity for woodland management, with a site index of 75-85 for upland oaks.

Recreation Resources: The Meadow Mountain Trail crosses both stands in this proposal. This section of the trail serves as a Handicapped Hunter Access that terminates approximately two miles south at the intersection of Frank Brenneman Road. Hiking, biking, hunting and snowmobiling opportunities are also available on the trail. However, the recommended prescription for this stand does not include any mechanical harvesting of any wood products and therefore will not impact normal use of the trail. The recommended prescription will not limit opportunities for visitors to partake in any pastimes while in this area of the forest.

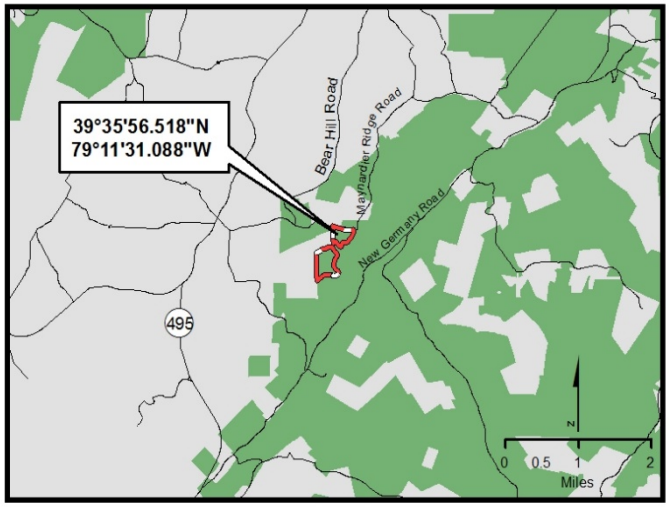
Management and Silvicultural Recommendations

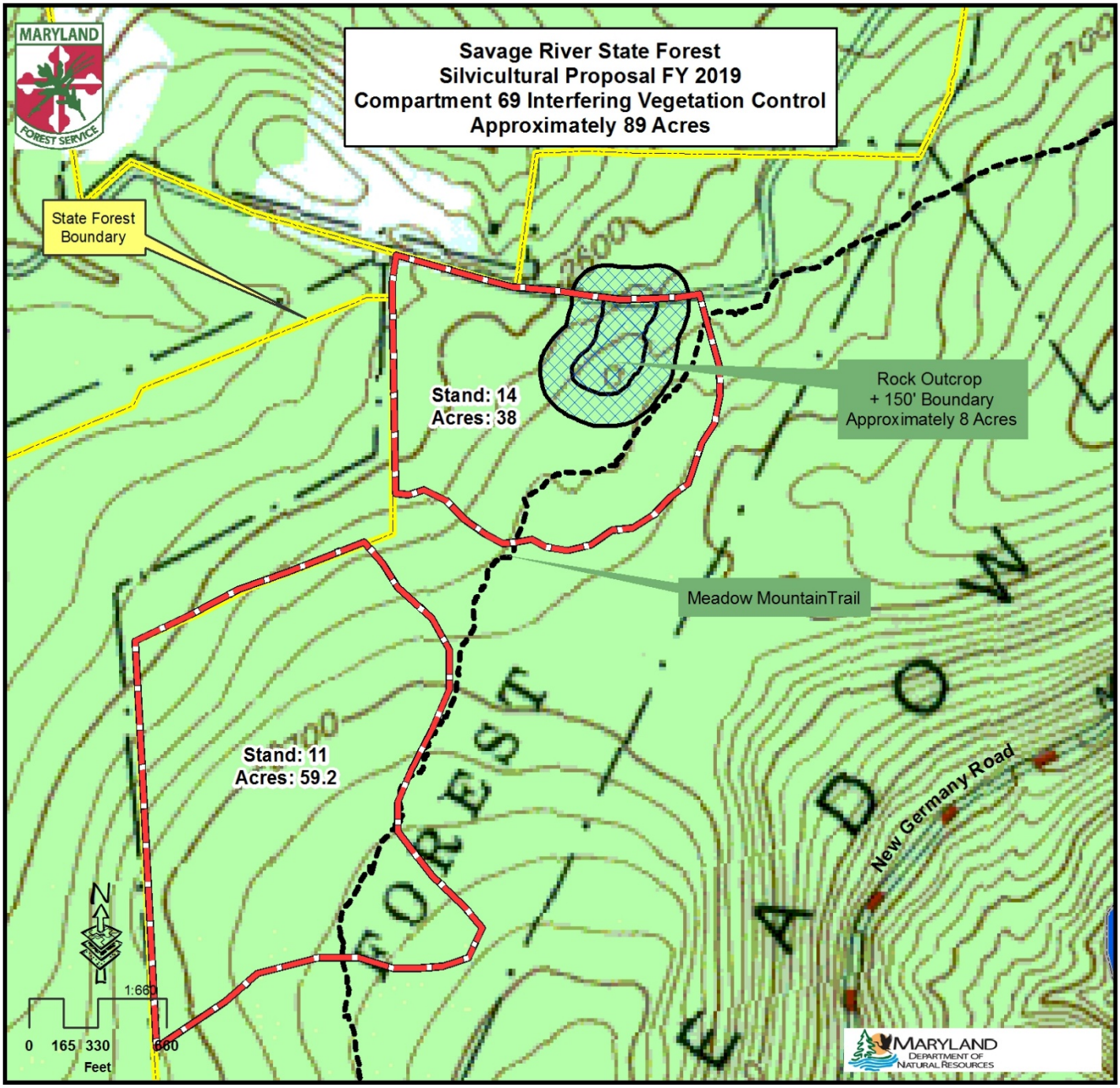
Due to the lack of established desirable regeneration and the overabundance of interfering vegetation in this stand, the planned silvicultural treatment for this stand is to treat and control the interfering understory vegetation using herbicide applications. The interfering woody vegetation in the mid canopy 0.5"- 6" will be controlled using low volume, direct herbicide applications with a suitable herbicide applied to the target trees via one of several viable methods including cut surface, hack and squirt and basal bark spray. The objective of these treatments is to open the forest floor to increased levels of diffuse sunlight necessary for desired seedling establishment and height growth development necessary to provide a future fully stocked stand.

The stand will be monitored for the establishment of desirable regeneration. Depending on the regeneration response to this treatment, a shelterwood harvest may be required to facilitate the growth into a competitive cohort. When the regeneration reaches competitive size and can provide a fully stocked stand a final removal harvest will be implemented.

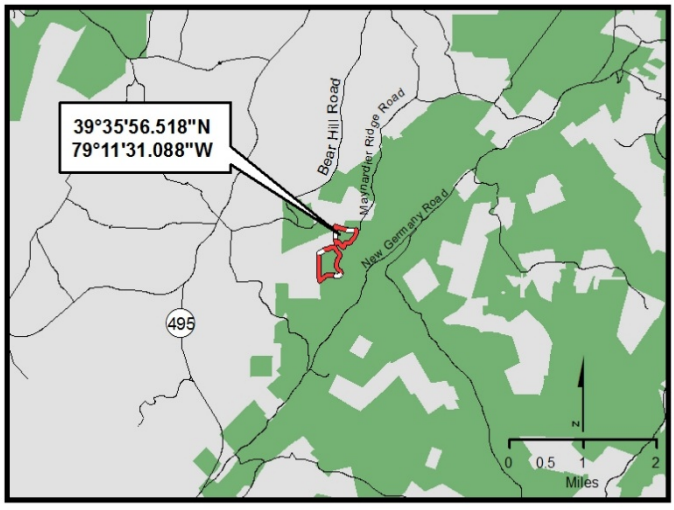


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 70 Stand 1 **FY-19**

Description/Resource Impact Assessment

Location: This 48-acre stand is located on the western side of Frank Brenneman road adjacent to the Meadow Mountain Trail in Compartment 70 Stand 1 of the Savage River State Forest.

Forest Community Type and Condition: The management unit consists of a mixed oak stand that is approximately 90 years old, with an average merchantable diameter of 15.5 inches. Stand composition includes red oak (44%), black cherry (11%), red maple (11%) and sugar maple (8%). This stand is overstocked at 82% relative density, and averages 139 ft^2 of basal area per acre. Oak regeneration as well as desirable regeneration in any stage is lacking across the site due in part to the interfering elements listed below.

Interfering Elements: Interfering understory plant competition is sufficient to cause significant interference with regeneration efforts with 92% of the site containing some form of significant vegetative interference. Tall woody interference occupies 73% of the management unit and is composed of witch hazel, striped maple and black birch. Low woody interference is found on 69% of the site consisting of witch hazel and striped maple. Problematic fern populations are found on 52% of the site. The non-native invasive species garlic mustard was found on site during the inventory. In addition, field evaluation of the site estimated deer browse impact to be moderate and must be considered when determining regeneration management strategies for the site.

Historic Conditions: According to State Forest records, no silvicultural activities have taken place on the management unit since state acquisition. No evidence of fire, diseases or significant insect infestation was observed during the inventory of the stand.

Rare, Threatened and Endangered Species: No known rare, threatened or endangered species were discovered within the management unit.

Habitats and Species of Management Concern: Several large rock outcrops were observed during the inventory of the stand. These features will be buffered accordingly to protect the unique habitat niche that it provides and will be excluded from any harvest operations.

Water Resources: This stand drains south into Monroe Run within the Savage River watershed. All proposed silvicultural treatments will be outside of all HCVF and stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

Soil Resources: Three soil types contribute to the substrate of the management unit including Stony land, steep (SrF), Dekalb and Gilpin very stony loams (DgC), and Dekalb and Leetonia very stony sandy loams (DlC). These soils are generally moderately deep and well drained. Degree of slope range from 0 - 35% throughout the site and these soils are potentially highly erodible. Equipment limitations range from slight to moderate on slopes over 15 percent and

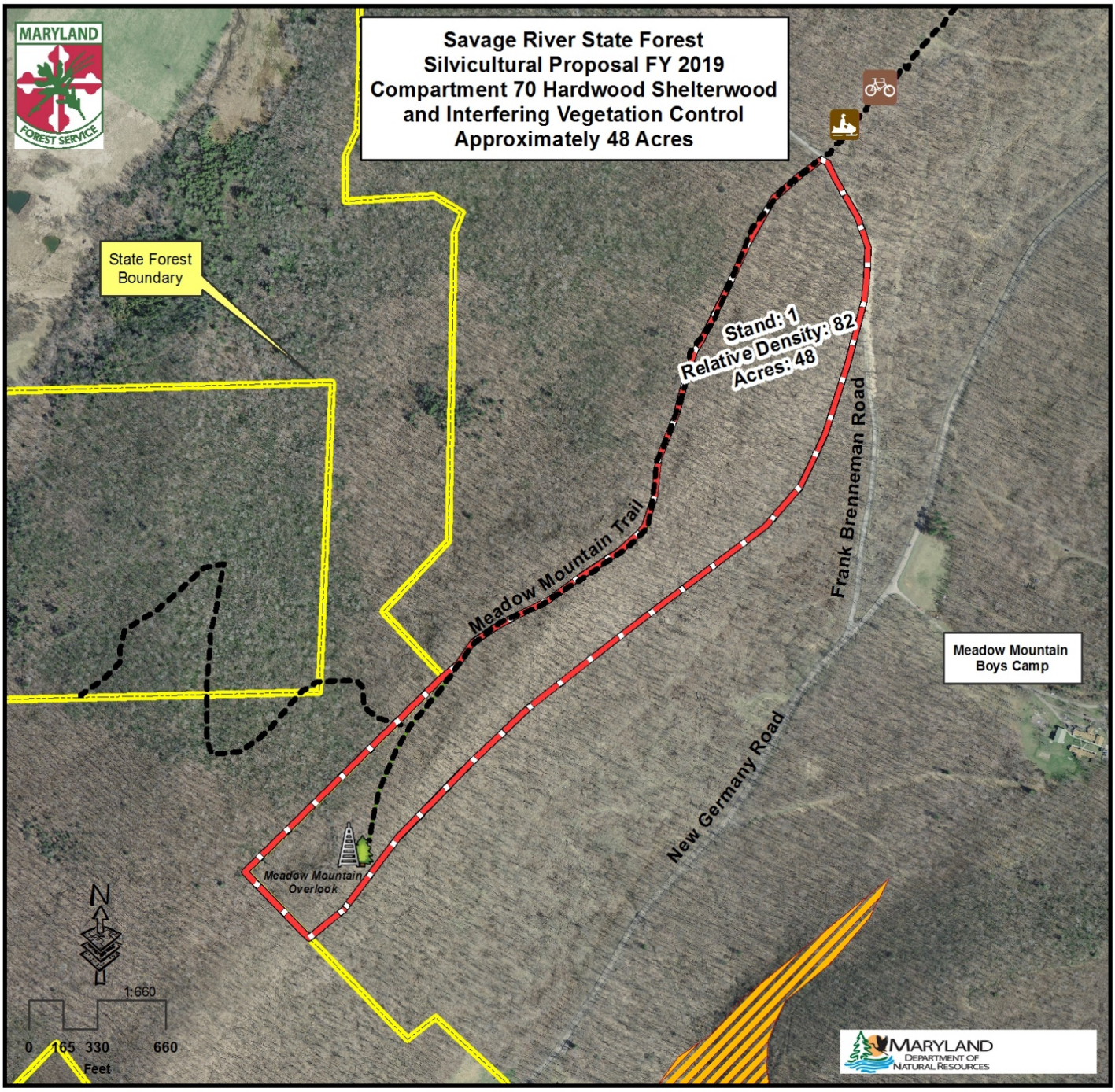
severe on slopes over 35 percent. All three soil types have good productivity for woodland management, with site index values ranging from 55-75 for upland oaks. The productivity of the site will be protected by minimizing the haul roads and skid trails as per the Department's Best Management Practices and rutting guidelines.

Recreational Resources: The Meadow Mountain Trail, which is part of the Continental Divide Loop Trail proposal, lies adjacent to the proposed harvest site and passes through the southern section of the management area. In order to harvest the entire management unit, it may be necessary for harvesting equipment to cross the trail surface between the overlook and the trail extension. Access to this section of the trail may be limited and/or suspended for the duration of the harvest. The trail will be posted with cautionary signage to inform forest visitors of possible danger from logging equipment entering and exiting the site. Hunting is also a popular activity in this area as the trail provides a multitude of access points into the state forest. Opportunities to hunt the area may also be limited or disrupted as log trucks and heavy equipment enter/exit the area.

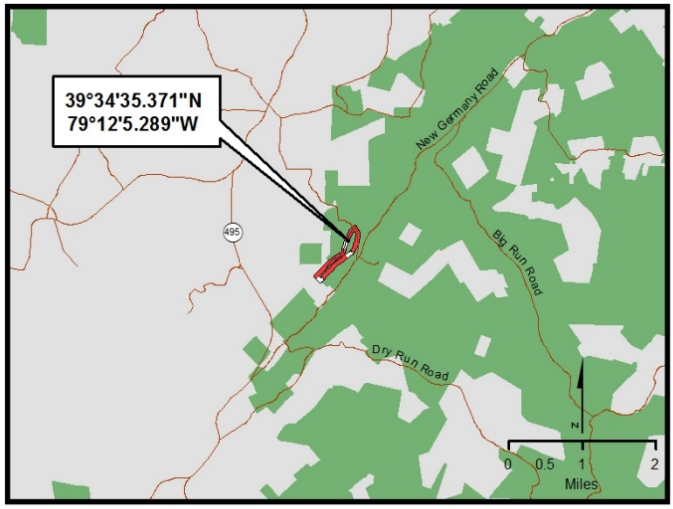
Management and Silvicultural Recommendations

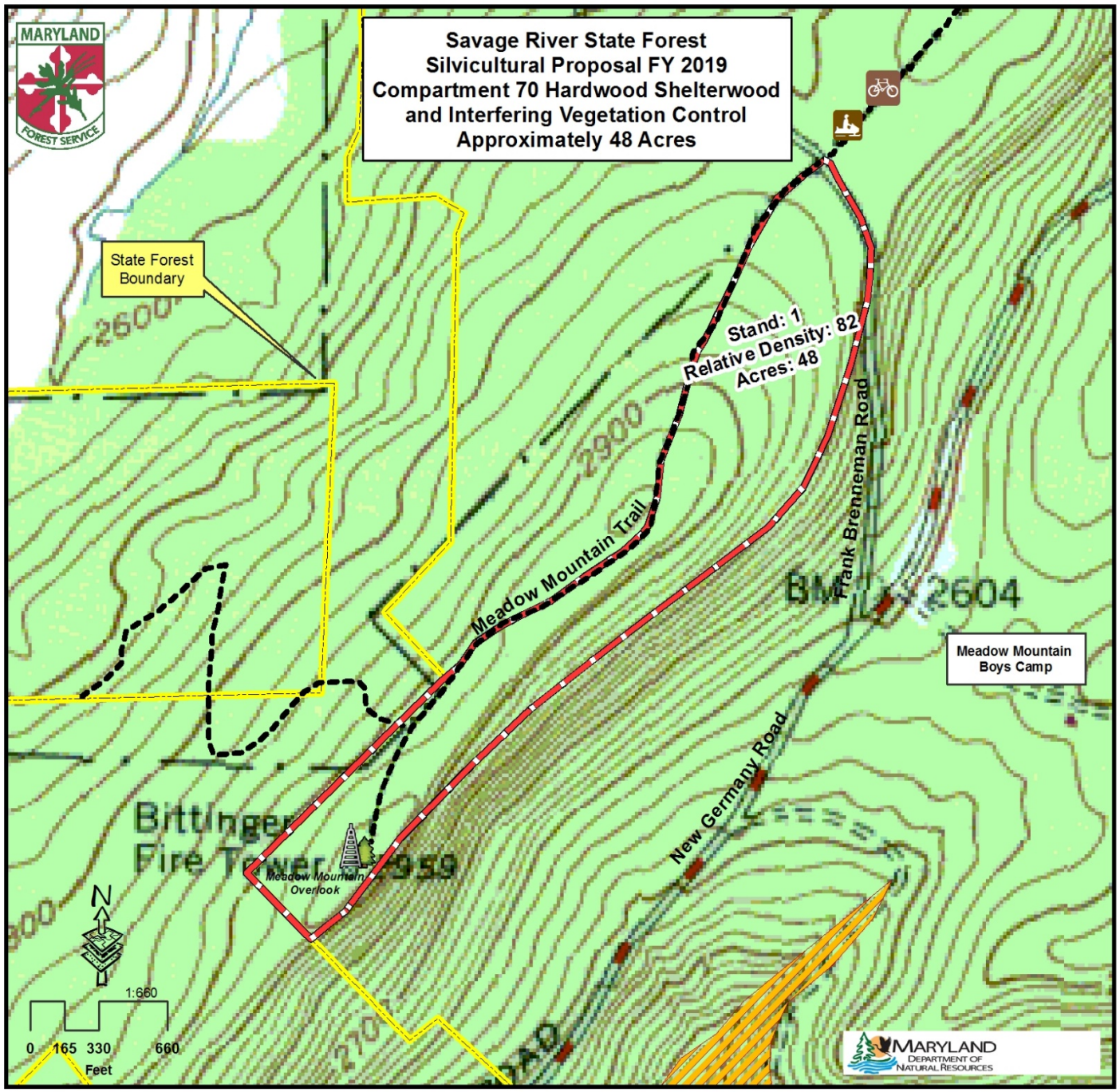
In an effort to maintain the current oak regeneration numbers and facilitate their growth into successive cohorts a two stage shelterwood system will be implemented in the management unit. The first stage of this regeneration system will be an establishment cut involving both thinning the stand and treating the interfering understory plants that are limiting seedling development. Approximately 100 ft^2/acre will be retained throughout the stand reducing relative density to 60%. Harvest yields will average 2,500 – 3,000 board feet/acre. Retention trees will be desirable dominant and co-dominant specimens of superior form that will be capable of surviving exposure, providing adequate shelter for developing regeneration and providing a seed source. Removals will be concentrated on unacceptable/undesirable growing stock and individual trees that have reached maturity.

In advance of the harvest operation, all interfering tall woody vegetation 0.5-6" will be controlled using a low volume, direct application of an appropriate herbicide using either cut surface or hack and squirt application techniques. Additionally, the interfering ferns will be treated with appropriate herbicides using broadcast foliar applications. Removal of these interfering layers will open the forest floor to increased sunlight necessary for desired seedling establishment. Post-harvest, regular inventories will be conducted within the stand to monitor regeneration in order determine the proper timing for a final removal harvest or determine if further cultural work is necessary for desirable regeneration to become established and provide a fully stocked stand before the final removal harvest is conducted.

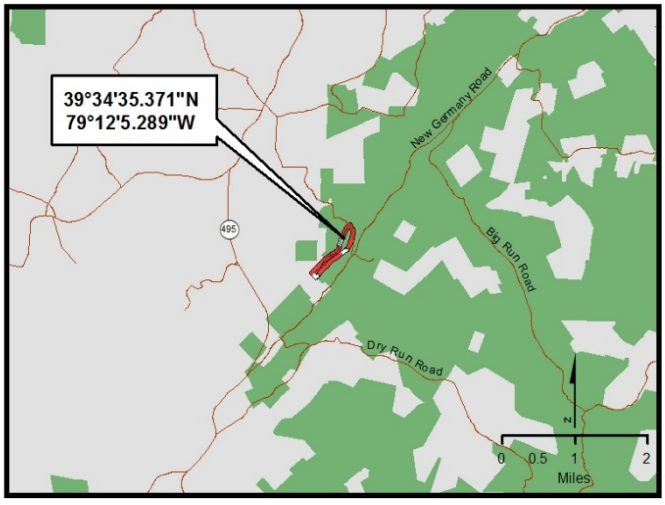


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



COMPARTMENT 77 Stands 4, 10, 18 **FY-19**

Description/Resource Impact Assessment

Location: This 32-acre proposal is situated north of Glendale Road, accessible via an existing forest access road located approximately 1.8 miles west of the intersection of State Route 495 and Glendale Road in Compartment 77 Stands 4, 10 and 18 of the Savage River State Forest.

Forest Community Type and Condition: A small sawtimber mixed oak stand occupies this 32-acre site. The stand is approximately 78 years old with an average merchantable diameter of 13.2 inches. This management unit is overstocked with a relative density of 94% and averages 122 ft^2 of basal area/acre. The dominant overstory species include white oak (25%), northern red oak (22%) and red maple (20%). Desirable regeneration of any species is insufficient to provide a fully stocked future stand due in part to the interfering elements described in the following section.

Interfering Elements: Interfering understory plant competition occupies approximately 100% of the site. The majority of this vegetation, 90%, is in the form of tall woody interference dominated by striped maple and witch hazel. Low woody interference is less problematic occupying 4% of the site. Problematic fern populations are found on half of the site. Two non-native invasive species (NNIS), Japanese stilt grass and Japanese barberry, were found in the stand.

Historic Conditions: According to state forest harvest records, the area was previously harvested in 1990. The stand adjacent to the west was thinned in 2014 and the stand located to the north of the proposal was thinned in 1996. No evidence of fire, significant insect infestation or forest diseases was recorded during the inventory process.

Rare, Threatened and Endangered Species: No rare, threatened or endangered species were discovered on the site.

.

Habitats and Species of Management Concern: No known habitats or species of management concern were found on the site.

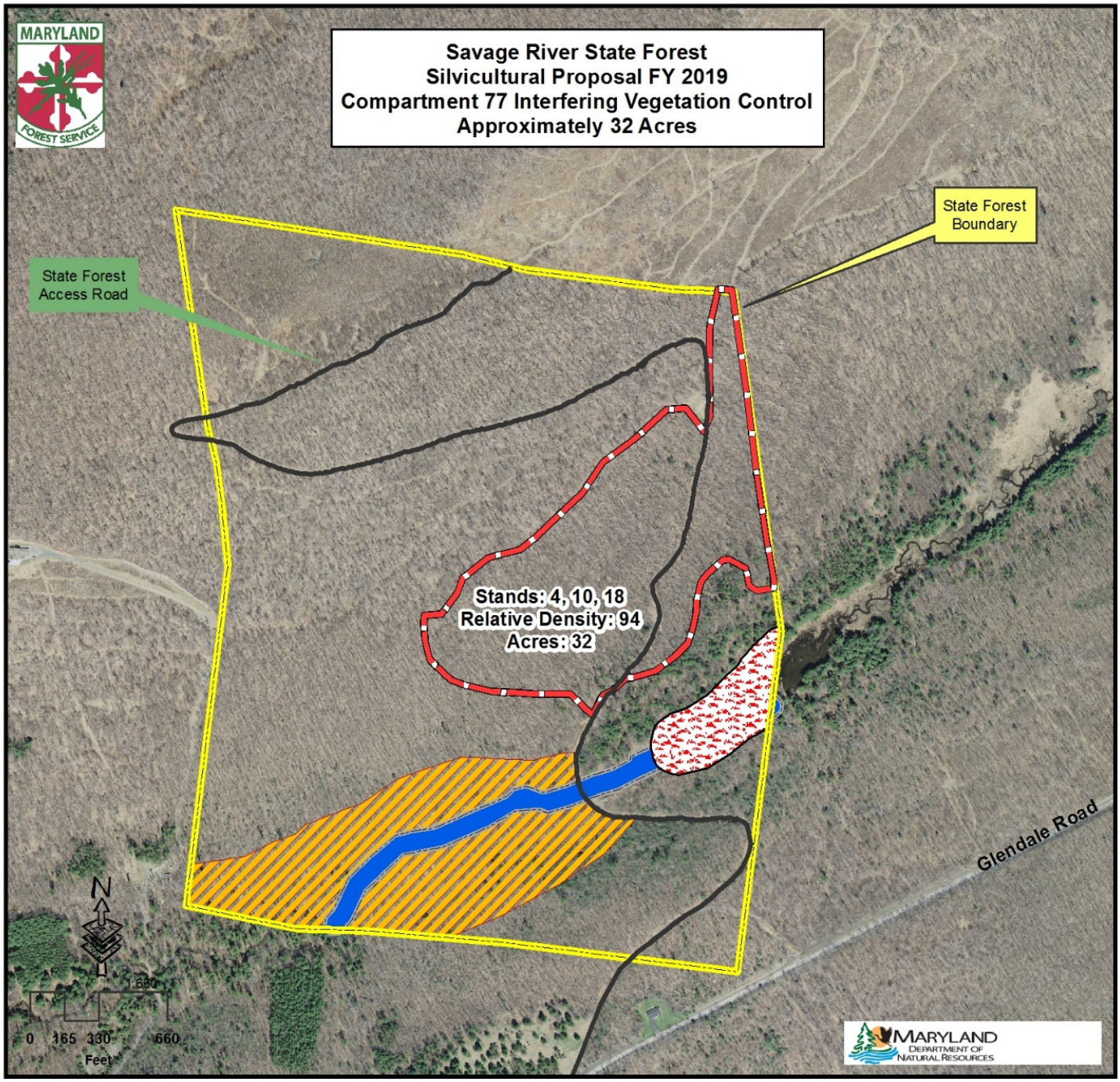
Water Resources: Drainage from the site is southward into Meadow Mountain Run within the Youghiogheny River watershed. The proposed silvicultural treatment will be outside of all HCVF stream buffer areas. No heavy equipment will be permitted within the protective riparian buffers of any streams or associated wetlands per the requirements set forth in the State Forests Sustainable Forest Management Plan.

Soil Resources: The substrate of the management unit is composed of Albrights very stony silt loam (AgC). Degree of slope ranges from 0-15% throughout the site. Equipment limitations are moderate due to wetness and a high water table in late winter and early spring. Hazard of erosion and windthrow is slight. The site has good productivity for woodland management, with a site index values ranging from 65-75 for upland oaks.

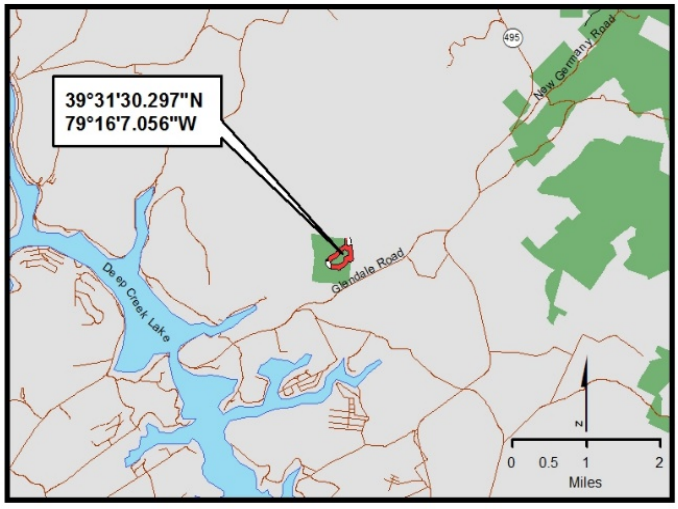
Recreational Resources: No developed recreational resources are found within the management unit currently. Designs for approximately 3.66 miles of singletrack bike trail have been approved for implementation beginning in September 2017. Besides biking, the main recreational activity performed within this area is hunting. Also, snowmobile traffic originating from Deep Creek State Park may occasionally occur on the forest access road. The recommended prescription for this stand does not include any mechanical harvesting of any wood products and therefore will not limit recreation opportunities as the project is being completed.

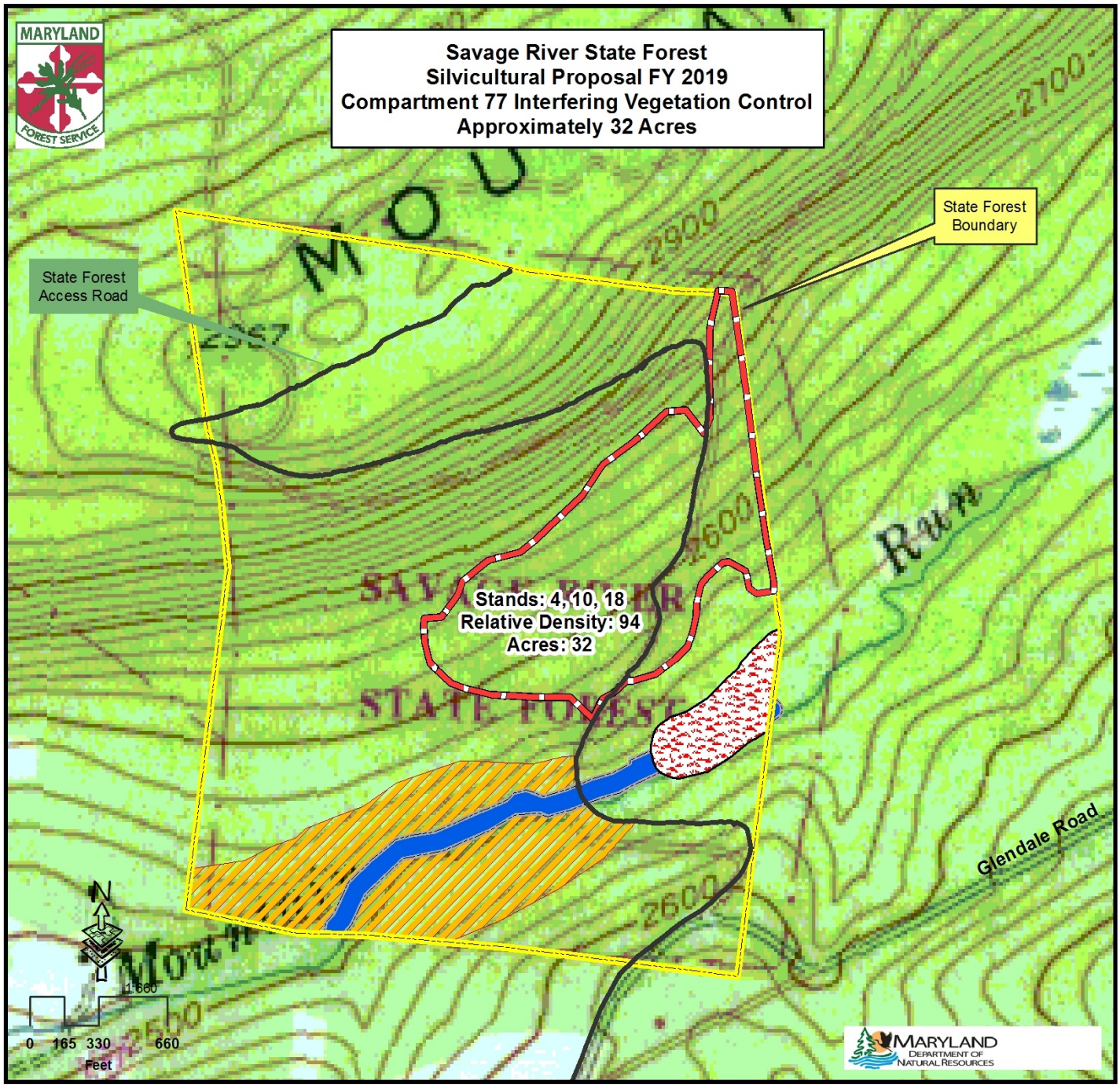
Management and Silvicultural Recommendations

Due to the lack of established desirable regeneration and the overabundance of interfering vegetation in this management unit, the planned silvicultural treatment for this stand is to treat and control the interfering understory vegetation using herbicide applications. The interfering woody vegetation in the mid canopy 0.5”- 6” will be controlled using low volume, direct herbicide applications with a suitable herbicide applied to the target trees via cut surface or hack and squirt methods. Additionally, the interfering ferns will be treated with appropriate herbicides using broadcast foliar applications. The objective of these treatments is to open the forest floor to increased levels of diffuse sunlight necessary for desired seedling establishment and height growth development. The stand will be monitored annually for the establishment of desirable regeneration. Depending on the regeneration response to this treatment, a shelterwood harvest may be required to facilitate the growth into a competitive cohort. When the regeneration reaches competitive size and can provide a fully stocked stand a final removal harvest will be implemented.

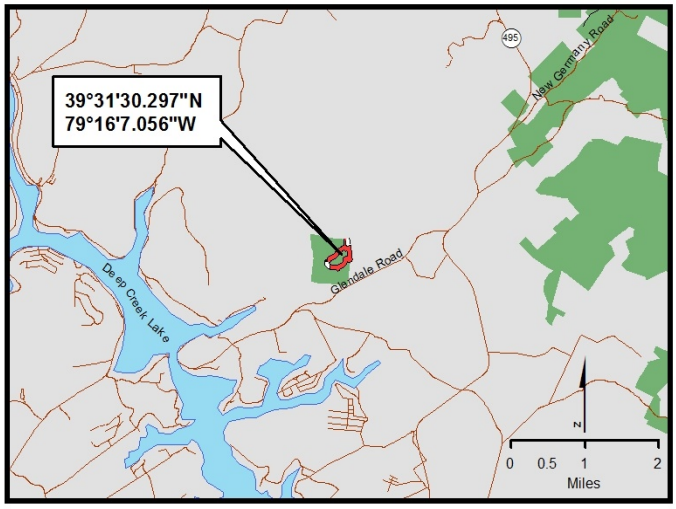


- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers





- Wildlands
- Ecologically Significant Area
- Old Growth
- Old Growth Ecosystem Area
- Wetland of State Concern
- Streams and 50' Buffers



XI. Operational Management and Budget Summary

A. Introduction
B. Funding Sources
C. Operational Cost

Submitted Budget Request

The submitted annual budget for Savage River State Forest totals $670,929. Of that amount, $359,361 goes to fund classified salaries and benefits for four employees; $93,681 funds four contractual employees and $185,539 for forest operations. Savage River has generated revenue that greatly exceeded its cost of operation for many years. The majority of revenue is obtained from the sale of forest products. Successful marketing in selling a mix of species and grades of wood products that the market most demands has contributed to substantial revenue generation over the years.

Operational Management

A. Introduction

This section of the plan is designed to cover the annual cost and revenues associated with the operational management of Savage River State Forest State Forest (SRSF). It is the Department's intent that all revenues generated from SRSF will be used to pay for the management and operation of the Forest. The numbers expressed in this section are only estimates and averages of annual expenses and revenues. These numbers will fluctuate each year based on management prescriptions, economic conditions and public use of the forest.

The following information is a breakdown of Revenues and Operational costs associated with SRSF. These figures are only estimates that are based on projected revenues and operational expenses. Yearly changes in timber markets and weather conditions can severely affect revenues. Operational expenses will vary from year to year and the numbers below are based on the budget request submitted for FY-2019.

B. SRSF Funding Sources: Estimated - *$670,929*

State Forests in Maryland are funded from several sources. The first source is the revenue generated by the forests. These funds are deposited in the Department of Natural Resources Forest or Park Reserve Fund and must be appropriated by the General Assembly through the annual budgeting process before being spent. The state forest budget is prepared approximately one year before the beginning of the fiscal year in which it will be spent. The budget then goes through the legislative approval/review process along with all other state operating budgets. Once adopted, the budget goes into effect the first day of the fiscal year (July 1st). Revenue generated by the state forest is designated special fund revenue. There may be special funds provided from the Department of Natural Resources Forest or Park Reserve Fund

that are not generated by this particular forest or there may be a lesser amount of special funds shown in the budget than was generated on this specific forest.

Another source of funding for the state forest is Recreational Trail Grants. These grants are competitive and are generally limited to $80,000 per year per grant. The source of this funding is the Federal Department of Transportation administered through the Maryland Department of Transportation, State Highway Administration. These funds are designated as reimbursable funds. Savage River State Forest has requested Recreational Trail Grant funds in the amount of $30,000.00 for personnel to maintain the newly developed 13-mile long St. John's Rock ORV Trail.

C. Operational Cost: Estimated Annual Expenses - *$670,929*

Operational expenses are those costs paid directly out of the SRSF operational budget by the State Forest Manager. The Forest Manager prepares a proposed operational budget for the forest based on instructions provided approximately one year in advance of the fiscal year. The FY-2018 budget proposal was prepared in August of 2016.

▪ *Classified Salaries, Wages and Benefits: $359,361*

This cost is associated with Special Funds which are state tax revenues provided annually. These funds are used to pay the salaries of the Maryland classified employees responsible for the management, operation and maintenance of the State Forest.

▪ *Contractual Staffing: $93,681*

This cost is associated with contractual staffing associated with operations of the state forest. Contractual personnel are responsible for conducting work outlined in the annual work plan, managing the daily activities on the forest, including boundary line work, maintenance of trails, forest roads, maintaining primitive campsites, a public shooting range, overlooks, wildlife habitat areas, and implementing all maintenance, recreational, silviculture and ecosystem restoration projects.

▪ *Land Operation Costs: $185,539*

This includes expenses for office and field equipment, vehicles, gates, gravel, signs, boundary paint, roadwork contracts and construction, trash removal from illegal dumping, boundary line work & surveying, tree planting, site preparation, control of invasive species, non-commercial thinning and other forest management practices. These costs vary greatly from year to year based on the activities identified in the Annual Work Plan.

D. Summary

This is the general breakdown on Revenues and Operational Costs associated with the Savage River State Forest. As described, these figures will vary from year to year. A more detailed picture on revenues and operational cost will be reviewed quarterly as the actual picture develops within implementation of Annual Work Plan and as operating budgets are approved

XII. Appendices

Appendix 1: Yellow Archangel Management Plan

Savage River State Forest Non-Native Invasive Plant Management:
Yellow Archangel (*Lamiastrum galeobdolon)*

Compartments 54 and 55; Dry Run Road

Description:

Dry Run, a tributary of the Savage River and Savage River Reservoir has been infested with the aggressively growing, non-native invasive perennial yellow archangel (*Lamiastrum galeobdolon).* The infestation of the area most likely originated from a private residence which was abandoned and the once maintained yard area was neglected, allowing the plant to escape to the adjacent property. After establishing a colony at the head of the watershed, the plant quickly enveloped the drainage from the private residence to the high water mark of the Savage River Reservoir, encompassing nearly 15 acres of forest land (See Invasive Species Management Map, p.19).

The plant grows quickly and out-competes native vegetation for resources. Yellow archangel spreads in several ways; by seed, by stem fragments, and by rooting at the nodes of the stem. This makes the plant very difficult to control and requires multiple applications of herbicide and diligent monitoring to limit the spread of the plant in natural forest environments. There is no projected end date for the herbicide treatments due to the persistent nature of this plant and efforts will be made annually until the spread of the plant is contained or the plant is eradicated. We anticipate successful eradication of this plant given the relatively confined area of infestation. Site monitoring will continue after the eradication of the plant for at least 5 years.

Treatment:

The initial treatment occurred on Thursday April 5, 2012. Ideal application time for this species occurs in March when the plant is beginning to grow and native plants are dormant. Weather conditions, particularly snow, have precluded the application of treatment for the past two years. Approximately one acre of the drainage was treated from the bridge at the intersection of Savage River Road and Dry Run Road north for nearly 600'. The width of the stream channel occupied by the yellow archangel averaged around 75'. Initial herbicide treatment was done with a 53.8% glyphosate product with the trade name Rodeo, (EPA Reg. No. 62719-324) labeled for aquatic use, and was applied using back pack sprayers at an application rate of 3.0 ounces per gallon resulting in a 2% solution. A total of 24oz of undiluted product (8 gallons of solution) was applied to the treatment area. Weather conditions at the time of application were sunny with temperature in the mid-50s and estimated wind speed of 3 mph and clear conditions were predicted for the next 24 hour period.

The second treatment occurred on Thursday May 8, 2014 and included reapplication to the original treatment area in order to treat individuals that may have been missed or re-sprouted due to insufficient product reaching the foliage. After the second treatment, nearly 2.7 acres of the drainage have been treated. Native plant emergence has halted further application of herbicide for the year. A 53.8% glyphosate product with the trade name Aqua Master, (EPA Reg.

No. 524-343) labeled for aquatic use, was applied using backpack sprayers at an application rate of 2.5 ounces per gallon of water resulting in a 2% solution. A total of 40oz of undiluted product (16 gallons solution) was applied to the treatment area. Weather conditions at the time of application were sunny with temperatures in the 60s and average wind speeds of 3 mph. Clear conditions were predicted for the following 24 hour period.

Product application is conducted by registered employees working under the license of a certified applicator (Permit No. 30914-77610; Categories 2and 6). The next treatment is scheduled for late March to early April of 2018 depending on snowfall.

Treatment Schedule	
Monitoring	Chemical
April – September (Annually)	Early March to April (Annually)

Appendix 2: Japanese Knotweed Management Plan

Savage River State Forest Invasive Plant Management:
Japanese Knotweed (Fallopia japonica)

Description:

Several areas of Savage River State Forest have become infested with the invasive plant Japanese knotweed (*Fallopia japonica*). The number of treatment areas that have been delineated (See Invasive Species Management Map, p.19) continues to grow and those of manageable size will be treated and monitored to determine the most effective course of action for suppressing and ultimately eradicating the plant from these areas of the forest. Knotweed growth near the Savage River Reservoir has reached a critical level and will not be treated at this time due to the overwhelming investment that would be required to reach any reasonable level of control. As more effective treatment methods become available for large areas, this area will be reevaluated in regard to implementing a control plan.

Japanese knotweed is a fast-growing, herbaceous, rhizomatous perennial that forms dense patches and shades out all nearly all native species. The plant originated in East Asia and was imported as an ornamental in the late 1800's. Also called Mexican bamboo, fleece flower, hu zhang, the plant can grow to heights of greater than 10 feet and can inhabit almost any terrestrial environment whether shaded or in full sunlight. It is difficult to control due to the massive number of seeds that are produced and the rhizomatous adaptation of the plant. Multiple applications of mechanical and chemical control as well as diligent monitoring will be necessary to control the spread of the plant in natural forest environments. There is no projected end date for the herbicide treatments due to the persistent nature of this plant and efforts will be made annually until the spread of the plant is contained or eradicated from the identified areas.

Treatment:

The initial treatments occurred in the first week of June, 2011 at campsite 171 on Rabbit Hollow Road and on Fairview Road approximately one mile from the intersection with New Germany Road. Both locations have small populations of knotweed. Treatments in all areas of the forest involve a two-step process that includes both mechanical and chemical means of control.

First, the knotweed is cut and allowed to grow back for 8 weeks, reaching only 2 to 4 feet in height. Second, the new growth is treated with a 2% solution of glyphosate as the active ingredient. Initial treatment was done with a 41% glyphosate product with the trade name Gly-4 (EPA Reg. No. 524-454-72693) and was applied using backpack sprayers at an application rate of 3.0 ounces per gallon resulting in a 3% solution. Approximately 4 gallons of solution was applied total between the two sites. Treatment of these two areas has been repeated on a yearly basis and two other areas have been added to the treatment regime.

The two areas added to the management plan include three patches adjacent to Route 495, just north of the intersection with New Germany Road and two patches located on Westernport and Aaron's Run Road, just south of the High Rock Tower. In 2013, a solution of 53.8% glyphosate with the trade name Rodeo (EPA Reg. No. 62719-326) and was applied with backpack sprayers at a rate of 2.6 ounces per gallon resulting in a 2% solution. A total of 19.5 ounces of undiluted product (50.7 gallons solution) was applied to the treatment areas.

Product application is/was conducted by registered employees working under the license of a certified applicator permit (Permit No. 30914-77610; Categories 2 and 6). The next scheduled mechanical treatment will occur June 1, 2018 followed by the herbicide treatment on July 27, 2018.

Treatment Schedule		
Monitoring	Mechanical	Chemical
March – June 2018	June 1, 2018	July 27, 2018
March – June 2018	June 1, 2019	July 27, 2019
March – June 2019	June 1, 2020*	July 27, 2020*
March – June 2020	June 1, 2021*	July 27, 2021*
March – June 2021	June 1, 2022*	July 27, 2022*
March – June 2022	As needed	As needed

* Treatment schedules may be altered/eliminated depending on the efficacy of the previous treatment applications.

Appendix 3: 10 Year Timber Harvest Summary Table

Fiscal Year	*Planned Harvest*	*Bd. Ft. Vol. Harvested*	*Gross value*
2008	**1.5 MMBF**	**1,032,193**	**$545,710.00**
2009	**1.5 MMBF**	**1,714,735**	**$411,485.00**
2010	**1.2 MMBF**	**1,244,076**	**$241,781.00**
2011	**750 MBF**	**850,561**	**$176,000.00**
2012	**382 MBF**	**144,349**	**$26,834.50**
2013	**488 MBF**	**863,049**	**$161,910.00**
2014	**1.02 MMBF**	**521,526**	**$72,689.77**
2015	**1.02 MMBF**	**1,286,994**	**$275,126.44**
2016	**1.0 MMBF**	**941,285**	**$225,796.59**
2017	**1.2 MMBF**	**853,347**	**$248,487.50**

Appendix 4: 2017 FSC Audit Action Plan

Maryland Department of Natural Resources Forest Service

Forest Stewardship Council Audit 2017

Corrective Action Plan

2017.1

FSC Indicator: US 7.1.b, 7.1.c., and 7.1.d

Non-Conformity (or Background/ Justification in the case of Observations): Continuation of OBS 2016.1, 2016.3, and 2016.4. According to interviews with FME staff, the Sustainable Forest Management Plans (SFMPs) for the Western Region are currently being revised for several reasons, including updating the information about the historical presence of conifers in the landscape and desired future conditions for these species. Some options for conifer management are being exercised as described in Annual Work Plans (AWPs), as in the case of the Northern goshawk.

The SFMPs describe the history of land use and past management, current forest types and associated development, size class and/or successional stages, and natural disturbance regimes that affect the FMU (see Indicator 6.1.a). However, the historical presence of conifers in the management plan could be expanded to include the knowledge presented by local forestry staff in 2016, which could help set the stage for conifer objectives on the landscape.

FME is considering expanding the use of native (e.g., Eastern white pine, Eastern hemlock, Virginia pine, Shortleaf pine, etc.) and non-native conifers (e.g., Norway spruce and Red pine) on certain sites as a wildlife management component, to restore native species (both conifer and broadleaf), and possibly to adapt to climate change and invasive pests/ pathogens. At the landscape level, FME has completed a partial assessment of the conifer cover as described in its response to OBS 2016.1, but a way to compare the county-level information from the early 1900s to today is incomplete. Information on current conifer cover on Western State Forests is complete.

At the landscape level, the desired future condition of the native and non-native conifer component, including selection of species that will meet social, economic, and ecological objectives depending on site conditions, has not been fully completed. FME staff pointed out that maintenance of current conditions may be desirable in many instances. However, opportunities to explore connectivity between conifer cover types for wildlife movement, hydrology or other objectives could be explored.

Corrective Action Request (or Observation): — The FMP should describe historical ecological conditions, history of land use and past management, current forest types and associated development, size class and/or successional stages, and natural disturbance regimes that affect the FMU (see Indicator 6.1.a).

The FME should describe a) current conditions of the timber and non-timber forest resources being managed; b) desired future conditions; c) historical ecological conditions; and d) applicable management objectives and activities to move the FMU toward desired future conditions.

2017.2

FSC Indicator: FSC-US 7.1.e.

Non-Conformity (or Background/ Justification in the case of Observations): Upgrade of OBS 2016.4. In 2016, the FY2017 Annual Work Plans (AWPs) were still under draft and thus the issue with incomplete AWPs was not a nonconformity. While many of the sensitive resources in question may be maintained under passive management, the AWPs are being implemented without sufficient review from Natural Heritage staff. Not only is review of options for conservation and/or maintenance of RTE species and communities an integral part of the FME's procedures, it also is something that stakeholders expect from FSC-certified entities to conform to indicator 7.1.e. The AWPs are a component of the management plan.

According to interviews with FME staff, of concern is the sensitive nature of some of the natural heritage information. As is the case in most states, confidential information may be excluded from publicly available documents in order to protect the resource.

Corrective Action Request (or Observation): The FMP shall include a description of the following resources and outline activities to conserve and/or protect:

- rare, threatened, or endangered species and natural communities (see Criterion 6.2);
- plant species and community diversity and wildlife habitats (see Criterion 6.3);
- water resources (see Criterion 6.5);
- soil resources (see Criterion 6.3);
- Representative Sample Areas (see Criterion 6.4);
- High Conservation Value Forests (see Principle 9);
- Other special management areas.

2017.3

FSC Indicator: FSC-STD-50-001 V1-2, 1.15, 1.16, and 6.1.

Non-Conformity (or Background/ Justification in the case of Observations):
The appropriate trademark symbol (® in superscript font) does not accompany the first use of "FSC" and "Forest Stewardship Council" on the FME's website.

No trademark approval records for the three detected uses were available (brochure, website, and AWP template).

The website does not have the promotional panel, or at least the FSC trademark license code, in a prominent place.

Corrective Action Request (or Observation):
FME shall implement corrective actions to resolve the nonconformities described above.

Appendix 5: 2017 SFI Audit Action Plan

Maryland Department of Natural Resources Forest Service

2017.06.15

Sustainable Forestry Initiative Audit 2017

Corrective Action Plan

Minor Non-Conformances

Indicator 1.1.1 i

In the FY2017 Annual Work Plans (AWP) for western State Forests the Ecologically Significant Area (ESA) Plans have not been completed. (SFI 2015-2019 Standards and Rules®, Section 2 – Forest Management, Indicator 1.1.1 i)

• Root Cause Analysis

The FME has met with the Wildlife & Heritage Service (WHS) staff with the sole purpose of continuing the development of the Ecologically Significant Area data for the Western Maryland state forests. The WHS staff person who has started this work by outlining the ESA areas has not completed this work yet. While this project is important to our forest management planning efforts, it is not within our authority to force this work to be done. We have and will continue to address this issue with DNR staff and look for creative alternatives.

• Corrective Action Plan

This work has been completed for the state forests in the Eastern Region, Chesapeake Forest and Pocomoke State Forest, and has proven to be very important to the management of those forests. It has been our intention that the Wildlife & Heritage Service would be able to provide that same product for our Western Maryland state forests. Certification on our Eastern state forests began in 2003 and on our Western Maryland state forests in 2011, so they did have a greater knowledge of the importance of complying with the requirements of the forest certification standards. Plus, while we are an organization with a leadership hierarchy, you cannot discount the factor of personalities when requesting specific work from a fellow unit.

• Containment Plan

First, it was important to have a member of the Wildlife & Heritage Service leadership attend the audit's opening meeting and hear directly this issue and its importance from the audit team.

Since the audit's closing meeting, the FME has drafted a detailed analysis of the Ecologically Significant Area work completed to date and what will constitute a success data set. Also the FME has again met with the WHS leadership to discuss the requested work and develop a plan for its completion.

• Responsible Person
Jack Perdue, Forest Resource Planning and the Maryland forest certification coordinator, will continue to lead the effort to work with the Wildlife & Heritage Service and Forest Service staff to secure the necessary data and information.

• Completion Date
This work will be a winter season effort when fieldwork is not a priority. Before then, the work analysis will be completed and expectations shared with the necessary Forest Service and Wildlife & Heritage Service staff. The results will be presented at the 2018 audit.

Indicator 4.2
On the Maryland DNR Forest Service website the words "Sustainable Forestry Initiative" do not include the registered trademark - ®. (SFI 2015-2019 Standards and Rules®, Section 5 Part 4, Indicator 4.2)

• Root Cause Analysis
This was an oversight on the part of the FME.

• Corrective Action Plan
The necessary changes have been drafted and will be submitted to NSF for approval in the near future. All necessary changes will be submitted to the Maryland DNR Office of Communications Management with all necessary website revisions made before July 14, 2017.

• Containment Plan
The FME reviewed the requirements of Indicator 4.2 plus other state forest certification websites to glean formatting and text. We then drafted appropriate text and submitted to the required forest certification groups for approval. After that approval, the updates will be submitted to the DNR website development staff to that the changes will be life online.

• Responsible Person
Jack Perdue, Forest Resource Planning and the Maryland forest certification coordinator, has worked with the Maryland Department of Natural Resources website development staff to make the necessary changes active.

• Completion Date
All necessary website revisions will be made before July 14, 2017.

Opportunity For Improvement

Indicator 1.1.1 i

There is an Opportunity for Improvement by including in forest management plans more information (known by forest managers) about the role of conifers in the natural history, historic composition, and ecology of higher-elevation portions of the western forests.

• Root Cause Analysis

This work was begun before the 2017 audit but had not yet been entered into the Sustainable Forest Management Plans. Finding historical information on the conifer component of the Western Maryland forests is available back to the beginning of the 20th century. Finding accounts before that period has been difficult. Research and inquiries continue.

• Corrective Action Plan

We have begun a conifer analysis for our Western Maryland state forests, beginning with the Green Ridge State Forest in Allegany County. This effort displayed the raw conifer cover at approximately 441 acres. This project has identified individual trees from six-inch resolution imagery, so even in a pure stand of pine the analysis will still show "holes" between the trees. This GIS data layer will show everything over two meters, so smaller plants such as mountain laurel will not be displayed.

• Containment Plan

Since the audit closing meeting, we have completed the analyses for the two state forests in Garrett County. We have since reviewed this draft analysis for both counties and will be including the results in each of the appropriate Sustainable Forest Management Plans.

• Responsible Person

Jack Perdue, Forest Resource Planning and the Maryland forest certification coordinator, will coordinate the necessary work with the staff GIS forester and State Forest managers.

• Completion Date

The results will be presented at the 2018 audit and will included in the updated Sustainable Forest Management Plans which will be available on the DNR website.

Appendix 6: Interdisciplinary Team Review and Comments

Maryland Department of Natural Resources State Forests

Savage River State Forest
FY-19 Annual Work Plan
ID Team Review

September 20, 2017

Attendance: Paul Busam (MDE), Alan Klotz (Fisheries), Scott Campbell (SRSF), Luke Morgan (Parks), Ed Thompson (WHS), George Eberling (MFS), John Wilson (LAP), Mike Friend (NRP), Sean Nolan (SRSF), Jack Perdue (MFS)

Overview / Discussion of FY 2019 Work Plan:

St Johns Rock ORV Trail Update
The St Johns Rock ORV trail is seeing minimal use. It has 9 campsites with less than 100 riders to date. Garrett Co will now allow ORV riders on County roads. State law allows counties to adopt such ordinances. Limits are less than 25 mph speed limits and for distances less than 200 ft.

Ginseng
DNR-NRP reported that there was a recent ginseng arrest on Savage River State Forest. They ceased about 1.5 pounds from the alleged poacher.

Meadow Mountain Trail Construction Update
A private group that is coordinating trail work on Meadow Mountain trail.

Red Spruce Research Proposal
There was a recent research proposal regarding climate change and how it may affect their range of species such as red spruce.

Silvicultural Projects
The proposed FY 2019 annual work plan was provided to the ID Team in advance for review and to determine the agenda for the field tour. Some sites were determined as not necessary for the team to visit. For those that were, field notes are provided below. Any specific AWP alterations will be noted; otherwise, the proposal was accepted as presented in the draft.

Compartment 70 Stand 1: 48-acre hardwood Shelterwood and Interfering Vegetation Control. Thin from below with herbicide treatment.
Note: use signage along the trail to explain goal of the treatment.

Compartment 10 Stand 56, 57: 54-acre regeneration harvest with retention of conifer.
Note: rocky areas buffered will be retained within the retention areas and not included as part of the harvested area.

Compartment 38 Stand 30: 70-acre treatment of interfering vegetation. Herbicide treatment above Callahan Swamp.
Note: The swamp is privately owned and POS may investigate the willingness of the owner(s) to sell this to the state. Natural Heritage Program recommends that this area become an extension of the existing ESA to the southwest — Callahan Swamp ESA. Proposal was dropped for this work plan and will be reevaluated at later date to determine if the area is to be included as part of the ESA or if the recommended silvicultural prescription is to be implemented.

Compartment 18 Stand 12 – 43-acre Hardwood Thinning
The planned silvicultural treatment for this stand is a thinning given that established regeneration levels are minimal and the stand is overstocked. Thinning the stand will reduce the stocking levels thereby reducing competition and will provide more growing space for the higher quality trees.
Note: Close proximity to the Meadow Mountain trail. Should use signage to make users aware of activity.

Compartment 69 Stands 11 and 14 — This treatment proposal was not in current AWP draft. It is an 89-acre herbicide treatment of 2 tracts. A 150' buffer will be placed around an 8-acre rock outcrop within stand 14 and the area will be excluded from the management activities proposed for the two stands.
Note: Close proximity to the Meadow Mountain trail. Should use signage to make users aware of activity.

Note: It was recommended by the ID Team to include recent purchases as part of the annual work plan proposals to be reviewed.

Appendix 7: Citizens Advisory Committee Review and Comments

Savage River State Forest
Citizens Advisory Committee AWP FY-19 Review
December 13, 2017

Attendance
Scott Campbell, Sean Nolan, George Eberling, Kevin Dodge, Mike Dreisbach, Rusty Leonard, Jim Minogue and Steve Green

The Citizens Advisory Committee was welcomed to Savage River State Forest at 6:00pm. The group was introduced to Sean Nolan, the new assistant manager of SRSF who was attending his first Citizens Advisory Committee meeting. Topics of discussion were left to the discretion of the group and the meeting began with inquiries about the St. John's Rock ORV Trail.

The CAC discussed the St. John's Rock ORV Trail and reviewed visitor usage statistics since the opening of the trail in July 2017. Revenue and expense figures were compared and discussed. Kevin Dodge gave an overview of the results from the ongoing environmental impact studies that occurring on/near the ORV trail. Kevin indicated that the students had made some interesting discoveries, particularly among the rattlesnake population of the area. Also, the students discovered non-native invasive species populations along the trail that were subsequently controlled with herbicide applied by state forest personnel. The students gained a wealth of useful experience and several master's theses will be developed as a result of the trail study.

In light of the very low usage of the trail, the CAC questioned if the trail could be managed in a different direction to attract more visitors and make better use of the facility. No specifics were offered, but future discussions on the issue are anticipated.

Following the ORV Trail discussion was the update on Phase II of the Meadow Mountain Trail construction. Garrett Trails board members Steve Green and Mike Dreisbach provided an update on the recently completed section of trail from Frank Brenneman Road to Otto Lane. Apologies were offered for the lack of communication between Garrett Trails and Savage River State Forest in regard to construction schedules and trail related events that forest staff was not privy to. Assurances were made for increased communication between the groups.

Concerns for the trail centered on the current gate configuration that is used at the intersections of the forest access roads and the county roads. Further discussions will be necessary to find a gate that will accommodate bike riders and at the same time limit vehicular access.

Garrett Trails received a Heritage Grant to create educational panels that will be placed along the trail to provide visitors with the history of the region. The panel designs and content will need to be vetted by the DNR Office of Communications before they can be implemented.

Another grant will be applied for in June 2018 for Phase III of the project which will take the trail from Otto Lane to New Germany Road. Volunteers are currently working on the trail to

keep it open and Garrett Trails members suggested the possibility of an Adopt-a-Trail program or implement an MOU with the state forest to allow work on the trail as necessary.

The entire FY-19 Annual Work Plan was reviewed, progressing through each section with an overview of each section and discussions were initiated throughout.

First, was the update of the wildlife plantings on the Rounds Farm that consisted of corn, millet, sunflowers and clover. The plantings have proven successful as several game species have been harvested from the property and wildlife sightings continue to increase in the area. No objections were voiced over the current management objectives of the parcel.

The next discussion focused on non-native invasive species management and current procedures being implemented to control them and the efficacy of treatments. An update on ongoing knotweed control was presented with mostly positive results from upper elevation sites. The magnitude of the issue in lower elevation areas was understood and no efforts for control will be attempted currently. Japanese stilt grass was discussed in the same vein, as a species that is beyond practical control. The isolated yellow archangel in Dry Run has not been chemically treated recently due to late snows and the likelihood of destroying non-target species.

A review of each silvicultural proposal in the FY-19 AWP was conducted. No specific comments were made regarding the eleven silvicultural proposals. The CAC members noted that none of the proposals had any elements that may be considered controversial, reflecting the policies and procedures adopted through the process of third party certification and the strict adherence to these standards in the land management strategy for Savage River State Forest. Given that the CAC was unable to conduct a field tour of the proposals, a slide show was compiled for each of the future harvests, giving the group at least an overall view of the location and composition of the stands to be managed.

Members of committee suggested that a spring meeting would be appropriate to allow for field visits to not only the current proposals, but to review and comment on harvests that have been completed in the last several years to illustrate how forest management has evolved in the face of certification as well as in a change in personnel. Ideally, the committee would favor a meeting to occur after the certification audit at the end of April, possibly early May. The logistics will be discussed in the coming months and an appropriate date will be set for the meeting. CAC members also noted that they would like to informed of the certification audit schedule so that they could attend the proceedings if their schedules allowed.

Closing notes: Forest staff thanked the CAC members for attending the meeting in spite of the inclement weather of the evening. Meeting adjourned at approximately 8:45 pm.

Appendix 8: Public Comments

Literature Cited

Brosi, Sunshine. 2016. Allegheny Wood Rat: Identifying and Targeting Intervention Strategies for Allegheny Woodrat (*Neotoma magister*) Recovery. Frostburg State University Research Proposal.

Conrad, Kevin. 2017. Maryland Department of Natural Resources Minimal Impact Use Agreement 2017DNR260 SRSF Project Description p.3. On File at Savage River State Forest.

Fitzpatrick, Matthew. 2017. Red Spruce: Evolutionary Responses to Climate Change at Range Limits. Appalachian Lab. Research Proposal.

Foster, R. W., and A. Kurta. 1999. Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). Journal of Mammalogy 80: 659−672.

Kunz, T. H., and L. F. Lumsden. 2003. Ecology of cavity and foliage roosting bats. *In*: T. H. Kunz and M. B. Fenton (eds) Bat ecology. University of Chicago Press, Chicago: 3–89.

MacDonald, William L. and Nuss, Donald L. 2016. Evaluating the potential of "Super Donor" strains of *Cryphonectria parasitica* to control chestnut blight infections. West Virginia University Research Proposal.

Turner, G. G., C. U. Meteyer, H. Barton, J. F. Gumbs, D. M. Reeder, B. Overton, H. Bandouchova, T. Bartonicka, N. Martínková, J. Pikula, and J. Zukal. 2014. Nonlethal screening of bat-wing skin with the use of ultraviolet fluorescence to detect lesions indicative of white-nose syndrome. Journal of Wildlife Diseases 50: 566−573.

USFWS. 2015. Endangered and threatened wildlife and plants; threatened species status for the northern long-eared bat with 4(d) rule. Federal Register 80(63): 17974−18033.

Vickers, Amanda, Brosi, Sunshine, Howell, James, Kaur, Bhavneet, Puthoff, David and Eisenstein, Edward. 2015. Ecological and Chemotypic Analysis for Improved Growth and Management of Naturally Occurring Black Cohosh (Actaea racemosa L.) Populations in Western Maryland. American Journal of Plant Sciences, 2015, 6, 3272-3281.