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Sustainable & Comprehensive Forest Management

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Conservation Planning Activity – 106, Design & Implementation Activity 165

Comprehensive Forest Stewardship Plan

Client Name: [redacted]
Farm Bill Program Name: Environmental Quality Incentives Program (EQIP)
Contract #: [redacted] **Tract:** [redacted]
Farm: [redacted] **Fields:** [redacted]

Primary Contact: [redacted]
Phone Number: [redacted]
Email Address: [redacted]
Mailing Address: [redacted]
Property Address: Same as above
Property Parcel IDs: See "Forest Description"

Property County, State: Jefferson, WV
Deeded Acreage[1]**:** 1,685.5[redacted]
Planned Acreage[2]**:** 1,583.84
Carbon Agreement Acreage[3]**:** 0.00
Plan Status: Updated
Prepared: [redacted]
Expires: [redacted]

TSP: Anthony F. Pappas, CF, RPF
SAF Certified Forester #308671
WV Registered Professional Forester #805
TSP#: 20-23162 (exp. 04/22/2027)

Mission Statement

"To wisely manage, conserve, and utilize our shared natural resources for the benefit of not only economic returns but also to the perpetual existence of our forests and the life within them using scientifically based and ecologically-sound forest and habitat management principles."

Additional deliverables to Client emailed separately:

- *Heritage Habitat Services Packet*
- *Inventory data*
- *GIS data*
- *Other related documents*

If enrolling in tax program, Client must apply themselves

[1] County Assessor's/Auditor's Office
[2] In-house ArcPro GIS calculation of Client's forested acreage.
[3] Landowner records

Signature Page

Technical Service Provider (TSP)

By signing below, the Technical Service Provider (TSP) certifies the work completed and delivered for this Forest Management Plan (106) and Forest Management Practice Design (165):

- Complies with all applicable Federal, State, Tribal, and local laws and regulations.
- Meets the General and Technical Requirements for this CPA and DIA.
- The planned practices are based on NRCS Conservation Practice Standards (CPSs) in the state Field Office Technical Guide where the practices are to be implemented.
- Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the client.
- Incorporates alternatives that are both cost effective and appropriate to address the resource issue(s) and client's objective(s).

TSP Printed Name: Anthony Pappas, C.F., WV R.F., Heritage Habitat & Forestry (TSP #20-23162)

TSP Signature: _____ **Date:** _____

Client/NRCS Conservation Program Participant

I accept the completed Forest Management Plan (106) and Forest Management Practice Design (165) deliverables as thorough and satisfying my objectives.

Client Printed Name: [redacted]

Client Signature: _____ **Date:** _____

NRCS Administrative Review

By signing below, NRCS verifies that the plan as reviewed has satisfied the deliverables required for a Forest Management Plan (106) and Forest Management Practice Design (165).

NRCS Printed Name: _____**Title:** _____

NRCS Signature: _____**Date:** _____

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**Appendixes A & B items also emailed as separate files to Client.*

CONSERVATION ASSISTANCE NOTES **NRCS-**
CPA-6 11-97

LAND USER	ADDRESS	ACREAGE	LOCATION
See cover page	See cover page	See cover page	See cover page

CURRENT CONSERVATION OBJECTIVES

To improve current forest condition for both ecological health and future timber development.

LIST POSSIBLE ALTERNATIVE RESOURCE MANAGEMENT SYSTEMS THE NRCS CONSERVATIONIST MIGHT CONSIDER WITH THE LAND USER (As objectives change record them in the notes)

See management plan.

Notes of significant assistance provided, alternatives considered, decisions reached, resource management systems or component practices installed, and follow up provided may be recorded chronologically belo w and on additional pages to provide a history of resource conservation planning and implementation activities with the land use. Include and evaluation of significant and social, cultural, economic, and environmental resources. (these included consideration of wetlands, flood plains, endangered species, archeological values, prime lands, etc.)

DATE	ASSISTED BY (initials)	NOTES
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Forest Description

Photographs presented within this plan are not actual Client's forestland, but stock photographs Heritage Habitat & Forestry uses for illustration purposes.

Parcel IDs:

[redacted]

Previous Landowner Management & Use History

- Areas of the property had been previously pastured
- Agriculture in some areas
- Iron furnace works
- Wildfire
- Previous timber harvesting planned in 2015 and completed by early 2025.

Current Landowner Management & Use Practices

- The timber has continued to grow across the property, increasing forest density and merchantable volume
- Trail maintenance
- Boundary marking
- Timber harvesting in certain areas, specially the northwest ¼ of the tract, which recently had a harvest conducted – there are contractual agreements currently in place for continued logging by same logging company. Client has documentation to this effect.
- Invasive species control
- Pollinator plantings
- [redacted]There is an active conservation easement with the [redacted]

[redacted]

Current Forest Condition:

Boundary Marking Condition: Boundaries are surveyed and adequately marked.

General Overview: The property is used primarily for conservation purposes, including allowing recreation, camping, hiking, meetings, and more for the general public. Landowner has been maintaining trails, conducting timber harvests, forest stand improvements, and general property development to greater assist appreciation and recreation on-site.

This forest is typical of a closed-canopy forest which means there is not a lot of sunlight reaching the forest floor due to midstory crowding and shading. Forest growth within a closed-canopy forest is also stagnant due to lack of growing space.

There are large amounts of chestnut oak throughout the property, with minimal species and/or structural diversity.

This forest contains primarily immature sawtimber, as evidenced by its quadratic mean diameter (QMD) of 11.7" – considerably less than the "rule-of-thumb" merchantable sawtimber size of 16.0". Uneven-aged timber harvesting could be conducted within the current 10-year management timeframe. There are several treatments that would enhance both the timber quality and wildlife habitat of the forest as outlined later in Plan.

The species composition of this forest is, generally speaking, desirable – although in need of additional sunlight on the forest floor to regenerate these desirable species.

This forest's soil report shows the dominant (17.0% of acreage) soil type is Cardova channery silt loam(CdD), "15 to 25 percent slopes[4]". As such, the tree site index is 60 feet[5] – further indicative of poor soil quality.

Stand Summaries: Stand 1 contains riverine/bottomland/streamside forest cover type, with the dominant tree species being yellow-poplar, American sycamore, and white oak in the overstory, and yellow-poplar, chestnut oak, and red maple in the midstory. The stand consists of decent wildlife habitat, and decent timber quality. The timber is immature and no commercial harvesting is recommended at this time, however, conducting recommended practices should improve the quality of both wildlife habitat and timber quality of this stand.

[4] "Soil Report".
[5] Ibid.

This stand may contain particularly sensitive areas, such as Streamside Management Zones[6], topographically defined streams, USGS designated streams (including ephemeral[7], perennial[8], and intermittent[9] streams), creeks, wetland areas, and other water bodies, as well as additional acreage that is consistent with the aforementioned conditions. Special caution must be taken when operating within this stand, being cognizant of stream banks, steep slopes, and sedimentation/erosion risks as enumerated in the appropriate state Best Management Practices booklet.

No active management besides invasive species control (using aquatically labeled herbicides) is recommended at this time.

Stand 2 contains oak-hickory forest cover type, with the dominant tree species being yellow-poplar, chestnut oak, and white oak in the overstory, and chestnut oak, yellow-poplar, and red maple in the midstory. The stand consists of poor wildlife habitat, and good timber quality. The timber is overcrowded, over dense, and ready for harvest. Conducting recommended practices should improve the quality of both wildlife habitat and timber quality of this stand.

Stand 3 contains predominately oak-pine forest cover type, with the dominant tree species being scarlet oak, chestnut oak, and pitch pine in the overstory, and chestnut oak, blackgum, and scarlet oak in the midstory. The stand consists of decent wildlife habitat, and decent timber quality. The timber is immature and no commercial harvesting is recommended at this time, however, conducting recommended practices should improve the quality of both wildlife habitat and timber quality of this stand. The large amounts of sassafras, red maple, and hickories should be targeted for removal in order to promote oak development.

[6] A protective strip of forestland adjacent to waterbody and/or channel; primarily used for protection of streams, creeks, banks, erosion risk, etc.
[7] A stream that typically flows only during rain events, otherwise may be dry – usually not indicated on USGS maps.
[8] A stream that has well-defined banks and channels, and continuously flows water except during droughts – USGS maps as solid blue line.
[9] A stream that has well-defined banks and channels but flows water occasionally during course of year – USGS maps as broken blue line.

Tract Statistics

Confidence %:	68.00	Tract Name:	[redacted]
Allowable Error%:	15.00	Location:	WV
		Report Date:	[redacted]
		# of Strata/Stands:	3
		Stats Basis:	Doyle per Acre

Stand ID	Acres	# Plots Merch	Lower Bound	Mean Per Acre Doyle	Upper Bound	Std Dev	Std Error %	CV
1_1_1	399.0	22	3,913.23	4,867.07	5,820.91	4,286.32	19.60	88.07
2_1_2	690.0	33	3,219.06	3,628.05	4,037.03	2,325.92	11.27	64.11
3_1_3	495.0	24	1,722.70	2,022.82	2,322.94	1,446.58	14.84	71.51
All stands	1,584.0	78	3,129.75	3,438.52	3,747.28	2,544.94	8.98	74.01

Timber was attempted to be cruised at a spacing and frequency as recommended by the U.S. Forest Service.

Plots are cruised with a BAF 10 prism, with diameters being either visually estimated or measured by diameter-tape/Biltmore stick.

Merchantable sawlog heights are in 16-ft. log-length, from a minimum diameter of 12" DBH up to a 10" top where form allows.

The following are data reports from TCruise, with additional inventory data being provided to landowner in a separate file.

Statistical Terms Explained

Confidence %: The amount of confidence in the data presented, up to 100%.

Allowable Error %: The goal error rate as a percentage.

Stats Basis: What unit the statistical analysis is based upon.

Lower bound – mean – upper bound: Based upon the statistical analysis, the lower bound is the lowest-most estimate of the value, while the mean is the average, and the upper bound is the upper-most estimate of the value.

Std Dev: "Standard deviation"; the amount of variability (i.e., spread) in the data presented.

Std Error %: "Standard error" as a percent; similar to standard deviation but applies as a percentage of the total value.

CV: "Coefficient of variation"; the relative variability of the data in relation to its mean.

Cruise Summary

Confidence %:	68.00	Tract Name:	[redacted]		
Allowable Error%:	15.00	Location:	WV		
		Report Date:	[redacted]		
		# of Strata/Stands:	3		
		Stats Basis:	Doyle	per Acre	

		Doyle		Int 1/4		Live*		
Stand ID	Acres	Total MBF	BF/Ac.	Total MBF	BF/Ac.	TPA	BA	QMD
1	399.0	1941.96	4,867.07	2,639.66	6,615.69	100.64	85.24	12.46
2	690.0	2503.35	3,628.05	3,474.84	5,036.00	89.91	79.39	12.72
3	495.0	1001.30	2,022.82	1,440.22	2,909.54	127.26	71.67	10.16
All stands	1,584.0	5446.61	3,438.52	7,554.73	4,769.40	104.29	78.45	11.74

Top Midstory Spp. by Live BA (6-10")			Top Species by Live Doyle BF			Management Recs					Forest	GV	Dead	Dead	Den	DWD/Ac.	Drumming	PW
Species 1	Species 2	Species 3	Species 1	Species 2	Species 3	Mgmt. 1	Mgmt. 2	Invasive Spp %	Canopy	Age	Type	TPA	TPA	BA	TPA		Logs/Ac.	Tons/Ac.
Yellow-Poplar	Chestnut Oak	Red Maple	Yellow-Poplar	Sycamore	White Oak	FSI(midstory)	UnevenAgeHa	25	51-99	50-99	Oak-hickor	0.8	2.571	2.86	0.61	0.04	0.01	1.58
Chestnut Oak	Yellow-Poplar	Red Maple	Yellow-Poplar	Chestnut Oak	White Oak	UnevenAgeHa	FSI(midstory)	25	51-99	50-99	Oak-hickor	1.053	4.248	3.03	0.41	0.03	0.00	2.57
Chestnut Oak	Blackgum	Scarlet Oak	Scarlet Oak	Chestnut Oak	Pitch Pine	FSI(midstory)	UnevenAgeHa	25	51-99	50-99	Oak-pine	2.122	3.507	1.25	0.07	0.05	0.01	4.21
												1.324	3.594	2.43	0.36	0.00	0.00	2.83

Forest Inventory Specifications:

- Timber was attempted to be cruised at a spacing and frequency as either recommended by the U.S. Forest Service[10], or the West Virginia Forest Stewardship Program manual.
    - Some stands may contain more/less than recommended cruise intensity.
- All active and potential wildlife den trees, snags, and large wolf trees were tallied.
- Open areas with the potential to become woodland either by natural regeneration or through the planting of trees were recorded.
    - Other open areas and potential wildlife feeding areas were noted.
        - These latter categories include natural and man-made openings such as wetland areas, bogs, roads, and already harvested areas.
- Each plot was visited, and information recorded concerning the present condition of the trees and vegetation, species present, relative age, size, volume, stocking, regeneration, harvesting possibilities and wildlife capabilities.
- Plots are cruised with a BAF 10 prism, navigated by GPS to within at least one chain (66') of plot center.
- Plot-entry data collected is as follows:
    - Plot number (as assigned on map)
    - 1/10 acre fixed radius plot to determine the following:
        - Presence of downed woody debris
            - Number of logs 30' long by 8" diameter
        - Presence of drumming logs
            - Number of logs 8' long by 16" diameter contour with slope on ground
    - Forest cover type of immediate vicinity
    - Approximate stand age
        - Determined by the predominate size of timber within view
            - 0-10 = majority trees <12" DBH
            - 11-49 = majority trees between 12" – 16" DBH
            - 50-99 = majority trees >16" DBH
            - 100+ = obviously old timber
    - Average canopy height
        - Determined by the average total height of dominant trees
    - Stand health
        - Determined by the immediate vicinity of the plot center
            - Satisfactory = <50% invasive species present, no sign of disease
            - Unsatisfactory = >49% invasive species present
            - Pest/Disease = obvious mortality due to pest/disease outbreak
    - Invasive species preponderance
        - Determined by the immediate vicinity of the plot center estimated visually as a percentage of ground cover occupied by such species
            - 0 = no invasive present (very rare)
            - 1 -25% = common
            - 50% = common
            - 75% = common
            - 100% = undeniably large amounts
    - Desirable tree species regeneration present?

[10] Title 190-Forestry Inventory Methods Technical Note (July 2018).

        - Yes/no
    - Recommended treatment (assuming invasive species control already recommended)
    - Previous forest management practices within immediate vicinity of plot center
- Tree-entry data collected is as follows:
    - Beginning north, prism is spun to determine in/out trees to be inventories.
    - Tree species identified and collected of each “in” tree.
    - Diameter at breast height (DBH): To nearest 1” diameter-class measured at 4 ½’ above ground on uphill side by diameter tape or Biltmore stick per following guidelines:

DBH Rules:

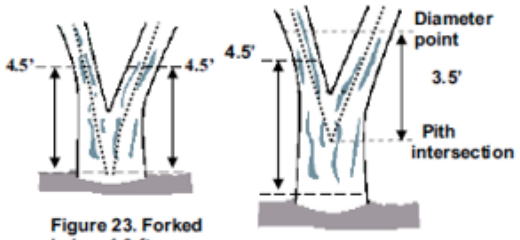


Figure 23. Forked below 1.0 ft.

Figure 24. Forked between 1.0-4.5 ft.

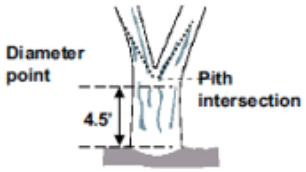
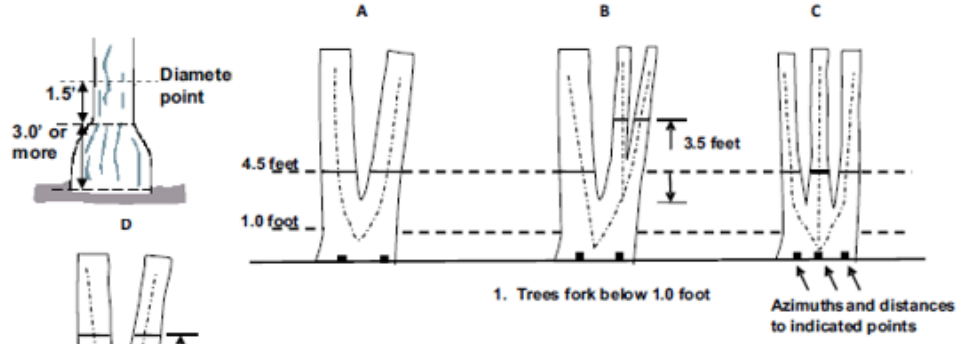
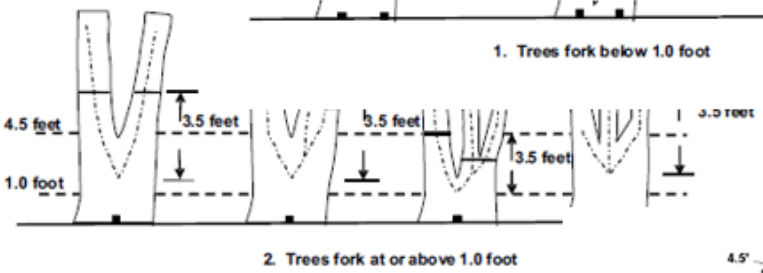
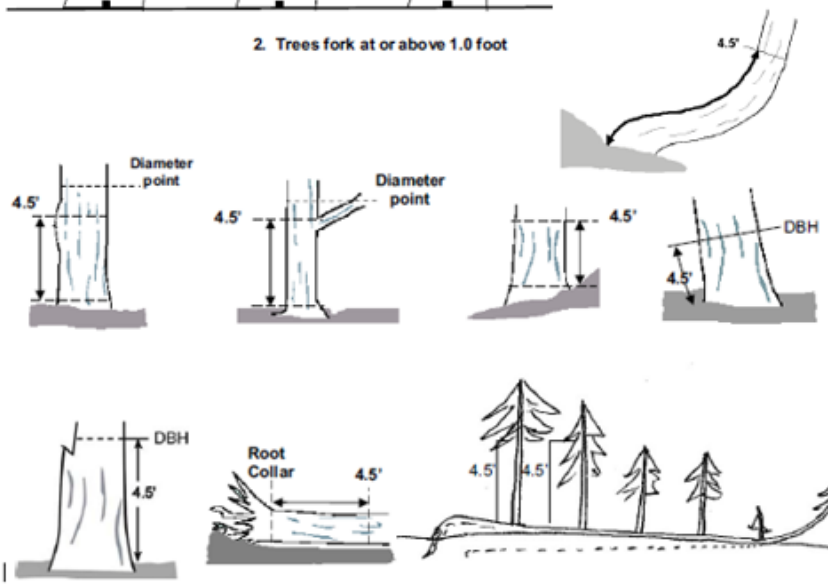


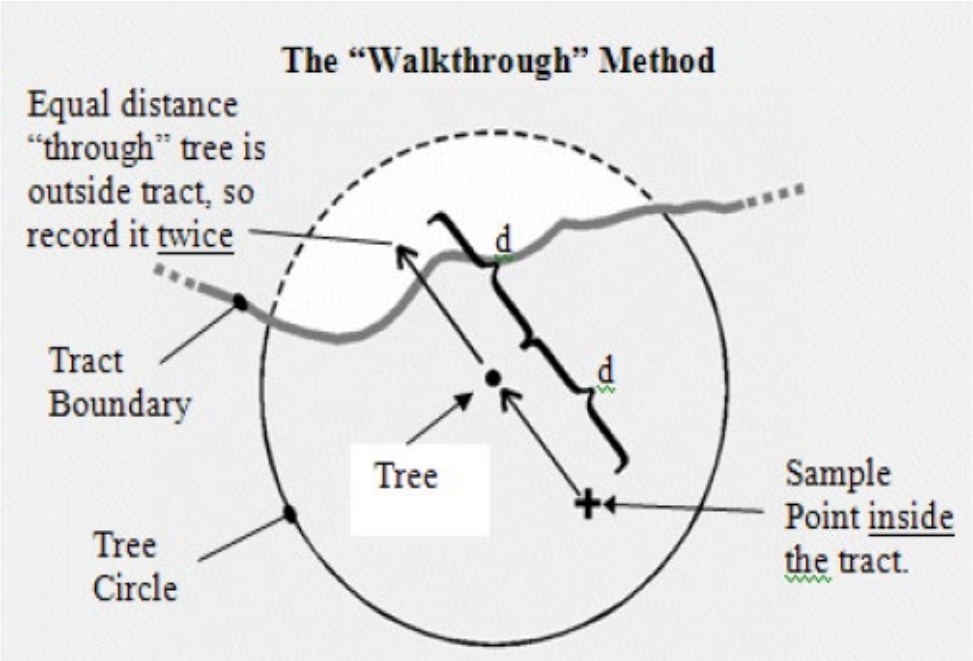
Figure 25. One tree.







- “Borderline trees”, i.e. those individual tree stems whose “in/out” determination per prism view is questionable, the Walkthrough Method (below) was applied:



  - Merchantable height
    - Measured either visually or using laser hypsometer to nearest ½ log determination (8’ section).
    - Sawtimber determined based up minimum DBH of 12” diameter class up to 10” top where form allows to nearest half-log (8’ section) with minimum of one clear side.
    - Pulpwood determined based upon minimum DBH of 8” diameter class up to 4” top where form allows to nearest 5’ section with a minimum of 15’ feet where form allows.
    - Pre-merchantable trees are those that are between 6 – 8” diameter class.
  - The presence of grapevine on each “in” tree.
    - Yes/no
- Timber inventory data calculated by TCruise forest inventory software and summarized in Microsoft Excel datasheets.
  - Doyle log rule form class of 78 utilized for all species.

Stand Table Summary

Tract Name: [redacted]
Location: WV
Acres: 1584.0
Date: [redacted]

HERITAGE Habitat & Forestry

Live Trees Per Acre

	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Norway Spruce	0.62	0.22	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97
Pitch Pine	0.37	0.24	0.66	0.23	0.44	0.22	0.16	0.05	0.00	0.00	0.00	0.00	2.38
Virginia Pine	0.68	0.00	0.15	0.12	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05
Boxelder	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Red Maple	21.47	2.09	2.20	0.70	0.44	0.50	0.18	0.00	0.04	0.00	0.03	0.00	28.11
Sugar Maple	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32
Yellow Buckeye	0.00	0.00	0.00	0.10	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27
Alianthus	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
Sweet Birch	0.72	0.00	0.49	0.00	0.17	0.00	0.00	0.00	0.04	0.00	0.00	0.00	1.41
Pignut Hickory	2.03	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.18
Shagbark Hick	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
Mockernut Hick	0.66	0.00	0.34	0.22	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.58
American Beech	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Black Walnut	0.34	0.00	0.00	0.11	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.60
Yellow-Poplar	1.34	0.46	0.91	0.59	0.34	0.62	0.99	0.29	0.29	0.20	0.18	0.20	6.42
Cucumbertree	0.34	0.00	0.15	0.11	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
Blackgum	13.79	0.70	1.28	0.23	0.00	0.07	0.05	0.00	0.04	0.00	0.00	0.00	18.22
E. Hophornbeam	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Sourwood	0.34	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Sycamore	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.05	0.11	0.10	0.00	0.10	0.42
Black Cherry	0.00	0.24	0.31	0.23	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.94
White Oak	2.17	0.20	1.06	1.05	0.37	0.43	0.41	0.23	0.23	0.10	0.14	0.15	7.21
Scarlet Oak	0.00	0.24	0.98	0.47	1.36	0.28	0.23	0.33	0.24	0.07	0.00	0.00	4.22
Chestnut Oak	5.57	3.60	2.11	1.81	0.83	0.48	0.76	0.29	0.24	0.07	0.09	0.13	15.99
N. Red Oak	1.54	0.67	0.49	0.82	0.60	0.13	0.12	0.14	0.12	0.03	0.00	0.09	4.74
Black Oak	0.00	0.24	0.00	0.33	0.63	0.58	0.12	0.29	0.08	0.11	0.06	0.00	2.44
Sassafras	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33
Am Basswood	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.02	0.09
Total	**53.74**	9.62	11.90	7.14	6.08	3.58	3.02	1.67	1.52	0.68	0.51	0.69	104.29

Stock Table Summary

Tract Na[redacted]
Location: WV
Acres: 1534.0
Date[redacted]

Volume Per Acre
SAW Units: Doyle

	Diameter at Breast Height												
Sawtimber	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Norway Spruce	**0.00**	**0.00**	**3.46**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.46**
Pitch Pine	0.00	0.00	19.75	18.51	41.69	18.37	27.10	17.94	0.00	0.00	0.00	0.00	143.35
Virginia Pine	**0.00**	**0.00**	**3.15**	**8.45**	**11.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**22.82**
Red Maple	0.00	0.00	41.55	24.17	27.72	48.47	28.66	0.00	0.00	0.00	0.00	0.00	170.57
Sugar Maple	**0.00**	**0.00**	**6.99**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**6.99**
Yellow Buckeye	0.00	0.00	0.00	0.00	10.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.81
Sweet Birch	**0.00**	**0.00**	**11.95**	**0.00**	**16.62**	**0.00**	**0.00**	**0.00**	**8.53**	**0.00**	**0.00**	**0.00**	**37.10**
Pignut Hickory	0.00	0.00	4.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.57
Mockernut Hick	**0.00**	**0.00**	**8.69**	**13.23**	**28.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.47**
Black Walnut	0.00	0.00	0.00	5.58	0.00	17.98	0.00	0.00	0.00	0.00	0.00	0.00	23.56
Yellow-Poplar	**0.00**	**0.00**	**23.18**	**43.35**	**42.58**	**88.95**	**186.58**	**82.19**	**117.37**	**102.24**	**99.85**	**148.42**	**934.71**
Cucumbertree	0.00	0.00	4.57	5.58	8.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.05
Blackgum	**0.00**	**0.00**	**31.76**	**10.66**	**0.00**	**0.00**	**7.64**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.05**
E. Hophornbeam	0.00	0.00	3.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.33
Sycamore	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**11.57**	**0.00**	**16.56**	**53.12**	**49.83**	**0.00**	**115.33**	**246.42**
Black Cherry	0.00	0.00	0.00	10.74	0.00	0.00	0.00	0.00	9.59	0.00	0.00	0.00	20.33
White Oak	**0.00**	**0.00**	**29.44**	**55.12**	**16.24**	**34.59**	**59.37**	**39.87**	**43.95**	**13.91**	**0.00**	**31.76**	**324.25**
Scarlet Oak	0.00	0.00	13.20	18.25	81.16	24.03	31.00	44.67	70.43	36.75	0.00	0.00	319.51
Chestnut Oak	**0.00**	**0.00**	**36.60**	**89.19**	**49.64**	**38.74**	**92.09**	**49.27**	**61.51**	**20.46**	**49.23**	**56.55**	**543.29**
N. Red Oak	0.00	0.00	11.25	37.01	48.26	18.75	16.05	38.04	24.70	15.26	0.00	0.00	209.31
Black Oak	**0.00**	**0.00**	**0.00**	**10.18**	**50.32**	**60.82**	**8.41**	**76.47**	**9.26**	**23.69**	**27.38**	**0.00**	**266.53**
Am Basswood	0.00	0.00	0.00	0.00	0.00	11.57	0.00	0.00	0.00	0.00	0.00	16.47	28.04
Sawtimber Total	**0.00**	0.00	253.44	350.00	433.72	373.84	456.89	365.01	398.46	262.14	176.46	368.54	3438.52

PW Units: Tons Per Acre

	Diameter at Breast Height												
Pulpwood	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Norway Spruce	**0.03**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**
Pitch Pine	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
Red Maple	**0.05**	**0.37**	**0.00**	**0.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**
Yellow-Poplar	0.05	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21
Blackgum	**0.09**	**0.24**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.38**
White Oak	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Scarlet Oak	**0.00**	**0.08**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.18**
Chestnut Oak	0.00	1.01	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22
N. Red Oak	**0.00**	**0.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.17**
Pulpwood Total	0.22	2.17	0.30	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.83

Wildlife Habitat Limiting Factors:

Bedding Habitat: Current forest lacks adequate acreage of native species bedding habitat. Current bedding habitat is dominated by grasses and nonnative invasive plants.

Escape Cover: Current forest lacks adequate acreage of native species escape cover. Without adequate escape cover, wildlife will flee to adjacent properties that contain this habitat type.

Horizontal & Vertical Structural Diversity: Structural diversity can be improved by implementing recommended practices to increase forest floor diversity, promote desirable understory development, and improve timber production and canopy-level diversity (under-, mid-, and overstory heights).

Downed Woody Debris: Some current downed woody debris exist on the property. This can be enhanced with management efforts. Downed woody debris is especially important as functioning escape and bedding habitat during inclement weather events, such as snowstorms and ice. Grasses do not act as cover during inclement weather, and it is important to provide woody structure on the forest floor for this reason.

Early Successional Habitat: Lacking. Can be created by implementing management practices.

> The first stage of forest succession.
>
> Commonly pictured as “old field” …fields that have been put out of agricultural development and are let alone to become “wild”. Typically, these old fields are full of invasive and non-native species, including cool-season grasses and light-seed invasive trees. You may see plants such as goldenrod, ragweed, or brambles (think blackberries and thorny bushes) occupying these old fields. This makes excellent wildlife cover and forage habitat for a variety of species, especially turkey poults and quail.

Young Forests: Lacking in select areas. Can be created approximately 10-years post-clearcut harvest.

> Densely packed stems of woody species.
>
> This successional stage is most common following disturbances such as timber harvests, fires, or insect/disease outbreaks. These forests contain many trees per acre, which is a necessary habitat requirement of grouse! This habitat type can be created by conducting clearcuts on your property and allowing forest succession to take its place. Once a young forest becomes dense and old enough, sunlight will no longer reach the forest floor. At this stage, management is required if keeping your stand in this habitat type is the goal. Typically, herbicide treatments are used to selectively remove stems of trees in order to open up the canopy to allow more sunlight onto the forest floor.

Closed-canopy Forests: Present among the majority of the acreage of the property. Having some mature forest is important, but the “bulk” of a well-managed forestland should contain several different age classes, and therefor different forest successional stages of development.

> Closed canopy forest with little to no desirable understory present.
>
> This is the most common forest type in the East. A closed canopy forest is one that is stagnant, both in terms of timber production and growth and wildlife habitat. Very little to no sunlight is reaching the forest floor, thereby hindering desirable species regeneration such as shade intolerant oaks, and instead promoting shade tolerant species such as maples and hickories. This stage of a forest is prime for a timber harvest or other overstory removal method.

Figure 1. Example of closed-canopy forest with minimal understory development. Stock photo not of Client's property.

Habitat Management Components & Recommendations[11]

Targeted Wildlife Species	Important Habitat Components & Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Early successional forested habitat sapling stage (0-20 year age class) with heavy stem densities —diversity of hard and soft mast producing species (i.e. dogwood, hawthorn, crabapple, apple, black haw) preferred. Northern and northeast facing slopes typically are the most productive sites. Even age silvicultural techniques and field border cuts are commonly utilized to accomplish this objective (a few mast producing trees and shrubs may be in out areas).	High	15 - 20%	<15%	<15%	x	
Wild turkey		N/A					
Gray & fox squirrels		N/A					
Ruffed grouse		High	25 - 40%	<15%	<15%	x	
White-tailed deer		High	25 - 35%	<15%	<15%	x	
Generalists	Mature deciduous forested habitat with a diversity of understory and herbaceous vegetation with a significant portion of the stocking in hard mast (i.e. oak, beech) production. Thinnings and selective harvests are commonly utilized to reduce BA to enhance mast production and understory vegetation. For squirrels - Mature deciduous forested habitat —hard mast (i.e. oak, hickory, beech) production with a moderate understory of shrubs and vines. Even-age regeneration cuts should be long and linear instead of block shaped.	High	40 - 60%	>75%	25 – 50%	x	
Wild turkey		High	50 - 75%	>75%	25 – 50%		x
Gray & fox squirrels		High	75 - 100%	>75%	25 – 50%		x
Ruffed grouse		High	Min. 25%	>75%	25 – 50%		x
White-tailed deer		High	40 - 60%	>75%	25 – 50%	x	

[11] Unique West Virginia wildlife habitats, associated rare and non-game species, and habitat recommendations (2015 WVDNR State Wildlife Action Plan) – Applicable to other states as well

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Herbaceous forested openings, savannas and/or linear openings (skid roads, pipelines, etc.) dispersed throughout forested areas, and/or hay lands and pasture fields bordering forested habitat provide important brood habitat. Legume/grass cover such as white clover, birdsfoot trefoil, creeping red fescue, tick trefoil, orchard grass is recommended	High	5 - 10%	5%	5%		x
Wild turkey		High	Min. 10% in forests; 40% in ag. land	5%	5%	x	
Gray &fox squirrels		N/A					
Ruffed grouse		High	5 - 10%	5%	5%		x
White-tailed deer		High	15 - 25%	5%	5%	x	
Generalists	Openlands such as hay lands, pasturelands can be enhanced by conversion to legume and/or warm season grass cover based upon management objectives. Aportion of openland habitat should be bordered by early successional forests. In addition, forest edges along openings can be “feathered back” utilizing border cuts.	Varies	If Applicable	N/A		x	
Wild turkey		High	If Applicable	N/A		x	
Gray &fox squirrels		N/A					
Ruffed grouse		High	If Applicable	N/A		x	
White-tailed deer		Medium	If Applicable	N/A		x	

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Snags –maintain snags in forested stands by leaving dead or dying trees	Medium	Min. 3-5/acre	2	>2	x	
Wild turkey		N/A					
Gray &fox squirrels		Medium	Min. 3-5/acre	2	>2	x	
Ruffed grouse		N/A					
White-tailed deer		N/A					
Generalists	Mow forest openings, logging roads, rights-of-way, etc. on an annual or biennial basis —mowing should be delayed until July 15. In larger and openings, a portion of it may be placed on a longer mowing rotation to allow it to revert to old field stage habitat which provides for additional diversity in plant communities.	Varies	If Applicable	N/A		x	
Wild turkey		Medium	If Applicable	N/A		x	
Gray &fox squirrels		N/A					
Ruffed grouse		Medium	If Applicable	N/A		x	
White-tailed deer		High	If Applicable	N/A		x	

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Waterholes and or vernal poets should be constructed in areas lacking standing water (i.e. dry ridge tops, upper slopes) benefit many species including amphibians, bats, etc. Wild turkeys obtain a portion of their water needs from surface water in very dry regions. Therefore, waterholes and/or vernal pools should be developed in areas lacking. Squirrels obtain the majority of their water needs from dew and succulent vegetation. However, on dry sites, water holes may have limited value for squirrels.	Medium	As needed	N/A			x
Wild turkey		Medium	As needed	N/A			x
Gray &fox squirrels		Low	As needed	N/A			x
Ruffed grouse		N/A					
White-tailed deer		Medium	As needed	N/A			x
Generalists	Protection of seeps and riparian areas from bad environmental impacts —100-foot buffers commonly recommended. Maintain mast producers in vicinity of seeps light thinnings are permissible to enhance mast production in these areas.	High	As needed	Implement State Best Management Practices (BMPs)			
Wild turkey		High	As needed	Implement State Best Management Practices (BMPs)			
Gray &fox squirrels		Medium	As needed	Implement State Best Management Practices (BMPs)			
Ruffed grouse		Medium	As needed	Implement State Best Management Practices (BMPs)			
White-tailed deer		High	As needed	Implement State Best Management Practices (BMPs)			

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Brush piles and windrows constructed along forested edges of openland habitat and/or fencerows. Brush piles provide escape and nesting cover for an assortment of songbirds and mammals.	Medium	If Applicable	N/A		x	
Wild turkey		High	If Applicable	N/A		x	
Gray &fox squirrels		Medium	If Applicable	N/A		x	
Ruffed grouse		High	If Applicable	N/A		x	
White-tailed deer		Medium	If Applicable	N/A		x	
Generalists	Live den and cavity trees —retain cull trees and snags of various DBHs in forest stands to provide trees for cavity using wildlife.	High	5-7/acre	<1	<1	x	
Wild turkey		N/A					
Gray &fox squirrels		High	2-3/acre	<1	<1	x	
Ruffed grouse		N/A					
White-tailed deer		N/A					

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Evergreen forested habitat —conifers, mountain laurel, and rhododendron preferred in close proximity to hard mast production and early successional habitat components. For turkeys - Evergreen forested habitat – mixed deciduous forests interspersed with conifers provided quality roosting areas.	Medium	5 - 10%	<5%	<5%	x	
Wild turkey		Medium	As needed	N/A		x	
Gray &fox squirrels		N/A					
Ruffed grouse		High	Min. 5 - 10% (up to 50%)	<5%	<5%	x	
White-tailed deer		Medium	5 - 10%	<5%	<5%	x	
Generalists	Large woody debris such as large tops and cull logs should be per acre sustained in forested stands to provide habitat for a diversity of species.	Medium	1-3/acre (min. 30' long &8" dia.)	<1	>1		
Wild turkey		N/A					
Gray &fox squirrels		N/A					
Ruffed grouse		N/A					
White-tailed deer		N/A					

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Small grain food plots (min. of 1 acre in size) - left unharvested and fallow for the following year. Preferred species include corn, milo sorghum, wheat, sunflower, buckwheat. Grain crops (i.e. corn, soybeans) —A few rows of unharvested grain crops left along woodland edges can provide a quality food source for fox squirrels in agricultural settings.	Low	5%	<5%	<5%	x	
Wild turkey		N/A					
Gray &fox squirrels		Low	If Applicable	N/A			x
Ruffed grouse		N/A					
White-tailed deer		Low	0 - 10%	<5%	<5%		x
Generalists	Livestock should be excluded from woodland areas to eliminate impacts to forest regeneration and stand composition.	/	100% (unless retained for shade)	N/A			x
Wild turkey		/	100% (unless retained for shade)	N/A			x
Gray &fox squirrels		/	100% (unless retained for shade)	N/A			x
Ruffed grouse		/	100% (unless retained for shade)	N/A			x
White-tailed deer		/	100% (unless retained for shade)	N/A			x

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Artificial nesting structures —If natural cavities arc a limiting factor, manmade structures can be constructed for a variety of wildlife species (i.e. squirrel, owls, bluebirds, wood ducks, etc.).	Varies	If Applicable	N/A		x	
Wild turkey		N/A					
Gray &fox squirrels		N/A					
Ruffed grouse		N/A					
White-tailed deer		N/A					
Generalists	Orchards (i.e. apple) and soft mast producing thickets (i.e. crabapple, hawthom) should be maintained. In addition, these areas can be enhanced by pruning and releasing fruit-bearing trees.	Varies	If Applicable	N/A		x	
Wild turkey		N/A					
Gray &fox squirrels		N/A					
Ruffed grouse		N/A					
White-tailed deer		High	If Applicable	N/A		x	

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Minimize human disturbance (especially vehicular - ATVs) during nesting and brood rearing seasons - April 15 to July 15).	High	N/A				
Wild turkey		High	N/A				
Gray &fox squirrels		N/A					
Ruffed grouse		High	N/A				
White-tailed deer		N/A					
Generalists	Retention and/or development of wild grape arbors and/or grape vines reaching canopy—select mast producing arbors/acre trees of lower quality (remove grape vines from best crop trees and mast producers).	N/A					
Wild turkey		Medium	3-5 vines &1-2 arbors/acre	1 affected TPA	1 affected TPA	x	
Gray &fox squirrels		Medium	3-5 vines/acre	1 affected TPA	1 affected TPA	x	
Ruffed grouse		High	Min. 3-5 vines & 1-2 arbors/acre	1 affected TPA	1 affected TPA	x	
White-tailed deer		High	3-5 vines/acre	1 affected TPA	1 affected TPA	x	

Targeted Wildlife Species	Important Habitat Components &Habitat Recommendations	Habitat Component Priority	Recommended # or %	Existing Units	Planned Units	Lacking	Adequate
Generalists	Drumming logs (located in even-age timber harvests) —logs should be a minimum of 16 inches in diameter and 8 feet in length and positioned along contour of land.	N/A					
Wild turkey		N/A					
Gray &fox squirrels		N/A					
Ruffed grouse		Medium	Min. 2-3/acre	<1	<1	x	
White-tailed deer		N/A					

Important Wildlife Foods: American beech, oak, greenbrier, black cherry, grapes, black walnut, pawpaw, hickory, dogwood, hawthorn, sumac, hop-hornbeam, viburnums, birch, aspen, sassafras, persimmon, blackgum, clover/grasses, various forbs, ferns, mountain laurel, rhododendron, witch-hazel, serviceberry, blueberry, huckleberry, insects (summer months).

Important Wild Turkey Foods: beech, oak, greenbrier, black cherry, grapes, dogwood, hawthorn, sumac, blackgum, viburnums, clover/grasses, mountain laurel, witch-hazel, serviceberry, blueberry, blackberry, huckleberry, various forbs, insects (summer months).

Important Squirrel Foods: Oak, beech, hickory, black walnut, black cherry, grapes, dogwood, yellow-poplar, maple, blackgum, mulberry, elm, fungi, hawthorn, field corn.

Important Ruffed Grouse Foods: beech, oak, greenbrier, black cherry, grapes, dogwood, hawthorn, sumac, hophornbeam, viburnums, birch, aspen, clover/grasses, ferns, mountain laurel, witch-hazel, serviceberry, blueberry, huckleberry, insects (summer months).

Important Deer Foods: oak, beech, black cherry, grape, dogwood, hawthorn, hickory, apple, blackgum, greenbrier, rhododendron, blueberry, viburnums, crabapple, grasses, legumes, forbs, browse-twigs (numerous species).

Desired Future Forest Condition:

First and foremost, control and maintenance of invasive non-native species is of upmost priority. A common invasive non-native shrub-like species is autumn olive. Although a fruit-producer, autumn olive remains a dangerous species across the landscape. The roots, through their relationship with local bacteria, can change the soil properties which in turn can alter the naturally-occurring species composition on-site[12]. Removal of all invasive species via herbicide is recommended. Native species will re-occupy the site that is currently being outcompeted by invasive plants.

The single-tree and group-selection timber harvest will create small patches, randomly spaced, throughout the stand in order to provide a diversity of tree canopy structures as well as provide early-successional habitat such as brambles and briars.

The current stand structure, from a wildlife habitat perspective, is stagnant and of low quality. Having trees of all the same approximate age, diameter, and crown position does not provide a multitude of habitat types required by large mammals (deer), small game (rabbits, squirrels), as well as a great number of songbirds.

The reduction of overstory tree density via timber sale will allow increased amounts of sunlight onto the ground to propagate the next generation of trees, specifically oaks which require large quantities of sunlight in order to germinate and survive.

Edge-feathering is prescribed around the openlands to improve wildlife habitat. Edge-feathering consists of a heavy removal of non-oak tree species around an approximate 100’ buffer along openlands to promote a “soft-edge”. This is a transition zone between a fully open field and a closed-canopy forest. This zone will provide small- and medium-sized game species, such as rabbits, turkeys, and deer, a thicket of briars, brambles, and shrub-like woody species such as sumac. This transition zone is vital across the landscape since this habitat type is largely gone across the state.

The patch clearcuts will create small patches, randomly spaced, throughout the stand in order to provide a diversity of tree canopy structures as well as provide early-successional habitat such as brambles and briars. The current stand structure, from a wildlife habitat perspective, is stagnant and of low quality. Having trees of all the same approximate age, diameter, and crown position does not provide a multitude of habitat types required by large mammals (deer), small game (rabbits, squirrels), as well as a great number of songbirds.

The reduction of midstory and overstory tree cover will allow increased amounts of sunlight onto the ground to propagate the next generation of trees, specifically oaks which require large quantities of sunlight in order to germinate and survive.

This forest may be well suited for a forest carbon program due to the structure, condition, and merchantability. An assessment should be requested. **Heritage Habitat & Forestry can facilitate landowners receiving free forest carbon quotes, reach out for more details.**

This forest may be well suited for non-traditional timber revenue sources, such as ginseng, maple syrup production, pawpaw farming, etc. Several resources are available to landowners to assist them in forest

[12] Andrijonas, 2011

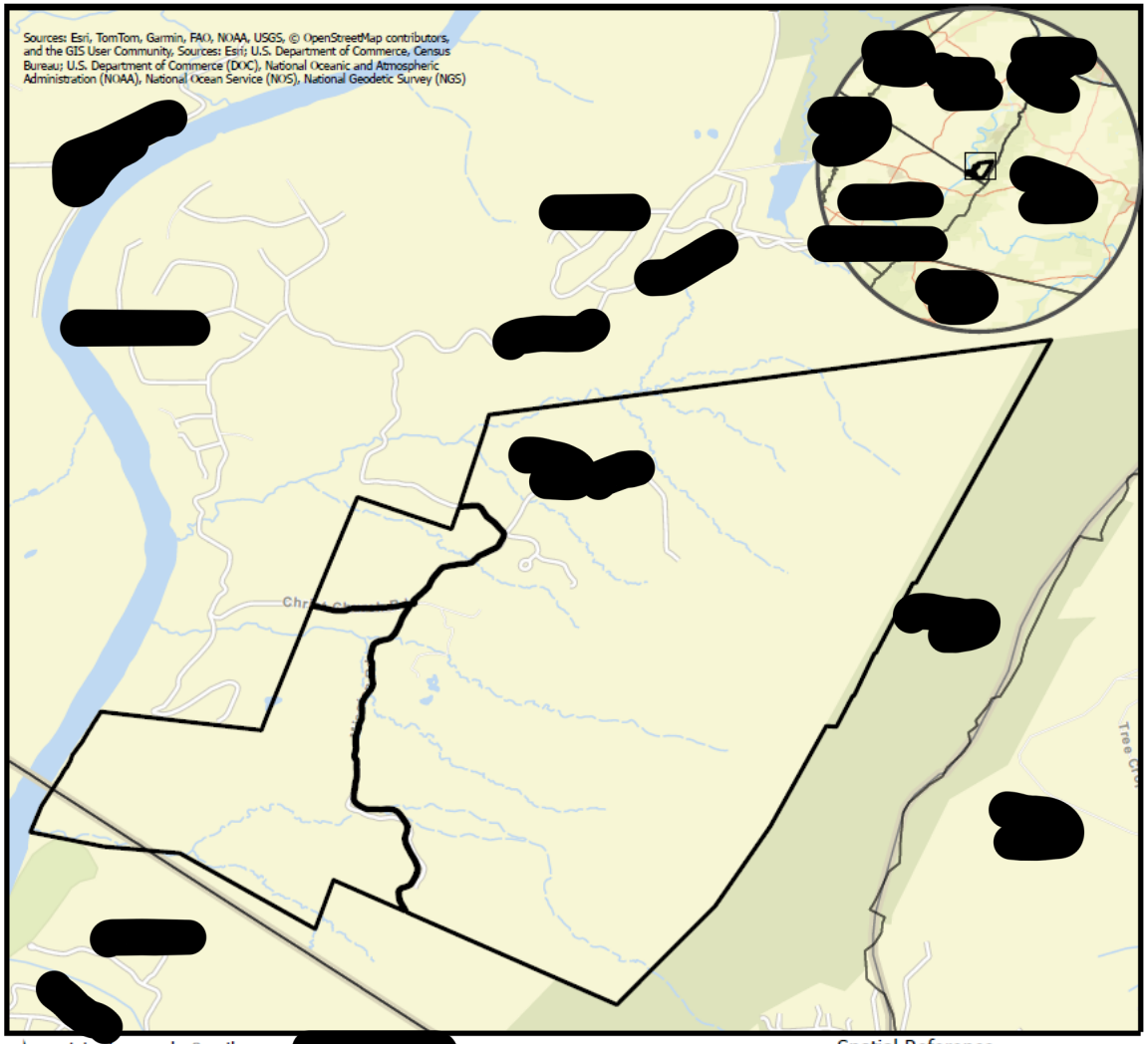
farming operations: Rural Action – ruralaction.org, and Future Generations University – future.edu, are good places to start!

Figure 2. Post-midstory herbicide control. Note understory regeneration. Stock photo not of Client's property.

Landowner Objectives

1. To improve the overall health and ecosystem services of the forest. Accomplished primarily through invasive species control (brush management/herbaceous weed treatment), edge feathering, uneven-aged harvesting, and patch clearcutting to provide a plethora of forest structure, species composition, vertical and horizontal cover, among other benefits.
    a. An 80% effectiveness rating of herbicide kill of invasive species will be considered accomplishing that particular treatment, along with removing several detrimental grapevines growing on high value tree species such as black walnut and red and white oak.
    b. Edge feathering around at least one field will be considered accomplishing that particular treatment.
    c. Harvesting at least one acre will be considered accomplishing that particular treatment.
    d. Patch clearcutting at least one patch will be considered accomplishing that particular treatment.
2. To provide an assortment of wildlife habitat types, for both game and non-game species through active forest management as listed in Objective 2.
    a. Completing one of the recommended treatments will be considered accomplishing this goal.
3. To protect water quality by limited use of herbicides, and using aquatically labeled chemicals, if applicable.
    a. Establishment of streamside management zones (SMZs) and limiting activities in these areas will be considered accomplishing this goal.
4. To improve timber quality for a future timber sale when commercially and silviculturally viable by accomplishing recommended treatments noted in this forest management plan.
    a. Attempting to implement at least one treatment will be considered accomplishing this goal.

[redacted] - Location Map



[redacted]

Conservation District: [redacted]

USA Counties

Property Boundary

LOCATION MAP OF CLIENT PARCEL(S).

PARCEL ID(S): SEE STEWARDSHIP PLAN

Spatial Reference
Name: GCS WGS 1984

All maps available for purchase in printed large-format (36" x 48")

Credits:
Heritage Habitat & Forestry
HH&F Geostpatial & Data Solutions
(330) 419-1769 / (681) 455-7741
HeritageHabitatCo.com

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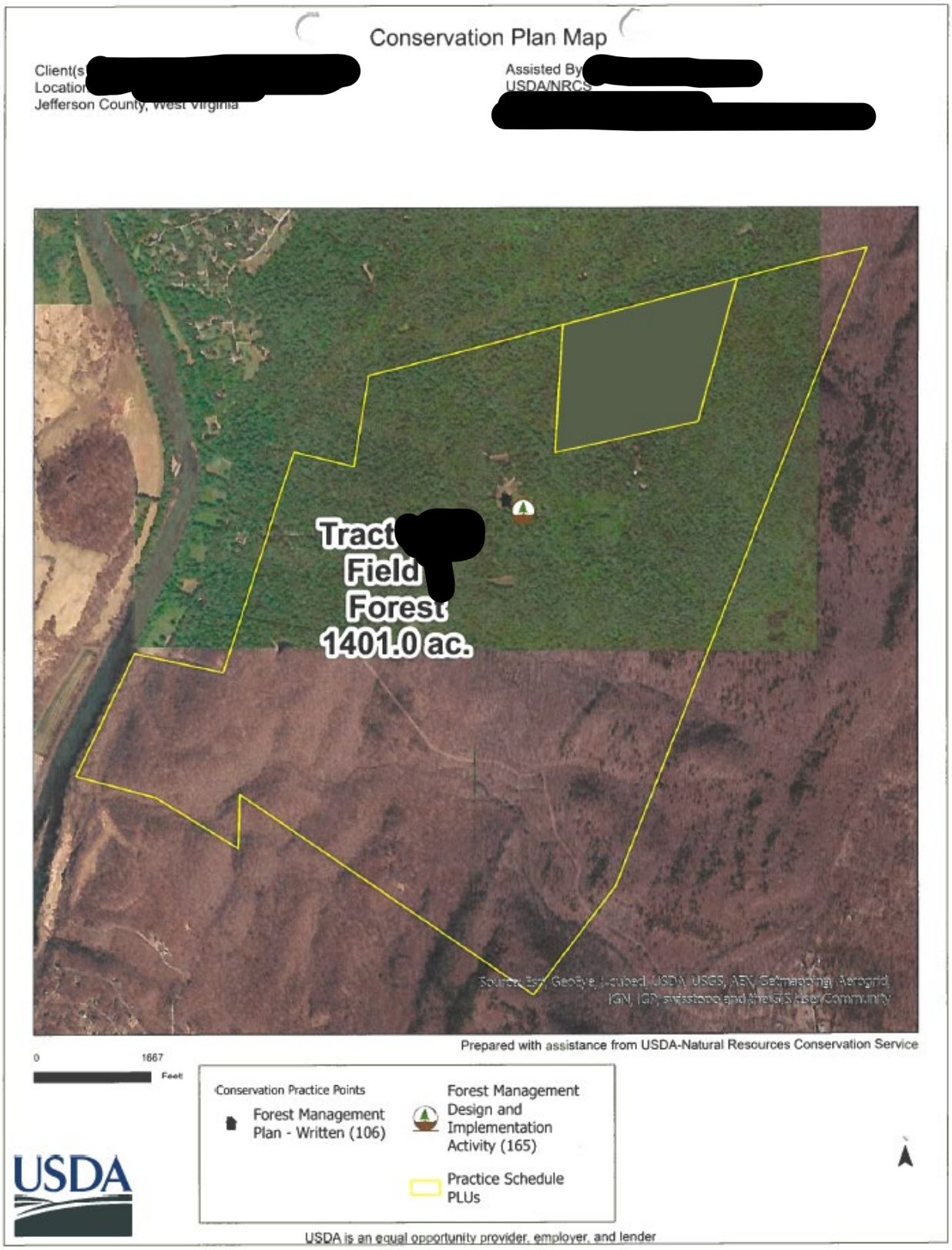
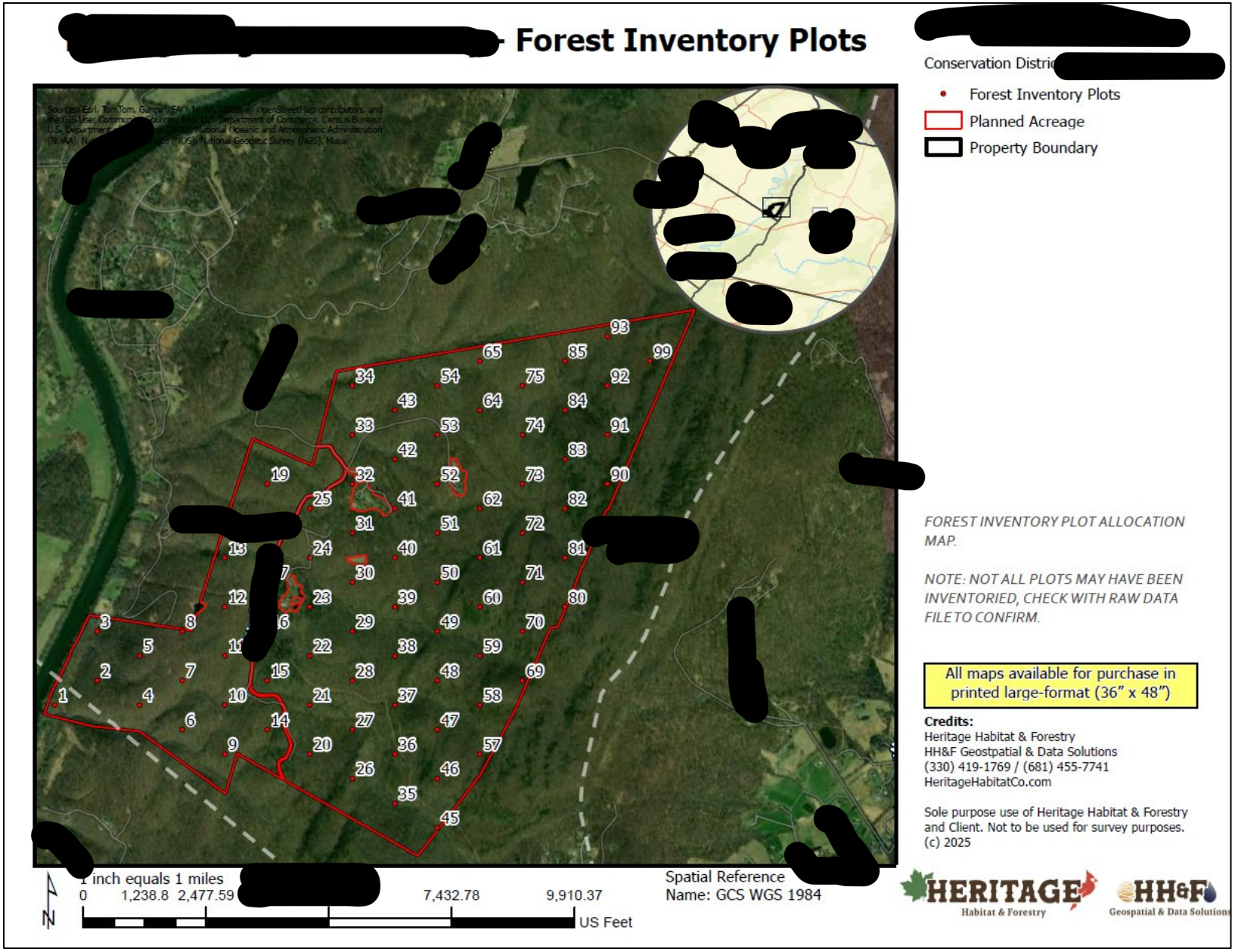
HERITAGE Habitat & Forestry

HH&F Geospatial & Data Solution

NRCS-Provided Conservation Plan Map




Forest Inventory Plots
Conservation Distric
Forest Inventory Plots
Planned Acreage
Property Boundary
FOREST INVENTORY PLOT ALLOCATION MAP.
NOTE: NOT ALL PLOTS MAY HAVE BEEN INVENTORIED, CHECK WITH RAW DATA FILE TO CONFIRM.
All maps available for purchase in printed large-format (36" x 48")
Credits:
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(330) 419-1769 / (681) 455-7741
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(c) 2025
1 inch equals 1 miles
0 1,238.8 2,477.59 7,432.78 9,910.37
US Feet
Spatial Reference
Name: GCS WGS 1984
HERITAGE Habitat & Forestry
HH&F Geospatial & Data Solutions


- Aerial Stands Map
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Stands
Property Boundary
FOREST STANDS AS DELINEATED BASED UPON FIELD OBSERVATIONS AND INVENTORY DATA.
All maps available for purchase in printed large-format (36" x 48")
Credits:
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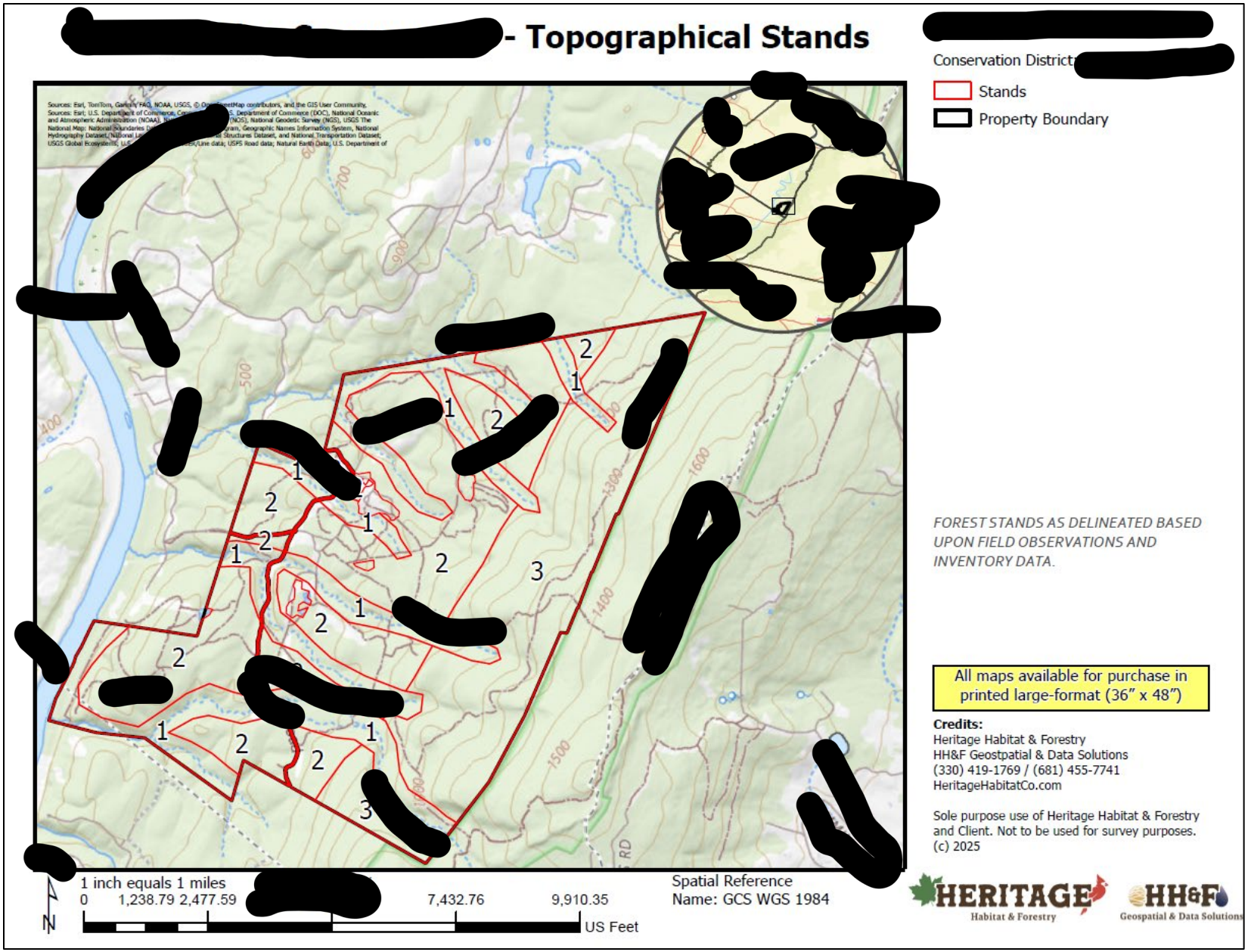
Name: GCS WGS 1984
HERITAGE
Habitat & Forestry
HH&F
Geospatial & Data Solutions


[redacted] - Topographical Stands
Conservation District [redacted]
Stands
Property Boundary
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All maps available for purchase in printed large-format (36" x 48")
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1 inch equals 1 miles
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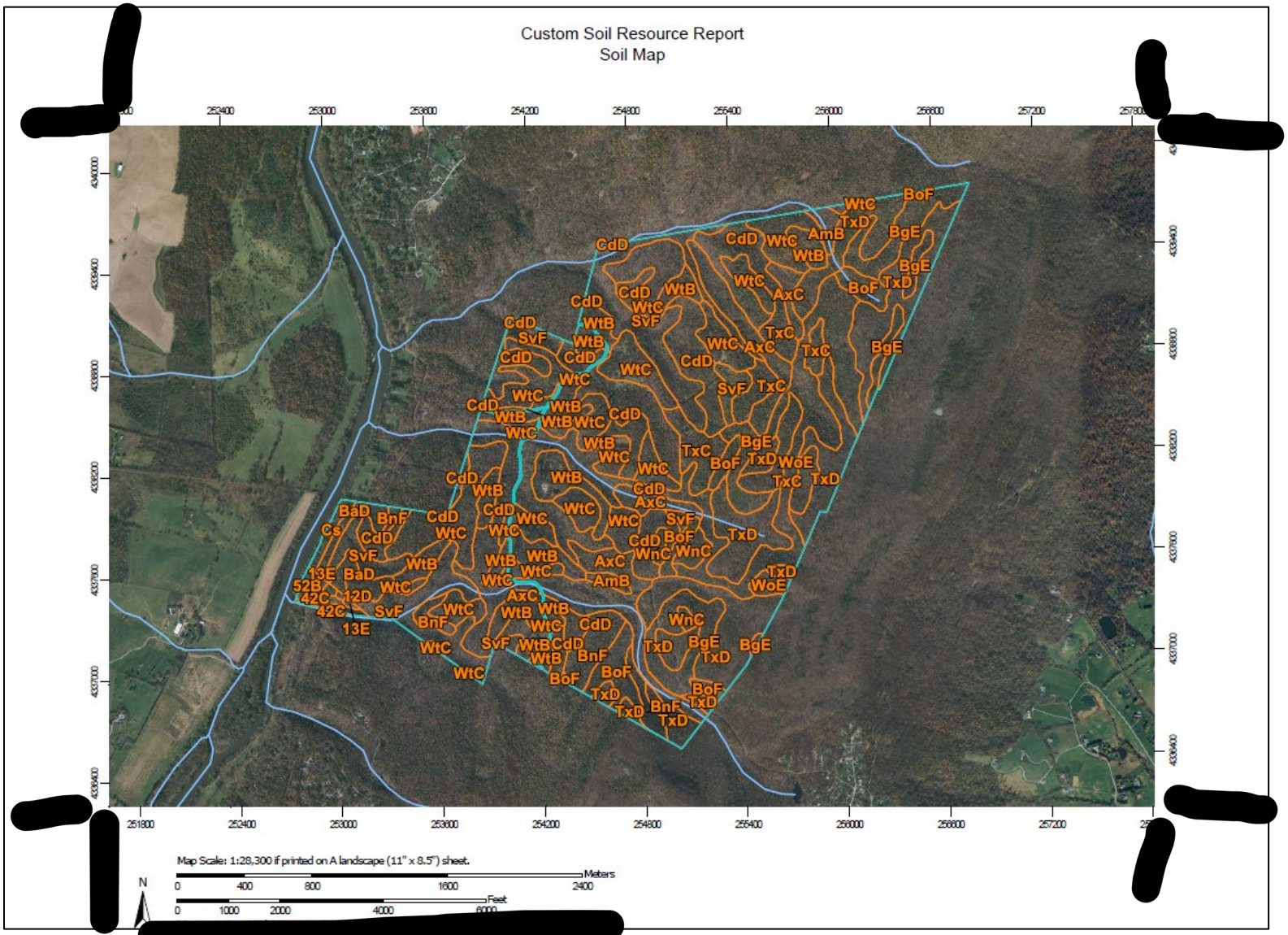
US Feet
Spatial Reference
Name: GCS WGS 1984
HERITAGE Habitat & Forestry
HH&F Geospatial & Data Solutions

TSP: Anthony F. Pappas, CF, RPF
County, State: Jefferson, WV
Conservation District: E. Panhandle
Date Prepared: [redacted]
Location (decimal degrees): See "Location Map"

Soil Map



MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

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

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

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

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

Soil Survey Area: [redacted]
Survey Area Data

Soil Survey Area: [redacted]
Survey Area Data: [redacted]

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Sep 23, 2020—Nov 20, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3D	Braddock very stony loam, 15 to 45 percent slopes	1.1	0.1%
12D	Dekalb channery sandy loam, 15 to 30 percent slopes	0.5	0.0%
13E	Dekalb very stony sandy loam, 30 to 50 percent slopes	1.8	0.1%
16B	Fluvaquents, 0 to 8 percent slopes	3.4	0.2%
42C	Rock outcrop-Dekalb complex, 3 to 45 percent slopes	3.1	0.2%
52B	Udipsamments, 0 to 8 percent slopes	3.7	0.2%
Subtotals for Soil Survey Area		**13.5**	**0.8%**
Totals for Area of Interest		**1,600.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AmB	Airmont cobbly loam, 0 to 8 percent slopes, stony	10.8	0.7%
AxC	Airmont very cobbly loam, 8 to 15 percent slopes, extremely stony	107.4	6.7%
BaD	Bagtown gravelly loam, 15 to 25 percent slopes, very stony	15.5	1.0%
BgE	Bagtown very flaggy sandy loam, 25 to 45 percent slopes, extremely stony	201.0	12.6%
BnF	Bagtown very flaggy loam, 25 to 65 percent slopes, rubbly	38.2	2.4%
BoF	Bagtown-Stumptown-Rock outcrop complex, 25 to 65 percent slopes	46.0	2.9%
CdD	Cardova channery silt loam, 15 to 25 percent slopes	271.5	17.0%
Cs	Combs fine sandy loam	6.3	0.4%
SvF	Sylvatus channery silt loam, 25 to 65 percent slopes	144.8	9.0%
TxC	Trego very flaggy loam, 3 to 15 percent slopes, extremely stony	62.4	3.9%
TxD	Trego very flaggy loam, 15 to 25 percent slopes, extremely stony	250.2	15.6%
WnC	Weverton very flaggy loam, 3 to 15 percent slopes, very stony	14.4	0.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WoE	Weverton-Rock outcrop complex, 15 to 45 percent slopes, very stony	22.6	1.4%
WtB	Whiteford channery silt loam, 3 to 8 percent slopes	134.1	8.4%
WtC	Whiteford channery silt loam, 8 to 15 percent slopes	262.3	16.4%
Subtotals for Soil Survey Area		**1,587.4**	**99.2%**
Totals for Area of Interest		**1,600.9**	**100.0%**

Report — Map Unit Description (Brief, Generated)

Minor map unit components are excluded from this report.

Clarke County, Virginia

Map Unit: 3D—Braddock very stony loam, 15 to 45 percent slopes

Component: Braddock (98%)

The Braddock component makes up 98 percent of the map unit. Slopes are 15 to 45 percent. This component is on mountain slopes on mountains. The parent material consists of colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map Unit: 12D—Dekalb channery sandy loam, 15 to 30 percent slopes

Component: Dekalb (80%)

The Dekalb component makes up 80 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountainsides on mountains. The parent material consists of residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F130AY003PA Phyllite-Metasandstone Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 13E—Dekalb very stony sandy loam, 30 to 50 percent slopes

Component: Dekalb (80%)

The Dekalb component makes up 80 percent of the map unit. Slopes are 30 to 50 percent. This component is on mountainsides on mountains. The parent material consists of residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F130AY003PA Phyllite-Metasandstone Upland ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map Unit: 16B—Fluvaquents, 0 to 8 percent slopes

Component: Fluvaquents (75%)

The Fluvaquents component makes up 75 percent of the map unit. Slopes are 0 to 8 percent. This component is on river valleys on flood plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the F130AY008PA Poorly To Somewhat Poorly Drained Floodplains And Toeslopes ecological site. Nonirrigated land capability classification is 6w. This soil meets hydric criteria.

Map Unit: 42C—Rock outcrop-Dekalb complex, 3 to 45 percent slopes

Component: Rock outcrop (55%)

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

Component: Dekalb (25%)

The Dekalb component makes up 25 percent of the map unit. Slopes are 3 to 45 percent. This component is on mountainsides on mountains. The parent material consists of residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F130AY004PA Quartzitic Upland ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map Unit: 52B—Udipsamments, 0 to 8 percent slopes

Component: Udipsamments (75%)

The Udipsamments component makes up 75 percent of the map unit. Slopes are 0 to 8 percent. This component is on mountain slopes on mountains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 42 inches during January, February, March, April, November, December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Jefferson County, West Virginia

Map Unit: AmB—Airmont cobbly loam, 0 to 8 percent slopes, stony

Component: Airmont, cobbly loam, stony (80%)

The Airmont, cobbly loam, stony component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on drainageways on mountains. The parent material consists of loamy colluvium and alluvium derived from quartzite. Depth to a root restrictive layer, fragipan, is 14 to 30 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Component: Typic Fragiaquults (5%)

Generated brief soil descriptions are created for major soil components. The Typic Fragiaquults soil is a minor component.

Map Unit: AxC—Airmont very cobbly loam, 8 to 15 percent slopes, extremely stony

Component: Airmont, very cobbly loam, x. stony (80%)

The Airmont, very cobbly loam, x. stony component makes up 80 percent of the map unit. Slopes are 8 to 15 percent. This component is on drainageways on mountains. The parent material consists of loamy colluvium and alluvium derived from quartzite. Depth to a root restrictive layer, fragipan, is 14 to 30 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Typic Fragiaquults (5%)

Generated brief soil descriptions are created for major soil components. The Typic Fragiaquults soil is a minor component.

Map Unit: BaD—Bagtown gravelly loam, 15 to 25 percent slopes, very stony

Component: Bagtown, gravelly loam, v stony (75%)

The Bagtown, gravelly loam, v stony component makes up 75 percent of the map unit. Slopes are 15 to 25 percent. This component is on mountain slopes on mountains. The parent material consists of coarse-loamy colluvium derived from quartzite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, March, April, December. Organic matter content in

the surface horizon is about 2 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map Unit: BgE—Bagtown very flaggy sandy loam, 25 to 45 percent slopes, extremely stony

Component: Bagtown, very flaggy sandy loam, x stny (75%)

The Bagtown, very flaggy sandy loam, x stny component makes up 75 percent of the map unit. Slopes are 25 to 45 percent. This component is on mountain slopes on mountains. The parent material consists of loamy colluvium derived from quartzite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map Unit: BnF—Bagtown very flaggy loam, 25 to 65 percent slopes, rubbly

Component: Bagtown, very flaggy loam, rubbly (70%)

The Bagtown, very flaggy loam, rubbly component makes up 70 percent of the map unit. Slopes are 25 to 65 percent. This component is on mountain slopes on mountains. The parent material consists of coarse-loamy colluvium derived from quartzite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map Unit: BoF—Bagtown-Stumptown-Rock outcrop complex, 25 to 65 percent slopes

Component: Bagtown, very flaggy sandy loam (55%)

The Bagtown, very flaggy sandy loam component makes up 55 percent of the map unit. Slopes are 25 to 65 percent. This component is on mountain slopes on mountains. The parent material consists

of coarse-loamy colluvium derived from quartzite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, June, July, October, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Stumptown, very flaggy sandy loam (25%)

The Stumptown, very flaggy sandy loam component makes up 25 percent of the map unit. Slopes are 25 to 65 percent. This component is on mountain slopes on mountains. The parent material consists of gravelly and loamy residuum weathered from quartzite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (10%)

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

Map Unit: CdD—Cardova channery silt loam, 15 to 25 percent slopes

Component: Cardova, channery silt loam (80%)

The Cardova, channery silt loam component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on mountain slopes on mountains. The parent material consists of loamy residuum weathered from phyllite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: Cs—Combs fine sandy loam

Component: Combs, fine sandy loam (75%)

The Combs, fine sandy loam component makes up 75 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains on river valleys. The parent material consists of coarse-loamy alluvium derived from limestone, sandstone, and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Component: Holly, loam (5%)

Generated brief soil descriptions are created for major soil components. The Holly, loam soil is a minor component.

Map Unit: SvF—Sylvatus channery silt loam, 25 to 65 percent slopes

Component: Sylvatus, channery silt loam (85%)

The Sylvatus, channery silt loam component makes up 85 percent of the map unit. Slopes are 25 to 65 percent. This component is on hillslopes on mountains. The parent material consists of gravelly residuum weathered from phyllite. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit: TxC—Trego very flaggy loam, 3 to 15 percent slopes, extremely stony

Component: Trego, very flaggy loam, STX (75%)

The Trego, very flaggy loam, STX component makes up 75 percent of the map unit. Slopes are 3 to 15 percent. This component is on mountain slopes on mountains. The parent material consists of

loamy colluvium derived from quartzite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map Unit: TxD—Trego very flaggy loam, 15 to 25 percent slopes, extremely stony

Component: Trego, very flaggy loam, STX (75%)

The Trego, very flaggy loam, STX component makes up 75 percent of the map unit. Slopes are 15 to 25 percent. This component is on mountain slopes on mountains. The parent material consists of loamy colluvium derived from quartzite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map Unit: WnC—Weverton very flaggy loam, 3 to 15 percent slopes, very stony

Component: Weverton, very flaggy loam, v stony (65%)

The Weverton, very flaggy loam, v stony component makes up 65 percent of the map unit. Slopes are 3 to 15 percent. This component is on ridges on mountains. The parent material consists of creep deposits derived from quartzite over residuum weathered from phyllite and/or quartzite. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map Unit: WoE—Weverton-Rock outcrop complex, 15 to 45 percent slopes, very stony

Component: Weverton, very stony sandy loam, v stny (50%)

The Weverton, very stony sandy loam, v stny component makes up 50 percent of the map unit. Slopes are 15 to 45 percent. This component is on ridges on mountains. The parent material consists of creep deposits derived from quartzite over residuum weathered from phyllite and/or quartzite. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

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

Map Unit: WtB—Whiteford channery silt loam, 3 to 8 percent slopes

Component: Whiteford, channery silt loam (80%)

The Whiteford, channery silt loam component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on mountain slopes on mountains. The parent material consists of loamy residuum weathered from phyllite. Depth to a root restrictive layer, bedrock, paralithic, is 55 to 70 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map Unit: WtC—Whiteford channery silt loam, 8 to 15 percent slopes

Component: Whiteford, channery silt loam (80%)

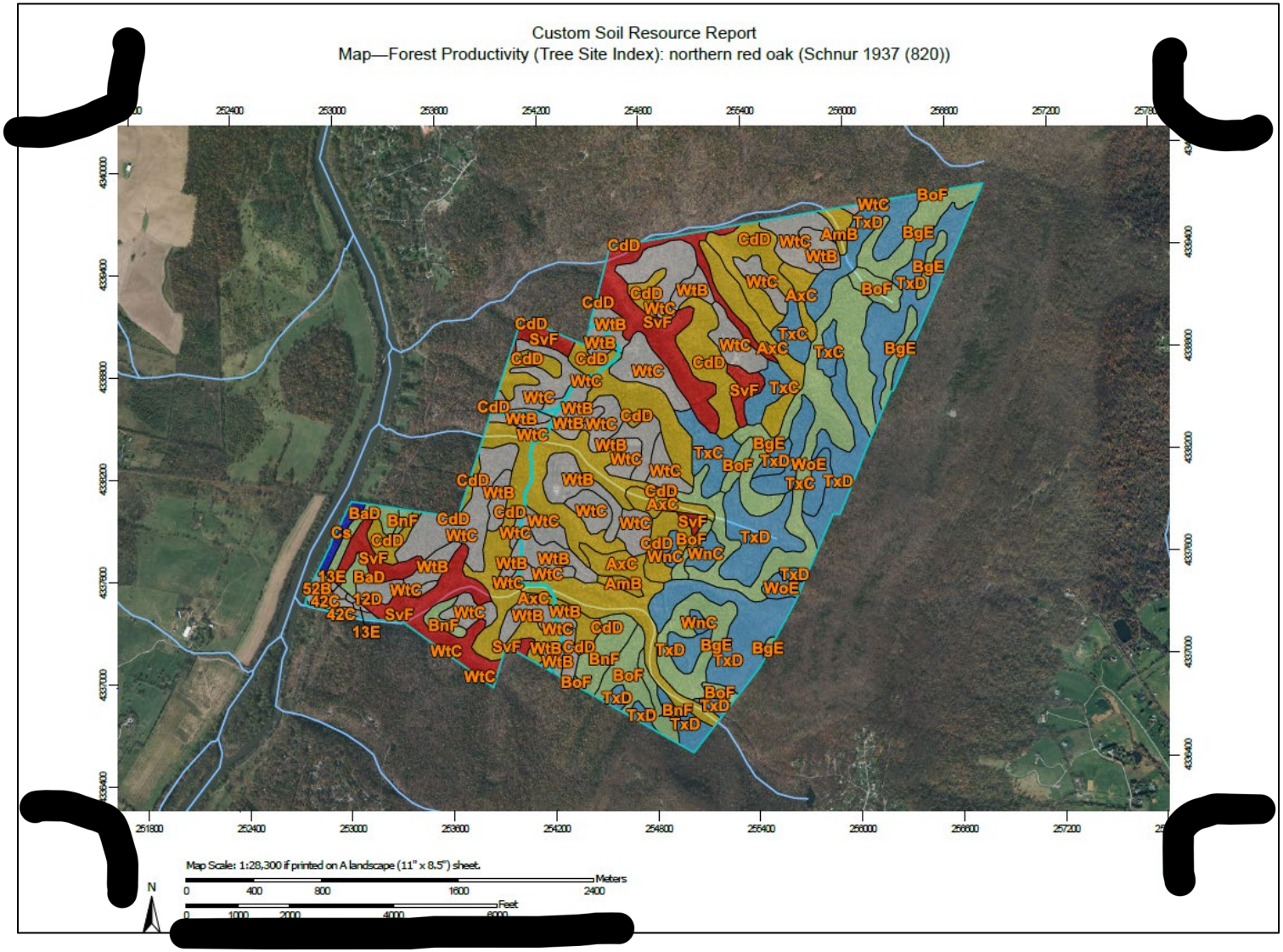
The Whiteford, channery silt loam component makes up 80 percent of the map unit. Slopes are 8 to 15 percent. This component is on mountain slopes on mountains. The parent material consists of loamy residuum weathered from phyllite. Depth to a root restrictive layer, bedrock, paralithic, is 55 to

70 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

TSP: Anthony F. Pappas, CF, RPF
County, State: [redacted]
Conservation District: [redacted]
Date Prepared: [redacted]
Location (decimal degrees): See "Location Map"

Forest Productivity Map

Site index based upon northern red oak, base age 100 years.



MAP LEGEND

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

Soils

Soil Rating Polygons
- <= 55
- > 55 and <= 60
- > 60 and <= 69
- > 69 and <= 70
- > 70 and <= 90
- Not rated or not available

Soil Rating Lines
- <= 55
- > 55 and <= 60
- > 60 and <= 69
- > 69 and <= 70
- > 70 and <= 90
- Not rated or not available

Soil Rating Points
- <= 55
- > 55 and <= 60
- > 60 and <= 69
- > 69 and <= 70
- > 70 and <= 90
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

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

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

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

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

Soil Survey Area: [redacted]
Survey Area Dat

Soil Survey Area [redacted]
Survey Area Data:

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Sep 23, 2020—Nov 20, 2020

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

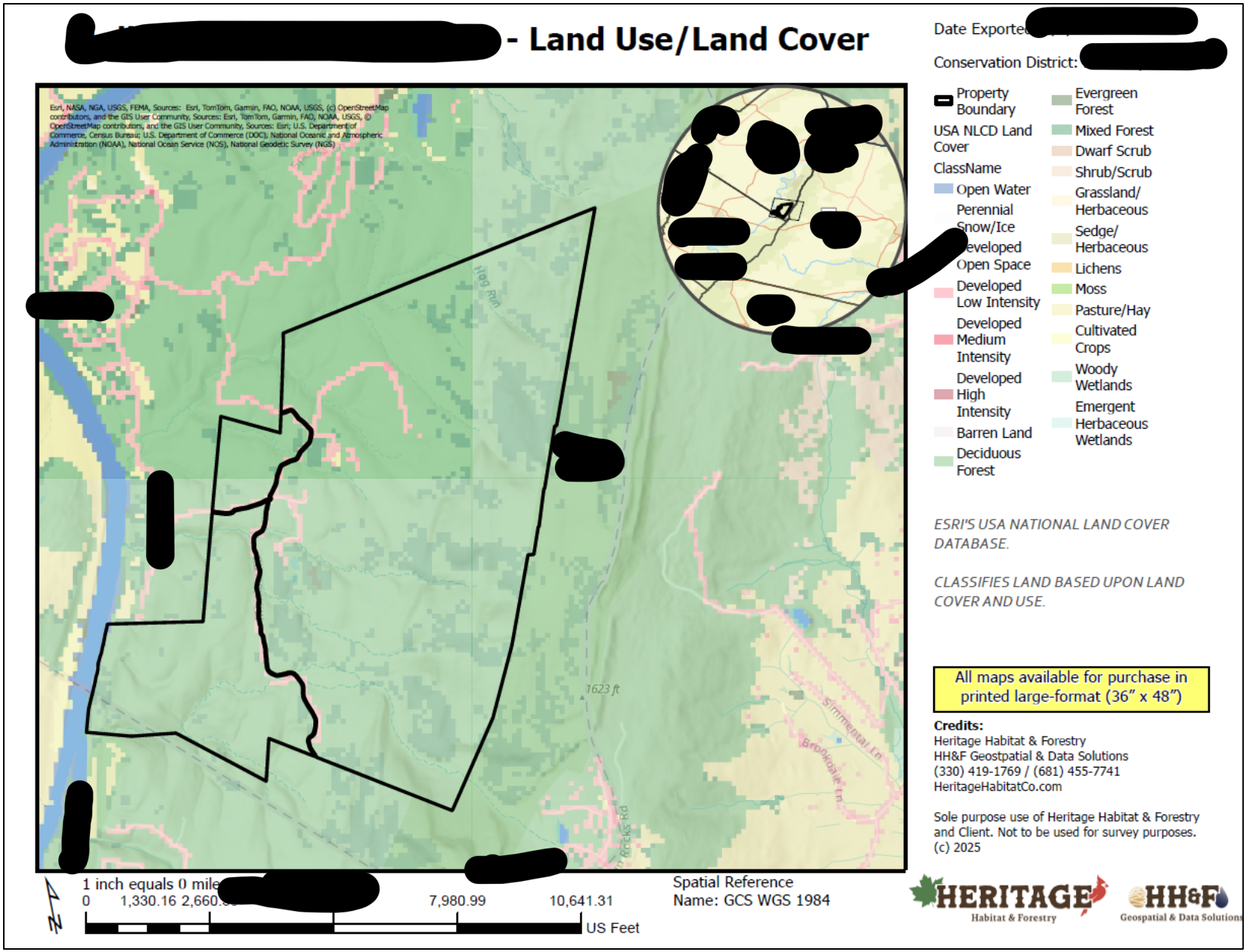
Table—Forest Productivity (Tree Site Index): northern red oak (Schnur 1937 (820))

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI	Percent of AOI
3D	Braddock very stony loam, 15 to 45 percent slopes		1.1	0.1%
12D	Dekalb channery sandy loam, 15 to 30 percent slopes		0.5	0.0%
13E	Dekalb very stony sandy loam, 30 to 50 percent slopes		1.8	0.1%
16B	Fluvaquents, 0 to 8 percent slopes		3.4	0.2%
42C	Rock outcrop-Dekalb complex, 3 to 45 percent slopes		3.1	0.2%
52B	Udipsamments, 0 to 8 percent slopes		3.7	0.2%
Subtotals for Soil Survey Area			**13.5**	**0.8%**
Totals for Area of Interest			**1,600.9**	**100.0%**

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI	Percent of AOI
AmB	Airmont cobbly loam, 0 to 8 percent slopes, stony	60	10.8	0.7%
AxC	Airmont very cobbly loam, 8 to 15 percent slopes, extremely stony	60	107.4	6.7%
BaD	Bagtown gravelly loam, 15 to 25 percent slopes, very stony	69	15.5	1.0%
BgE	Bagtown very flaggy sandy loam, 25 to 45 percent slopes, extremely stony	69	201.0	12.6%
BnF	Bagtown very flaggy loam, 25 to 65 percent slopes, rubbly	69	38.2	2.4%
BoF	Bagtown-Stumptown-Rock outcrop complex, 25 to 65 percent slopes	69	46.0	2.9%
CdD	Cardova channery silt loam, 15 to 25 percent slopes	60	271.5	17.0%
Cs	Combs fine sandy loam	90	6.3	0.4%

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI	Percent of AOI
SvF	Sylvatus channery silt loam, 25 to 65 percent slopes	55	144.8	9.0%
TxC	Trego very flaggy loam, 3 to 15 percent slopes, extremely stony	70	62.4	3.9%
TxD	Trego very flaggy loam, 15 to 25 percent slopes, extremely stony	70	250.2	15.6%
WnC	Weverton very flaggy loam, 3 to 15 percent slopes, very stony	70	14.4	0.9%
WoE	Weverton-Rock outcrop complex, 15 to 45 percent slopes, very stony	70	22.6	1.4%
WtB	Whiteford channery silt loam, 3 to 8 percent slopes		134.1	8.4%
WtC	Whiteford channery silt loam, 8 to 15 percent slopes		262.3	16.4%
Subtotals for Soil Survey Area			**1,587.4**	**99.2%**
Totals for Area of Interest			**1,600.9**	**100.0%**

Site index is a term used by foresters to describe the site productivity for a certain tree species or group of tree species. The site indexes used in this plan are derived primarily from soil productivity information obtained on soil maps developed for your county by the NRCS of the USDA and are based on the height that a tree will grow on a particular soil in 100 years. If a tree grows 50 feet in 100 years, the site index is 50; if it grows 100 feet in the same time period, the site index is 100 and the larger the number, the higher the site productivity. Site classes are closely related to available moisture. Generally, the better sites are in the bottoms, hollows, northern, and eastern slopes while the poor sites are on the ridge, southern, and western slopes. – *WV Stewardship Program*


[redacted] - Land Use/Land Cover
Date Exported: [redacted]
Conservation District: [redacted]
Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Sources: Esri; U.S. Department of Commerce, Census Bureau; U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS)
Property Boundary
USA NLCD Land Cover
ClassName
Open Water
Perennial Snow/Ice
Developed Open Space
Developed Low Intensity
Developed Medium Intensity
Developed High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Dwarf Scrub
Shrub/Scrub
Grassland/ Herbaceous
Sedge/ Herbaceous
Lichens
Moss
Pasture/Hay
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
ESRI'S USA NATIONAL LAND COVER DATABASE.
CLASSIFIES LAND BASED UPON LAND COVER AND USE.
All maps available for purchase in printed large-format (36" x 48")
Credits:
Heritage Habitat & Forestry
HH&F Geostpatial & Data Solutions
(330) 419-1769 / (681) 455-7741
HeritageHabitatCo.com
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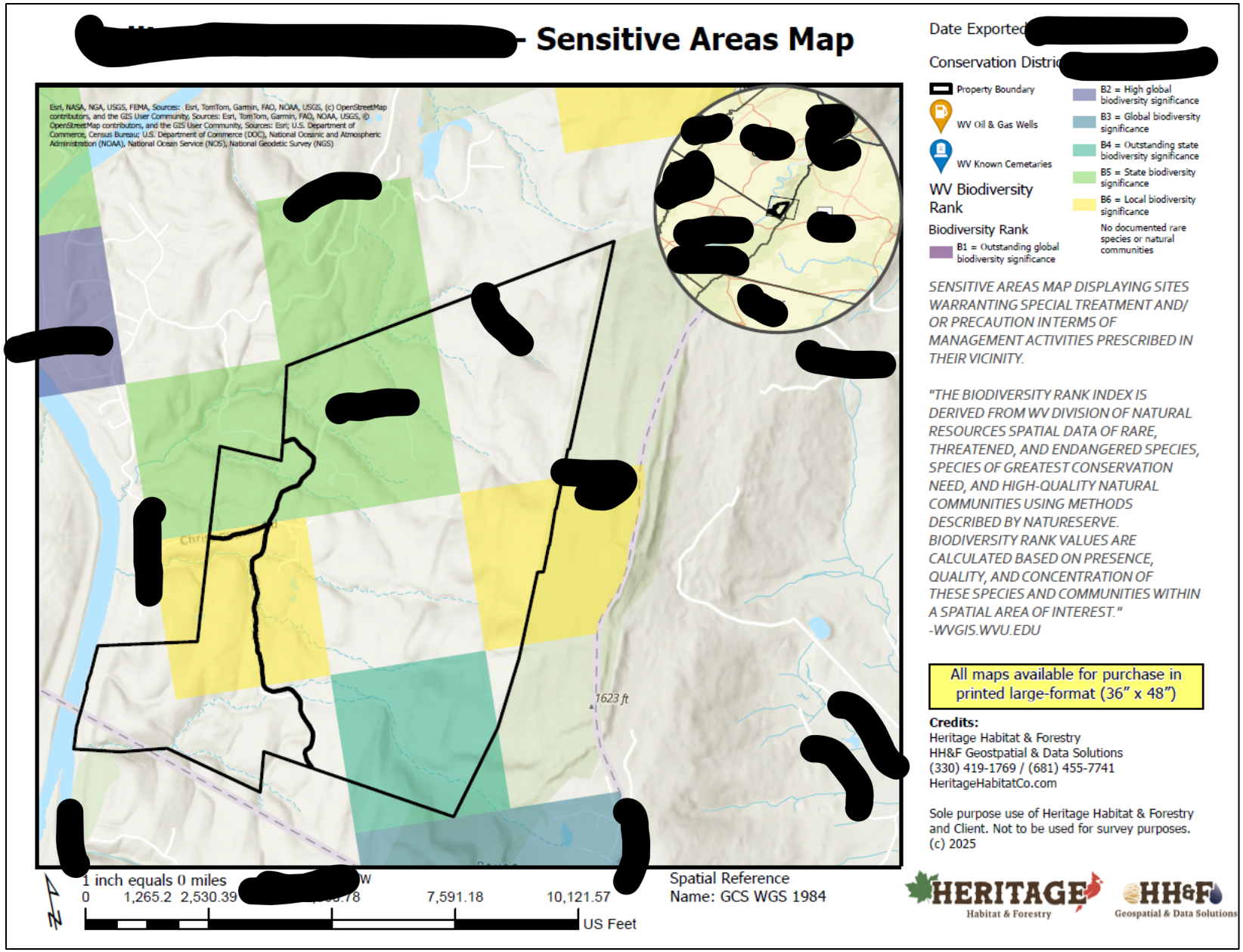
Hog Run
1623 ft
Simmental Ln
Brookdale Ln
Rocks Rd
1 inch equals 0 mile
0
1,330.16
2,660.
7,980.99
10,641.31
US Feet
Spatial Reference
Name: GCS WGS 1984
HERITAGE Habitat & Forestry
HH&F Geospatial & Data Solutions


[redacted] - Sensitive Areas Map
Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Sources: Esri; U.S. Department of Commerce, Census Bureau; U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS)
1623 ft
1 inch equals 0 miles
0 1,265.2 2,530.39 7,591.18 10,121.57
US Feet
Spatial Reference
Name: GCS WGS 1984
Date Exported [redacted]
Conservation Distric [redacted]
Property Boundary
WV Oil & Gas Wells
WV Known Cemetaries
WV Biodiversity Rank
Biodiversity Rank
B1 = Outstanding global biodiversity significance
B2 = High global biodiversity significance
B3 = Global biodiversity significance
B4 = Outstanding state biodiversity significance
B5 = State biodiversity significance
B6 = Local biodiversity significance
No documented rare species or natural communities
SENSITIVE AREAS MAP DISPLAYING SITES WARRANTING SPECIAL TREATMENT AND/ OR PRECAUTION IN TERMS OF MANAGEMENT ACTIVITIES PRESCRIBED IN THEIR VICINITY.
"THE BIODIVERSITY RANK INDEX IS DERIVED FROM WV DIVISION OF NATURAL RESOURCES SPATIAL DATA OF RARE, THREATENED, AND ENDANGERED SPECIES, SPECIES OF GREATEST CONSERVATION NEED, AND HIGH-QUALITY NATURAL COMMUNITIES USING METHODS DESCRIBED BY NATURESERVE. BIODIVERSITY RANK VALUES ARE CALCULATED BASED ON PRESENCE, QUALITY, AND CONCENTRATION OF THESE SPECIES AND COMMUNITIES WITHIN A SPATIAL AREA OF INTEREST."
-WVGIS.WVU.EDU
All maps available for purchase in printed large-format (36" x 48")
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HH&F Geostpatial & Data Solutions
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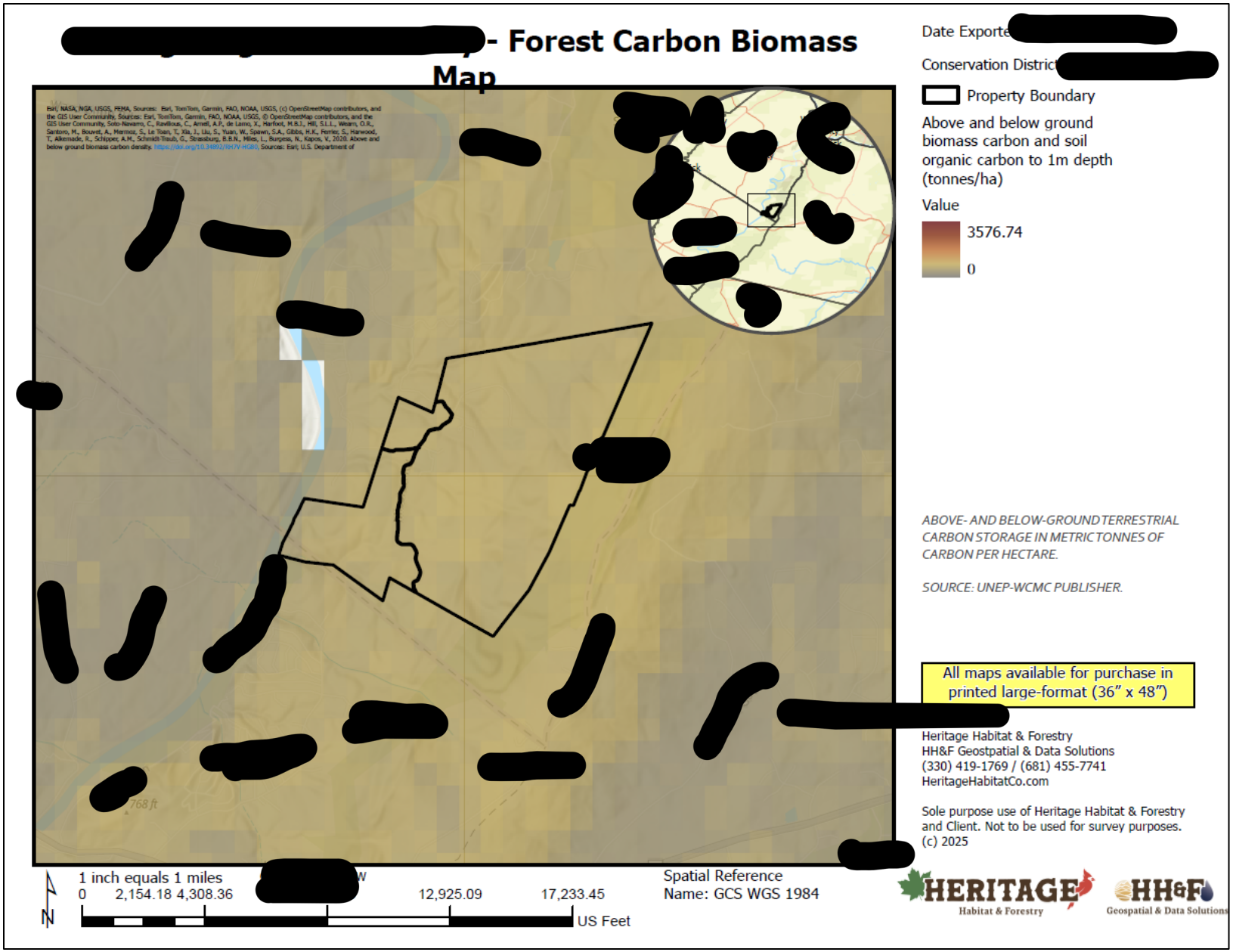
HH&F Geospatial & Data Solutions


[redacted]- Forest Carbon Biomass Map
Date Exported: [redacted]
Conservation District: [redacted]
Property Boundary
Above and below ground biomass carbon and soil organic carbon to 1m depth (tonnes/ha)
Value
3576.74
0
ABOVE- AND BELOW-GROUND TERRESTRIAL CARBON STORAGE IN METRIC TONNES OF CARBON PER HECTARE.
SOURCE: UNEP-WCMC PUBLISHER.
All maps available for purchase in printed large-format (36" x 48")
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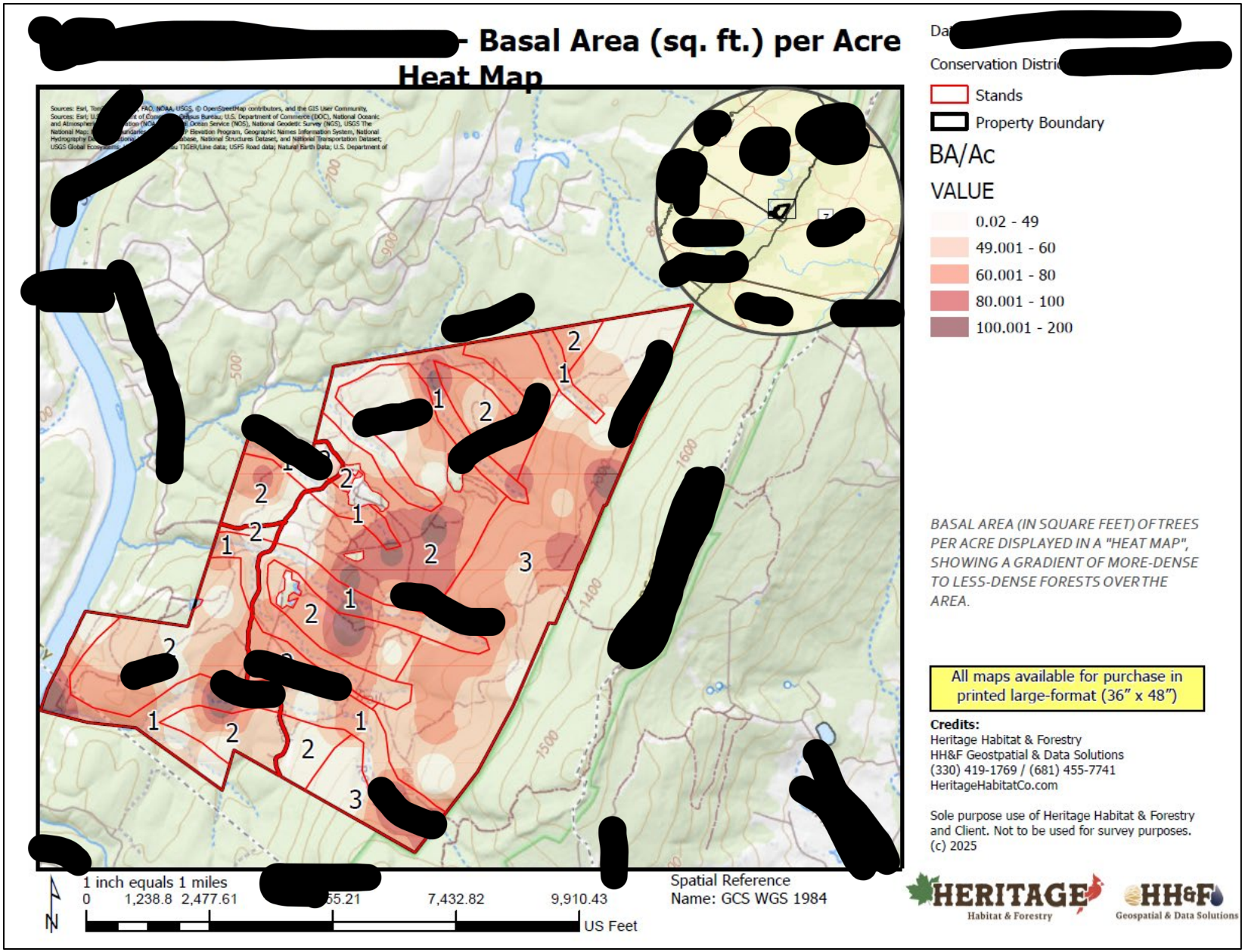
(c) 2025
1 inch equals 1 miles
0 2,154.18 4,308.36 12,925.09 17,233.45
US Feet
N
Spatial Reference
Name: GCS WGS 1984
HERITAGE Habitat & Forestry
HH&F Geospatial & Data Solutions


[redacted] - Basal Area (sq. ft.) per Acre Heat Map
Da[redacted]
Conservation Distri[redacted]
Stands
Property Boundary
BA/Ac
VALUE
0.02 - 49
49.001 - 60
60.001 - 80
80.001 - 100
100.001 - 200
BASAL AREA (IN SQUARE FEET) OF TREES PER ACRE DISPLAYED IN A "HEAT MAP", SHOWING A GRADIENT OF MORE-DENSE TO LESS-DENSE FORESTS OVER THE AREA.
All maps available for purchase in printed large-format (36" x 48")
Credits:
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HeritageHabitatCo.com
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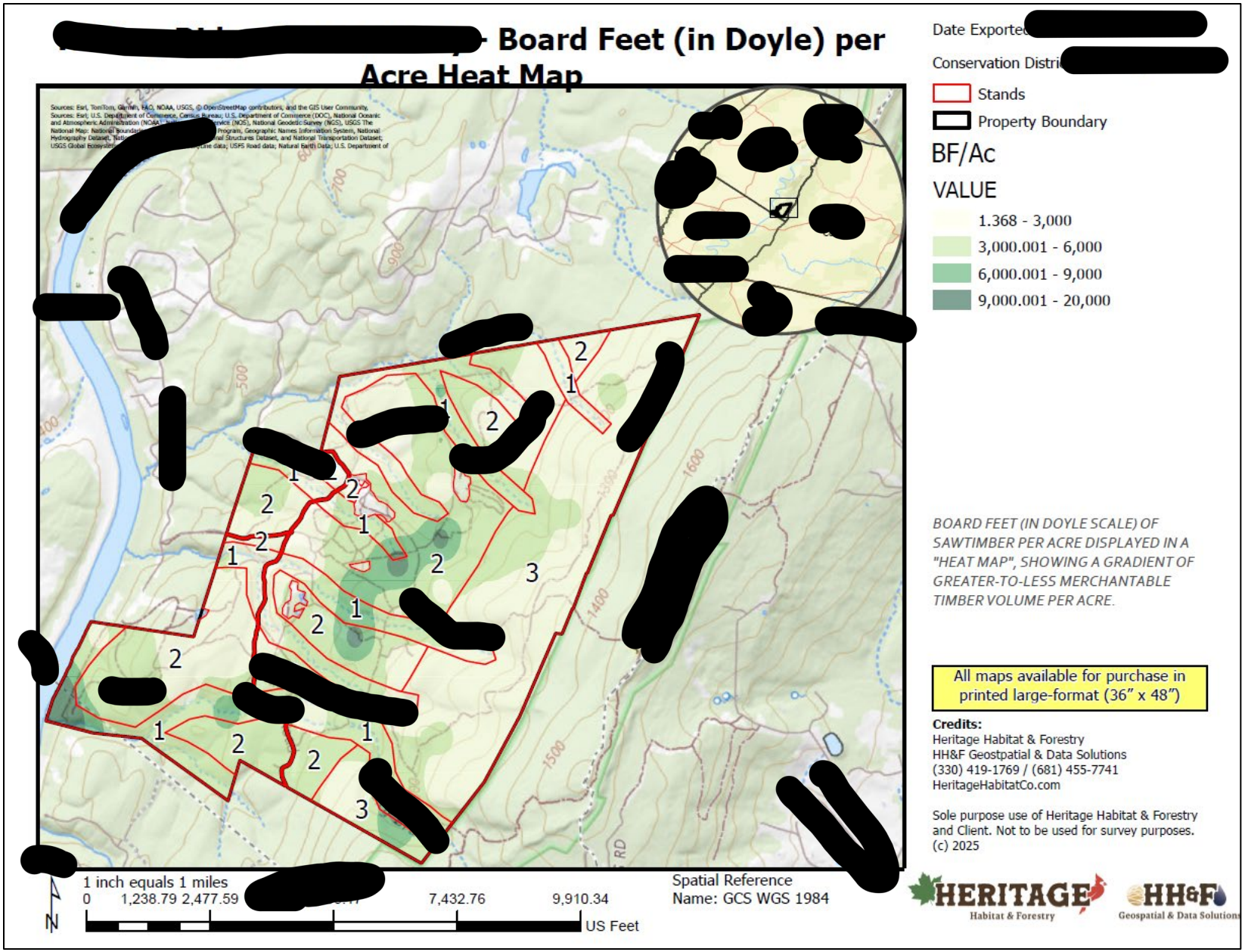
(c) 2025
1 inch equals 1 miles
0
1,238.8
2,477.61
7,432.82
9,910.43
US Feet
N
Spatial Reference
Name: GCS WGS 1984
HERITAGE Habitat & Forestry
HH&F Geospatial & Data Solutions


[redacted] Board Feet (in Doyle) per Acre Heat Map
Date Exported [redacted]
Conservation Distri[redacted]
Stands
Property Boundary
BF/Ac
VALUE
1.368 - 3,000
3,000.001 - 6,000
6,000.001 - 9,000
9,000.001 - 20,000
BOARD FEET (IN DOYLE SCALE) OF SAWTIMBER PER ACRE DISPLAYED IN A "HEAT MAP", SHOWING A GRADIENT OF GREATER-TO-LESS MERCHANTABLE TIMBER VOLUME PER ACRE.
All maps available for purchase in printed large-format (36" x 48")
Credits:
Heritage Habitat & Forestry
HH&F Geostpatial & Data Solutions
(330) 419-1769 / (681) 455-7741
HeritageHabitatCo.com
Sole purpose use of Heritage Habitat & Forestry and Client. Not to be used for survey purposes.
(c) 2025
1 inch equals 1 miles
0 1,238.79 2,477.59 7,432.76 9,910.34
US Feet
Spatial Reference
Name: GCS WGS 1984
N
HERITAGE Habitat & Forestry
HH&F Geospatial & Data Solutions

Stand Summary Table

Stand[13] #	1	2	3
Acres	399	690	495
Site Index[14]	55	60 – 70	70
Forest Cover Type[15]	Riverine/Bottomland	Oak-Hickory (Conifer <25%)	Oak/Pine (Conifer 25-49%)
Dominant Size Class[16]	Sawtimber	Sawtimber	Pulpwood
Doyle Board Foot Volume per Acre	4,867	3,628	2,910
QMD (inches)	12.46	12.72	10.16
Stocking %[17]	70	65	60
Invasive Spp. Cover %	As shown on "Treatment Map"	As shown on "Treatment Map"	As shown on "Treatment Map"
Topography (Aspect, Slope)	Bottomlands	Westerly; rolling	Westerly; steep
Spongy (Gypsy) Moth Hazard Rating[18]	Moderate Risk (11-24% mortality estimate)	Moderate Risk (11-24% mortality estimate)	Moderate Risk (11-24% mortality estimate)
Description	Immature moisture-tolerant hardwood species	Sawtimber-size dominated Chestnut oak, with pockets of yellow-poplar along ravine edges	Immature timber with minimal understory present
Management Recommendation	Invasive species control	Invasive species control, edge feathering, uneven-aged timber harvesting	Invasive species control, patch clearcutting

[13] A "stand", in an ecological and silvicultural context, is a contiguous group of similar plants (trees) sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficient uniform quality. (*The Dictionary of Forestry*, 1998).
[14] Site index is a measure of site productivity, relative to a particular species (Northern red oak) at some base age (100 years), with an average height (of 100 ft.).
[15] Forest cover type is a determination of "the plant species forming a plurality of composition across a given area (stand). (*The Dictionary of Forestry*, 1998).
[16] Based upon quadratic mean diameter: Regenerating = <6", Poletimber = 6 – 8", Pulpwood = 10 – 12", Sawtimber = 12"+
[17] *Stocking Chart for Upland Central Hardwoods*
[18] Determined by chart under "Spong Moth Information".

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
Explanation below												
NRCS Tract #	*Stand # according to Stand Maps*	*Total stand acres / total acres treated*	*Priority of recommendation, with 1 being highest priority*	*The NRCS EQIP code associated with a practice, if cost-share is available*	*Recommended service or treatment*	*Description of the recommendation*	*The amount of "x" units planned for that recommendation*	*How much the recommendation would cost to execute*	*How much the recommendation would cost to execute if landowner hired Heritage Habitat & Forestry as a retained consultant*	*Estimated income generated from recommendation*	*The month(s) the treatment is planned for*	*The year(s) the treatment is planned for*

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
Recommendations												
All	All	All	1	N/A	Forestland Operations Management	Month-to-month retainer agreement for all forest- and land-management practices	All	Starting at $2,000 per month	/	/	All	2025 – 2035
All	All	All	1	N/A	Forest Management Plan	Updated timber inventory & management plan	All	Inquire	10% discount	/	Any	2035
TBD	TBD	TBD	2	N/A	Forest Carbon Assessment	An assessment of your property for potential carbon credit sales	TBD	Inquire	10% discount	/	Any	2025 – 2035
TBD	TBD	TBD	2	N/A	Forest Carbon Credit Sale Administration **(if interested)**	Management & auditing of forest carbon project	TBD	Starting at $5,000 per year	/	/	Any	2025 – 2035
TBD	TBD	TBD	2	N/A	Hunting Lease **(if interested)**	Entertain offers to lease hunting rights	TBD	$2,000 per year	/	$5 – 20 per acre per year	Any	2025 – 2035
TBD	TBD	TBD	2	N/A	Absentee Property Oversight **(if interested)**	Oversight of absentee property, providing landowner monthly updates	All	Starting at $1,200 per month	/	/	All	2025 – 2035
All	All	All	1	N/A	Boundary Maintenance	Mark & maintain boundary lines	Perim-eter	Seek contra-ctor	/	/	ASAP	ASAP
[redacted]	1	399 / 2	1	314	Brush Management	Control of invasive species	2 acres	Approx. $1,000 per acre	/	/	May through Sept.	2026

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
					(Woody Invasive Species Control)	(25% observed cover over entire stand)						
[redacted]	2	690 / 32	1	314	Brush Management (Woody Invasive Species Control)	Control of invasive species (25% observed cover over entire stand)	32 acres	Approx. $1,000 per acre	/	/	May through Sept.	2027
[redacted]	3	495 / 9	1	314	Brush Management (Woody Invasive Species Control)	Control of invasive species (25% observed cover over entire stand)	9 acres	Approx. $1,000 per acre	/	/	May through Sept.	2028
[redacted]	1	399 / 2	1	N/A	"Brush Management Project" Planning & Oversight	Planning & oversight of invasive species control; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures	2 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	
[redacted]	2	690 / 32	1	N/A	"Brush Management Project" Planning & Oversight	Planning & oversight of invasive species control; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures	32 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
[redacted]	3	495 / 9	1	N/A	"Brush Management Project" Planning & Oversight	Planning & oversight of invasive species control; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures	9 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	
[redacted]	1	399 / 4	1	315	Herbaceous Treatment (Non-woody Invasive Species Control)	Control of invasive species (5% observed cover over entire stand)	4 acres	Approx. $1,000 per acre	/	/	May through Sept.[19]	2029
[redacted]	1	399 / 4	1	N/A	"Herbaceous Treatment Project" Planning & Oversight	Planning & oversight of herbaceous treatment; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures	4 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	
[redacted]	2	690 / 4	1	315	Herbaceous Treatment (Non-woody Invasive Species Control)	Control of invasive species (5% observed cover over entire stand)	4 acres	Approx. $1,000 per acre	/	/	May through Sept.[20]	2029
[redacted]	2	690 / 4	1	N/A	"Herbaceous Treatment	Planning & oversight of herbaceous	4 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	

[19]As label allows.
[20]As label allows.

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
					Project" Planning & Oversight	treatment; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures						
[redacted]	3	495 / 3	1	315	Herbaceous Treatment (Non-woody Invasive Species Control)	Control of invasive species (5% observed cover over entire stand)	3 acres	Approx. $1,000 per acre	/	/	May through Sept.[21]	2029
[redacted]	3	495 / 3	1	N/A	"Herbaceous Treatment Project" Planning & Oversight	Planning & oversight of herbaceous treatment; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures	3 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	
[redacted]	3	495 / 13	4	647	Early Successional Habitat	Clearcut forest openings (patch clearcuts)	13 acres	Seek contra-ctor	/	/	Jan through Apr.	2027
[redacted]	3	495 / 12	4	647	Early Successional Habitat	Clearcut forest openings (patch clearcuts)	12 acres	Seek contra-ctor	/	/	Jan through Apr.	2028
[redacted]	3	495 / 25	4	N/A	"Patch Clearcuts Project"	Planning & oversight of patch clearcut treatment; mapping,	25 total acres	$85 per hour	Included with retainer	/	As contractors fulfill project	

[21] As label allows.

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
					Planning & Oversight	flagging, bid preparation, contractor management, auditing, and close-out procedures						
[redacted]	2	5 / 5	3	647	Early Successional Habitat	Cutback borders (edge feathering)	5 acres	Seek contra-ctor	/	/	Jan through Apr.	2028
[redacted]	2	5 / 5	3	N/A	"Edge Feathering Project" Planning & Oversight	Planning & oversight of edge feathering treatment; mapping, flagging, bid preparation, contractor management, auditing, and close-out procedures	5 acres	$85 per hour	Included with retainer	/	As contractors fulfill project	
[redacted]	2	690 / 579	1	N/A	Timber Harvest	Uneven-aged timber harvest; preferably to be marked by a registered professional forester and/or a Certified Forester, Consulting Forester	579 acres	/	/	TBD	Any	2025 +
[redacted]	2	690 / 579	1	N/A	Timber Sale Administration	Administration of timber harvesting, including timber marking, mapping, flagging, bid	579 acres	10% of selling price, or $5,000; which is greater	$5,000 mini-mum fee waived	/	As loggers operate	

Treatment Schedule

Tract #	Stand #	Total Acres / Treated Acres	Ranked Priority *(1 – 10; 1 being highest)*	NRCS Practice Code *(if applicable)*	Recommended Service or Treatment	Treatment or Service Description	Planned Amount and Unit	Financial Projection *(if purchased)*			Planned Month(s)	Planned Year(s)
								Raw Expense	Retained Expense	Income		
						preparation, contractor management, auditing, and close-out procedures.						
[redacted]	2	690 / harvest area	1	N/A	Regeneration Survey	Visual observational survey of harvested area to ensure desirable tree species regeneration and post-harvest site conditions; ideally 5 years post-harvest	TBD	$15 per acre	Included with retainer	/	Any	5 years post-harvest
[redacted]	2	690 / harvest area	1	N/A	Regeneration Cruise	Timber cruise as-planned at 10-yr interval, but added regenerative inventory specifications to cruise instructions to ensure sustainability of site post-harvest	TBD	Addt'l $2 per acre	Included with retainer	/	Any	2035
Grand Total[22]								?	?	?	< IF PURCHASED	

[22] Net present value at X% discount rate, in USD, real dollars

Treatment Notes

- Before entering a timber sale agreement or conducting other forestry work that is not listed in your treatment schedule, contact your forester first to ensure compliance with your approved management plan.
- For invasive species control via herbicide application, always follow label instructions – specifically pertaining to site, application timing (season of year), and application method(s).
    - A helpful resource is presented here by the U.S. EPA Bulletins Live! Two program:
        - https://www.epa.gov/endangered-species/bulletins-live-two-view-bulletins
- For a list of companies able to fulfill your recommended forest treatments, please contact us.
- If enrolled in a forest carbon agreement, check your contract with the project developer to ensure compliance with any restrictions that may be in place on your property.
    - Family Forest Carbon Program restrictions listed below, "*A Forester's Guide To The Family Forest Carbon Program In The Central And Southern Appalachians*" – always check your contract for up-to-date restrictions
        - Commercial timber harvests and non-commercial tree cutting are allowed through the Growing Mature Forests practice but must meet the following criteria to ensure that the cutting is sustainable and meets program goals:
            - I. Permitted Removals:
                - a. Landowners may remove any dead wood or live trees from their Contract Area that pose a threat to human safety and health. Landowners are responsible for contacting FFCP personnel when hazard removal is to occur.
                - b. Landowners may remove dead wood or live trees from their Contract Area for personal use (i.e., not for barter, sale, or trade) in amounts of "Cords" listed in the table below in total during a 12-month period, limited in the case of live trees to those of less than 12" in diameter. Harvest for personal use must be evenly distributed throughout accessible forested areas within the Contract Area and not confined to one area and may not be conducted in a manner that is intended to result in or reduce the requirements for a Substantial Harvest (described below). These permitted removals may not be conducted if they cause or contribute to any Prohibited Removals (described below).

Forested Contract Area (acres)	Maximum Cords per Year
30-199	5
200-299	10
300-399	15
400-499	20
500+	25

To keep track of implementation of recommended treatments

Treatment Activities Progress Table (Forest Monitoring Form)

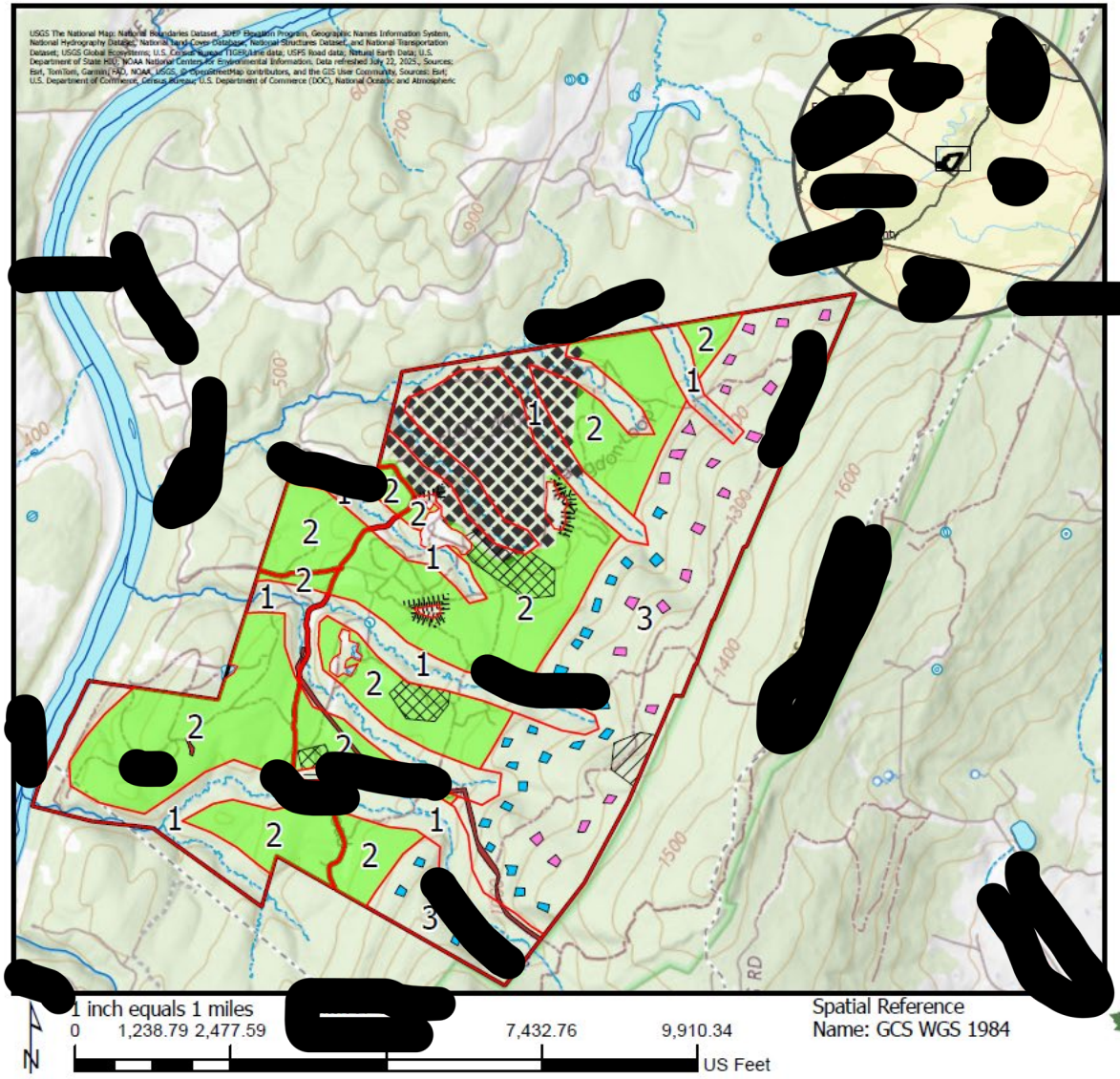
Tract #	Stand #	NRCS Practice Code *(if applicable)*	NRCS Practice Name/Heritage Habitat & Forestry Practice Name	Activity Description	Planned Amount	Completed Amount	Completed Date

To record any amendments to this management plan during 10-year cycle

Forest Stewardship Plan Amendment(s) Table

Tract #	Date	New Stand(s)	Amendment Description	Reason for Amendment

[redacted] - Treatment Map



Conservation Distric[redacted]

- Stands
- Brush Mgmt. (314) - 2026
- Brush Mgmt. (314) - 2027
- Brush Mgmt. (314) - 2028
- Herbaceous Treatment (315) - 2029
- Edge Feathering (647)
- Patch Clearcuts (649) - 2027
- Patch Clearcuts (649) - 2028
- Uneven-aged Timber Harvesting
- Pre-planned Timber Harvests
- Property Boundary

TREATMENT MAP OF CLIENT'S FORESTLAND.

All maps available for purchase in printed large-format (36" x 48")

Credits:
Heritage Habitat & Forestry
HH&F Geostpatial & Data Solutions
(330) 419-1769 / (681) 455-7741
HeritageHabitatCo.com

HERITAGE Habitat & Forestry HH&F Geospatial & Data Solutions

Existing & Desired Future Conditions

Forested Stand Description and Management Recommendations

Stand 1, 399 acres

Existing Conservation Practices: None

NRCS Resource Concerns:[23] Plant pest pressure

Recommended EQIP Practices: 314 – Brush Management

Is a harvest recommended within this 10-year plan? No

Existing Forest Conditions

General Summary: Stand 1 contains riverine/bottomland/streamside forest cover type, with the dominant tree species being yellow-poplar, American sycamore, and white oak in the overstory, and yellow-poplar, chestnut oak, and red maple in the midstory. The stand consists of decent wildlife habitat, and decent timber quality. The timber is immature and no commercial harvesting is recommended at this time, however, conducting recommended practices should improve the quality of both wildlife habitat and timber quality of this stand.

This stand may contain particularly sensitive areas, such as Streamside Management Zones[24], topographically defined streams, USGS designated streams (including ephemeral[25], perennial[26], and intermittent[27] streams), creeks, wetland areas, and other water bodies, as well as additional acreage that is consistent with the aforementioned conditions. Special caution must be taken when operating within this stand, being cognizant of stream banks, steep slopes, and sedimentation/erosion risks as enumerated in the appropriate state Best Management Practices booklet.

No active management besides invasive species control (using aquatically labeled herbicides) is recommended at this time.

- The current forest cover type is acceptable considering this stand's topography, location, aspect, and other factors.
- The current basal area of this stand is 85 square feet per acre, which is higher than recommended. Active management may be required in order to reduce the basal area to the desired amount.
- The average tree diameter is 12.46", which indicates the majority of stems being typical for this stand type and current condition (given prior and current land use history).

[23] Descriptions of each recommendation located in NRCS Resource Concerns.
[24] A protective strip of forestland adjacent to waterbody and/or channel; primarily used for protection of streams, creeks, banks, erosion risk, etc.
[25] A stream that typically flows only during rain events, otherwise may be dry – usually not indicated on USGS maps.
[26] A stream that has well-defined banks and channels, and continuously flows water except during droughts – USGS maps as solid blue line.
[27] A stream that has well-defined banks and channels but flows water occasionally during course of year – USGS maps as broken blue line.

- The merchantable volume, expressed in Doyle board feet per acre, indicates this stand is not ready for a commercial harvest.
- As indicated by the stocking percentage, this stand is within recommended range and is in need of maintaining stocking to meet desired future conditions. This can be accomplished through active management.
- The regenerating tree species do adequately provide desirable regeneration of this forest type.
- The dominant and midstory tree species composition are desired.
- The stand health has been determined to be satisfactory due to the absence of large amounts (>= 50% cover) of invasive species as listed above.
- There is approximately 1 grapevine-affected tree per acre, which is below the "threshold" for management of 40 per acre.

Noxious & Invasive Plants: Multiflora rose, Japanese stiltgrass, Japanese barberry, tree-of-heaven, autumn olive, bush honeysuckle, and others that may not have been visually noted.

Insect and/or Disease Present: Previous infestation of emerald ash borer, maple tar spot. Spongy (gypsy) moth, beech bark disease, hemlock woolly adelgid, and others may be present but weren't noted during property visits.

Recommended Forest Management Activities[28]

1. **Brush Management (314):** The control and removal of non-native invasive species and detrimental grapevine, such as grapevine growing on commercially valuable species such as black walnut, oak, and others. This stand did not exhibit substantial amounts of invasive species, so activities regarding this practice may be limited to very select, individual areas instead of entire stand acreage.
    a. This practice can be accomplished by Landowner involvement or via hired contractor(s).
        i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
            1. See "**Project Planning & Oversight**" practice on Treatment Schedule.

No-Action Alternatives

1. **Brush Management (314):** Non-native invasive species will continue to proliferate and dominate the understory of the forest, thereby reducing ecological diversity, function, and overall forest health. Non-native invasive species do not pose a substantial threat to this stand, but not controlling the existing plants will lead to further infestation.

[28] Descriptions of each recommendation located in Conservation Job Sheets.

Desired Future Forest Conditions

1. **Brush Management (314):** Removal of non-native invasive species will promote the development of a native understory that is currently being outcompeted by invasive plants. This step must be the initial management practice prior to any other practice being attempted.

Stand 1 General Analysis

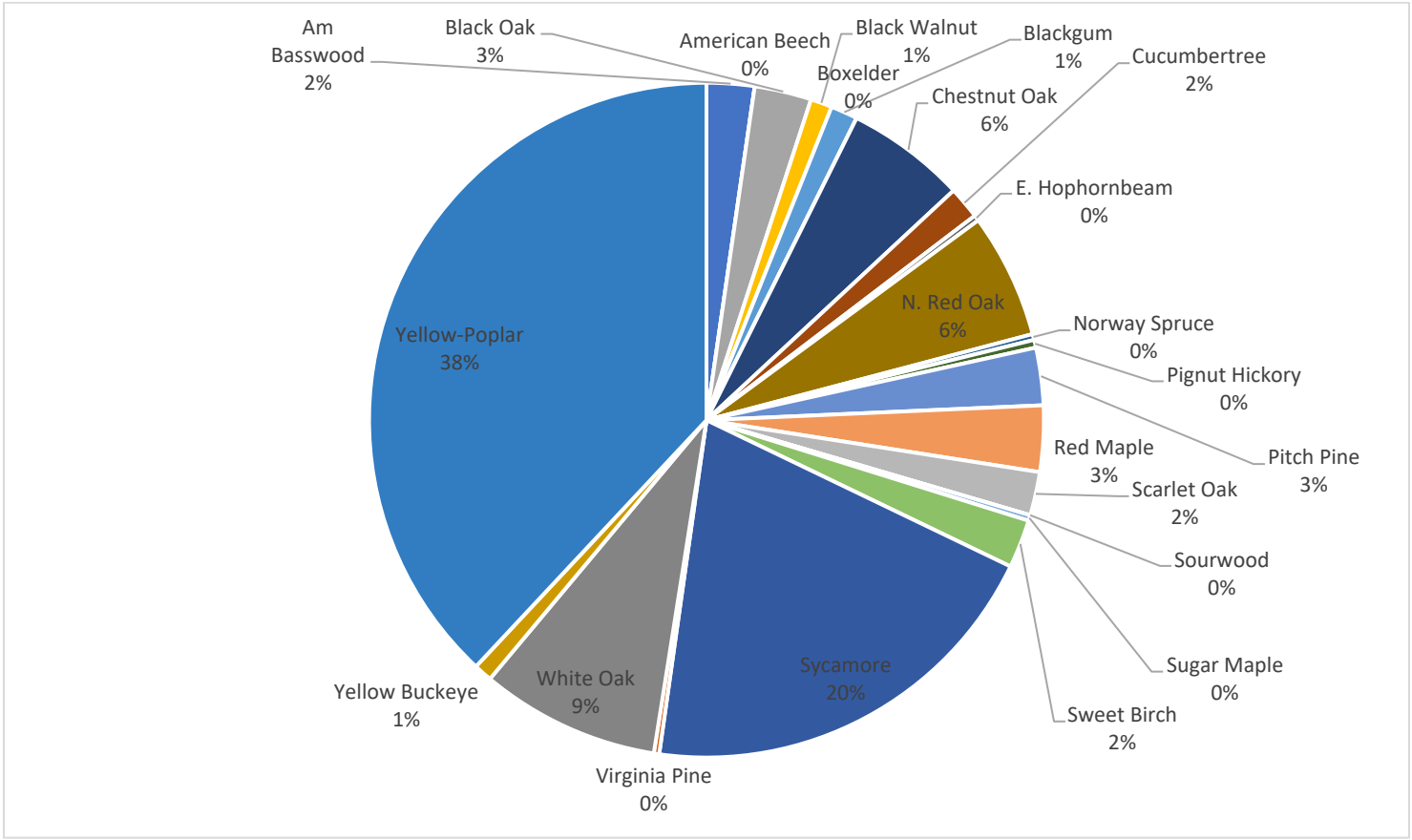
Detailed stand statistical analysis available under "Forest Condition" section of management plan		
Forested Acres = 399	**Number of Inventory Plots[29] = 22**	
Item	**Current Condition**	**Desired Condition**
Den, Snags, & Cavity Trees per Acre	1	>= 8 per acre
Dead Trees per Acre	3	Minimum 5 per acre
Grapevine-affected Trees per Acre	1	Minimum 5 per acre
Live Basal Area per Acre	85	61 - 80
Dead Basal Area per Acre	3	
Downed Woody Debris[30]	<1	>= 2 per acre
Drumming Logs[31]	<1	>= 2 per acre
Forest Cover Type	Riverine/Bottomland	Riverine/Bottomland
Average Dominant Canopy Height	75'	
Average Sawtimber Tree Age	75	
Dominant Size Class	Sawtimber	Sawtimber
Stocking %	70%	60 - 80%
Invasive Species Cover %	25%	<10%
Spongy (Gypsy) Moth Hazard Rating	Moderate Risk	
Dominant Species by Live Doyle BF/ac	Yellow-poplar, American sycamore, white oak	
Dominant midstory[32] species by BA/ac	Yellow-poplar, chestnut oak, red maple	
Desirable Tree Regeneration Present	Yes - matches forest type	
Logging Trail Conditions	Needs Improved	
Dominant Soil Types[33]	SvF	

Can be enhanced through recommended practices

Can be enhanced through recommended practices

[29] Data in stands with less than 3 plots, or average >10 ac. per plot may be estimated by forester's discretion to better emulate true field conditions.
[30] Either 6 or more logs 30' long by 8" diameter or 2 or more logs 30' long by 16" diameter.
[31] At least 2 logs 8' long by 16" diameter contour with slope on ground.
[32] Trees with DBH of 6-8" class.
[33] Refer to appended Soil Report for specifics and descriptions.

Current Live Doyle Board Foot Volume by Species Composition[34]:



[34] May not sum to 100% due to rounding errors.

Current Diameter Distribution Table[35]:

	Live Trees Per Acre												
	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Norway Spruce	2	1	1	0	0	0	0	0	0	0	0	0	4
Pitch Pine	0	0	0	0	1	0	0	0	0	0	0	0	1
Virginia Pine	0	0	1	0	0	0	0	0	0	0	0	0	1
Boxelder	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Maple	15	0	1	1	1	1	0	0	0	0	0	0	19
Sugar Maple	0	0	1	0	0	0	0	0	0	0	0	0	1
Yellow Buckeye	0	0	0	0	1	0	0	0	0	0	0	0	1
Sweet Birch	1	0	1	0	1	0	0	0	0	0	0	0	3
Pignut Hickory	2	0	1	0	0	0	0	0	0	0	0	0	3
American Beech	1	0	0	0	0	0	0	0	0	0	0	0	1
Black Walnut	1	0	0	0	0	0	0	0	0	0	0	0	2
Yellow-Poplar	4	1	3	1	1	2	1	0	0	1	0	0	14
Cucumbertree	1	0	1	0	0	0	0	0	0	0	0	0	3
Blackgum	8	1	1	0	0	0	0	0	0	0	0	0	13
E. Hophornbeam	0	0	1	0	0	0	0	0	0	0	0	0	1
Sourwood	1	0	0	0	0	0	0	0	0	0	0	0	1
Sycamore	0	0	0	0	0	0	0	0	0	0	0	0	2
White Oak	2	0	1	0	0	0	0	1	1	0	0	0	5
Scarlet Oak	0	0	1	0	0	0	0	0	0	0	0	0	2
Chestnut Oak	10	3	1	3	0	1	0	0	0	0	0	0	19
N. Red Oak	0	0	1	1	1	0	0	0	0	0	0	0	3
Black Oak	0	0	0	1	0	1	0	0	0	0	0	0	2
Am Basswood	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	50	6	12	8	6	5	3	2	2	1	0	1	101

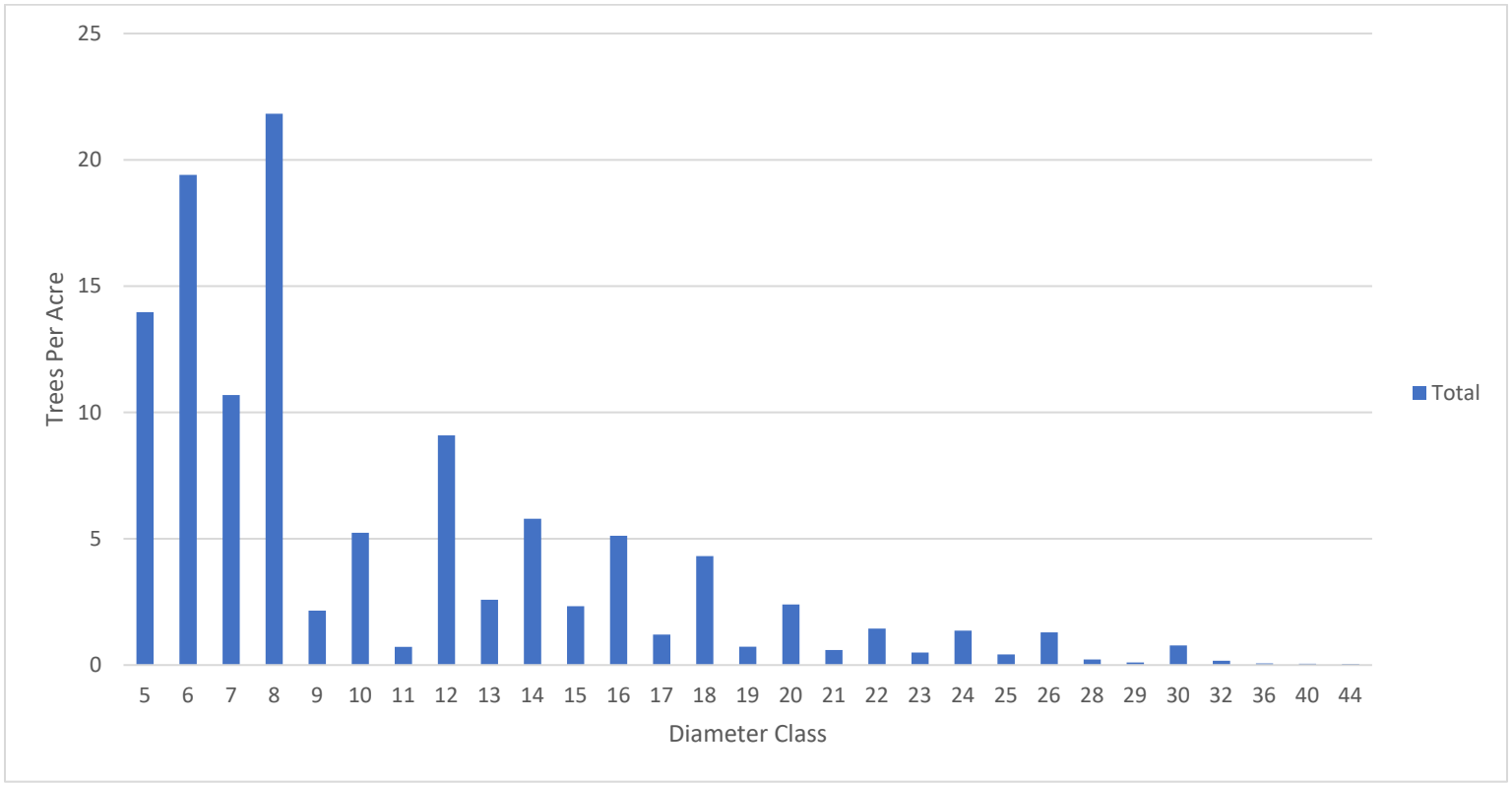
[35] May not sum properly due to rounding errors.

10-yr Projected Desired Diameter Distribution[36]:

	Live Trees Per Acre												
	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Norway Spruce		0	0	0	0	0	0	0	0	0	0	0	0
Pitch Pine		0	0	0	0	1	0	0	0	0	0	0	1
Virginia Pine		0	0	1	0	0	0	0	0	0	0	0	1
Boxelder		0	0	0	0	0	0	0	0	0	0	0	0
Red Maple		15	0	1	1	1	1	0	0	0	0	0	17
Sugar Maple		0	0	1	0	0	0	0	0	0	0	0	1
Yellow Buckeye		0	0	0	0	1	0	0	0	0	0	0	1
Sweet Birch		1	0	1	0	1	0	0	0	0	0	0	3
Pignut Hickory		2	0	1	0	0	0	0	0	0	0	0	3
American Beech		1	0	0	0	0	0	0	0	0	0	0	1
Black Walnut		1	0	0	0	0	0	0	0	0	0	0	2
Yellow-Poplar		4	1	3	1	1	2	1	0	0	1	0	14
Cucumbertree		1	0	1	0	0	0	0	0	0	0	0	3
Blackgum		8	1	1	0	0	0	0	0	0	0	0	10
E. Hophornbeam		0	0	1	0	0	0	0	0	0	0	0	1
Sourwood		1	0	0	0	0	0	0	0	0	0	0	1
Sycamore		0	0	0	0	0	0	0	0	0	0	0	1
White Oak		2	0	1	0	0	0	0	1	1	0	0	5
Scarlet Oak		0	0	1	0	0	0	0	0	0	0	0	2
Chestnut Oak		10	3	1	3	0	1	0	0	0	0	0	19
N. Red Oak		0	0	1	1	1	0	0	0	0	0	0	3
Black Oak		0	0	0	1	0	1	0	0	0	0	0	2
Am Basswood		0	0	0	0	0	0	0	0	0	0	0	0
Total		47	5	11	8	6	5	3	2	2	1	0	91

[36] May not sum properly due to rounding errors.

Current Diameter Distribution Frequency Graph:



Existing & Desired Future Conditions

Forested Stand Description and Management Recommendations

Stand 2, 690 acres

Existing Conservation Practices: None

NRCS Resource Concerns:[37] Plant pest pressure, Plants - Plant Productivity & Health, Animals - Terrestrial Habitat

Recommended EQIP Practices: 314 – Brush Management, 315 – Herbaceous Treatment, 647 – Cutback Borders (Edge Feathering)

Is a harvest recommended within this 10-year plan? Yes

Existing Forest Conditions

General Summary: Stand 2 contains oak-hickory forest cover type, with the dominant tree species being yellow-poplar, chestnut oak, and white oak in the overstory, and chestnut oak, yellow-poplar, and red maple in the midstory. The stand consists of poor wildlife habitat, and good timber quality. The timber is overcrowded, over dense, and ready for harvest. Conducting recommended practices should improve the quality of both wildlife habitat and timber quality of this stand. Previous timber harvesting planned in 2015 and completed by early 2025.

- The current forest cover type is acceptable considering this stand's topography, location, aspect, and other factors.
- The current basal area of this stand is 79 square feet per acre, which is within recommended range.
- The average tree diameter is 12.72", which indicates the majority of stems being typical for this stand type and current condition (given prior and current land use history).
- The merchantable volume, expressed in Doyle board feet per acre, indicates this stand is potentially ready for a commercial harvest.
- As indicated by the stocking percentage, this stand is within recommended range and is in need of maintaining stocking to meet desired future conditions. This can be accomplished through active management.
- The regenerating tree species do adequately provide desirable regeneration of this forest type.
- The dominant and midstory tree species composition are desired.
- The stand health has been determined to be satisfactory due to the absence of large amounts (>= 50% cover) of invasive species as listed above.
- There is approximately 1 grapevine-affected tree per acre, which is below the "threshold" for management of 40 per acre.

[37] Descriptions of each recommendation located in NRCS Resource Concerns.

Noxious & Invasive Plants: Multiflora rose, Japanese stiltgrass, Japanese barberry, tree-of-heaven, autumn olive, bush honeysuckle, and others that may not have been visually noted.

Insect and/or Disease Present: Previous infestation of emerald ash borer, maple tar spot. Spongy (gypsy) moth, beech bark disease, hemlock woolly adelgid, and others may be present but weren't noted during property visits.

Recommended Forest Management Activities[38]

1. **Brush Management (314):** The control and removal of non-native invasive species and detrimental grapevine, such as grapevine growing on commercially valuable species such as black walnut, oak, and others. This stand did not exhibit substantial amounts of invasive species, so activities regarding this practice may be limited to very select, individual areas instead of entire stand acreage.
    b. This practice can be accomplished by Landowner involvement or via hired contractor(s).
        i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
            1. See "**Project Planning & Oversight**" practice on Treatment Schedule.

2. **Herbaceous Weed Treatment (315):** The control and removal of herbaceous weed species, such as Japanese stiltgrass. This stand did not exhibit substantial amounts of invasive herbaceous species, so activities regarding this practice may be limited to very select, individual areas instead of entire stand acreage.
    c. This practice can be accomplished by Landowner involvement or via hired contractor(s).
        i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
            1. See "**Project Planning & Oversight**" practice on Treatment Schedule.

3. **Cutback Borders (647):** Edge-feathering an approximate 100' buffer around the openlands is recommended. This habitat improvement practice will create early- to mid-successional woody and herbaceous wildlife habitat with little or no detriment to the residual timber within the buffer. It is recommended to remove overstory and midstory non-oak species in order to allow the most sunlight possible to reach the forest floor to advance herbaceous as well as early-successional woody species within the edge buffer. This will be a heavy removal with a goal residual basal area of 50 square feet per acre. The goal is to greatly reduce the tree density within the buffer to promote transitional habitat. The edge feathering should provide adequate bedding and escape cover to a multitude of wildlife species. The elimination of the "hard edge"

[38] Descriptions of each recommendation located in Conservation Job Sheets.

and establishment of more of a “transitional phase” between field and forest will greatly improve wildlife habitat.

a. This practice can be accomplished by Landowner involvement or via hired contractor(s).
    i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
        1. See “**Project Planning & Oversight**” practice on Treatment Schedule.

4. **Timber Harvest:** An overstory timber harvest in the form of single-tree and group-selection methods is recommended. A majority of the sawtimber-sized trees are within the canopy space of each other and growth in volume and value has been stagnant due to these conditions.

   A single-tree/group-selection timber harvest method is a part of what’s called “uneven-aged management”. According to the Dictionary of Forestry (SAF, 1998), uneven-aged methods regenerate and maintain a multi-aged structure by removing some trees in all size classes either single, in small groups, or in strips.

   Group selection involves the removal of trees with a new age class being established in these groups. The width of such groups are commonly approximately twice the height of the mature trees. (SAF, 1998)

   Single-tree selection involves the removal of individual trees of all size classes more or less uniformly throughout the forest, to promote growth of remaining trees and to provide space for regeneration. (SAF, 1998)

   Uneven aged management in the way of single-tree and group-selection is a timber marking strategy that involves painting the individual trees to be harvested across the property in a way that takes “one tree here, one tree there” (single-tree selection) as well as removing groups of sawtimber-sized trees in ¼ - ½ acre openings (group selection). This method provides a patchwork of forest density post-harvest and increases both the forest’s vertical and horizontal structural diversity by not marking timber in a consistent way across the forest.

   To increase wildlife benefit in this stand, early successional forest habitat is created by removing groupings (group-selection) of the larger canopy trees present, thereby allowing more sunlight to reach the forest floor which will lead to development of an understory.

   a. This practice can be accomplished by selling timber to a licensed logger.
       i. Heritage Habitat & Forestry can facilitate all aspects of timber sale administration, including bid preparation, monitoring and auditing of loggers during execution, and reporting of logger progress to Client.

5. **Post-harvest Regeneration Survey:** Conduct an inventory to determine post-harvest regeneration response and ensure oak species occupy at least 33% of the regenerating trees (sized 2 – 6" DBH).
    a. This practice can be accomplished by Heritage Habitat & Forestry as a separate service fee.

No-Action Alternatives

1. **Brush Management (314):** Non-native invasive species will continue to proliferate and dominate the understory of the forest, thereby reducing ecological diversity, function, and overall forest health. Non-native invasive species do not pose a substantial threat to this stand, but not controlling the existing plants will lead to further infestation.

2. **Herbaceous Weed Treatment (315):** Non-native invasive species will continue to proliferate and dominate the understory of the forest, thereby reducing ecological diversity, function, and overall forest health. Non-native invasive species do not pose a substantial threat to this stand, but not controlling the existing plants will lead to further infestation.

3. **Cutback Borders (647):** Without edge habitat, prey species will have little-to-no escape cover to avert predation in and around openlands areas.

4. **Timber Harvest:** Without a timber harvest, the timber will continue to mature and grow – contributing to even greater density-dependent mortality and loss of economic value.

   The forest itself will continue to have little-to-no desirable understory development due to the closed canopy structure of the mature overstory.

5. **Post-harvest Regeneration Survey:** Without conducting an inventory, the success of desirable species recruitment (in this case, oaks) could only be based on observational data, if that.

Desired Future Forest Conditions

1. **Brush Management (314):** Removal of non-native invasive species will promote the development of a native understory that is currently being outcompeted by invasive plants. This step must be the initial management practice prior to any other practice being attempted.

2. **Herbaceous Weed Treatment (315):** Removal of non-native invasive species will promote the development of a native understory that is currently being outcompeted by invasive plants. This step must be the initial management practice prior to any other practice being attempted.

3. **Cutback Borders (647):** Edge-feathering is prescribed around the openlands to improve wildlife habitat. Edge-feathering consists of a heavy removal of non-oak tree species around an approximate 100' buffer along openlands to promote a "soft-edge". This is a transition zone between a fully open field and a closed-canopy forest. This zone will provide small- and medium-sized game species, such as rabbits, turkeys, and deer, a thicket of briars, brambles, and shrub-like woody species such as sumac. This transition zone is vital across the landscape since this habitat type is largely gone across the state.

4. **Timber Harvest:** The single-tree and group-selection timber harvest will create small patches, randomly spaced, throughout the stand in order to provide a diversity of tree canopy structures as well as provide early-successional habitat such as brambles and briars.

   The current stand structure, from a wildlife habitat perspective, is stagnant and of low quality. Having trees of all the same approximate age, diameter, and crown position does not provide a multitude of habitat types required by large mammals (deer), small game (rabbits, squirrels), as well as a great number of songbirds.

   The reduction of overstory tree density via timber sale will allow increased amounts of sunlight onto the ground to propagate the next generation of trees, specifically oaks which require large quantities of sunlight in order to germinate and survive.

5. **Post-harvest Regeneration Survey:** The inventory data will show oak species occupy at least 33% of the regenerating trees (sized 2 – 6" DBH).

Stand 2 General Analysis

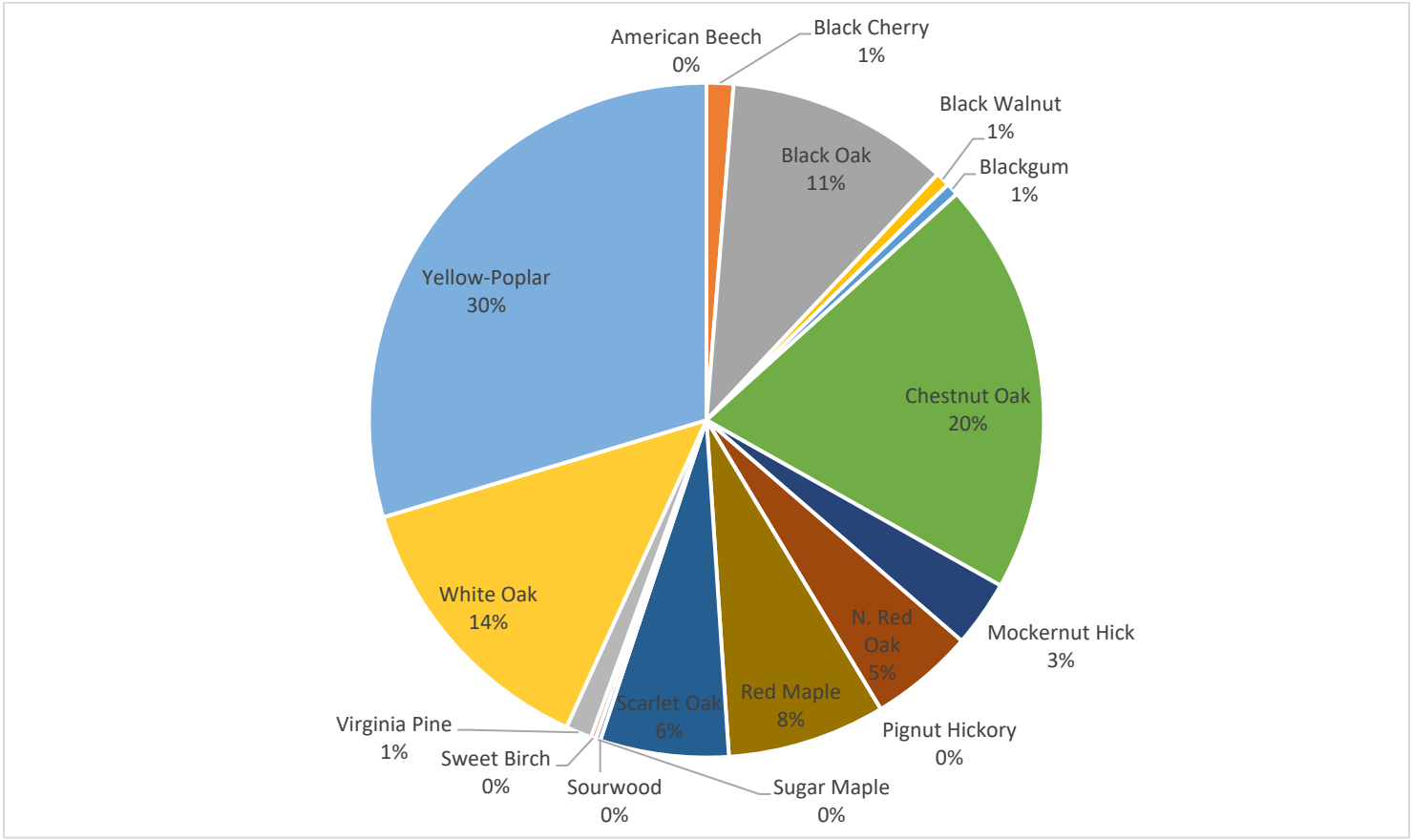
Detailed stand statistical analysis available under "Forest Condition" section of management plan		
Forested Acres = 690	**Number of Inventory Plots[39] = 33**	
Item	**Current Condition**	**Desired Condition**
Den, Snags, & Cavity Trees per Acre	<1	>= 8 per acre
Dead Trees per Acre	4	Minimum 5 per acre
Grapevine-affected Trees per Acre	1	Minimum 5 per acre
Live Basal Area per Acre	79	61 - 80
Dead Basal Area per Acre	4	
Downed Woody Debris[40]	<1	>= 2 per acre
Drumming Logs[41]	<1	>= 2 per acre
Forest Cover Type	Oak-Hickory (Conifer <25%)	Oak-Hickory (Conifer <25%)
Average Dominant Canopy Height	75'	
Average Sawtimber Tree Age	75	
Dominant Size Class	Sawtimber	Pulpwood
Stocking %	65%	60 - 80%
Invasive Species Cover %	10%	<10%
Spongy (Gypsy) Moth Hazard Rating	Moderate Risk	
Dominant Species by Live Doyle BF/ac	Yellow-poplar, chestnut oak, white oak	
Dominant midstory[42] species by BA/ac	Chestnut oak, yellow-poplar, red maple	
Desirable Tree Regeneration Present	Yes - matches forest type	
Logging Trail Conditions	Usable As-is	
Dominant Soil Types[43]	WtC, CdD	

Can be enhanced through recommended practices

Can be enhanced through recommended practices

[39] Data in stands with less than 3 plots, or average >10 ac. per plot may be estimated by forester's discretion to better emulate true field conditions.
[40] Either 6 or more logs 30' long by 8" diameter or 2 or more logs 30' long by 16" diameter.
[41] At least 2 logs 8' long by 16" diameter contour with slope on ground.
[42] Trees with DBH of 6-8" class.
[43] Refer to appended Soil Report for specifics and descriptions.

Current Live Doyle Board Foot Volume by Species Composition[44]:



[44] May not sum to 100% due to rounding errors.

Current Diameter Distribution Table[45]:

	Live Trees Per Acre												
	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Virginia Pine	2	0	0	0	0	0	0	0	0	0	0	0	2
Red Maple	19	4	3	1	0	1	0	0	0	0	0	0	29
Sugar Maple	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweet Birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Pignut Hickory	2	0	0	0	0	0	0	0	0	0	0	0	2
Mockernut Hick	0	0	1	0	1	0	0	0	0	0	0	0	2
American Beech	2	0	0	0	0	0	0	0	0	0	0	0	2
Black Walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-Poplar	1	1	0	1	0	0	2	0	0	0	0	0	7
Blackgum	7	1	0	0	0	0	0	0	0	0	0	0	11
Sourwood	0	1	0	0	0	0	0	0	0	0	0	0	1
Black Cherry	0	0	0	1	0	0	0	0	0	0	0	0	1
White Oak	4	0	2	2	0	1	1	0	0	0	0	0	13
Scarlet Oak	0	0	0	0	1	0	0	0	0	0	0	0	2
Chestnut Oak	2	4	1	1	1	1	1	1	0	0	0	0	12
N. Red Oak	2	0	0	0	0	0	0	0	0	0	0	0	4
Black Oak	0	0	0	0	1	1	0	0	0	0	0	0	3
Total	40	10	10	8	5	4	4	2	2	1	1	1	90

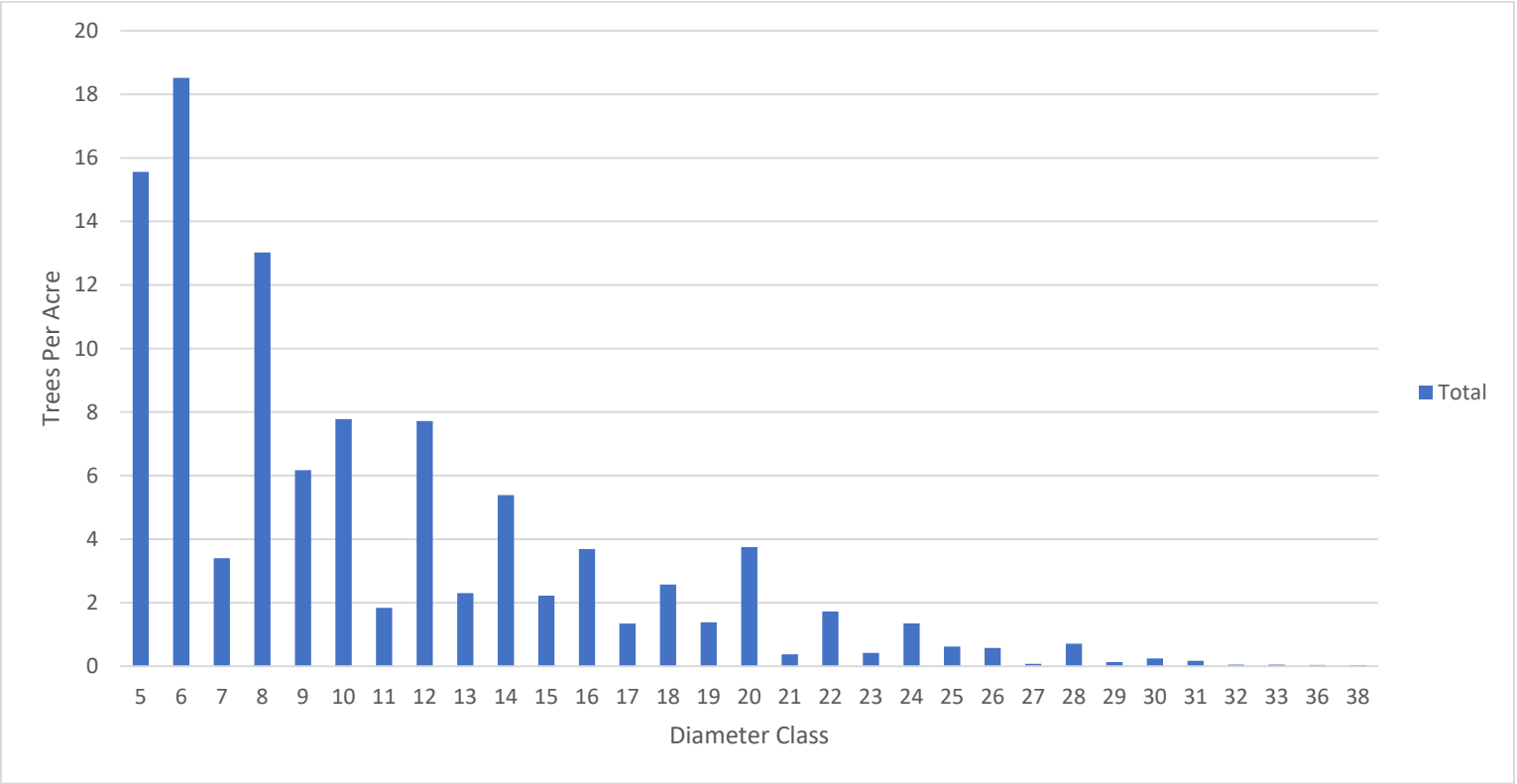
[45] May not sum properly due to rounding errors.

10-yr Projected Desired Diameter Distribution[46]:

	Live Trees Per Acre												
	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Virginia Pine		1	0	0	0	0	0	0	0	0	0	0	2
Red Maple		4	1	1	1	0	0	0	0	0	0	0	8
Sugar Maple		0	0	0	0	0	0	0	0	0	0	0	0
Sweet Birch		0	0	0	0	0	0	0	0	0	0	0	0
Pignut Hickory		1	0	0	0	0	0	0	0	0	0	0	1
Mockernut Hick		0	0	1	0	1	0	0	0	0	0	0	2
American Beech		1	0	0	0	0	0	0	0	0	0	0	1
Black Walnut		0	0	0	0	0	0	0	0	0	0	0	0
Yellow-Poplar		1	1	0	1	0	0	1	0	0	0	0	6
Blackgum		4	1	0	0	0	0	0	0	0	0	0	5
Sourwood		0	1	0	0	0	0	0	0	0	0	0	1
Black Cherry		0	0	0	1	0	0	0	0	0	0	0	1
White Oak		4	0	1	1	0	1	1	0	0	0	0	9
Scarlet Oak		0	0	0	0	1	0	0	0	0	0	0	2
Chestnut Oak		1	1	1	1	0	0	0	0	0	0	0	5
N. Red Oak		1	0	0	0	0	0	0	0	0	0	0	3
Black Oak		0	0	0	0	1	0	0	0	0	0	0	2
Total		18	4	7	6	4	2	3	2	2	1	1	49

[46] May not sum properly due to rounding errors.

Current Diameter Distribution Frequency Graph:



Existing & Desired Future Conditions

Forested Stand Description and Management Recommendations

Stand 3, 495 acres

Existing Conservation Practices: None

NRCS Resource Concerns:[47] Plant pest pressure, Animals - Terrestrial Habitat

Recommended EQIP Practices: 314 – Brush Management, 315 – Herbaceous Treatment, 647 – Clearcut Forest Openings (Patch Clearcuts)

Is a harvest recommended within this 10-year plan? No

Existing Forest Conditions

General Summary: Stand 3 contains predominately oak-pine forest cover type, with the dominant tree species being scarlet oak, chestnut oak, and pitch pine in the overstory, and chestnut oak, blackgum, and scarlet oak in the midstory. The stand consists of decent wildlife habitat, and decent timber quality. The timber is immature and no commercial harvesting is recommended at this time, however, conducting recommended practices should improve the quality of both wildlife habitat and timber quality of this stand. The large amounts of sassafras, red maple, and hickories should be targeted for removal in order to promote oak development.

- The current forest cover type is acceptable considering this stand's topography, location, aspect, and other factors.
- The current basal area of this stand is 72 square feet per acre, which is within recommended range.
- The average tree diameter is 10.16", which indicates the majority of stems being typical for this stand type and current condition (given prior and current land use history).
- The merchantable volume, expressed in Doyle board feet per acre, indicates this stand is not ready for a commercial harvest.
- As indicated by the stocking percentage, this stand is within recommended range and is in need of maintaining stocking to meet desired future conditions. This can be accomplished through active management.
- The regenerating tree species do adequately provide desirable regeneration of this forest type.
- The dominant and midstory tree species composition are desired.
- The stand health has been determined to be satisfactory due to the absence of large amounts (>= 50% cover) of invasive species as listed above.
- There are 2 grapevine-affected trees per acre, which is below/above the "threshold" for management of 40 per acre.

[47] Descriptions of each recommendation located in NRCS Resource Concerns.

Noxious & Invasive Plants: Multiflora rose, Japanese stiltgrass, Japanese barberry, tree-of-heaven, autumn olive, bush honeysuckle, and others that may not have been visually noted.

Insect and/or Disease Present: Previous infestation of emerald ash borer, maple tar spot. Spongy (gypsy) moth, beech bark disease, hemlock woolly adelgid, and others may be present but weren't noted during property visits.

Recommended Forest Management Activities[48]

1. **Brush Management (314):** The control and removal of non-native invasive species and detrimental grapevine, such as grapevine growing on commercially valuable species such as black walnut, oak, and others. This stand did not exhibit substantial amounts of invasive species, so activities regarding this practice may be limited to very select, individual areas instead of entire stand acreage.
    d. This practice can be accomplished by Landowner involvement or via hired contractor(s).
        i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
            1. See "**Project Planning & Oversight**" practice on Treatment Schedule.

2. **Herbaceous Weed Treatment (315):** The control and removal of herbaceous weed species, such as Japanese stiltgrass. This stand did not exhibit substantial amounts of invasive herbaceous species, so activities regarding this practice may be limited to very select, individual areas instead of entire stand acreage.
    e. This practice can be accomplished by Landowner involvement or via hired contractor(s).
        i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
            1. See "**Project Planning & Oversight**" practice on Treatment Schedule.

3. **Clearcut Forest Openings (647):** A non-commercial midstory and overstory reduction method called patch clearcutting is recommended. Patch clearcuts consist of the removal of the majority of undesirable midstory and overstory trees in a small area (typically ¼ acre in size) in order to promote understory development in the form of thickets and promote desirable species regeneration such as oaks and hard maple.

    Clearing 1/2 to 2 acres per patch on south or west facing slopes will maximum bedding usage of these areas. Those slopes receive sunlight in the beginning of the day and that is especially

[48] Descriptions of each recommendation located in Conservation Job Sheets.

important to deer bedding during winter months. This can be accomplished via chainsaw or herbicide application.

a. This practice can be accomplished by Landowner involvement or via hired contractor(s).
    i. Heritage Habitat & Forestry can facilitate contractor selection, including bid preparation for work project, monitoring and auditing of contractor during execution, and reporting of contractor progress to Client.
    ii. Heritage Habitat & Forestry can also mark each individual patch location, including which trees to remove/which trees to leave.
        1. See "**Project Planning & Oversight**" practice on Treatment Schedule.

No-Action Alternatives

1. **Brush Management (314):** Non-native invasive species will continue to proliferate and dominate the understory of the forest, thereby reducing ecological diversity, function, and overall forest health. Non-native invasive species do not pose a substantial threat to this stand, but not controlling the existing plants will lead to further infestation.

2. **Herbaceous Weed Treatment (315):** Non-native invasive species will continue to proliferate and dominate the understory of the forest, thereby reducing ecological diversity, function, and overall forest health. Non-native invasive species do not pose a substantial threat to this stand, but not controlling the existing plants will lead to further infestation.

3. **Clearcut Forest Openings (647):** Without creating bedding cover on this south-facing slope (which is optimal due to soil structure and sunlight intensity), wildlife will lack important wintertime bedding habitat and may resort to adjacent properties (if habitat is available).

Desired Future Forest Conditions

1. **Brush Management (314):** Removal of non-native invasive species will promote the development of a native understory that is currently being outcompeted by invasive plants. This step must be the initial management practice prior to any other practice being attempted.

2. **Herbaceous Weed Treatment (315):** Removal of non-native invasive species will promote the development of a native understory that is currently being outcompeted by invasive plants. This step must be the initial management practice prior to any other practice being attempted.

3. **Clearcut Forest Openings (647):** The patch clearcuts will create small patches, randomly spaced, throughout the stand in order to provide a diversity of tree canopy structures as well as provide early-successional habitat such as brambles and briars. The current stand structure, from a wildlife habitat perspective, is stagnant and of low quality. Having trees of all the same approximate age, diameter, and crown position does not provide a multitude of habitat types

required by large mammals (deer), small game (rabbits, squirrels), as well as a great number of songbirds.

The reduction of midstory and overstory tree cover will allow increased amounts of sunlight onto the ground to propagate the next generation of trees, specifically oaks which require large quantities of sunlight in order to germinate and survive.

Stand 3 General Analysis

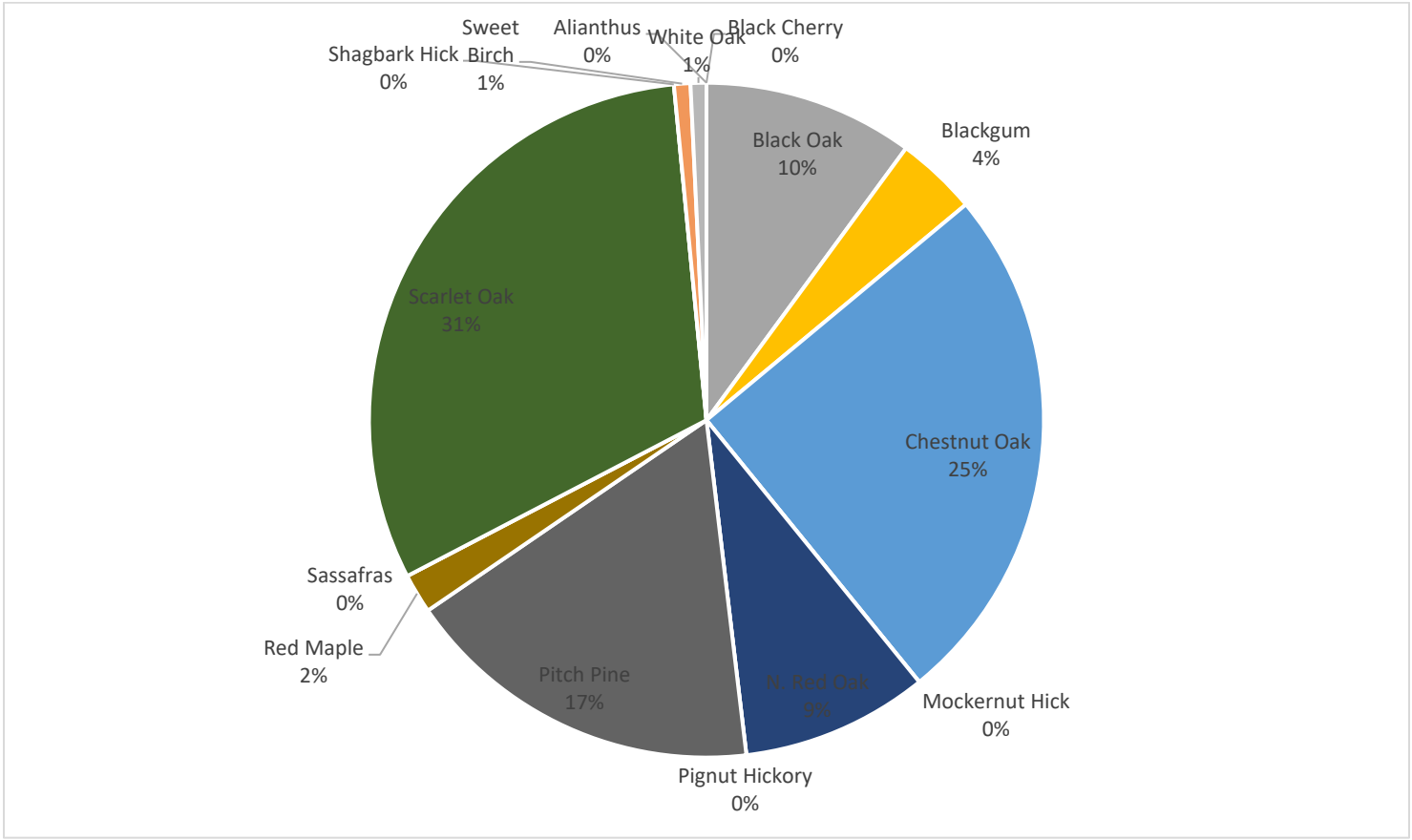
Detailed stand statistical analysis available under "Forest Condition" section of management plan		
Forested Acres = 495	**Number of Inventory Plots[49] = 24**	
Item	**Current Condition**	**Desired Condition**
Den, Snags, & Cavity Trees per Acre	<1	>= 8 per acre
Dead Trees per Acre	4	Minimum 5 per acre
Grapevine-affected Trees per Acre	2	Minimum 5 per acre
Live Basal Area per Acre	72	61 - 80
Dead Basal Area per Acre	1	
Downed Woody Debris[50]	<1	>= 2 per acre
Drumming Logs[51]	<1	>= 2 per acre
Forest Cover Type	Oak/Pine (Conifer 25-49%)	Oak-Hickory (Conifer <25%)
Average Dominant Canopy Height	30'	
Average Sawtimber Tree Age	30	
Dominant Size Class	Pulpwood	Sawtimber
Stocking %	60%	60 - 80%
Invasive Species Cover %	10%	<10%
Spongy (Gypsy) Moth Hazard Rating	Moderate Risk	
Dominant Species by Live Doyle BF/ac	Scarlet oak, chestnut oak, pitch pine	
Dominant midstory[52] species by BA/ac	Chestnut oak, blackgum, scarlet oak	
Desirable Tree Regeneration Present	Yes - matches forest type	
Logging Trail Conditions	Needs Improved	
Dominant Soil Types[53]	TxD, BgE	

Can be enhanced through recommended practices

Can be enhanced through recommended practices

[49] Data in stands with less than 3 plots, or average >10 ac. per plot may be estimated by forester's discretion to better emulate true field conditions.
[50] Either 6 or more logs 30' long by 8" diameter or 2 or more logs 30' long by 16" diameter.
[51] At least 2 logs 8' long by 16" diameter contour with slope on ground.
[52] Trees with DBH of 6-8" class.
[53] Refer to appended Soil Report for specifics and descriptions.

Current Live Doyle Board Foot Volume by Species Composition[54]:



[54] May not sum to 100% due to rounding errors.

Current Diameter Distribution Table[55]:

	Live Trees Per Acre												
	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Pitch Pine	1	1	2	1	1	1	0	0	0	0	0	0	7
Red Maple	30	2	2	0	0	0	0	0	0	0	0	0	34
Alianthus	0	2	0	0	0	0	0	0	0	0	0	0	2
Sweet Birch	1	0	1	0	0	0	0	0	0	0	0	0	2
Pignut Hickory	2	0	0	0	0	0	0	0	0	0	0	0	2
Shagbark Hick	1	0	0	0	0	0	0	0	0	0	0	0	1
Mockernut Hick	2	0	0	0	0	0	0	0	0	0	0	0	2
Blackgum	27	1	3	0	0	0	0	0	0	0	0	0	33
Black Cherry	0	1	1	0	0	0	0	0	0	0	0	0	1
White Oak	0	0	0	0	0	0	0	0	0	0	0	0	0
Scarlet Oak	0	1	2	1	3	0	1	0	0	0	0	0	9
Chestnut Oak	8	4	4	2	1	0	1	0	0	0	0	0	20
N. Red Oak	2	2	1	2	1	0	0	0	0	0	0	0	8
Black Oak	0	1	0	0	0	1	0	0	0	0	0	0	2
Sassafras	1	0	0	0	0	0	0	0	0	0	0	0	4
Total	77	13	15	6	7	2	1	1	1	0	0	0	127

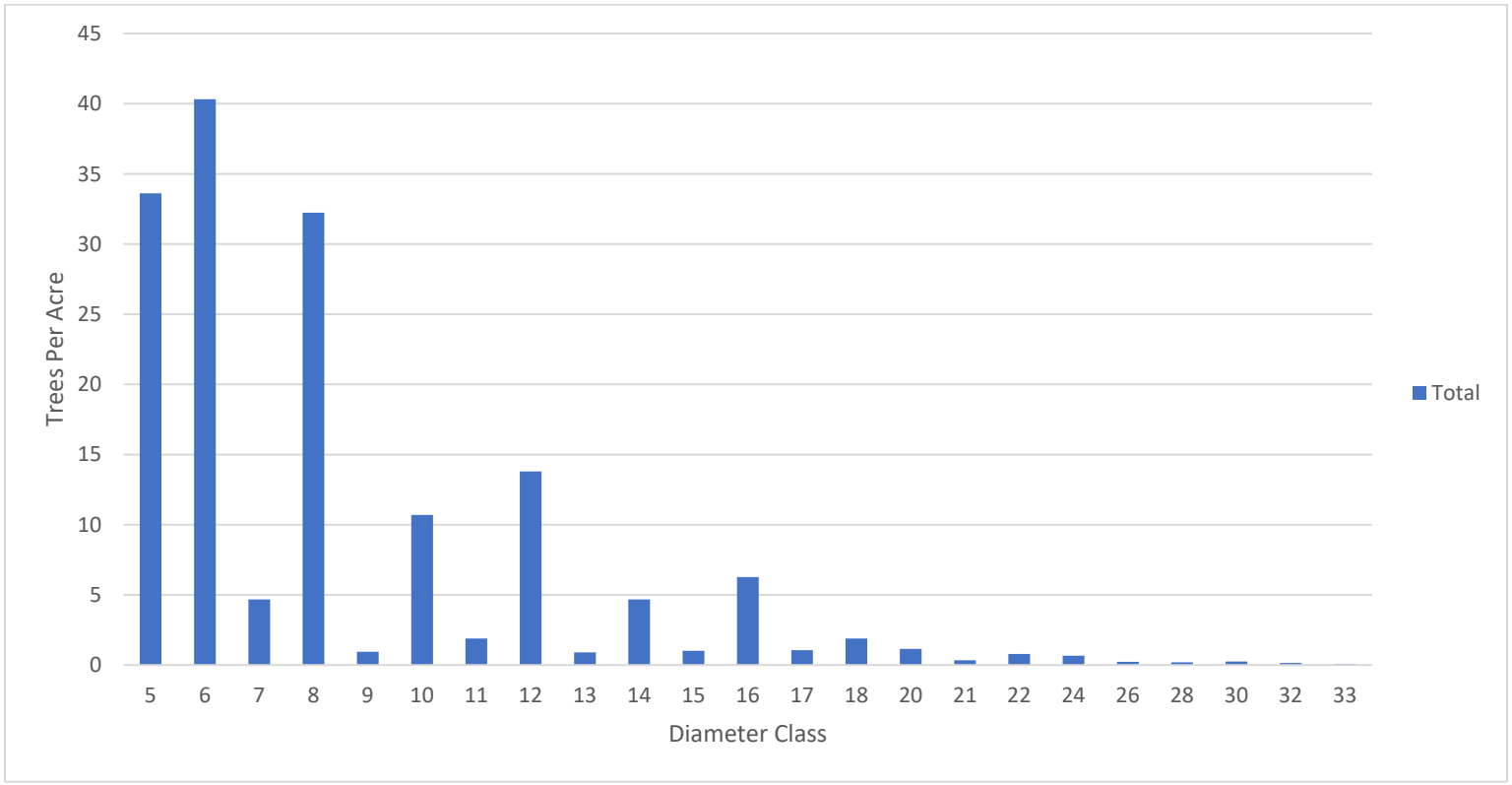
[55] May not sum properly due to rounding errors.

10-yr Projected Desired Diameter Distribution[56]:

	Live Trees Per Acre												
	Diameter at Breast Height												
Species	**6-8"**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30+**	**Total**
Pitch Pine		0	0	1	1	1	1	0	0	0	0	0	4
Red Maple		15	1	1	0	0	0	0	0	0	0	0	18
Alianthus		0	0	0	0	0	0	0	0	0	0	0	0
Sweet Birch		1	0	1	0	0	0	0	0	0	0	0	2
Pignut Hickory		1	0	0	0	0	0	0	0	0	0	0	1
Shagbark Hick		1	0	0	0	0	0	0	0	0	0	0	1
Mockernut Hick		2	0	0	0	0	0	0	0	0	0	0	2
Blackgum		10	1	1	0	0	0	0	0	0	0	0	12
Black Cherry		0	1	1	0	0	0	0	0	0	0	0	1
White Oak		0	0	0	0	0	0	0	0	0	0	0	0
Scarlet Oak		0	1	2	1	3	0	1	0	0	0	0	9
Chestnut Oak		8	4	4	2	1	0	1	0	0	0	0	20
N. Red Oak		2	2	1	2	1	0	0	0	0	0	0	7
Black Oak		0	1	0	0	0	1	0	0	0	0	0	2
Sassafras		0	0	0	0	0	0	0	0	0	0	0	0
Total		40	10	11	6	7	2	1	1	1	0	0	79

[56] May not sum properly due to rounding errors.

Current Diameter Distribution Frequency Graph:



Forest Carbon Analysis

We believe your forest **may be** a good fit for a forest carbon program, given your ownership strategy, land management goals, and current forest condition. Enrolling in a program that has its own set of harvesting restrictions **should not** affect the way you manage your forest – in that we can still sustainably manage your property while earning income from a carbon right sale. **We recommend not enrolling Stand 2 into any forest carbon project.**

Some items of note; in the most recent published report from Ecosystem Marketplace, titled "2024 State of the Voluntary Carbon Market[1]" (https://www.ecosystemmarketplace.com/publications/2024-state-of-the-voluntary-carbon-markets-sovcm/) there were some insightful observations, including:

- "In 2023, the volume and value of the voluntary carbon market contracted…56%...from 2022 levels…" (pg. 4)
- "The average price per to CO2e of VCM credits declined by 11%...to $6.53 USD per ton..." (pg. 4)
- "61 percent decline in total market value year-over-year…" (pg. 4)
- "These figures based on market data received from 90 EM Respondents with transactions in 2023, compared to 115 Respondents in 2022." (pg. 4)
- "Prices for ARR [Afforestation-Reforestation and Revegetation] credits rose 31 percent and prices for Improved Forest Management (IFM) rose 11 percent…" (pg. 10)
    - ARR credit price in 2023: $15.74 USD
    - IFM credit price in 2023: $16.21 USD (pg. 11)
- "Forestry and Land Use remains the largest category of carbon credits by transaction volume…" (pg. 12)

Be aware this report is for the voluntary carbon market, not the compliance market. It is important to know which market you are transacting in!

We suggest a further analysis regarding eligibility for the following additional carbon project developers:

- Anew Climate: 5,000 forested acre minimum, 10-yr. contract
- Bosland: 200 unforested acres, 60-year contract
- Forest Carbon Works: 40 forested acre minimum, 60 – 125-yr. contract
- Family Forest Carbon Program: 30 forested acre minimum, 20-yr. contract
- Finite Carbon: 5,000 forested acre minimum, 10 reporting periods-length contract
- Green Assets: 5,000 forested acre minimum, 15-20-yr. contract
- LandYield: 40 forested acre minimum, 40-yr. contract
- Living Carbon: 200 unforested acres, 40-yr. contract
- NativState: 40 forested acres, 40-yr. contract, select southern states
- Working Trees: no acreage minimum, 30-yr. contract, working pasture

Be mindful of the following:

1. We adamantly recommend having a lawyer review the contract.
    a. Be sure you realize the restrictions placed on timber harvesting, firewood removals, etc. in the contract.
2. What is your "ownership strategy"?
    a. Short term property owner (<20 years)
    b. Legacy property (>100 years)
    c. Unknown
        i. Carbon contract follows the property.
3. Can you forest be sustainable given the restrictions in-place by a carbon contract?
    a. Addressed above
4. What does the carbon credit research tell us?
    a. Addressed in "Ecosystem Marketplace" Report
5. How does your offer stack up against others?
    a. Addressed in comparison table above.
6. Enrollment in one program will disqualify the property from being enrolled in any future programs (examples below):
    a.

SUBSEQUENT ENROLLMENTS OF PROJECT INSTANCES

Landowners (e.g., farmers and family foresters) participating in grouped projects or non-grouped projects with multiple project activity instances want the flexibility to exit one project and enroll in another at a future date. In the absence of such flexibility, some are hesitant to enroll in a carbon project due to concerns that future eligibility to participate in another project being compromised.

In the immediate term, Verra will not allow landowners (e.g., farmers and family foresters) participating in grouped projects or non-grouped projects with multiple project activity instances to exit one project and enroll in another at a future date (subsequent project instance enrollments). Instead, Verra has begun drafting a plan to allow transfers; the new rules are tentatively scheduled to take effect in Q4 2024.

    b.

Landowners may not enroll property that was previously listed as a verified forest carbon project.

If the property was previously included in a verified forest carbon project, such as through the now defunct Chicago Climate Exchange (CCX), then that property is not eligible for Membership with Forest Carbon Works. If you have signed a contract for a one-year harvest deferral program but have not yet been paid, check with your Membership Advisor to see if there is a pathway forward for your property.

7. Ensure enrollment into a carbon program will not disqualify your property from any current or future state tax reduction programs.

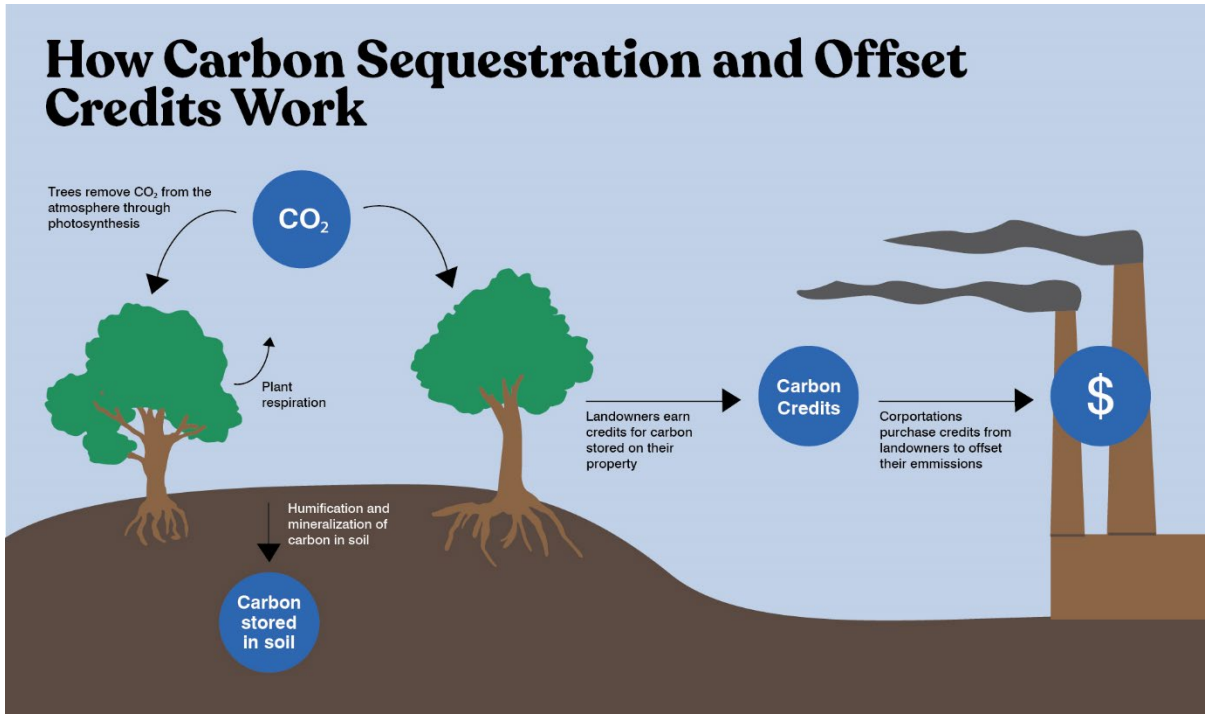


Figure 3. Source: https://www.outdoors.org/resources/amc-outdoors/conservation-and-climate/how-amc-is-fighting-climate-change-through-carbon-credits/

Improved Forest Management (IFM)	• "Quantifying the greenhouse gas removals generated from preventing logging of forests that would have been logged in the absence of purchasing the forestry carbon credit."
Avoided Conversion (AC)	• "Preventing the loss of existing forests to nonforest use by protecting or enhancing the forest cover."
Afforestation/Reforestation (A/R)	• "Creating forests on land that was previously un-forested, restoring forests on land that was once forested."

Descriptions: https://www.arborday.org/carbon/project-types.cfm

Forest Carbon Consulting

Interested.in.a.free?no.obligation.quote.for.carbon.credits?.Please.fill.out.the.following¿

Do you have any existing restrictions on how much timber you can legally harvest? Yes / No

Select which program(s) you are interested in receiving a quote for:

☐ Bosland Growth – Reforestation Project Type - https://boslandgrowth.com/

- Minimum 200 unforested acres to be planted in trees in return for payments
- 60-year contract

☐ Forest Carbon Works – Improved Forest Management Project Type - https://forestcarbonworks.org/

- Minimum 40 forested acres
- 40-year contract

☐ Family Forest Carbon Program – Improved Forest Management Project Type - https://familyforestcarbon.org/

- Minimum 30 forested acres
- 20-year contract

☐ LandYield– Improved Forest Management Project Type - https://landyield.com/

- Minimum 40 forested acres
- 40-year contract

☐ Living Carbon– Reforestation Project Type - https://www.livingcarbon.com/

- Minimum 200 unforested acres to be planted in trees in return for payments
- 40-year contract

☐ NativState– Improved Forest Management Project Type – https://nativstate.com/

- Minimum 40 forested acres
- 40-year contract

Once selected, we can facilitate your quote! Reach out with any questions!

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Conservation Practice Job Sheet(s)

NRCS Natural Resources Conservation Service

DEVELOPED IN COOPERATION WITH THE WEST VIRGINIA DIVISION OF FORESTRY

Brush Management

Conservation Practice WV Job Sheet **Code 314**

DEFINITION

This practice pertains to the removal of woody vegetation including those that are invasive and noxious on all types of lands.

PURPOSE

Landowners can use this practice to create a specific plant community that is consistent with an ecological site.

It may also be used to restore or release certain vegetative communities to protect a resource such as soil or water quality. This practice can be used to modify, maintain or enhance fish, wildlife including habitat for native pollinators.

Brush management may be utilized to improve the quality and quantity of livestock and wildlife forage; or reduce fire fuel loads.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all types of lands (except cropland) where it is necessary to reduce, remove or manipulate existing woody vegetation to achieve a desired condition.

This practice does not apply to removal of vegetation where a landuse change is desired. Refer to conservation practice standard (460) Land Clearing.

When the intent is to manage trees for silvicultural purposes, do not use this practice. Refer to conservation practice standard (666) Forest Stand Improvement.

CRITERIA FOR ESTABLISHMENT

Treatments for brush can be either:

- mechanical,
- biological; or
- chemical

They may be used alone or in combination with one another. They are often more effective and better maintained if they are used in combination or concurrently.

NRCS cannot develop biological or chemical treatment recommendations except for biological control utilizing grazing animals. In these cases, refer to (528) Prescribed Grazing or consult the

local NRCS field office to ensure that the desired results are achieved and maintained.

NRCS can provide some types of biological and/or chemical control references if they are necessary, but at a minimum refer to the NRCS pesticide screening information (Win-PST) provided with this jobsheet if chemical application is required.

Noxious and Invasive Control

If this practice is applied to control woody noxious or invasive woody plant species, apply it in a manner to achieve the desired control of the target plants and protection of desired species. A list of potentially noxious or invasive weeds may be found in Table 1 (below) and Section II of the NRCS Field Office Technical Guide.

Apply this practice according to the desired plant community needs. Base this on the desired species composition, structure and canopy characteristics of the existing vegetative community.

Table 1. Common Woody Noxious Plants

COMMON NAME	SPECIES	CHARACTERISTIC
multiflora rose	*Rosa multiflora*	WV Noxious Weed
tree-of heaven	*Ailanthus altissima*	WV Noxious Weed
autumn olive	*Elaeagnus umbellata*	WV Noxious Weed
Tatarian honeysuckle	*Lonicera tatarica*	WV Noxious Weed
Japanese barberry	*Berberis thunbergii*	Potentially Invasive
paulownia	*Paulownia tomentosa*	Potentially Invasive
oriental bittersweet	*Celastrus orbiculatus*	Potentially Invasive

Wildlife Species and Pollinators

When possible apply this practice outside the ground nesting bird season (March 15 – July 15).

In order to preserve those native plant species that most wildlife rely on as food or cover, target only invasive and/or non-native species that threaten those plant communities and pollinator resources (i.e. favor flowering forbs).

If habitat for native pollinators is a principle concern, apply any required herbicide treatment during evening hours or after dark when pollinators are less active.

It should be noted that even species such as autumn olive and multiflora rose provide resources that are attractive to pollinators and other wildlife. If wildlife (especially pollinators) are currently using these species as the primary food sources, attempt to remove them as quickly as possible during times of inactivity to allow more native sources to replenish the supply of food.

If it is obvious that non-native woody or invasive plants are providing the overwhelming majority of pollen and/or nectar resources in an area considered for pollinator habitat; remove no more than 1/3 of the entire stand in one growing season.

Most pesticides do not discriminate between harmful and beneficial insects. Use formulations that are safest for bees when possible. Utilize the lowest lethal rates in conjunction with the most targeting method to minimize the risk. Avoid broad spectrum herbicides when possible.

Formulation	Hazard Level to Pollinators
Dust	Worst
Wettable Powder	
Flowable	
Emulsifiable Concentrate	
Soluble Powder	
Solution	
Granular	Least

OPERATION AND MAINTENANCE

Safety:

Brush management practices should always be applied using NRCS or EPA approved materials and procedures. Operations must always comply with all local, state, and federal laws and ordinances. Always dispose of herbicides and herbicide containers in accordance with the label directions and comply with all federal, state and local regulations.

Refer to the results of the Windows Pesticide Screening Tool (Win-PST) risk assessment for the risks associated with pesticides. Pay particular attention to the Pesticide Active ingredient Rating Report or other reports dealing with the soil types located on the property. These reports identify such items as solubility, the ability for the pesticide to

move in the soil, toxicity to fish and wildlife and leaching.

A safety plan for individuals exposed to chemicals, including telephone numbers and addresses of emergency treatment centers and the telephone number for the nearest poison control center.

SAFETY INFORMATION	
National Pesticide Information Center (NPIC) (Non-Emergency Information)	**1-800-858-7384** Monday to Friday 6:30 a.m. to 4:30 p.m. Pacific Time
Chemical Transportation Emergency Center (CHEMTRAC)	1-800-424-9300

Remember to follow all label requirements for any pesticides as well as, mixing/loading setbacks from wells, intermittent streams and rivers, natural or impounded ponds and lakes, and reservoirs.

If applicable you should post signs, according to label directions and/or federal, state and local laws, around fields that have been treated and follow the restricted entry intervals.

Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS). MSDS and pesticide labels may be accessed on the Internet at: http://www.greenbook.net/

Calibrate any application equipment according to recommendations before each seasonal use and with each major chemical and site change.

Inspect and replace any faulty equipment used to implement this practice (i.e. sprayers, mowers, etc)

Maintenance: Landowners should maintain records of brush control for at least two years. Herbicide application records must be in accordance with USDA Agricultural Marketing Service's Pesticide Recordkeeping Program and state-specific requirements.

Remember that follow-up treatments are usually necessary to achieve complete removal..

Following the initial application, some regrowth, resprouting, or reoccurrence of brush is to be expected. Spot treatment of individual plants or areas needing re-treatment should be performed while it is small and most vulnerable to the treatment procedures.

The success of this practice is determined by evaluating post-treatment regrowth of the target species after sufficient time has passed to monitor the situation and gather reliable data. The length of these evaluation periods will depend on the woody species being monitored, the proximity of seeds, branches, and roots to the site, how the seeds are transported (wind or animals) and the methods and materials used. It may be necessary to re-apply this practice depending on a number of factors.

SEE ALSO:

USDA Agricultural Marketing Service, Science and laboratories, Pesticide Recordkeeping Program (PRP) available at: http://www.ams.usda.gov/

National Pesticide Information Center - NPIC is a cooperative agreement between Oregon State University and the U.S. Environmental Protection Agency available at: http://npic.orst.edu/index.html

The Greenbook Group – Chemical Data Delivery Solutions available at: http://www.greenbook.net/

NRCS Natural Resources Conservation Service

SPECIFICATIONS

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide. Information in this job sheet is considered part of the conservation plan.

Brush Management – WV Job Sheet

Client: [redacted]	Farm #: [redacted]
Applicable Field(s): 1	Tract #: [redacted]
Designed By: Anthony F. Pappas, CF, RF	Date: [redacted]

PURPOSE (check all that apply)

- ☒ Restore or release desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality or enhance stream flow
- ☒ Control of noxious or invasive woody species
- ☒ Maintain, modify, or enhance fish or wildlife (including pollinator habitat)
- ☒ Improve forage accessibility, quality and quantity for livestock and wildlife
- ☒ Control invasives in woodland settings for the purpose of timber production.
  Invasive species to be controlled: see job sheet page 6
- ☒ Create the desired plant community consistent with the ecological site

CHEMICAL CONTROL – If applicable, complete the following table for control of undesirable woody species using chemical methods.

☐ Refer to the attached WVU Cooperative Extension Service Information	Field # Stand 1	Field # Stand 2	Field # Stand 3
Landuse	Forest	Forest	Forest
Acres	2	32	90
Primary Soil Type	See soil report	See soil report	See soil report
Specie(s) to be controlled	See pg. 6	See pg. 6	See pg. 6
Estimated % pre-treatment vegetation/cover density	>50%	>50%	>50%
Planned % post-treatment vegetation/cover target density	<10%	<10%	<10%
Chemical application method [1]	Spot Spray	Spot Spray	Spot Spray
Application dates	May - Sept., 2026	May - Sept., 2027	May - Sept., 2028
Second application dates (if applicable)	Annually until controlled	Annually until controlled	Annually until controlled
Target plant growth stage at application	Actively growing	Actively growing	Actively growing
WIN/PST risk assessment attached or included (To be completed by NRCS)			

[1] **Chemical Application Method** – List as backpack sprayer, spray boom, aerial, spot or other (describe in the additional procedures section)

List any special mitigation, timing considerations or other factors (such as soil texture and organic matter content) that must be considered to ensure the safest, most effective herbicide application; or see the attached references. Follow all label and safety requirements when applying pesticides.

MECHANICAL CONTROL – If applicable, complete the following table for control of undesirable woody species using mechanical methods. **Note:** Mechanical control alone is typically not recommended for the control of invasives in woodland.			
☐ Refer to the attached WVU Cooperative Extension Service Information	Field #_____	Field #_____	Field #_____
Landuse			
Acres			
Species to be controlled			
Estimated % pre-treatment vegetation/cover density			
Planned % post-treatment vegetation/cover target density			
Method of application (equipment)			
Date(s) of application			
Second application dates (if applicable)			

Additional techniques, procedures or references to be followed:

BIOLOGICAL CONTROL– If applicable, complete the following table for control of undesirable woody species using biological methods. **Note:** Biological control is typically not recommended for the control of invasives in woodland.			
☐ Refer to the attached WVU Cooperative Extension Service Information	Field #____	Field #____	Field #____
Landuse			
Acres			
Species to be controlled			
Estimated % pre-treatment vegetation/cover density			
Planned % post-treatment vegetation/cover target density			
Type(s) of livestock to be utilized			
Type(s) of livestock to be utilized			
Stocking Rate			
Grazing Dates			
Secondary Grazing Dates (if applicable)			
Other biological control method			

Additional techniques, mitigations precautions or procedures or references to be followed:

NRCS Natural Resources Conservation Service

Brush Management – WV Job Sheet

If needed, an aerial view, map or a sketch of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

Refer to the Conservation Plan Map for specific locations of practices.

Operation and Maintenance or Additional Specifications or Notes:

Follow the procedures and methods for Operation and Maintenance as outlined in the section of this document entitled "Operation and Maintenance". **Additional:**

Species to be controlled = multiflora rose, Japanese barberry, tree-of-heaven, autumn olive, bush honeysuckle, and privet

Questions regarding the establishment, operation or maintenance of this practice should be directed to:

Anthony Pappas at 330-419-1769

Clear Form

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Herbaceous Weed Treatment

Conservation Practice WV Job Sheet *Code 315*

DEFINITION

This practice pertains to the removal or control of herbaceous weeds including invasive, noxious and prohibited plants.

PURPOSE

Landowners can use this practice to:

- Enhance accessibility, quantity, and quality of forage and/or browse.
- Restore or release native or create desired plant communities and wildlife habitats consistent with the ecological site.
- Protect soils and control erosion
- Reduce fine-fuels fire hazard and improve air quality

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all lands except active cropland where removal reduction, or manipulation of herbaceous vegetation is desired.

This practice does not apply to removal of herbaceous vegetation by prescribed fire (use Prescribed Burning - 338) or removal of herbaceous vegetation to facilitate a land use change (use Land Clearing - 460).

CRITERIA

Treatments to control herbaceous weeds may be either:

- mechanical
- biological
- chemical
- any combination of the above

THIS INFORMATION IS CONSIDERED PART OF THE CONSERVATION PLAN/CONTRACT

These may be used alone or in combination with one another. They are often more effective and better maintained if they are used in combination or concurrently.

NRCS cannot develop biological or chemical treatment recommendations except for biological control utilizing grazing animals. NRCS can provide some types of biological and/or chemical control references if they are necessary, but at a minimum refer to the NRCS pesticide screening information (Win-PST) provided with this job sheet if chemical application is required.

Common Noxious Herbaceous Weeds

There are many species of herbaceous weeds that occur throughout West Virginia in terrestrial as well as aquatic habitats. The table below lists a few of the most common species that have the potential to be invasive and/or noxious where they occur. They are listed without respect to whether they have been "legally" identified as West Virginia Noxious Weeds.

COMMON NAME	SPECIES
plumeless thistle	*Carduus acanthoides*
curled thistle	*Carduus crispus*
spotted knapweed	*Centaurea stoebe*
musk thistle	*Carduus nutans*
Canada thistle	*Cirsium arvense*
kudzu	*Pueraria montana*
Johnsongrass	*Sorghum halepense*
giant hogweed	*Heracleum mantegazzianum*
purple loosestrife	*Lythrum salicaria*
mile-a-minute	*Polygonum perfoliatum*
Japanese knotweed	*Polygonum cuspidatum*
Japanese stiltgrass	*Microstegium vimineum*
poison hemlock	*Conium maculatum*
common reed	*Phragmites australis*
garlic mustard	*Alliaria petiolata*
water milfoil	*Myriophyllum spicatum*
yellow iris	*Iris pseudacorus*

Refer to Section II of the WV FOTG for more information regarding noxious and potentially invasive species.

Terrestrial Wildlife and Pollinators

When possible apply this practice outside the ground nesting bird season (March 15 – July 15).

In order to preserve those native plant species that most wildlife rely on as food or cover, target only invasive and/or non-native species that threaten those plant communities. If habitat for native pollinators is a principle concern, apply any required herbicide treatment during evening hours or after dark when pollinators are less active.

It should be noted that even species listed in this document provide may be attractive to pollinators and other wildlife. If wildlife (especially pollinators) are currently using these species as the primary food sources, attempt to remove them as quickly as possible during times of inactivity to allow more native sources to replenish the supply of food.

Most pesticides do not discriminate between harmful and beneficial insects. Use formulations that are safest for bees when possible. Utilize the lowest lethal rates in conjunction with the most targeting method to minimize the risk. Avoid broad spectrum herbicides when possible.

Formulation	Hazard Level to Pollinators
Dust	Worst
Wettable Powder	
Flowable	
Emulsifiable Concentrate	
Soluble Powder	
Solution	
Granular	Least

OPERATION AND MAINTENANCE

Safety: Weed management practices should always be applied using NRCS or EPA approved materials and procedures. Operations must always comply with all local, state, and federal laws and ordinances. Always dispose of herbicides and herbicide containers in accordance with the label directions and comply with all federal, state and local regulations.

Refer to the results of the Windows Pesticide Screening Tool (Win-PST) risk assessment for the risks associated with pesticides. Pay particular attention to the Pesticide Active ingredient Rating Report or other reports dealing with the soil types located on the property. These reports identify such items as solubility, the ability for the pesticide to move in the soil, toxicity to fish and wildlife and leaching.

A safety plan for individuals exposed to chemicals, including telephone numbers and addresses of emergency treatment centers and the telephone number for the nearest poison control center.

SAFETY INFORMATION	
National Pesticide Information Center (NPIC) (Non-Emergency Information)	**1-800-858-7384** Monday to Friday 6:30 a.m. to 4:30 p.m. Pacific Time
Chemical Transportation Emergency Center (CHEMTRAC)	1-800-424-9300

Remember to follow all label requirements for any pesticides as well as, mixing/loading setbacks from wells, intermittent streams and rivers, natural or impounded ponds and lakes, and reservoirs.

If applicable you should post signs, according to label directions and/or federal, state and local laws, around fields that have been treated and follow the restricted entry intervals.

Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS). MSDS and pesticide labels may be accessed on the Internet at: http://www.greenbook.net/

Calibrate any application equipment according to recommendations before each seasonal use and with each major chemical and site change.

Inspect and replace any faulty equipment used to implement this practice (i.e. sprayers, mowers, etc)

Maintenance: Landowners should maintain records of weed control for at least two years. Herbicide application records must be in accordance with USDA Agricultural Marketing Service's Pesticide Recordkeeping Program and state-specific requirements.

Remember that follow-up treatments are usually necessary to achieve complete removal.

Following the initial application, some regrowth, resprouting, or reoccurrence of weed problems is to be expected. Spot treatment of individual plants or areas needing re-treatment should be performed while it is small and most vulnerable to the treatment procedures.

The success of this practice is determined by evaluating post-treatment regrowth of the target species after sufficient time has passed to monitor the situation and gather reliable data. The length of these evaluation periods will depend on the species being monitored, the proximity of seeds to the site, how the seeds are transported (wind or animals) and the methods and materials used. It may be necessary to re-apply this practice depending on a various factors.

SEE ALSO:

USDA Agricultural Marketing Serv ice, Science and laboratories, Pesticide Recordkeeping Program (PRP) available at: http://www.ams.usda.gov/

National Pesticide Information Center - NPIC is a cooperative agreement between Oregon State University and the U.S. Environmental Protection Agency available at: http://npic.orst.edu/index.html

The Greenbook Group – Chemical Data Delivery Solutions available at: http://www.greenbook.net/

SPECIFICATIONS

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide. Information in this job sheet is considered part of the conservation plan.

Herbaceous Weed Treatment – WV Job Sheet

Client [redacted]	Farm # [redacted]
Applicable Field(s): 1	Tract # [redacted]
Designed By: Anthony F. Pappas, CF, RF	Date [redacted]

PURPOSE (check all that apply)
☐ Enhance accessibility, quantity, and quality of forage and/or browse.
☑ Restore or release native or create desired plant communities and wildlife habitats
☐ Protect soils and control erosion
☐ Reduce fine-fuels fire hazard and improve air quality

CHEMICAL CONTROL – If applicable, complete the following table for control of undesirable herbaceous species using chemical methods.

☐ Refer to the attached chemical Information	Field # Stand 1	Field # Stand 2	Field # Stand 3
Landuse	Forest	Forest	Forest
Acres	4	4	3
Primary Soil Type	See soil report	See soil report	See soil report
Specie(s) to be controlled	Japanese stiltgrass	Japanese stiltgrass	Japanese stiltgrass
Estimated % pre-treatment vegetation/cover density	75%	75%	75%
Planned % post-treatment vegetation/cover target density	<10%	<10%	<10%
Chemical application method [1]	Backpack sprayer	Backpack sprayer	Backpack sprayer
Application dates	May through Sept., 2029	May through Sept., 2029	May through Sept., 2029
Second application dates (if applicable)	Annually until controlled	Annually until controlled	Annually until controlled
Target plant growth stage at application	Vegetative state	Vegetative state	Vegetative state
Third application dates (if applicable)	Annually until controlled	Annually until controlled	Annually until controlled
Target plant growth stage at application	Vegetative state	Vegetative state	Vegetative state
WIN/PST risk assessment attached or included (To be completed by NRCS)			

[1] **Chemical Application Method** – List as **backpack sprayer, spray boom, aerial, spot** or **other** (describe in the additional procedures section)

List any special mitigation, timing considerations or other factors (such as soil texture and organic matter content) that must be considered to ensure the safest, most effective herbicide application; or see the attached references. Follow all label and safety requirements when applying pesticides.

MECHANICAL CONTROL – If applicable, complete the following table for control of undesirable herbaceous species using mechanical methods.			
☐ **Refer to the attached Information**	Field #_____	Field #_____	Field #_____
Landuse			
Acres			
Species to be controlled			
Estimated % pre-treatment vegetation/cover density			
Planned % post-treatment vegetation/cover target density			
Method of application (equipment)			
Date(s) of application			
Second application dates (if applicable)			

Additional techniques, procedures or references to be followed:

BIOLOGICAL CONTROL– If applicable, complete the following table for control of undesirable species using biological methods. **Note:** Biological control is typically not recommended for the control of invasives in woodland.			
☐ **Refer to the attache Information**	Field #____	Field #____	Field #____
Landuse			
Acres			
Species to be controlled			
Estimated % pre-treatment vegetation/cover density			
Planned % post-treatment vegetation/cover target density			
Type(s) of livestock to be utilized			
Type(s) of livestock to be utilized			
Stocking Rate			
Grazing Dates			
Secondary Grazing Dates (if applicable)			
Other biological control method			

Additional techniques, mitigations precautions or procedures or references to be followed:

Herbaceous Weed Treatment – WV Job Sheet

If needed, an aerial view, map or a sketch of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

Refer to the Conservation Plan Map for specific locations of practices.

Operation and Maintenance or Additional Specifications or Notes:

Follow the procedures and methods for Operation and Maintenance as outlined in the section of this document entitled "Operation and Maintenance". Additional:

Questions regarding the establishment, operation or maintenance of this practice should be directed to:

Anthony Pappas at 330-419-1769

Planner Certification
This plan meets the requirements of West Virginia NRCS Conservation Practice Standard – Herbaceous Weed Treatment, Code 315. Signature_____ Title_____ Date_____
Certification of Practice Completion
This practice has been completed according to NRCS plans and specifications. (Indicate in Practice Specifications if there were any changes to the planned practice and amount.) Signature_____ Title_____ Date_____

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NRCS Natural Resources Conservation Service

Early Successional Habitat Development/Management

Cutback Borders for Wildlife

WV Conservation Practice Job Sheet **Code 647**

Definition

Manage plant succession to develop and maintain early successional habitat to benefit desired wildlife and/or natural communities.

Purpose

To provide habitat for species requiring early successional habitat for all or part of their life cycle.

Where Used

Cutback borders are normally established as part of a conservation management system to address wildlife, and the owner's objectives.

They may also apply to recreational land, odd areas or on other land where agronomic crops are grown.

Frequently the edges of fields become invaded by undesirable trees that grow to a size of no value to edge species and shade out plants of benefit. Also, roots and branches of large trees that extend into a field sharply reduce production along its edges. Sometimes woodland edges end abruptly at a field edge. This is sometimes referred to as a hard edge. In these situations, cutting, or otherwise removing most trees will provide several benefits.

Cutback borders can be developed to create valuable cover and food resources for wildlife that depend on brushy habitats, such as bobwhite quail, fox, rabbits, cardinals and small mammals. Well-managed field borders may also provide foraging opportunities for typical forest wildlife, such as ruffed grouse, bobwhite quail and wild turkey. These areas may increase the availability of foods and provide critical winter, escape and nesting cover for a variety of wildlife.

Criteria

This job sheet will help you design cutback borders that provide early successional wildlife habitat.

NRCS Natural Resources Conservation Service

Cutback borders create a "softer" edge and better transition zone from woodland to open areas. This method may be effective within forested areas adjacent to permanent food plots, logging roads and landings or other settings where wildlife is a primary concern.

As the term implies, cutback borders are usually created by felling trees with a chainsaw. Other methods include, killing selected trees with a basal application of herbicide or using a bulldozer or other means to push the trees away from the field edge.

When sawed, some hardwoods will quickly sprout at the stump and form a brush border in one or two growing seasons.

This practice may be particularly useful when "daylighting" or enhancing the habitat surrounding narrow forest trails or harvest roads and existing log landings.

Some general criteria apply to establishment of cutback borders:

- Where existing herbaceous field borders occur along woodland edges, they may be widened and enhanced by cutting woodland edges back to encourage growth of shrubs and other wildlife food-bearing plants. This creates a "softer" edge and better transition zone from woodland to open areas. This method may be effective within forested areas adjacent to permanent food plots, logging roads and landings or similar woodland type settings.
- Leaving cut slash and woody material on the ground along woodland border edge cuts provides additional wildlife cover and may deter browsing of new sprouts.
- Cutback borders will be at least 30 feet wide and extend along as much of the field edge as possible
- Cut back borders may be established at different times throughout the property; or a portion of a field's edge may be established each year to provide various stages of regrowth.
- When cutting borders, leave trees or shrubs of special benefit. Species such as dogwoods, viburnums and serviceberry are examples of species that should be retained.
- The width of the border may vary throughout its length and not be uniform. The width may be increased depending on management goals and objectives. Generally, the wider the area the better the habitat it provides. Narrow borders are susceptible to heavy predation on animals that inhabit these transition areas.
- Shrubby vegetation may also be planted within and along cut-back borders which may serve to supplement existing species to provide a specialized food or cover type (e.g. conifer planting for winter cover).
- Some important considerations on how these areas will re-establish once cut are: the amount of sunlight received each day, the seed source available, climate, aspect and the existing vegetation.

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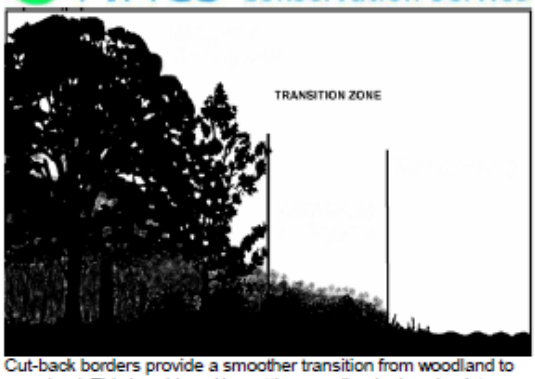


Cut-back borders provide a smoother transition from woodland to grassland. This is achieved by cutting woodland edges back to encourage growth of shrubs and other wildlife food-bearing plants.

Installation Methods

Cutback borders may be established several different ways. Three different ways are described below.

A. Single Tier Method - The simplest method is to cut all woody stems within the designated width and length and allow natural revegetation to establish the desired community. A few trees or shrubs that provide special sources of food or cover may be left standing within the border. Species such as dogwoods, conifers, certain oaks, viburnums and serviceberry are a few examples.

B. Triple Tier Method - To maximize wildlife values in cutback borders the following guide produces a tiered or layered result:

1. Cut all plants in the first 10 feet (minimum)of the border that are greater than 1 inch d.b.h. For wildlife benefits, the slash may be piled but could be left where cut. If windrowed brush piles are desired, refer to the WV Job Sheet (647) Early Successional Habitat Management/ Development – Brush Piles for Wildlife.
2. Within the next 10 feet (minimum) cut (and pile if desired) trees over 2 inches d.b.h.
3. The next 10 feet (minimum) cut and remove all trees and shrubs over 4 inches d.b.h., unless the tree or shrub is producing a desired kind of food.

C. Selective Tier Method - Another method of obtaining a high quality "tiered" cutback border is to cut all trees in a selected strip that are of a height that if felled in the direction of the field would extend beyond the edge. This method results in cutting progressively larger trees as you move from the field into the woodland.

Herbicides may also be used to create cutback borders. Contact the West Virginia Division of Forestry for herbicide recommendations suitable for this purpose.

Operation and Maintenance

Inspect cutback borders to ensure that the desired community is establishing, control invasive plants and take other measures to ensure the effectiveness of the border.

Cutback borders consist of adapted species of small trees, shrubs and some herbaceous plants. They are more effective and provide more environmental benefits when established around the entire field. Plants that attract insects can serve as food sources for wildlife and create a "softer" edge and better transition zone from woodland to open areas

Observe proper safety when felling trees and using equipment. Herbicides used for establishment purposes and for control of noxious or invasive species must be used in accordance with all labels and precautions.

The ideal cutback border will appear unkempt and be composed of a variety of shrubby and some herbaceous plant species. After a long period, cut back borders may mature to the point of losing the effectiveness. Periodic pruning or thinning may be required. Although re-establishment may eventually become necessary, not more than 50% of all border habitats should be disturbed in any one year. In addition, never disturb the entire border habitat around a single field in the same year.

Cutback borders should never be disturbed during the nesting season (March 15 – July 15) to protect nesting wildlife.

Typically, supplemental nutrients are not necessary for the establishment of this practice. Nutrients may be applied to any tree or shrub species planted within the border as required. Refer to the individual species requirements and the operation and maintenance for those species as identified in the (612) Tree/Shrub Establishment standard or associated job sheet.

Specifications

Site-specific requirements are listed on the specifications sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide.

647 Early Successional Habitat Development/Management - WV Job Sheet - Cutback Borders for Wildlife

Client [redacted]	Farm [redacted]
Field(s): 1	Tract # [redacted]
Designed By: Anthony F. Pappas, CF, RF	Date [redacted]

Purpose (check all that apply)	
☒ Provide early successional food and cover for wildlife	☐ Enhancement of an existing herbaceous field border
☐ Planned in association with the construction of brush piles or forest openings (Refer to 645 - Brush Piles for Wildlife or Forest Openings Job Sheet(s))	☐ A component practice associated with a wildlife management plan (Refer to 645 Upland Wildlife Habitat Management)
☐ Other (specify)	

Planned Area (check all that apply)	
☒ Adjacent to woodland, roads timber trails or log landings	☒ Adjacent to pasture, hay fields or other grasslands (i.e. permanent food plots)
☐ Adjacent to annually cropped fields	☐ Other (specify) _____

Layout	Cutback Border 1	Cutback Border 2	Cutback Border 3	Cutback Border 4
Field Number	Stand 2			
Date Planned	2025 - 2028			
Width (ft)	50 - 100'			
Length Along Edge of Field (ft)	2,600			
Total Area (acres)	5			
Slope (%)	Variable			
Method of Establishment[1]	Mechanical & chemical			
Installation Method [2]	Single tier method			
Supplemental Planting Planned	No			
Target or Planted Species [3]	Oaks, hickories			
Target or Planted Species	Persimmon, dogwood			
Target or Planted Species	Musclewood, hophornbeam			
Retained Species [4]	Various hard & soft mast producers			
Retained Species				
Retained Species	Musclewood, ironwood, etc			

[1] Identify how the border will be established: Mechanical (chainsaw, heavy equipment, etc.) or Chemical (herbicide application). Contact the WV Division of Forestry for herbicide recommendations appropriate for this purpose.

[2] List the method used to install the cutback border. Methods are listed as Single Tier Method, Triple Tier Method, or Selective Tier Method; and are found under the section of this document entitled Installation Methods.

[3] List the target (desired) species that will likely re-establish within the border. If supplemental planting is planned, list the species that are to be planted within the cutback border. Refer to the West Virginia Conservation Practice standard (612) Tree/Shrub Establishment and associated job sheets for species, quantities and methods.

[4] List any existing desirable species to retain during establishment of the border. If none, list as N/A.

386 Field Border - WV Job Sheet

If needed, an aerial view or a side view of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

See management plan.

Operation and Maintenance and Additional Specifications:
Maintain original width and length of the cutback border(s). Inspect periodically for invasion of noxious plant species and control as required by mechanical removal or herbicide application. Once the cutback border is fully mature or the transition zone becomes abrupt, it may be necessary to maintain or re-establish the border. As a general rule, when the trees and shrubs in at least 50 percent of the border exceed 15 feet in height, the cutting and removal process should be repeated. Do not disturb more than 50% of all border habitats in any one year. Do not disturb the entire field border habitat around a single field in the same year. Field borders should not be disturbed during the nesting season (March 15 – July 15) to protect ground-nesting wildlife. Appropriate precautions should be taken to ensure the safety of construction and maintenance crews.
Additional requirements:

For information concerning the establishment or maintenance of this practice contact:

Anthony Pappas at 330-419-1769

NRCS Natural Resources Conservation Service

Early Successional Habitat Development/Management - WV Job Sheet Code 647
Clearcut Forest Openings

Definition

Manage plant succession to develop and maintain early successional habitat to benefit desired wildlife and/or natural communities.

Purpose

To provide habitat for species requiring early successional habitat for all or part of their life cycle.

Conditions Where Practice Applies

On all lands that are suitable for the kinds of desired wildlife and plant species.

Early successional habitat management/development is normally established concurrently with other practices as part of a wildlife resource management system.

This job sheet pertains to creating clearcut openings within otherwise contiguous forest settings. Openings in the forest canopy occur naturally due to overstory tree loss from insects,
fire, storms, and disease. These gaps are generally occupied by a mixture of tree seedlings, shrubs, grasses, and/or broadleaf plants that contribute to the diversity of the forest and provide valuable habitat for many species of wildlife including reptiles, deer, turkeys, grouse, bats, rabbits, small mammals and songbirds.

Considerations for Establishment

Most wildlife species benefit from a variety of vegetative conditions other than the climax stage. Forest openings can provide the place for this diversity to occur. This improves habitat for species that utilize and benefit from early successional woody vegetation within forested settings. To achieve the desired habitat, it is essential to understand the daily and seasonal requirements of the wildlife species prior to implementing this practice. Refer to the NRCS conservation practice standard (645) Upland Wildlife Habitat Management for more information regarding the daily and seasonal habitat requirements for various species of wildlife.

Some general criteria apply to creation of all types of openings:

- Openings scattered throughout a targeted species' home range can add diversity and benefit a variety of wildlife. The type of forest stands, their age class, and how they are arranged determines the species of wildlife that benefit.
- Identify and utilize existing openings. These may include log landings, skid trails, roadsides and utility rights-of-way.
- When creating openings, look for areas that are relatively flat and free of rocks such as on benches and ridge tops.
- Sites with little slope generally have better soils, less soil erosion problems, and more planting options than steeper sites. When openings are created near drainages, a forested buffer should be maintained. Refer to conservation practice standard (391) Riparian Forest Buffer for more information.
- Openings may be constructed by various means including mechanical and chemical methods.
- The size of openings varies with the individual species requirements and site characteristics. However, forest openings generally range from one to 10 acres and should follow the contour while being as irregular in shape as possible. **Careful consideration must be given to the effectiveness of openings less than one acre due to shading from the surrounding canopy.**
- Isolated woodland tracts less than 40 acres generally do not benefit from forest openings. Caution should be exercised when proposing several forest openings in large contiguous woodland sites. A single large opening or too many small openings may lead to habitat fragmentation.

- Southerly facing slopes are preferred, since they tend to receive more hours of direct sunlight per day and remain free from snow for longer periods of time in early spring and fall.
- Avoid sites with high quality trees that may have important economic or wildlife values.
- Areas that have been damaged from insects or severe weather should be considered first, as well as sites where the majority of trees present are in the sapling to pole size range (2" to 10"diameter at breast height (DBH)).
- Slas, stumps and debris may be left on site, removed, windrowed, harvested or piled adjacent to openings to provide additional habitat.
- If an opening is to be actively managed, the site selected must be easily and permanently accessible with necessary equipment.

Clearcut Forest Openings

This method should be utilized when early successional woody vegetation is desired. Openings may be established in hardwood and coniferous stands. Clear-cut and shelterwood cuts may be used in either hardwood stands or coniferous stands. However, hardwood forest openings are more easily achieved through the use of the clear-cut method; while shelterwood cuts may prove more useful in coniferous settings. For both types of forest openings, refer to the practice standard (666) Forest Stand Improvement for specific information concerning these methods.

A. Deciduous Hardwood Settings

- Areas should be irregular in shape and fit the contour where feasible. Various wildlife species prefer differing shapes and sizes of openings. Size will depend on the requirements of the targeted species and the site characteristics.
- All woody vegetation over 4" DBH or greater than 15' in height should be removed. In most instances all trees, regardless of size, may be removed for better regeneration and to remove potential predator perches.
- Slash may be left on the site or removed. Removal will provide more area for sprouting and regrowth but may be more susceptible to browse.
- Where possible, select tree species which rapidly re-sprout from stumps or roots (e.g. aspen, maple, etc).

B. Coniferous Settings (Shelterwood Cuts)

This procedure applies to conifer stands where the majority of trees and shrubs exceed 20 feet in height; or occur as mature block or plantation stands.

- Create openings within coniferous stands by removing 40 – 60% of the basal area from the site. This opens the canopy to allow more sunlight to reach the forest floor andencourages the natural production of coniferous seedlings and shrubs.
- Mature trees of good form and good seed production should be selected for initial retention. Remove the mature trees once seedlings have become established.

Coordinating Forest Openings with a Timber Harvest

Timber harvests may be planned to coincide with the creation of forest openings. The methods described above to construct openings or maintain existing openings in forested areas, may also be utilized where timber production is an objective. A forestry management plan should be developed prior to timber harvest. The WV Division of Forestry should be consulted to coordinate these methods with timber production. **Note: Harvesting activities may be subject to the WV Logging and sediment Control Act.**

Chemicals

Herbicides may be effectively used to manipulate succession, control noxious or exotic weeds, reduce competition and improve overall diversity.

Careful planning and application are required in the use of herbicides to improve existing habitat. Selection of a product should be based on several factors including: desired effect to the vegetative community, affects to non-target wildlife specie(s), toxicological risks and off-site movement. Chemicals should not be utilized where pollinators are a concern.

Chemicals must only be applied for the uses listed on the label. All manufacturers' recommendations, precautions and directions must be followed.

Consult West Virginia University Extension Service personnel or the WV Division of Forestry for herbicide recommendations. A pesticide applicators license may be required for some herbicides.

Operation and Maintenance

Early successional communities require frequent disturbance to maintain the desired composition. Maintenance activities should occur outside the primary ground nesting season (March 15 – July 15)

NRCS Natural Resources Conservation Service

Early Successional Habitat/Development – WV Job Sheet **Code 647**
Clearcut Forest Openings

Specifications

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide.

Client: [redacted]	**Farm #:** [redacted]
Field(s): 1	**Tract #:** [redacted]
Designed By: Anthony F. Pappas, CF, RF	[redacted]
Targeted Wildlife Specie(s): Deer, turkey, grouse, bear, songbirds, rabbits, and others	

Purpose (check all that apply)	
☒ Create early successional woody openings or scrub/shrub habitat	☒ Create wildlife habitat in conjunction with a forestry/timber management plan
☒ Creating habitat for other game and non-game species including threatened or endangered species	☐ Component of a wildlife management plan developed using the (645) Upland Wildlife Habitat Management standard

Layout (as applicable)

Home range of the target specie(s): Several acres | Total # of openings: 50 | Total acreage of openings: 25 acres

Field or Plot No.	Size (ac)	Date Planned	Method of Establishment[1]	Management [2]
Stand 3	25	2027-28	Mechanical/chemical	Once 314 accomplished

[1] **Method of Establishment**: Describe how the opening will be constructed. For early successional openings, list how the area is to be established either **Mechanical** (e.g. hand establishment/chainsaw, heavy equipment, etc.) **Chemical** or a **Combination** of both. If available, list any chemicals, precautions, rates and timing in the "Additional Notes and Specifications" section on the following page.

[2] **Management**: Under the appropriate column list management activities (as appropriate).

NOTE: Timber harvesting activities may be subject to the WV Logging and Sediment Control Act. Contact the WV Division of Forestry for more information.

NRCS Natural Resources Conservation Service

Early Successional Habitat Development/Management – WV Job Sheet Code 647

Clearcut Forest Openings

If needed, an aerial view, map or a sketch of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

See management plan.

Additional Specifications and Notes: (i.e. herbicide application, operation and maintenance specifics, coordination with timber harvests, etc.)

May apply herbicide to species such as American beech to prevent resprouting. Allow red maple, elm, and basswood to resprout for woody browse for deer.

Questions regarding the establishment, operation or maintenance of this practice should be directed to:

Anthony Pappas at 330-419-1769

NRCS Resource Concerns

USDA United States Department of Agriculture
Natural Resources Conservation Service

ANIMALS
Terrestrial Habitat

Animals

Aquatic Habitat for Fish and Other Organisms

Terrestrial Habitat for Wildlife and Invertebrates

Feed and Forage Imbalance

Inadequate Livestock Shelter

Inadequate Livestock Water Quantity, Quality and Distribution

Terrestrial Habitat for Wildlife and Invertebrates

Quantity, quality or connectivity of food, cover, space, shelter, and/or water is inadequate to meet requirements of identified terrestrial wildlife or invertebrate species.

What is it?

Upland and wetland dependent organisms lack adequate habitat. Wildlife habitat includes the food, water, cover, and space required by identified terrestrial wildlife or invertebrate species to complete all or parts of their life cycle. Examples include locating a mate, obtaining sufficient water, or finding areas to rest.

Why is it important?

Perhaps the greatest threat to wildlife is habitat loss through lack of management, invasive plants, and habitat conversion or destruction. Upland and wetland habitat dependent organisms that lack adequate tree, shrub, or herbaceous plant cover necessary for mating and nesting, or shelter and cover for nesting, feeding, and resting will not thrive. Maintaining or increasing habitat is critical to sustain long-term population stability. Conserving, restoring, and connecting habitat improves the odds that wildlife communities will thrive.

What can be done about it?

Maintaining a sustainable population often requires the cooperation of multiple landowners. Individual landowners can address shortcomings on their property by establishing new habitat or enhancing existing habitat by installing wildlife structures such as nest boxes or brush piles. Systematic planting of appropriate tree, shrub, and herbaceous plants, and properly arranging and connecting habitat components across a landscape are important to ensure that each component benefits the target species of concern. Accomplishing this goal requires an understanding of the specific cover, mating, and nesting needs of the target wildlife or invertebrate species.

Terrestrial Habitat for Wildlife and Invertebrates at a Glance

Problems / Indicators—Loss of habitat to support desired wildlife species	
Typical Causes	**Examples of Typical Solutions**
• Insufficient shelter/cover • Insufficient food • Insufficient water quantity or quality • Fragmented habitat	• Add shelter features, such as nest boxes or platforms, brush piles, rock piles, and root wads • Leave portions of crop fields unharvested • Create or restore wetlands and ephemeral water features • Add herbaceous buffers and tree or shrub plantings, such as shelterbelts, hedgerows, windbreaks, and similar plant structures

USDA United States Department of Agriculture
Natural Resources Conservation Service

PLANTS
Plant Pest Pressure

Plants

- Plant Pest Pressure
- Productivity and Health
- Structure and Composition
- Wildfire Hazard from Biomass Accumulation

Plant Pest Pressure
Excessive damage to plant communities from pests such as undesired plants, insects, diseases, animals, soil borne pathogens, and nematodes. This concern addresses invasive plant, animal and insect species.

What is it?
Plants provide food for many forms of life. Human beings and grazing animals depend on plants for food. Large numbers of other much smaller creatures, such as insects and their larvae, also feed on plants. Other plants, insects, fungi, bacteria, and viruses use plants as a host during part of their life cycle. Generally, these interactions are symbiotic, predictable, and benign. However, we apply the term "pest" to any animal, insect, bacteria, or virus when any of these interactions become unbalanced and unacceptable plant damage occurs. Pests can also take the form of any organism that competes for space, nutrients, or water (e.g., weeds). Heat, drought, wind, sun, and cold create stress on plants that make them more susceptible to pests. Pests can vary from place to place, crop to crop, year to year.

Why is it important?
For plants to produce a desired yield, preferred products, or favored environmental outcomes, plant communities must be protected from undesirable pests such as weeds, insects, fungi, bacteria, viruses and animals.

What can be done about it?
Management, monitoring, and record-keeping can help stifle damage from plant pests within tolerable limits. Integrated pest management is an effective and environmentally sensitive approach to pest management that relies on a combination of common treatments. Set Thresholds: Before taking any pest control action, set a point at which pest populations or environmental conditions indicate that pest control action must be taken. Monitor and Identify Pests: Not all insects, weeds, and other living organisms require control. For grazing lands, weeds or invasive plants outcompete the desired crop or desired plant community when plants are weak and not thriving, or they are overused. Identify pests accurately so appropriate control decisions can be made in conjunction with action thresholds. Prevention: The first line of pest control is to manage and prevent pests from becoming a threat. Rotate crops and select pest-resistant varieties. Rotate forms and mode of action in pesticides to prevent and alleviate pesticide resistance. On grazing lands, maintain native plant communities or desired plants with adequate cover to protect sites from plant pest establishment. Control: If pest control is required, evaluate control methods for effectiveness and risk. Use low-risk pest controls first, such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring indicates controls are not working, additional pest control methods such as targeted spraying of pesticides/herbicides should be used. Use the application of non-selective pesticides as a final method when thresholds and conditions warrant their use.

Plant Pest Pressure at a Glance
(continued)

USDA United States Department of Agriculture
Natural Resources Conservation Service

PLANTS

Plant Productivity and Health

Plants

- Plant Pest Pressure
- Plant Productivity and Health
- Plant Structure and Composition
- Wildfire Hazard from Biomass Accumulation

Plant Productivity and Health

Improper fertility, management, or plants not adapted to site negatively impact plant productivity, vigor, and/or quality.

What is it?

Plants established in locations where the climate, soils, or moisture availability are unfavorable can be stressed and may not thrive even with excellent management. Natural events such as drought or cultural practices such as grazing and mowing can cause plant stress. Improper management (e.g., exorbitant plant populations)are a stressor that can affect plant productivity and health. Plants under stress are more susceptible to disease and insect damage. Symptoms of poor plant vigor and health may include slow growth, discoloration of leaves, wilting or drooping foliage, leaf drop, root pruning, changes in growth form and discolored roots, and even plant death.

Why is it important?

To meet productivity and conservation goals, it is important that plants are adapted to the site on which they are growing, established in proper populations, provided with enough nutrients, water, and sunshine, and protected from excessive levels of stress.

What can be done about it?

Using conservation practices can help establish and maintain plant productivity and health. Assistance from a crop specialist, grazing land specialist, forester, or biologist may be needed to set realistic production and conservation goals that consider species suitability, soils, climate, management options, and local data for similar cropping/forestry systems. The NRCS Web Soil Survey (http://websoilsurvey.nrcs.usda.gov) is a source of soils information for the growth of crops and trees. Extension programs and educators from local universities are resources for cultural and management practices that keep plants healthy and productive. Nutrient management guides the rate, source, timing, and placement of nutrients as needed to meet production and health goals. Integrated pest management provides techniques to detect, avoid, and treat pests and diseases. Forestry conservation practices can remove and replace unhealthy trees and treat woody debris to reduce risks from insects and diseases. Conservation practices in cropping systems address soil problems such as erosion, compaction, low organic matter, or contaminants through the use of cover crops, new crop rotations, or changes in tillage and/or harvesting methods. Conservation practices in grazing systems can assist in alleviating stressors such as plant vigor and reduced production yields by increasing grazing distribution, managing forage stubble heights, and providing adequate rest periods during seasonal growth variations.

Plant Productivity and Health at a Glance

(continued)

Plant Productivity and Health (continued)

Plants

Plant Pest Pressure

Plant Productivity and Health

Plant Structure and Composition

Wildfire Hazard from Biomass Accumulation

Plant Productivity and Health at a Glance

Problems / Indicators—Yield or growth is substantially less than expected, plants are disease and/or pest-ridden, plants fail to thrive	
Typical Causes	**Examples of Typical Solutions**
• Plants receive inadequate nutrition during critical growth periods • Plants fail to thrive due to poor soil conditions • Plants wilt, freeze or rot even during normal climate conditions • Plants not adapted to site • Plants are grazed or harvested below adequate stubble heights for adequate energy reserves • Plant community not resistant or resilient to natural or cultural stressors • Plant community management using inappropriate methods, timing, extent, duration, or frequency	• Use nutrient management to address the form, rate, placement, and timing of nutrient application • Consider crop rotations, deep rooted cover crops, drainage, and deep tillage • Consider alternate crops/trees or different plant varieties • Manage grazing periods to alter timing frequency, duration during seasonal growth variations • Manage harvest heights and timing to increase plant vigor and production yields • Improve plant community diversity and structure to restore and maintain plant community health and productivity • Use site-suited, genetically appropriate plant materials • Implement management practices to achieve desired plant community composition, structure, and productivity to maintain ecosystem health • Use appropriate timing, duration, and extent, and frequency of management practices to achieve desired productivity and health outcomes

USDA United States Department of Agriculture
Natural Resources Conservation Service

PLANTS
Structure and Composition

Plants

Plant Pest Pressure

Plant Productivity and Health

Plant Structure and Composition

Wildfire Hazard from Biomass Accumulation

Plant Structure and Composition

Plant communities have insufficient composition and structure to achieve ecological functions and management objectives. This resource concern includes degradation of wetland habitat, targeted ecosystems, or unique plant communities.

What is it?

Degraded plant composition occurs when there is a lack of diversity of plant species within a geographic area or an imbalance in the relative abundance of plant species or their interactions with other organisms (e.g., bacteria, fungi, pollinators, animals, etc.). Degraded structure refers to plant density, distribution patterns, or height and layering that is not suited to providing the desired conservation benefits and products.

Why is it important?

Achieving conservation and production goals requires effective management within the structure and composition of plant communities and their changes over time. The interactions among plants, other organisms, and environmental factors such as soil, climate, and topography influence how a plant community functions to cycle water and nutrients, protect and build soil, nurture wildlife, and produce usable products.

What can be done about it?

Conservation practices used to correct problems with structure and composition vary depending on conservation goals, the plant community desired, as well as site conditions and projected future environmental change. Activities that adjust structure and composition include removing undesirable plants and establishing native or adapted species according to a site plan that addresses spacing, distribution patterns, and vertical canopy layering. Practices such as grazing, mowing, pruning, fertilization, and burning can encourage or suppress certain species to help meet the desired structure and composition. Additionally, planting woody and/or herbaceous species can be effective in meeting conservation goals for the desired plant structure and composition.

Plant Structure and Composition at a Glance

Problems / Indicators—Inadequate structure and composition	
Typical Causes	**Examples of Typical Solutions**
• Pests, disease, fire exclusion, wildfire, and/or mismanagement reduces or eliminates key components of the plant community • Invasive species outcompete desired plants • Loss of or change in natural disturbance regimes (e.g., fire, wind, flooding, weather patterns)	• Employ or modify use of cultural practices (e.g., grazing, burning, mowing, pruning) • Treat or remove vegetation to reestablish desired habitat • Control invasive species and use integrated pest management techniques to maintain the plant community • Reestablish desired plant community

SWAPAE+H Resource Concerns – www.usda.nrcs.gov

Statistical Forest Inventory Information[57]

Tract Summary by Group, and Product

Number of Stands	3
# Plots/points:	78
Total Acres:	1,584.0
Saw Volume Unit	Doyle/Int

Tract Name:	[redacted]
Location:	[redacted]
Report Date:	[redacted]

Red Maple ---> Hardwood Class

Stand Total				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF
Submerchantable	11,987.5			

Per Acre				
BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
1.0	7.6			

[57] Not be used for the sale of forest products. Not a timber appraisal or a 100% tally of standing timber.

Pulpwood	30,827.5	798.3			5.5	19.5	0.5		
Small Saw	3,009.4	0.0	104.1	181.5	1.7	1.9	0.0	65.7	114.6
Med Saw	1,270.9	0.0	120.7	170.8	1.3	0.8	0.0	76.2	107.8
Lg Saw	287.5	0.0	45.4	61.9	0.4	0.2	0.0	28.7	39.1
Group Merch Total	35,395.4	798.3	270.2	414.2	8.9	22.3	0.5	170.6	261.5

Sugar Maple ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Small Saw	508.1	0.0	11.1	16.9	0.3	0.3	0.0	7.0	10.6
Group Merch Total	508.1	0.0	11.1	16.9	0.3	0.3	0.0	7.0	10.6

Yellow Buckeye ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**

Med Saw	272.2	0.0	17.1	24.7	0.2	0.2	0.0	10.8	15.6
Group Merch Total	272.2	0.0	17.1	24.7	0.2	0.2	0.0	10.8	15.6

Sweet Birch ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	1,135.2	0.0			0.3	0.7	0.0		
Small Saw	770.7	0.0	18.9	32.3	0.4	0.5	0.0	12.0	20.4
Med Saw	272.2	0.0	26.3	41.7	0.2	0.2	0.0	16.6	26.3
Lg Saw	60.5	0.0	13.5	17.4	0.1	0.0	0.0	8.5	11.0
Group Merch Total	2,238.6	0.0	58.8	91.3	1.0	1.4	0.0	37.1	57.6

Pignut Hickory ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**

Pulpwood	3,214.3	0.0			0.5	2.0	0.0		
Small Saw	241.9	0.0	7.2	14.2	0.1	0.2	0.0	4.6	8.9
Group Merch Total	3,456.2	0.0	7.2	14.2	0.6	2.2	0.0	4.6	8.9

Shagbark Hick ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	590.9	0.0			0.1	0.4	0.0		
Group Merch Total	590.9	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0

Mockernut Hick ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	1,050.4	0.0			0.1	0.7	0.0		
Small Saw	873.2	0.0	34.7	58.4	0.5	0.6	0.0	21.9	36.9

Med Saw	581.9	0.0	45.2	69.8	0.5	0.4	0.0	28.6	44.0
Group Merch Total	2,505.5	0.0	80.0	128.2	1.2	1.6	0.0	50.5	80.9

American Beech ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	1,609.2	0.0			0.3	1.0	0.0		
Group Merch Total	1,609.2	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0

Black Walnut ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	544.3	0.0			0.1	0.3	0.0		
Small Saw	177.7	0.0	8.8	15.1	0.1	0.1	0.0	5.6	9.5
Med Saw	225.8	0.0	28.5	40.7	0.3	0.1	0.0	18.0	25.7

Group Merch Total	947.9	0.0	37.3	55.8	0.5	0.6	0.0	23.6	35.2

Yellow-Poplar ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	2,849.4	330.4			0.7	1.8	0.2		
Small Saw	2,101.8	0.0	142.5	243.2	1.4	1.3	0.0	89.9	153.5
Med Saw	1,422.9	0.0	190.0	283.0	1.5	0.9	0.0	120.0	178.7
Lg Saw	2,953.9	0.0	1,148.1	1,433.1	5.7	1.9	0.0	724.8	904.8
Group Merch Total	9,328.0	330.4	1,480.6	1,959.4	9.3	5.9	0.2	934.7	1,237.0

Cucumbertree ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	544.3	0.0			0.1	0.3	0.0		

Small Saw	419.6	0.0	16.1	29.3	0.2	0.3	0.0	10.2	18.5
Med Saw	136.1	0.0	14.1	21.3	0.1	0.1	0.0	8.9	13.5
Group Merch Total	1,100.0	0.0	30.2	50.6	0.5	0.7	0.0	19.0	31.9

Blackgum ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Submerchantable	17,913.0				1.5	11.3			
Pulpwood	22,610.5	600.7			3.9	14.3	0.4		
Small Saw	2,128.0	0.0	67.2	118.9	1.2	1.3	0.0	42.4	75.1
Lg Saw	87.1	0.0	12.1	16.7	0.1	0.1	0.0	7.6	10.6
Group Merch Total	24,825.6	600.7	79.3	135.6	5.1	15.7	0.4	50.1	85.6

E. Hophornbeam ---> Hardwood Class

Stand Total	Per Acre

Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Small Saw	241.9	0.0	5.3	8.0	0.1	0.2	0.0	3.3	5.1
Group Merch Total	241.9	0.0	5.3	8.0	0.1	0.2	0.0	3.3	5.1

Sourwood ---> Hardwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Pulpwood	544.3	0.0			0.1	0.3	0.0		
Group Merch Total	544.3	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0

Sycamore ---> Hardwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Med Saw	107.5	0.0	18.3	27.0	0.1	0.1	0.0	11.6	17.0

Lg Saw	564.3	0.0	372.0	436.2	1.4	0.4	0.0	234.8	275.4
Group Merch Total	671.8	0.0	390.3	463.2	1.6	0.4	0.0	246.4	292.4

Black Cherry ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Small Saw	366.0	0.0	17.0	26.2	0.3	0.2	0.0	10.7	16.5
Lg Saw	61.3	0.0	15.2	19.3	0.1	0.0	0.0	9.6	12.2
Group Merch Total	427.3	0.0	32.2	45.5	0.4	0.3	0.0	20.3	28.7

White Oak ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	3,157.5	92.1			0.5	2.0	0.1		
Small Saw	2,765.7	0.0	147.4	248.0	1.8	1.7	0.0	93.1	156.6

Med Saw	894.7	0.0	80.5	114.3	0.9	0.6	0.0	50.8	72.2
Lg Saw	1,237.3	0.0	285.7	363.3	2.1	0.8	0.0	180.3	229.3
Group Merch Total	8,055.2	92.1	513.6	725.6	5.4	5.1	0.1	324.2	458.1

Scarlet Oak ---> Hardwood Class

Stand Total					Per Acre				
Product	**Trees**	**PW Tons**	**Doyle MBF**	**Int 1/4 MBF**	**BA**	**Trees**	**PW Tons**	**Doyle BF**	**Int 1/4 BF**
Pulpwood	640.8	286.5			0.3	0.4	0.2		
Small Saw	1,448.7	0.0	57.7	97.0	0.9	0.9	0.0	36.4	61.3
Med Saw	1,702.1	0.0	158.8	240.5	1.6	1.1	0.0	100.2	151.8
Lg Saw	1,095.4	0.0	289.6	369.0	1.9	0.7	0.0	182.9	232.9
Group Merch Total	4,887.0	286.5	506.1	706.5	4.7	3.1	0.2	319.5	446.0

Chestnut Oak ---> Hardwood Class

Stand Total	Per Acre

Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Pulpwood	14,616.9	1,937.9			3.9	9.2	1.2		
Small Saw	4,766.9	0.0	213.3	350.0	2.9	3.0	0.0	134.7	221.0
Med Saw	1,312.2	0.0	125.9	182.4	1.3	0.8	0.0	79.5	115.2
Lg Saw	1,768.9	0.0	521.3	660.4	3.3	1.1	0.0	329.1	416.9
Group Merch Total	22,464.8	1,937.9	860.6	1,192.8	11.4	14.2	1.2	543.3	753.0

N. Red Oak ---> Hardwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Pulpwood	3,188.1	270.0			0.7	2.0	0.2		
Small Saw	1,873.8	0.0	141.3	217.8	1.5	1.2	0.0	89.2	137.5
Med Saw	791.7	0.0	80.1	119.5	0.8	0.5	0.0	50.5	75.4
Lg Saw	371.3	0.0	110.2	143.1	0.6	0.2	0.0	69.6	90.3
Group Merch Total	6,224.9	270.0	331.5	480.3	3.6	3.9	0.2	209.3	303.2

Black Oak ---> Hardwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Small Saw	444.0	0.0	29.4	43.1	0.4	0.3	0.0	18.6	27.2
Med Saw	1,669.1	0.0	176.1	261.8	1.7	1.1	0.0	111.1	165.3
Lg Saw	664.4	0.0	216.7	274.9	1.3	0.4	0.0	136.8	173.5
Group Merch Total	2,777.5	0.0	422.2	579.8	3.4	1.8	0.0	266.5	366.0

Am Basswood ---> Hardwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Med Saw	107.5	0.0	18.3	27.0	0.1	0.1	0.0	11.6	17.0
Lg Saw	38.7	0.0	26.1	30.6	0.1	0.0	0.0	16.5	19.3
Group Merch Total	146.2	0.0	44.4	57.6	0.2	0.1	0.0	28.0	36.4

Hardwood Class ---> Hardwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Class Merch Total	129,218.6	4,315.8	5,177.9	7,150.0	58.8	81.6	2.7	3,268.9	4,513.9

Norway Spruce ---> Softwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Pulpwood	1,322.7	100.1			0.4	0.8	0.1		
Small Saw	206.1	0.0	5.5	7.9	0.1	0.1	0.0	3.5	5.0
Group Merch Total	1,528.9	100.1	5.5	7.9	0.5	1.0	0.1	3.5	5.0

Pitch Pine ---> Softwood Class

Stand Total	Per Acre

Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Pulpwood	969.0	69.5			0.3	0.6	0.0		
Small Saw	1,668.0	0.0	89.5	149.9	1.0	1.1	0.0	56.5	94.6
Med Saw	676.6	0.0	66.2	96.5	0.7	0.4	0.0	41.8	60.9
Lg Saw	338.8	0.0	71.3	93.1	0.5	0.2	0.0	45.0	58.7
Group Merch Total	3,652.4	69.5	227.1	339.4	2.4	2.3	0.0	143.4	214.3

Virginia Pine ---> Softwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Small Saw	437.5	0.0	18.4	29.5	0.3	0.3	0.0	11.6	18.6
Med Saw	149.8	0.0	17.8	27.9	0.1	0.1	0.0	11.2	17.6
Group Merch Total	587.3	0.0	36.1	57.4	0.4	0.4	0.0	22.8	36.3

Softwood Class ---> Softwood Class

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Class Merch Total	5,768.5	169.6	268.7	404.8	3.3	3.6	0.1	169.6	255.5

All Species Groups ---> All Secondary groups

Stand Total					Per Acre				
Product	Trees	PW Tons	Doyle MBF	Int 1/4 MBF	BA	Trees	PW Tons	Doyle BF	Int 1/4 BF
Grand Merch Total	134,987.1	4,485.4	5,446.6	7,554.7	62.1	85.2	2.8	3,438.5	4,769.4

Example

Ways we can be of assistance are labeled by our service in boxes such as this throughout this section!

Forest Resources[58]

Trespass Mgmt.

Access – a general description of access to the property:

The property is easily accessible from the mailing address in [redacted]. The address will take you to the [redacted] where there are several residents and other campsite-like structures throughout.

Adjacent Ownership Concerns – a general description of neighboring or inclusion areas:

Rights-of-ways may be maintained by the utility company. It is imperative when cutting trees near the RoW to ensure safe, directional felling. If not possible, no cutting of trees along the line is recommended. The utility company will maintain the RoW most likely with a mix of herbicide application and sawing.

There are numerous springs on neighboring properties.

Several landowners have forestland and have conducted timber harvesting in the past.

The [redacted] borders this property, and hikers frequently come down off the trail and hike this property, stay at lodging, and generally rest from their through-hike. This can potentially lead to introduction of nonnative and invasive plants. This also presents a unique opportunity to "showcase" the property as an educational tool to members of the public.

Aesthetics – current or future aesthetic considerations for the woodland:

Forest aesthetics is often associated with older, more mature forests. Many folks enjoy mature forests with big trees, yet others find beauty in a young forest vibrant with the songs of early successional forest songbirds, or where they can take their favorite bird dog for an autumn hunt for ruffed grouse. Forest management addresses these and other various aesthetic tastes and may weigh in visual goals of the neighbors. When you are weighing aesthetic goals, consider as a "group" 1) visual aesthetics, 2) the aesthetics of a dynamic functioning forest ecosystem, and 3) the particular wildlife species you hope to encourage at your property.

Geospatial Services

Archeological/Historical Resources – a general consideration and description of such resources:

Historical and cultural resources are nonrenewable and can never be replaced once destroyed. These resources provide us a unique glimpse into the past and a look at the people and how they cared for the land. Good stewardship involves recognizing these resources and protecting them. These resources should be conserved whenever possible when they are present on the property.

There are several nearby cemeteries, along with historical building foundations present on the property.

Adjacent to this property, however, is the [redacted]

Visit the WV Department of Arts, Culture, and History at wvculture.org to learn more. However, should any sites be located, please contact the WV Division of Culture and History at the address below.

WV Division of Culture and History

[58] Sources used to compile information include NRCS CPA106 Management Plan template, Ohio Woodland Stewardship Management Plan template, & West Virginia Stewardship Program management plan template.

The Culture Center
Capitol Complex
1900 Kanawha Boulevard East
Charleston, WV 25305-0300

Forestland Operations

Best Management Practices (BMPs) – maintaining the integrity and productivity of woodland sites:

BMPs are basic protection measures used to guard your forest soils against problems related to soil/site limitations and equipment usage - rutting, excessive disturbance and compaction, erosion, and sedimentation.

Practices used in logging to limit erosion and prevent siltation of creeks

- Planning the operation
- Using filter strips
- Using necessary water control structures
- Maintaining these structures
- Seeding certain areas when finished

Any decision to initiate a timber harvest on your woodlands can be frightening and even a bewildering experience. However, both educational and technical assistance is available which can lead you through the step-by-step procedures of selling your forest products.

A properly planned timber harvest can result in immediate financial returns along with future benefits such as a more productive woodland, better wildlife habitats and increase property values due to increased accessibility, improved recreational potential for hiking and hunting and the ability to better protect your woodland from fire, insects and disease.

Hilly to steeply-sloped terrain is more subject to site disturbance and subsequent soil erosion and sedimentation. Forest management often may still be accomplished on these steep areas with the use of BMPs. Even when the forest terrain is nearly level to gently rolling, and where slope does not present a hindrance to access for management activities, it is important to keep the trails away from the small drainages where possible. This helps protect water quality by providing a buffer strip of undisturbed soil and leaf litter where any sediment can be trapped before reaching the drainage if some should get washed off the path.

During timber harvest activities, follow the Best Management Practices outlined in the "West Virginia Silvicultural Best Management Practices for Controlling Soil Erosion and Sedimentation from Logging Operations". This booklet is available online at https://wvforestry.com/best-management-practices/ or at your local Division of Forestry office.

West Virginia Best Management Practices[59] (BMPs) For Wetlands Or Riparian Zones

Any harvesting operations or other forest management activities, including road building, that occur in or near streams, wetlands or riparian zones should be conducted with extreme caution.

[59] May be used as a general reference for other states as well.

These areas are frequently critical zones for wildlife and may be used more extensively by a variety of wildlife than any other habitat.

Streams include those that are permanent (perennial) and wet weather (intermittent) in nature; wetlands are lowlands covered with shallow and sometimes temporary waters and those with a water table near the surface, at least part of the year; and riparian zones are areas of vegetation bordering flows, streams, lakes, ponds and marshes.

No-cut buffer strips or only very light selection cuts should be planned along streams. All tree tops should be pulled a minimum of 25 feet from perennial and intermittent streams.

Wetland and riparian zones vary markedly in the amount and type of vegetation present. Wetlands can be predominately forested, occupied by shrubs and grasses or even have emergents or aquatic beds. There are over 200 different species of birds, mammals, reptiles and amphibians in the eastern United States that to some extent depend on wetlands for habitat.

Forested riparian zones along streams provide migration routes for some wildlife species and may, in some areas be the only permanent habitats available to certain other species.

Therefore, at least a 15’ no cut zone should be maintained. Tree removal is generally not permitted in this zone especially to preserve adequate shading of the stream. A light selection zone for the next 60' should be used where only minimal numbers of carefully selected trees can be removed.

In situations where a forested buffer along a stream does not exist, one should be created by stopping the present use or by planting a forested buffer. In agricultural use areas a minimum total buffer of 95-100' should be established and maintained. Sometimes narrower buffers are sufficient if they are carefully maintained.

All trees felled into these areas, including the tree tops should be winched from the area. Equipment should not be permitted within 100 feet of these areas.

Log Road Seeding Alternatives Information

SEEDING AND MULCHING SPECIFICATIONS

- All landings will be seeded and mulched.
- All mineral soil disturbed within the Streamside Management Zone will be seeded and mulched. Road fills and other disturbed soil that are not part of a road surface should be seeded and mulched immediately after construction.
- Any road that exceeds 15% slope and is not effectively stabilized must be seeded and mulched.
- All areas seeded and mulched must develop vegetative cover. Lime and fertilizer are not required but proper application may reduce the number of return trips to ensure vegetative catch.
- Compacted soils should be scarified to a depth of 2-3 inches to ensure good seed germination and rooting.
- Straw is the preferred mulch. Use of hay is permissible but not encouraged due to the risk of spreading invasive or exotic species.
- For each section of the planned logging operation, all exposed mineral soil areas that are to be seeded and mulched should have the high berms removed, outsloped, smoothed, water barred and then seeded and mulched immediately after they are no longer needed. Don’t wait!

SEED MIXTURE

The goal of any seed mixture is to ensure temporary stabilization of the site and to provide a microclimate and soil conditions conducive to the re-establishment of native vegetation. Wildlife enhancement may be a secondary priority according to landowner desires, but, in any case, the DOF does not recommend seed mixtures containing any WVDNR-designated Threat Level 1 invasive species.

SHADED AREAS

- Late summer and fall mix: 30 lbs. Lathco Flat Pea, 50 lbs. winter wheat, 15 lbs. Creeping Red Fescue
- Spring and summer mix: 30 lbs. Lathco Flat Pea, 20 lbs. Annual Ryegrass, 15 lbs. Creeping Red Fescue

SUNNY AREAS

- Late summer and fall mix: 50 lbs. winter wheat, 12 lbs. Crimson or Red Clover, 15 lbs. Creeping Red Fescue
- Spring and summer Mix: 20 lbs. Annual Ryegrass, 12 lbs. Crimson or Red Clover, 15 lbs. Creeping Red Fescue

SEEDING DATES AND RECOMMENDATIONS

- Best months to ensure seeding success are March through June and late August through early October.
- The worst months to seed are July, late October, November, December and January. Seeding can be done during these times, but weather conditions may hinder vegetative establishment.
- Frost seeding or seeding on snow is more likely to succeed in February or early March.
- All legume seeds must be inoculated before seeding.
- Lime and fertilizer will help to ensure vegetative cover on exposed subsoil and dry sites.

Carbon Consulting

Carbon Cycle – Healthy, sustainably managed forests can help to reduce atmospheric carbon:

When you as a forest landowner choose to maintain your forestland rather than convert it a non-forest use, you are making a significant contribution to the carbon cycle equation; healthy forests generally take in (sequester) more carbon than they release. Forest landowners that hold an interest or focus upon the carbon cycle have opportunities to enhance carbon sequestration on the property by conducting various silvicultural practices that enhance the forest's ability to capture and hold carbon, and by re-establishing woodlands on non-forested land.

Efforts to reduce carbon dioxide emissions have resulted in carbon now being a priced environmental commodity in the global marketplace. Active forest managers may find opportunities for carbon trading under participation in “ecosystem services” markets. Heritage Habitat can advise you in enrolling in the numerous carbon programs available to landowners. You may be able to earn income off your forest’s carbon storage properties.

For further information about carbon sequestration and voluntary carbon markets, plus other potential forest ecosystem services, visit the US Forest Service web site at http://www.fs.fed.us/ecosystemservices/.

Equipment & Technology – relevant forestry equipment and technology currently used and/or available:

Modern forest management equipment includes effective and safe herbicides, heavy machinery with less ecological footprint and impact, as well as remote reconnaissance and sensing equipment such as drones, GIS systems, and others.

Landowner has access to tractor, chainsaw, and hand tools, but may be more interested in contracting physical labor to specialized providers.

Forest Health Mgmt.

Fire – identify hazards, fire breaks, safety zones, note dead trees from insects or disease, etc.:

Properties and homes in West Virginia are not immune to the risks of fire and fire-related damage. Spring and fall are our main "fire seasons". A step one may take to protect one's forest is to have a system of paths that may double as firebreaks. For the home site, maintain good access for fire vehicles, create a defensible space around your home and outbuildings by removing flammable materials such brush, leaves, sticks, and twigs; remove these from roofs and gutters too. Landscape around buildings with less flammable plants and materials, avoid evergreens by or near the home, keep an outdoor water source, and avoid outdoor burning.

There is an increased risk of wildfire on this property, as it is in a “Moderate” risk-zone by the U.S. Forest Service (https://research.fs.usda.gov/firelab/products/dataandtools/wildfire-hazard-potential), and as such, increased awareness of the possibilities and appropriate mitigation measures are recommended.

It is also noted that, due to the tourism element of the nearby [redacted] Proactive measures (such as warning signs, etc.) are recommended to mitigate this potential issue.

Visit the WV Fire Burning Guidelines webpage at https://wvforestry.com/fire-laws/ to learn more.

West Virginia Forest Fire Laws

The periods of each year between March 1 and May 31, inclusive, and October 1 and December 31, inclusive, are hereby designated as Forest Fire Seasons.

No person shall during ANY such fire season, except between the hours of 5:00 p.m. and 7:00 a.m. prevailing time, set on fire or cause to be set on fire any forest land, or any grass, grain, stubble, slash, debris or other inflammable materials. Any fire set during this time shall be extinguished prior to 7:00 a.m. prevailing time. Such prohibition of fires between 7:00 a.m. and 5:00 p.m. prevailing time shall not be construed to include (1) small fires set for the purpose of food preparation, or providing light or warmth around which all grass, brush, stubble, or other debris has been removed for a distance of ten feet from the fire, and (2) burning which may be conducted at any time when the ground surrounding the burning site is covered by one inch or more of snow.

No burning may be done unless all inflammable material has been removed from around the material to be burned as a safety strip for a distance which insures that the fire will not escape and which is not less than 10 feet. If fire escapes beyond the safety strip, the person responsible shall be guilty of a misdemeanor.

Before leaving ANY fire for ANY period of time, it must be totally extinguished.

Commercial permits to burn during the prohibited periods may be issued by the Division of Forestry.

All sawmills, power shovels, or an engine or machine capable of throwing sparks must be provided with an adequate spark arrestor if operating on land subject to fire by any cause.

All inflammable waste disposal areas on ANY land must annually have removed all grass, brush, debris and other inflammable material adjacent to such disposal areas to provide adequate protection to prevent the escape of fire to adjacent lands.

The State shall recover from the person or persons, firms or corporations whose negligence or whose violations of any provisions of this article cause ANY fire at ANY time on any grass or forest land the amount expended by the State.

A landowner must take all practicable means to suppress ANY fire on his property. If he fails to do so, the State shall collect from him the amounts expended by the State for such purposes.

WV Division of Forestry 1900 Kanawha Boulevard, East Charleston, WV 25305-0180

(304) 558-2788/FAX (304) 558-0143

www.wvforestry.com

FIREWISE WEST VIRGINIA
No Cost, Just A Little Time

50 things you can do to help protect your home from wildfire

- Perform a *FIREWISE* assessment of your home.
- Move your firewood pile out of your home's defensible space.
- Clean your roof and gutters of leaves and pine needles (best done in November).
- Clear the view of your house number so it can be easily seen from the street.
- Remove conifer shrubs from your home's defensible space, especially if your home is in a high-risk area.
- Put a hose (at least 100' long) on a rack and attach it to an outside faucet.
- Trim all tree branches if they overhang your house.
- Trim all tree branches from within 20' of all chimneys.
- Remove trees along the driveway to make it at least 16' wide.
- Prune branches overhanging the driveway to have a minimum 16' overhead clearance.
- Maintain a green lawn for 30' around your home.
- If new homes are still being built in your area, talk to the developer and local zoning officials about building standards.
- Develop and discuss an escape plan for your family and pets. Have a practice drill.
- Get involved with your community's disaster mitigation plans.
- Check your fire extinguishers. Are they still charged? Are they easy to get to in an emergency? Does everyone in the family know where they are and how to use them?
- Clear deadwood and dense flammable vegetation from your home's defensible space.
- Review your homeowner's insurance policy for adequate coverage. Consult your insurance agent about costs of rebuilding and repairs in your area.
- Talk to your children about not starting fires or playing with matches.
- If you have a burn barrel that you use for burning trash, *STOP!* Burning trash is illegal in West Virginia.
- Compost leaves in the fall, don't burn them.
- If you burn your brush piles or garden debris, follow state burning regulations and local ordinances – use common sense when burning – don't burn on a windy day.
- Always have a shovel on hand and hook up the garden hose *BEFORE* you start the fire.
- Never burn if the smoke and flames are blowing towards your home (or your neighbor's home).

Minimal Cost Actions *($10 – $25 and a little time)*

- Install highly visible house numbers (at least 4" tall) on your home.
- Install big, highly visible house numbers (at least 4" tall) at the entrance of the driveway onto the street. Use non-flammable materials and posts.
- Install metal screens on all attic, foundation, and other openings on your home to prevent accumulation of leaves and needles.
- Hold a neighborhood meeting to talk about fire safety. Invite your local fire chief. Have coffee and donuts for neighbors.
- Install a fire extinguisher in the kitchen *AND* the garage.
- Install a metal shield between your home and an attached wood fence or deck.
- Replace conifer and evergreen shrubs with low-flammable plants in your home's defensible space.
- Prune and thin conifer trees that are located within 30' to 100' of your home.

- Purchase and use a *NOAA* weather alert radio. Many types of emergencies are announced through this service.
- Install a spark arrestor or heavy wire screen with openings less than 1/2" on wood burning fireplaces and chimneys.

Moderate Cost Actions *($50 - $250 and a little more work)*

- Build a gravel turnaround area near your house big enough to allow a fire truck to turn around.
- Join your neighbors in creating an additional access road into your neighborhood. Share the costs.
- Modify driveway gates to accommodate fire trucks. They should be at least 12' wide and set back at least 30' from the road. If locked, use a key box approved by your local fire department or use or a chain loop with a lock that can be cut in an emergency.
- Replace vinyl gutters and downspouts with non-flammable, metal gutters and downspouts that incorporate easily cleaned or non-clogging features.
- Treat flammable materials like wood roofs, decks and siding with fire retardant chemicals.
- Enclose decks to prevent accumulation of leaves, needles, and debris. Include a metal screen with a 1/4" or less mesh opening to prevent sparks from getting under the deck.

High Cost Actions *(more than $500)*

- Replace your roof with fire-resistant materials such as Class A shingles, metal or tile.
- Install a roof irrigation system to protect your home's roof.
- Install an independent water supply for a sprinkler system with a non-electric (e.g. propane) powered pump capable of running unattended for 24 hours.
- Replace wood or vinyl siding with non-flammable material.
- Replace single-pane glass windows and plastic skylights with tempered, double-pane glass.
- Box in roof eaves, fascias, and soffits with aluminum or steel materials with metal screens to prevent entry of sparks.
- Have electric service lines to your house placed underground.
- Relocate propane tanks inside the defensible space but at least 10' from the house.
- Have non-flammable ground cover such as gravel under and around propane tanks for 10'.
- Improve driveway culverts and bridges to accommodate the weight of a fire truck.
- Improve your driveway by straightening sharp curves and filling in sharp dips that would hinder a fire truck.

(Modified from original list compiled by Minnesota DNR Firewise Program)

Please visit these websites for more information on Firewise and how to make your home or community safer from wildfire:

FIREWISE USA™
RESIDENTS REDUCING WILDFIRE RISKS

WEST VIRGINIA DIVISION OF FORESTRY
www.wvforestry.com

5:00 P.M.
BURNING LAW

MARCH 1 - MAY 31
5:00 P.M. - 7:00 A.M.

OCTOBER 1 - DECEMBER 31
5:00 P.M. - 7:00 A.M.

MAXIMUM FINE: $1,000.00
FOR VIOLATING THE BURNING LAW

BURNING LAWS IN BRIEF

- NO BURNING FROM 7 A.M. UNTIL 5 P.M.
- FIRE MUST BE ATTENDED AT ALL TIMES
- AREA MUST BE CLEARED DOWN TO MINERAL SOIL
- FOR A MINIMUM DISTANCE OF 10 FEET AROUND WHAT IS BEING BURNED.
- IF YOUR FIRE ESCAPES, YOU ARE LIABLE FOR THE
- COSTS OF FIGHTING THE FIRE AND ANY DAMAGE THE FIRE MAY CAUSE TO OTHERS.

WILLFULLY SETTING FIRES IS A FELONY AND PUNISHABLE BY FINE AND/OR IMPRISONMENT
(WEST VIRGINIA ARSON HOTLINE 1-800-233-FIRE)

SPONSORED BY: WV DIVISION OF FORESTRY
UNITED STATES FOREST SERVICE

Forest Health Mgmt.

Forest Health – a general description of the health of the forest:

No problematic insect pests or diseases were noted during the forest inventory besides previous infestation of emerald ash borer. Japanese stiltgrass was observed in each stand but was limited to the roads. This accounts for approximately 5% of the area of all stands. In many instances, the use of hand pulling, digging, mowing and other mechanical measures can be an effective control of initial populations of Japanese stiltgrass.

However, there may be other insects or disease present that were not noted during site visit. Of particular concern is spongy (gypsy) moth, spotted lanternfly, and several other beetles, worms, etc. It is important to maintain vigilance in monitoring your property for problematic insects and diseases.

Oak species are preferred food sources for the Gypsy moth. The good news is that after the initial wave of Gypsy moths showed up, a fungus showed up that keeps these critters in pretty good check. The fungus is named Entomophaga miamaiga…"Em" for short. Still, it's a good idea to keep tabs on any oaks present in the forest to see if any egg masses start to show up in July-August - identified as a characteristic tan fuzzy oval mass that looks like Velcro. If you see eggs masses and can count more than 50 during a five minute walk around the oaks, then your trees are at risk of being partially or completely defoliated if the Spring is very dry and therefore not conducive to development of the Em fungus for natural control. There are options for control of Gypsy moth using aerial application of pesticides to the tree leaves, so that larvae ingesting such pesticides then die. One such pesticide is a "biocide" - the bacteria Bacillus thuringiensis (Bt).

Another woodland pest of great concern is the emerald ash borer (EAB), an invasive insect from Asia that only attacks ash trees. The larvae eat the living tissue of ash trees just underneath the bark. With a large enough infestation, this process essentially chokes off the flow of water and nutrients within the tree which leads to the tree's mortality. This insect can spread naturally from tree to tree, as well as artificially through the movement of ash material such as firewood.

You can reduce the risk of losses by gradually reducing the ash component of your woodlot. When doing a forest thinning or a crop tree release, if you have a choice between an ash and another desirable species, you may choose to cut the ash and let the other species grow. By gradually doing this ash reduction throughout your woods, you can avoid any serious impact on your woods if the emerald ash borer does eventually get there.

Control of grapevines on selected crop trees will guard those crop trees from the damage risks posed by this woody native vine. However, native grapevines are part of the forest ecosystem; keeping selected vines may be considered a part of maintaining overall forest health.

Figure 3. Even native species, such as certain ferns, can be deemed "invasive" - this photo shows ferns outcompeting desirable tree regeneration post-harvest. Stock photo not of Client's property.

Several non-native invasive species have been noted in the stand descriptions. Removal of non-native invasive species will promote the development of a native understory that is currently being outcompeted by invasive plants. This step must be the initial management practice prior to any other practice being attempted.

Active forest management is the best treatment to aid in overall forest health!

Invasive Pests That Threaten And Kill Trees

Sourced from the West Virginia Forest Stewardship Program Management Plan Template

The transportation of goods and services, plants and animals worldwide has introduced unwanted invasive species which have threatened particular plants, trees, and ecosystems in our forests of West Virginia. In many cases these invasives have devastating impacts on our native vegetation due to the lack of control through natural checks and balances such as parasites, diseases, insects, predators, etc. not present in our ecosystems.

In West Virginia, Forest Health Protection Specialists, foresters, landowners, and wildlife biologists strive to manage invasive species in an attempt to maintain a healthy forest ecosystem and reduce economic or environmental harm or harm to human health . The challenges to management depend on the objectives for a given piece of land as invasives can impact wood fiber, wildlife needs, recreation and aesthetics.

While there are many invasives in the state and some heading our way, forest managers should be particularly concerned and aware of Spongy moth, Beech Bark disease, Emerald Ash Borer, Hemlock Wooly Adelgid, Thousand Cankers Disease, and Asian Longhorned Beetle. Annual monitoring for these invasives with plans for management options should help the landowner control the impact brought on by these forest pests.

Spongy Moth

Minimizing Impacts in Your Woodlands

The spongy moth is potentially the most destructive forest pest threatening West Virginia woodlands. Since its inadvertent introduction into Massachusetts in 1869, it has spread naturally south and west at approximately 5-10 miles per year. Currently it is found statewide except for counties in the southwest portion of the state.

In the northeastern states, spongy moth populations peak every 8 to 11 years. They feed on more than hundreds of different tree and shrub species in forest and urban areas. Repeated heavy defoliation by spongy moths leads to the death of trees. Spruce, pine and hemlocks die after one year of heavy defoliation. Hardwood tree mortality after two successive years of defoliation, can reach as high as 80%.

Recommendations

There are five essential steps in minimizing spongy moth impacts:

1. IDENTIFY STANDS WHERE SEVERE IMPACTS ARE LIKELY

Spongy moths attack trees by feeding on their leaves. Severe defoliation and mortality are most likely in stands having a high percentage of oak, the favorite food of spongy moth caterpillars. Generally, if 60 percent or more of a hardwood tree's foliage is removed, the tree will, later in the same growing season produce a new set of leaves. This places a heavy demand on the tree's food reserves and makes it more vulnerable to attack by other organisms. This significantly increases tree deaths.

Based upon evaluations of spongy moth mortality in West Virginia, the Division of Forestry has developed guidelines (see below) for estimating the potential mortality that can be expected following one, two or three consecutive years of spongy moth defoliation. These guidelines are simply a rule-of-thumb and may not account for all of the variation in damage that may be caused. The extent of mortality will be affected

by many interrelated factors like frequency and intensity of defoliation, tree stress, actions of secondary organisms such as shoestring root rot and the two-lined chestnut borer, influence of spongy moth parasites and predators, effectiveness of control measures and weather conditions. Each of these factors is in of themselves difficult to predict. Though not perfect, the guidelines do provide an indication as to where severe impacts are most likely to occur.

Guidelines for estimating potential mortality

% Oak	Potential for Mortality	Degree of Mortality
>50%	High	25%
21-49%	Moderate	11-24%
11-20%	Low	5-10%
<10%	Very Low	<4%

Using these guidelines, your timber stands were assigned hazard ratings for potential mortality from spongy moth. (See Stand Management Summary Table (Table 2))

Now that you know WHERE severe impacts can be expected you need to know WHEN control actions are needed.

2. DETERMINING WHEN DEFOLIATING POPULATIONS ARE PRESENT

Treatments to control spongy moth are needed when spongy moth egg masses reach or exceed the following levels. Such numbers will seriously impact your management objective:

Management Objectives & Acceptable Egg Masses per Acre

Timber	1,000
Aesthetics	700
Wildlife – Mast Production	500
Recreation – Nuisance Prevention	250

Inspect your woodland for egg masses sometime after the leaves drop in the fall each year. If they are found, count the number on a 1/40 acre plot. You only want to determine the number of new (current year) egg masses per acre. New egg masses are brightly colored and firm to the touch. Old egg masses are faded and spongy. To do this, step off a rectangular plot 27 feet by 40 feet. Count the number of new egg masses on trees, stumps, down logs, etc. in this area and multiply by 40 to obtain the approximate number of egg masses per acre. Egg mass counts should be made in no less than ten plots located in the stands having moderate to high spongy moth hazard ratings. Average the per acre egg mass counts and if you find 1,200 or more egg masses per acre you can expect moderate to heavy defoliation and subsequent tree mortality unless you apply control measures to the stands. Lesser numbers, as shown by the above table, may also cause problems. It should be noted that the West Virginia Department of Agriculture will conduct egg mass surveys on your property upon request.

3. SPRAY TO PREVENT HEAVY DEFOLIATION

Spraying is rather expensive, but well worth the money to protect high value sawlog and veneer quality trees and stands where moderate to high tree mortality is expected.

Contact your consulting forester, the local DOF Service Forester or entomologists from the West Virginia Department of Agriculture, Plant Industries Division for specific control recommendations. You may be eligible to participate in the State operated control program. If not, you will be provided with a list of aerial applicators that will treat your woodlands for a fee. Spraying must be done in early to mid- May when the caterpillars are small.

The West Virginia Department of Agriculture (WVDA) coordinates and conducts a Cooperative State County Landowner (CSCL) spongy moth suppression program for the landowners of West Virginia in cooperation with the county commissions in the generally infested counties and with the USDA-Forest Service who has historically provided cost share dollars for the program. Aerial spraying is done on a demand basis to minimize forest damage. Sign-up for the Spongy Moth CSCL program is available June through August at your WVU County Extension Office or your local WVDA office in any of the participating counties.

4. USE SILVICULTURE TO MINIMIZE IMPACTS

Silvicultural treatments can be used in advance of spongy moth infestation to minimize impacts. Such treatments decrease the susceptibility to defoliation and strengthen the stand against tree mortality.

Thinning and improvement cuttings will increase the vigor of residual trees by increasing both crown and root growing space. Healthy, vigorous trees are more likely to survive and recover from spongy moth defoliation and to resist attack by secondary organisms.

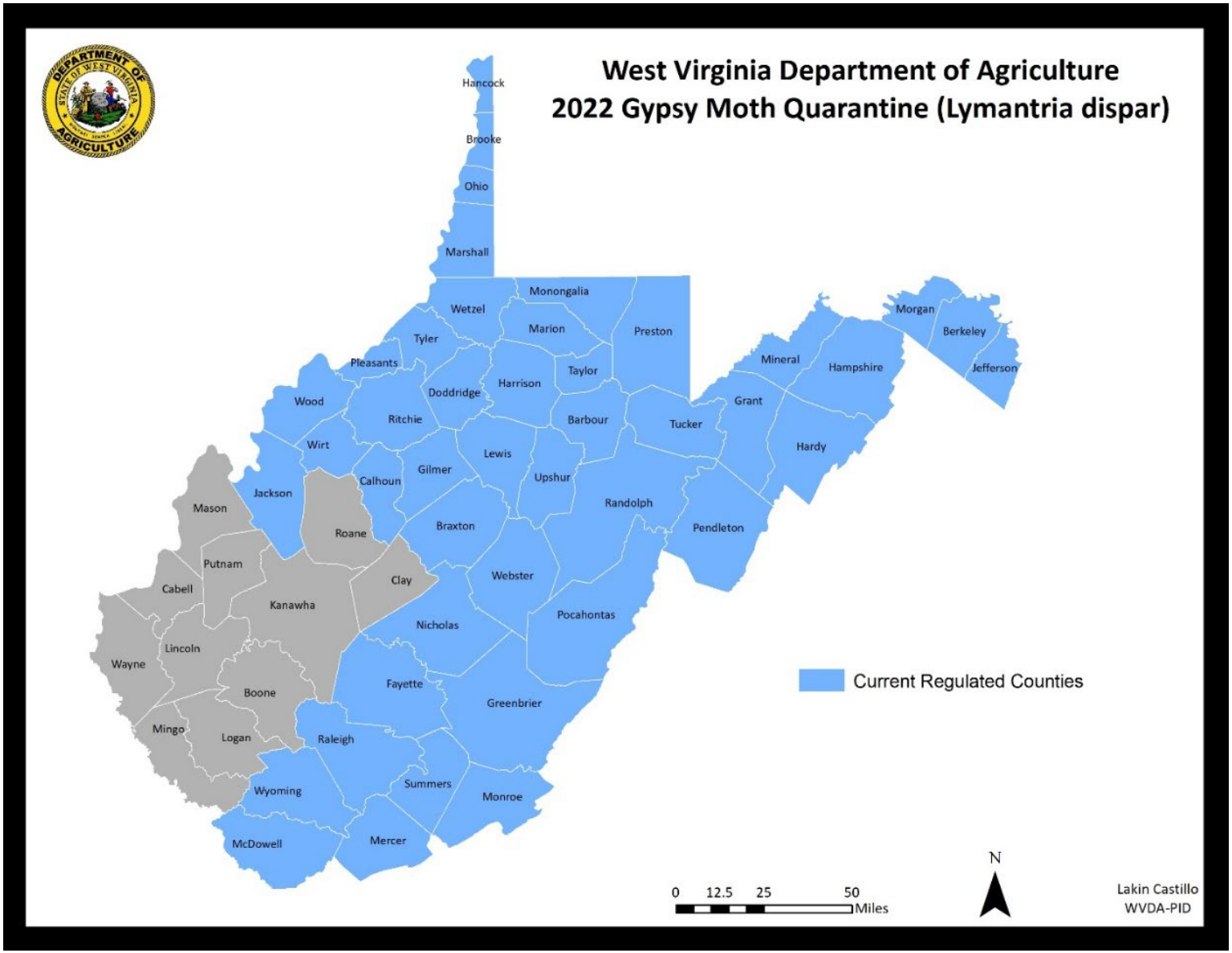
Thinning will strengthen the stand against mortality by removing high risk trees before they are defoliated and die. High risk trees are low vigor trees with poor crowns.

5. SALVAGE DEAD TREES WITHIN TWO YEARS

Despite your precautions, if the spongy moth is allowed to feed, some trees will die within one to three years after defoliation. Unfortunately, the value of veneer trees disappears as soon as they die and dead sawtimber trees lose 10 to 15 percent of their value each year they are dead because of drying checks, wood decay and wood borer defects. If possible, the salvage and utilization of dead timber will reduce the economic loss. However, the utilization of dead sawtimber trees is feasible for the first two to three years after death, and it is preferred that they be salvaged within the first year after death. Dead trees can be used for pulpwood for at least five years after death.

6. SPONGY MOTH REGULATORY PROGRAM

It should be noted that a spongy moth regulatory program does exist although it does not directly affect most landowners. The program monitors the intrastate and interstate movements of spongy moth regulated articles from spongy moth regulated areas to presently “uninfested” counties. Articles include nursery stock; cut Christmas trees, logs, mobile homes and outdoor household articles. West Virginia currently has 44 counties regulated and considered generally infested by Lymantria dispar. The WVDA regulates the movement of articles out of these counties into non quarantined counties or states. There were no new counties quarantined in 2022. More information can be obtained by calling your local WVDA representative.


West Virginia Department of Agriculture
2022 Gypsy Moth Quarantine (Lymantria dispar)
Hancock
Brooke
Ohio
Marshall
Monongalia
Wetzel
Marion
Preston
Tyler
Pleasants
Taylor
Harrison
Doddridge
Wood
Ritchie
Barbour
Tucker
Wirt
Lewis
Gilmer
Upshur
Calhoun
Jackson
Mason
Randolph
Roane
Braxton
Pendleton
Putnam
Webster
Clay
Cabell
Kanawha
Pocahontas
Nicholas
Lincoln
Wayne
Fayette
Greenbrier
Boone
Mingo
Logan
Raleigh
Wyoming
Summers
Monroe
McDowell
Mercer
Morgan
Berkeley
Jefferson
Mineral
Hampshire
Grant
Hardy
Current Regulated Counties
0 12.5 25 50
Miles
N
Lakin Castillo
WVDA-PID

Beech Bark Disease

Beech Bark Disease is a result of the exotic beech scale insect (Cryptococcus fagisuga) infesting American beech trees. These infestations are followed by one of two species of Neonectria fungi, Neonectria faginata or Neonectria ditissima that eventually kill the tree. Currently, the disease is centered in eastern West Virginia (Figure 1). The American beech provides wood products and valuable mast for wildlife every 2-3 years. In our northern forest type, it provides most of the available mast.

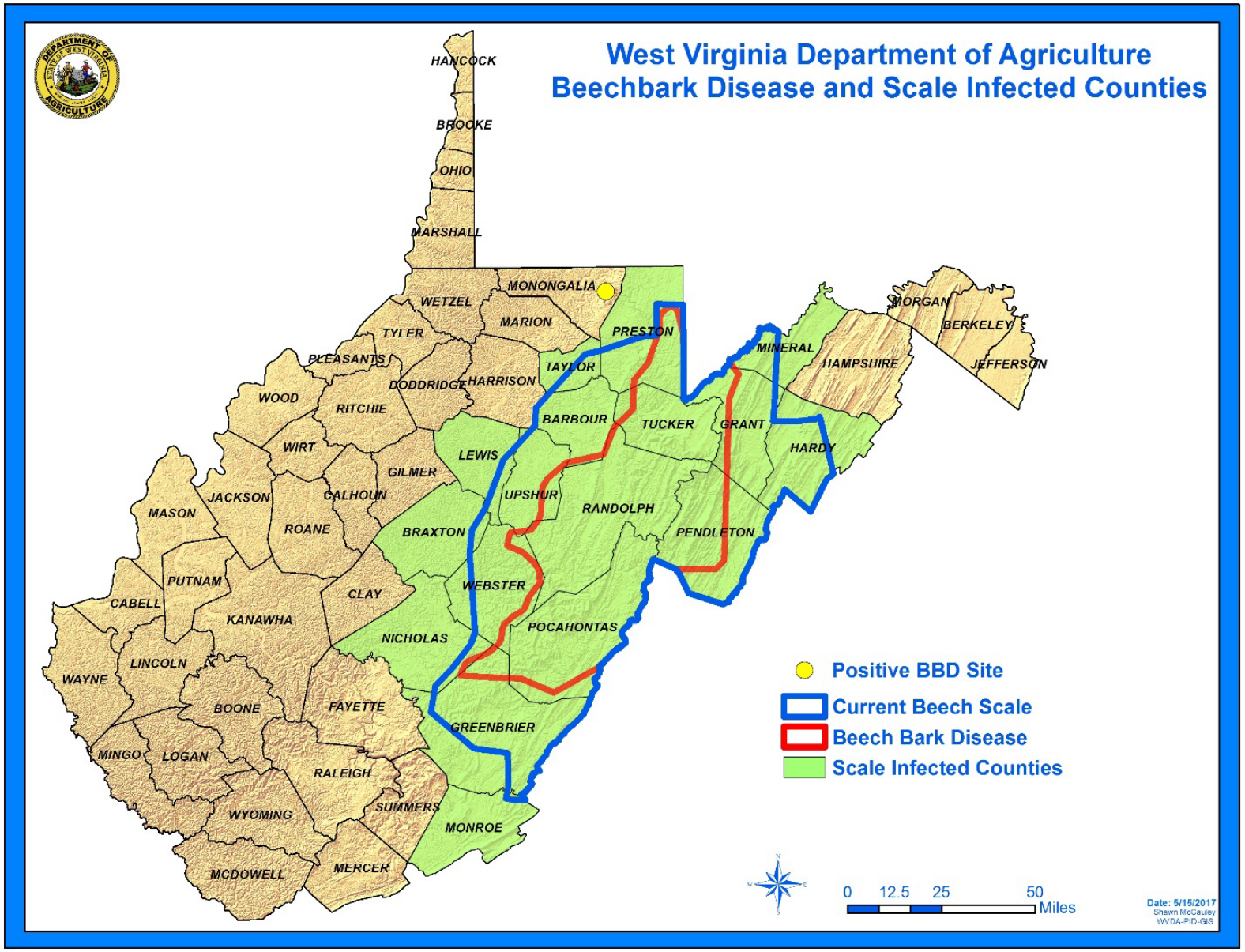
The American beech provides wood products and valuable mast for wildlife every 2-3 years. In our northern forest type, it provides most of the available mast.

Management for Beech Bark Disease

Monitor and evaluate the insect and disease status of the stand. The disease begins with many beech scale insects feeding on tree sap while forming a white wooly wax over their bodies. Once the beech scale insects have opened wounds in the bark, the Neonectria fungus begins to colonize the bark, cambial layer, and sapwood of the tree. This stage of the disease produces cankers sometimes resulting in isolated tarry spots oozing from the bark and causes fissures on the outer bark. Disease-free stands should be surveyed at regular intervals to detect the arrival of beech scale.

1) Develop a plan for Beech scale infestation and subsequent infection.

- Minimize potential impact by reducing in advance the amount of beech (large trees) in the overstory.
- Beech regeneration can be controlled using group selection, individual tree selection or cutting strategies that favor shade intolerant species (i.e. clearcutting or heavy shelterwood).
- All trees heavily infested by beech insect scale and/or infected by Neonectria spp. should be salvaged, and trees with little or no scale and no Neonectria fungus should be retained. In all cases, large, overmature trees should be removed because they serve as targets for intercepting the beech scale and then as infestation for surrounding trees (Houston et al. 1979). Trees with smooth bark should be retained over those with roughened bark since these areas harbor and promote initial infestations.
- Dead and dying beech creates hazard trees that endanger people and property because weakened trees are prone to bole breakage called “Beech snap”.


West Virginia Department of Agriculture
Beechbark Disease and Scale Infected Counties
HANCOCK
BROOKE
OHIO
MARSHALL
WETZEL
MONONGALIA
MARION
PRESTON
TYLER
PLEASANTS
TAYLOR
HARRISON
DODDRIDGE
WOOD
RITCHIE
BARBOUR
TUCKER
GRANT
WIRT
LEWIS
HARDY
GILMER
JACKSON
CALHOUN
UPSHUR
RANDOLPH
MASON
ROANE
BRAXTON
PENDLETON
PUTNAM
WEBSTER
CLAY
CABELL
KANAWHA
POCAHONTAS
NICHOLAS
LINCOLN
WAYNE
BOONE
FAYETTE
GREENBRIER
MINGO
LOGAN
RALEIGH
SUMMERS
WYOMING
MONROE
MCDOWELL
MERCER
MORGAN
BERKELEY
MINERAL
HAMPSHIRE
JEFFERSON
Positive BBD Site
Current Beech Scale
Beech Bark Disease
Scale Infected Counties
0 12.5 25 50
Miles
Date: 5/15/2017
Shawn McCauley
WVDA-PID-GIS

Hemlock Woolly Adelgid

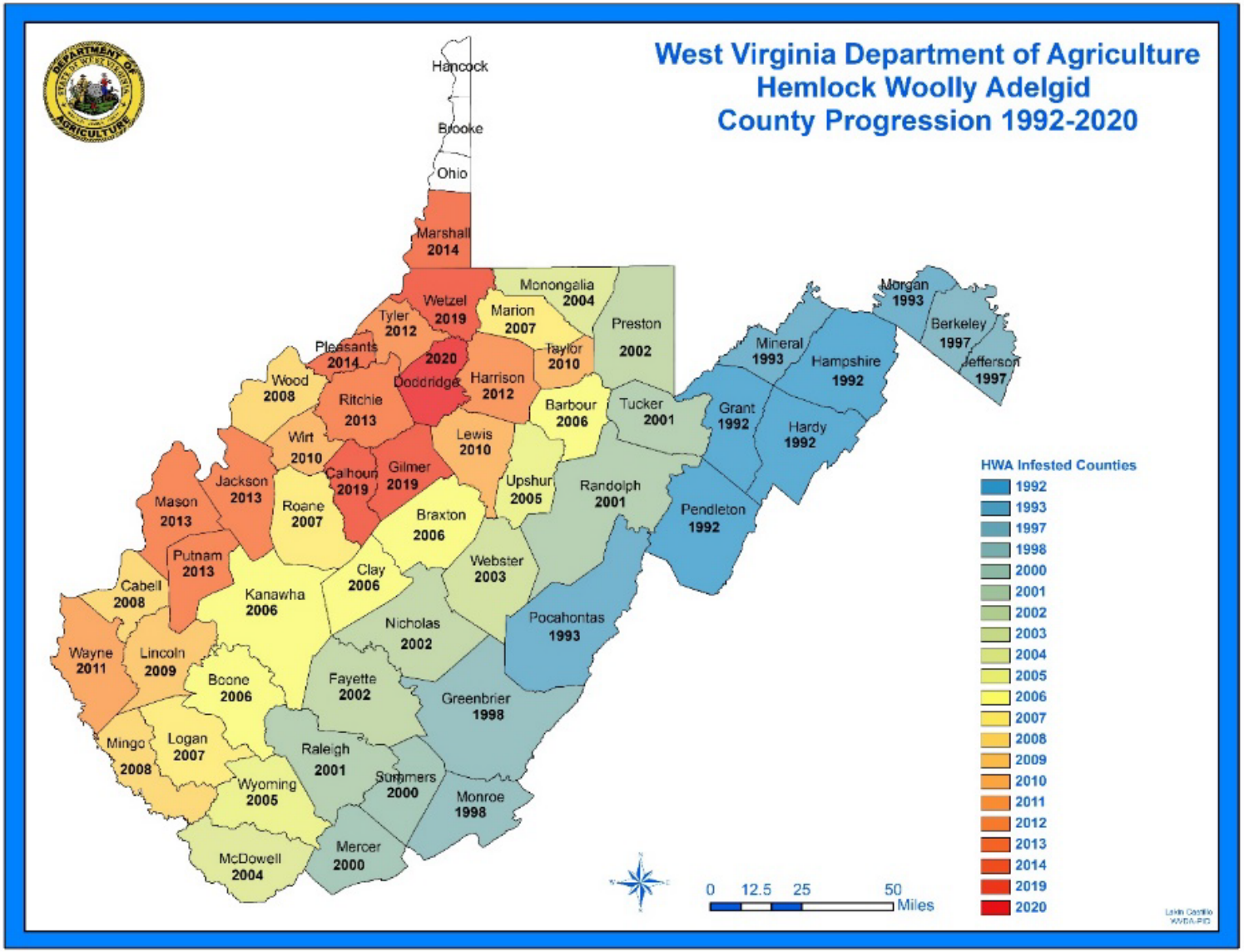
Eastern hemlock (Tsuga canadensis) is the most shade-tolerant and long-lived tree species in Eastern North America. Its unsurpassed ability to tolerate low light enables it to form dense canopies and stands that provide a unique habitat for many plant and wildlife species. Hemlock Wooly Adelgid is a non-native invasive insect that attacks and kills Eastern and Carolina Hemlock. Once infested and left untreated, trees rarely recover

Management for Hemlock Woolly Adelgid

Monitor and evaluate the presence of HWA in your hemlock stands in late March- early April. Look for immobile white wooly masses at the base of needles on the undersides of hemlock twigs. Trees that have been impacted for years will display off-colored needles, often grayish- cast with thinning crowns. HWA is present in most all of West Virginia.

1) Control treatments are available but are labor intensive and expensive and may be suitable for individual trees. Check with your Service Foresters. In forested stands where HWA is present, management options are limited.

- Salvage operations and planning for the next stand – remove all Hemlock.
- Hemlocks play an important role in many ecosystems in West Virginia. They provide shelter and thermo-cover for wildlife, cooling shade for trout streams, and coarse woody debris on the forest floor and streams. Consider replacing hemlock by favoring native species such as White Pine or Red Spruce by natural regeneration or planting. Some non-native hemlock species can also be planted.
- Forgoing control treatments is another option. In some recreational areas, directional felling of danger trees would be a good practice.


West Virginia Department of Agriculture
Hemlock Woolly Adelgid
County Progression 1992-2020
Hancock
Brooke
Ohio
Marshall 2014
Wetzel 2019
Tyler 2012
Pleasants 2014
2020
Doddridge
Wood 2008
Ritchie 2013
Wirt 2010
Calhoun 2019
Gilmer 2019
Jackson 2013
Mason 2013
Roane 2007
Putnam 2013
Cabell 2008
Wayne 2011
Lincoln 2009
Kanawha 2006
Boone 2006
Clay 2006
Braxton 2006
Lewis 2010
Harrison 2012
Monongalia 2004
Marion 2007
Taylor 2010
Barbour 2006
Upshur 2005
Webster 2003
Nicholas 2002
Fayette 2002
Logan 2007
Mingo 2008
Wyoming 2005
Raleigh 2001
McDowell 2004
Mercer 2000
Summers 2000
Preston 2002
Tucker 2001
Randolph 2001
Pocahontas 1993
Greenbrier 1998
Monroe 1998
Pendleton 1992
Grant 1992
Hardy 1992
Mineral 1993
Hampshire 1992
Morgan 1993
Berkeley 1997
Jefferson 1997
HWA Infested Counties
1992
1993
1997
1998
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2019
2020
0 12.5 25 50
Miles

Emerald Ash Borer

White Ash is found in every county in West Virginia. Green Ash can be found in the rich alluvial soils along major water courses. It is conceivable that these species will disappear from our West Virginia Forests. EAB is an exotic beetle from Asia that first appeared in 2007 in West Virginia most likely through the transportation of infested firewood. Emerald ash borer beetles are usually 1/3 to ½ inch long and are usually with metallic emerald green wing covers. The beetles emerge in May to early June and live for about 3 weeks. They feed upon ash foliage, usually leaving small, irregularly shaped patches along the leaf margins. The female will lay approximately 30 to 60 eggs during its lifespan. The eggs are deposited individually in bark crevices or under bark flaps on the trunk or branches. Eggs hatch in 7 to 10 days.

After hatching, the larvae chew through the bark and into the phloem and cambial region. Larvae feed on the phloem for several weeks, creating serpentine galleries packed with fine sawdust-like fass. The larvae overwinter in shallow chambers, excavated in the outer sapwood or in the bark. Pupation begins in late April or early May. The newly formed adults emerge head-first through a D-shaped exit hole.

It is difficult to detect EAB in newly infested trees because they exhibit few, if any, external symptoms. As the EAB densities build, foliage wilts, branches die, and the tree canopy becomes increasingly thin. Many trees appear to lose 30 to 50 percent of the canopy after only a few year of infestation. Trees may die after 3 to 4 years of heavy infestation.

Management for Emerald Ash Borer

The goal of the WV DOF is not to eliminate ash from the forest, but to create a more diverse forest resource that is resistant to catastrophic changes affecting a single species or genera. Generally, the recommendation is to reduce the ash component of forest stands to a maximum 10% of the total basal area, and to promote tree species diversity. Vigorous pole size and smaller ash should be targeted for retention. Removing one large ash has a much greater effect on reducing EAB population potential than does removing many saplings or a few pole size trees.

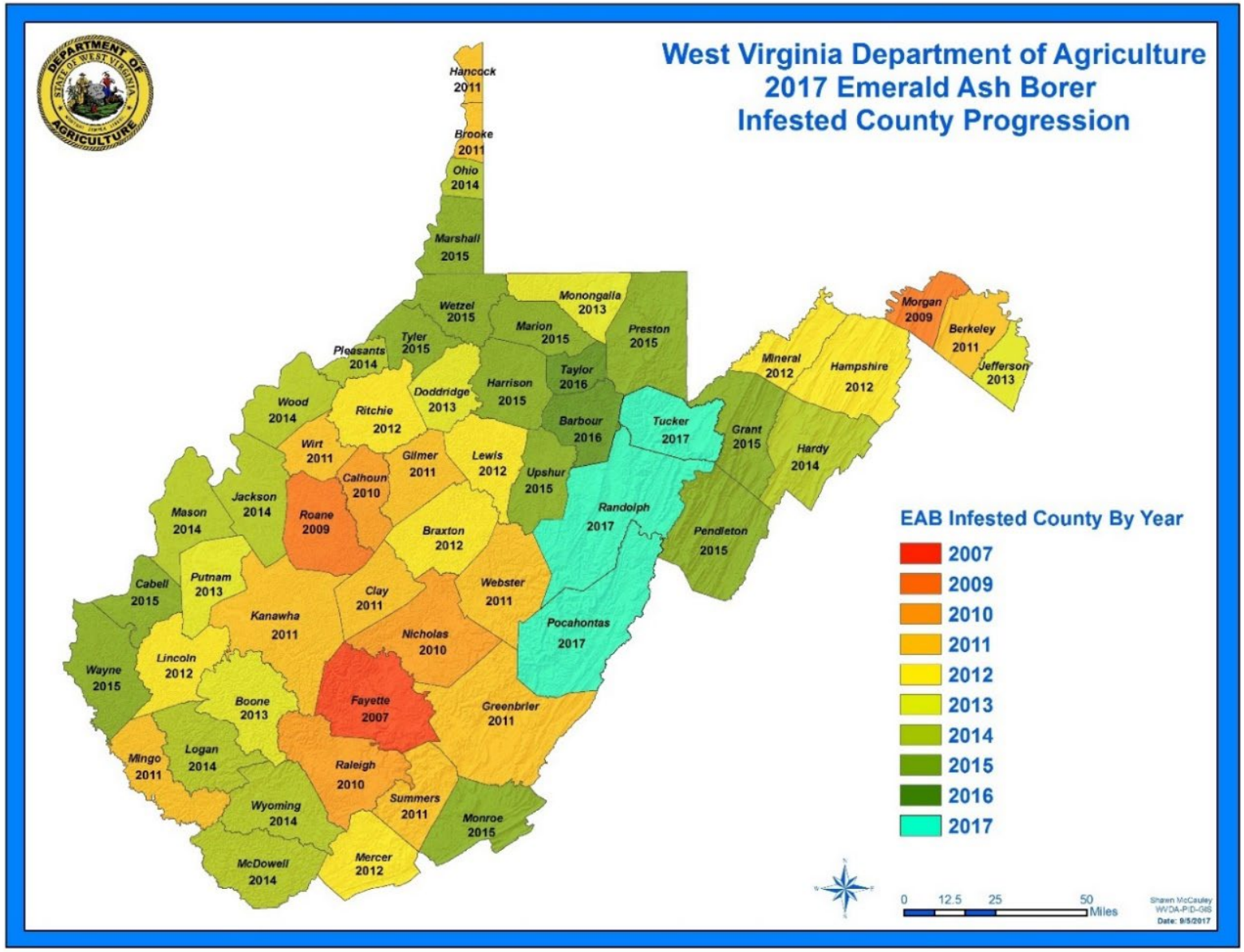
Stands with high basal areas of ash present the greatest challenges since it will occur as pockets within the stand. Reducing these pockets may create large canopy gaps. These large openings encourage both ash regeneration and recruitment. Where possible these gaps should be less than 60 feet in diameter. If these large gaps cannot be avoided, then active treatment of ash regeneration may be necessary to keep it at an appropriate level and to encourage species diversity. In some cases, planting a desired mix of tree species may be necessary.

Monitor and evaluate Ash trees in the stand. Controlling the spread of emerald ash borer begins with keeping ash trees healthy and unstressed. The insect is usually spread through human activities, such as moving infested firewood. Prevent ash borer by inspecting firewood closely before purchasing and buy locally when possible. Do not transport firewood if you live in an area that has an ash borer population. Infested trees are identified by canopy dieback, D-shaped exit holes and bark splitting on your ash trees.

1) Control treatments are available but are labor intensive and expensive and may be only suitable for individual trees. Check with your Service Foresters.

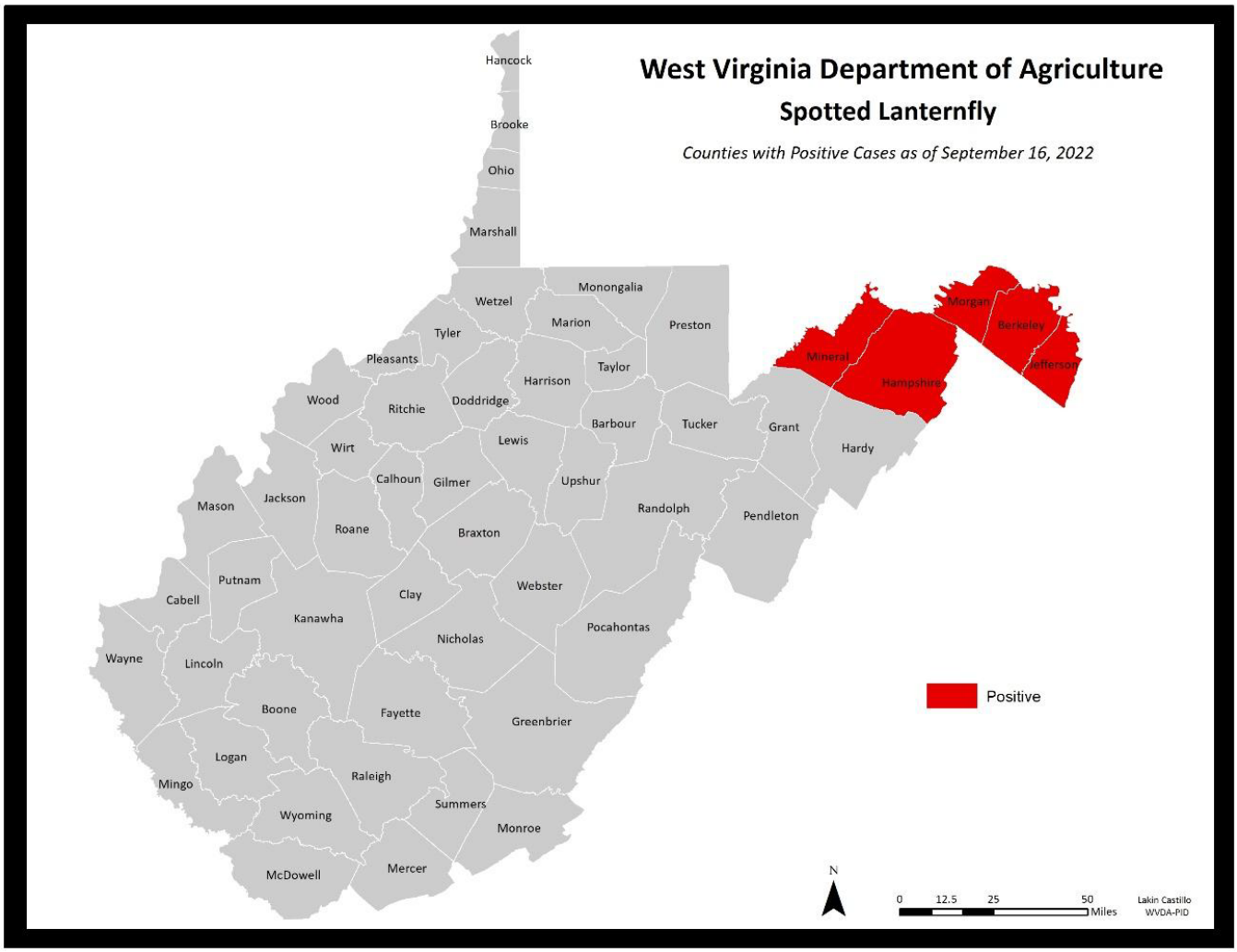
- In forested stands where infestation is present:

    - Remove all infested trees plus all large Ash >12”DBH. Leave small Ash for future stand. Using some of the wood is better than letting it all die and rot.
- In forested stands with high value Ash, monitor for EAB annually. Reduce the Ash component in your stand by removing lesser quality trees. Efforts to leave some Ash for genetic stock are more likely to survive if “neighboring threats are reduced”. Two to four mature ash per acre with well-formed crowns can serve as seed trees.
- To retain stand vigor:
    - Minimize harvesting damage
    - Use current BMPs
    - Stay current with new EAB research
    - Be aware of EAB locations in West Virginia


West Virginia Department of Agriculture
2017 Emerald Ash Borer
Infested County Progression
Hancock 2011
Brooke 2011
Ohio 2014
Marshall 2015
Wetzel 2015
Monongalia 2013
Marion 2015
Preston 2015
Tyler 2015
Pleasants 2014
Wood 2014
Ritchie 2012
Doddridge 2013
Harrison 2015
Taylor 2016
Barbour 2016
Tucker 2017
Morgan 2009
Berkeley 2011
Jefferson 2013
Mineral 2012
Hampshire 2012
Grant 2015
Hardy 2014
Wirt 2011
Gilmer 2011
Lewis 2012
Upshur 2015
Calhoun 2010
Jackson 2014
Mason 2014
Roane 2009
Braxton 2012
Randolph 2017
Pendleton 2015
Cabell 2015
Putnam 2013
Clay 2011
Webster 2011
Kanawha 2011
Nicholas 2010
Pocahontas 2017
Wayne 2015
Lincoln 2012
Boone 2013
Fayette 2007
Greenbrier 2011
Logan 2014
Mingo 2011
Raleigh 2010
Summers 2011
Wyoming 2014
Monroe 2015
McDowell 2014
Mercer 2012
EAB Infested County By Year
2007
2009
2010
2011
2012
2013
2014
2015
2016
2017
0 12.5 25 50
Miles
Shawn McCauley
WVDA-P:D-GIS
Date: 9/5/2017

Spotted Lanternfly

Spotted Lanternfly (Lycorma delicatula) (SLF) poses risks to both West Virginia's agriculture and forest industries. SLF causes severe damage to several important agricultural and forest crops including grapes and black walnut. These destructive insects damage plants by feeding on a plant's sap and thus depleting it of water and nutrients. They also damage plants by coating foliage with their excrement. A dark mold grows on the excrement and prevents photosynthetic activity, thereby reducing plant metabolism and indirectly causing decline and eventual death. SLF was first detected in WV in 2019 and is currently found in 6 counties. SLF has a high potential to rapidly spread throughout West Virginia, especially along major transportation routes.



Invasive Plant Species Information

Invasive Shrub and Tree Control Methods

- Herbicides to use: Systemic herbicides, active ingredients of glyphosate, triclopyr or imazapyr. Make sure the label is read thoroughly to ensure both the plant and habitat are listed as acceptable for treatment.
    - Cut-stump: involves removing brushy part of plant (ensure no seeds are spread) and treating the cut surface with a concentrated amount of herbicide. Effective as long as ground is not frozen.
    - Basal bark: involves spraying the base of a plant with a horticultural oil-herbicide mix; best done a foot or so off the ground. Effective as long as ground is not frozen.
    - Foliar: Best for large patches with few desirable species mixed in. Best to treat in late fall or early spring, when plants are sending resources to their roots.
    - Hack-and-squirt: For Tree of Heaven, creating a ring of hack marks around the entire tree and squirt a concentrated herbicide solution into the wound; best done in late summer, prevents root suckering.
- Mechanical or manual control: best for small infestations or areas that are sensitive where herbicides cannot be used. Must be done repeatedly to get good results. NOT recommended for Tree of Heaven and other species that readily re-sprout.
- Biocontrol: Rose rosette disease is a native virus spread by mites. It causes rapid elongation of new shoots followed by a "witches broom" growth pattern. The witches broom shoots may take on a reddish or dark orange color. Shoots may also grow in a spiral pattern or have much thicker branches than other shoots. A rose plant will typically die within 1-2 years of infection. Infection can be spread through clipping an infected branch and placing it on a healthy plant.

Invasive Herb Control

- Japanese Knotweed:
    - Cut stems in June, allow re-growth, and spray with aquatic-approved herbicide in August. Pick up plant pieces as these can resprout.
    - Can repeatedly mow for several years in a row for small infestations to exhaust roots.
- Purple Loosestrife
    - Spray in mid-summer and in early fall
    - Galerucella beetles
    - Can dig out single plants or small clumps, ensuring all root tissue is removed.
- Japanese Stiltgrass
    - Repeated mowing or hand-pulling for small infestations.
    - Systemic herbicides or herbicides specific to annual grasses
- Garlic Mustard
    - Hand-pulling light infestations
    - Systemic herbicides (i.e. glyphosate) can be used in late fall or early spring.
    - Fire can encourage growth.

Invasive Vine Control

- Mile-a-minute

- Biological: A weevil has been approved for release in the US (Rhinoncomius latipesl that feeds on the weed. WVDA has a release program.
- Chemical: Low rate of glyphosate should get approval from WVDA prior to treatment because of Mile-a-Minute's growth habit.
- Cultural: Prevent vegetation gaps and disturbances; maintain broad vegetative buffers on riparian zones and forest edges. Can be hand pulled (using gloves) if infestation is small enough.

- Kudzu
  - Chemical: General use herbicides (glyphosate, triclopyr, metsulfuron, picloram), spraying as much as possible.
  - Can combine chemical control with prescribed burns
  - Manual: Can mow or cut vines to prevent invasiveness.
  - Extensive care must be taken due to growth on and around vital tree species.

Figure 4. Cost-share funds may be available to landowners to conduct recommended practices, such as crop-tree release - which could improve maple syrup production! Stock photo not of Client's property.

Project Planning

Financial Assistance – There are several programs available to landowners for cost-share assistance to fulfill recommended forest management practices:

There are federal government programs that can reimburse a percentage of the cost, not to exceed the maximum rate allowed to a landowner for installing needed conservation practices on their land. All conservation practices have their own specifications and maximum reimbursement rates. These specifications must be met in order to receive payment. Landowners may be required to submit bills, invoices, time sheets, etc. in order to receive payment. If a landowner is interested in obtaining financial assistance on forestry and/or wildlife practices with the Natural Resources Conservation Service (NRCS) and/or Farm Service Agency (FSA) the following steps must be completed. It is highly recommended that landowners call ahead of time to make sure that someone will be in the office that day.

Step 1. Register your property with the local Farm Service Agency (FSA) office to obtain a Farm ID number, if you do not already have one. In order for the FSA to assign a farm number you will need to provide the following information:

- Complete/file Form AD-2047 (Request for Farm and Producer Record Change).
- A copy of your deed or a tax tickets with current owners name.
- Locate the property boundary on maps in the FSA office. (Plat of survey helpful here.)
- Complete and file Form AD-1026 (Highly Erodible Land Conservation and Wetland Conservation Certification).
- Complete and file Form CCC-941 (Payment Eligibility Average Adjusted Gross Income Certification).

Failure to submit any of the above paperwork will stop the process until it has been completed. It should be noted that other forms/paperwork may be required based on the status of ownership.

Step 2. Contact your local Natural Resource Conservation Service (NRCS) office and complete and file an application for Environmental Quality Incentives Program (EQIP). For CRP/CREP the local Farm Service Agency (FSA) office will need to be contacted.

Step 3. NRCS, along with other technical service providers, will then meet with you to explain the programs in more detail and determine what practices, if any, are needed. If your application is approved for funding, you will be notified by the local NRCS office and be asked to sign a contract for financial assistance. It is very important that landowners do not begin practices until they are notified that their project has been approved and a contract has been developed and signed. Similar process is implemented with the local FSA office.

USDA Contact Information For Financial Assistance On EQIP, AMA, CREP, Etc.

Reach out to Heritage Habitat & Forestry for assistance; heritagehabitatco@gmail.com, 330-419-1769. To find your state/county NRCS service center, visit the following website and enter your state and county:

https://www.nrcs.usda.gov/contact/find-a-service-center?state=54&county=061

Forests of Recognized Importance (FORI) – Forest of Recognized Importance are considered critically important because they contain a unique combination of values. You can learn more about FORI here: https://mylandplan.org/content/how-do-i-know-if-i-have-forest-recognized-importance. These can be social, cultural, biodiversity and environmental values:

- Social or cultural values are aspects of a forest that are critical to the surrounding community's identity. They can range from significant historical features (such as sacred sites or burial grounds) to the forest's role within the community—for example, whether local residents have traditionally depended on the forest for berries, firewood, or other products.
- Biodiversity values are critical to preserving local flora and fauna. Such values could include rare ecosystems or habitats, or unusual communities of plant or animal species. Keep in mind that these ecosystems and species need not be on state or federal Threatened or Endangered Species lists—they may just be considered rare regionally or locally.
- Environmental values can benefit the whole community. Some examples are forests whose presence helps protect local watersheds or prevent erosion in vulnerable areas.

When forestry professionals and other experts evaluate a forest as a potential Forest of Recognized Importance, they look at the entire landscape—not just a single stand of trees—and consider all of these values. Places that combine and contain these features are rare, so it is especially important to protect them.

There is another important point to keep in mind. Most Forests of Recognized Importance in the U.S. that are globally, nationally, or regionally significant have already been identified and protected by state or federal government or have been put under a conservation easement by an environmental nonprofit organization. You are more likely to be near a Forest of Recognized Importance than to have one. But even if that is the case, there are still steps you can take in your own woods to help protect that Forest of Recognized Importance.

Given this Standard for the Tree Farm program (if you are enrolling), you do not have any FORI on your property, but your property is still vital to protecting the water quality of the state.

I, or my designated representative, have made an assessment on the applicability of Forests of Recognized Importance to this property.

Initial: __ AP___ Date: _____[redacted]_____

I consulted these resources to determine the applicability of FORI:

https://ipac.ecosphere.fws.gov/

Date: _____AP_____

Is this property of sufficiently large size to constitute a landscape with cultural, historical, or ecological significance, or is it part of a landscape that does? Yes_____ No ___x____

Forest Succession – The changing of plant composition, form, and structure over time.

Forests are constantly changing, contrary to popular belief. The ecological clock of forests is constantly ticking. Unvegetated ground is quickly colonized by early colonizing species, such as grasses, sedges, and other herbaceous growth. Trees are quick to follow, especially light-seeded species such as elms, maples, and ashes. Over time, these pioneer species die out and create new canopy gaps throughout the forest where shade intolerant species, such as oak, have a chance to now occupy the forest. These forests now grow old and constantly are being disturbed, be it fire (lighting strikes), natural disaster (tornadoes, floods,

Figure 5. An example of a post-clearcut harvest area where trees are entering the "stem exclusion" successional stage. Stock photo not of Client's property.

hurricanes), and insect/disease outbreaks (native bark beetles). All these disturbances create ever more canopy gaps and change in vertical and horizontal diversity within a forest. Disturbance is a natural ecological function that serves a vital role in long term forest sustainability. Without disturbance, the forest's successional stages will come to a halt and a plethora of ecological functions will diminish or cease altogether. Wildlife habitat is optimized when a wide variety of successional stages are present on the landscape.

Pre-European settlement times saw Native Americans purposefully burning the forest in order to promote more desirable wildlife habitat. Let alone the naturally occurring lighting strike fire. Fire has been and continues to be a vital disturbance regime critical to long term forest sustainability. In areas where fire is no longer used, man must take the role of disturbance-maker! Timber harvests are an excellent way to manage the species composition and emulate the natural disturbance regimes in your region.

Forestry Terms – Forestry terminology for landowners, professional foresters, and others:

Consistent forestry terminology is essential to anyone interested and involved in the science, management, and conservation of forests. The Society of American Foresters (SAF) offers a great resource for such forestry terminology: "The Dictionary of Forestry". This dictionary is an excellent tool available for anyone to learn more about the language used in forestry. The dictionary provides precision, clarity, and consistency in communication of forestry terms.

Grazing Practices – livestock is absent from the property.

Other Resources – a general description of any other notable woodland resources:

Associated forest resources vary somewhat from forest to forest, but typically include a variety of herbaceous plants present within the woodlands or old fields within a property. Spring, summer, and fall wildflowers provide non-timber benefits to anyone who takes the time to enjoy the blossoms. Along with the flowers, there is a vast array of insect life – pleasant and sometimes unpleasant – that is essential to good ecosystem function. Native and non-native honeybees and butterflies are examples of beneficial insects. Medicinal shrubs and herbs and maple syrup are more examples of other beneficial forest resources.

Protect all woodland from forest fires, insects and diseases. Diseased trees should be removed from the stand during cultural treatments. Report all forest fires immediately to the Division of Forestry Fire Forester or Service Forester for your county or to your local volunteer fire department.

1. Leave at least three to five standing dead snags or live den trees per acre, for cavity nesting birds and animals. Mature sawtimber, certain undesirable species and most damaged trees should be harvested, leaving a good stocking of immature trees of desirable species for the future stand. However, some large wolf trees, especially good mast producers, should be left to benefit wildlife.
2. Concentrate cultural work on the better sites first, where the largest increase in benefits for both timber production and wildlife can be obtained.

3. Water diversion measures (refer to supplemental material) and seeding should be undertaken on constructed log roads and landings to reduce the possibility of erosion and siltation and to create wildlife feeding areas.
4. Destructive grazing by livestock and deer can be extremely detrimental to forest trees and regeneration. Therefore, livestock grazing of the woodland should be restricted. A sound deer harvest management plan should be adopted by the landowner to ensure that the deer population is maintained at a level compatible with the capacity of the habitat. In addition, timber harvesting measures (i.e. leaving a significant volume of slash in harvested stand) should be incorporated into timber sale contracts which will help deter browse impacts.

Figure 6. Example of a desirable cavity tree. Stock photo not of Client's property.

5. Construct and maintain a good system of forest roads on the property to provide easy access for future woodland management work and serve as firebreaks and access lanes should fire suppression be needed in the future. Properly located roads will significantly increase the value of the property, provide for increased recreational opportunities and, if properly seeded using wildlife mixtures, will greatly benefit many species of birds and animals.
6. Plant open or understocked areas with desirable tree species. It is recommended that plantations include more than one tree species to minimize the effects of any disease, insect or browsing problem that may attack a single tree species. Some species recommended for planting include white, red and scotch pines, Norway spruce, yellow poplar and black walnut. (Note: open areas should typically be retained from a wildlife diversity standpoint; however, if planted with trees, additional mast producing species should be incorporated into plantings to increase wildlife habitat quality.)
7. Control of competing vegetation in established plantations is desirable and necessary for optimum growth and survival of the planted seedlings.
8. Various silvicultural treatments should be conducted over the woodland acreage. These include cleanings in sapling hardwood stands, thinning in pole and light sawtimber stands to improve species composition and stocking of desirable crop trees and crown release cuttings to release desirable regeneration from overtopping cull trees.
9. Utilize material from thinning operations, whenever markets exist for these intermediate products.
10. Cut climbing vines which are growing on desirable trees. Vines can cause the formation of crooks and forks, thereby reducing the quality and value of future crop trees. However, vines,

especially grape vines provide excellent wildlife food and sometimes cover. Grape vines in low valued tree species should not be cut and if vines have already created an arbor in the tree tops, they should be left alone; work around these trees.

11. Maintain wildlife food species such as dogwood, service berry, hawthorn, crabapple, sumac and viburnum, especially around the woodland edge. Border plantings of gray dogwood, chestnut chinquapin, bear oak and other seedlings desirable for wildlife food should be established.
12. Maintain buffer areas along all well-traveled roads and along streams to maintain aesthetic appeal and to protect streams from siltation or dramatic temperature changes. However, such buffer areas can be harvested or otherwise treated if affected by windstorms insects, diseases, over maturity or in cases where safety dictates.
13. Consult a forester whenever questions arise regarding the management of the woodland acreage. Do not sell timber or any forest products without a written agreement or contract (refer to Supplemental Materials). A contract prepared by a forester, when followed, prevents damage to the stand and environment and usually results in better prices.
14. Consider the lifetime of enjoyment you can receive from a well managed and improved forest environment. Encourage other woodland owners to adopt forest management programs so they too can provide for the future of the State and future generations. A well-managed forest will provide profits and many other amenities on a perpetual basis.
    a. Protect important wildlife habitat features such as spring seeps, riparian areas, caves, rock outcrops, etc.

Figure 7. Drumming logs are important for grouse. Stock photo not of Client's property.

Biodiversity

Figure 8. Biodiversity can be encouraged by selective retention of cavity trees and/or "snags" - trees that otherwise may be viewed as "undesirable". Stock photo not of Client's property.

Biodiversity means a variety of life forms. It can be considered at three levels: ecosystem, community and individual species. All three levels are interconnected and hierarchical; species are dependent on communities, which are dependent on the larger ecosystems in which they reside. Biologically diverse ecosystems tend to be more productive and resilient than those with less diversity.

Bioenergy

Bioenergy is an environmental energy alternative to fossil fuels and may be the key to helping reduce fire danger in the nation's forests. However, several obstacles must be successfully addressed before biomass energy can become viable. First, to make biomass fuel delivery feasible, forest managers must have a viable market within reasonable distance that pays an adequate price. Second, to assure

payback of large initial investments, investors in energy production facilities must have a reliable fuel source at prices that allow competitive production over a long enough period. Today, neither of these situations exists. The use of biomass for energy will always be the lowest-value use. Small- diameter or other or non-traditional wood products will out-bid the energy industry for the biomass supply. The biomass energy market, however, can provide a way of disposing of otherwise problematic residual material in a least-cost, if not profitable, manner.

Past Management – a general description of previous forestry activities, cost-share program implementations, and other relevant history of property use:

The landowner has continued to conducted timber harvesting and invasive species control in certain areas of the property, as well as maintenance access trials and boundary lines. Firewood removals via dead and dying trees has occurred as well. The property is used primarily for conservation purposes, including allowing recreation, camping, hiking, horseback riding, meetings, and more for the general public. Landowner has been maintaining trails, conducting timber harvests, forest stand improvements, and general property development to greater assist appreciation and recreation on-site.

Prescribed Burning Opportunities - prescribed burning is currently prohibited on private land based on West Virginia; State Code: https://wvforestry.com/laws-regulations/fire/.

Recreation – current and potential recreational activities at property:

Each forest has a unique history and character, and this continues to build under your stewardship. This forest could be used for hunting, picnicking, or wildlife watching, among others. Many landowners find enjoyment in doing improvement work in their woods. Others find pleasure in watching the birds. Some folks gain gourmet foods from the woods, gathering fruits, nuts, or wild mushrooms. Flowering trees like dogwood, redbud and serviceberry, whenever present, add to the beauty of the forest. Maintaining some trails will improve access and your opportunities for use of the area. A walk in the forest provides a time of learning but also a time to relax. The woodlands can be a quiet place of solitude after a busy day at work, or anytime for that matter.

Landowner enjoys the aesthetics of the property by hiking and riding throughout. Hunting is a common activity on the property, so enhancement of wildlife habitat is important to landowner.

Project Planning

The general public also utilizes the property – lodging, hiking, and other activities. See “Trail Map” on page 278.

Reforestation & Afforestation Opportunities – needs identified for reforestation and/or afforestation on the property:

Natural seeding of forest by current species along with recommended management practices should adequately recruit the next generation of forest.

Tax Tips for Forested Landowners: https://www.timbertax.org/publications/fs/taxtips/TaxTip2023.pdf , https://forestrywebinars.net/partner-section/usda-forest-service-national-timber-tax/?searchterm=forest%20tax

Threatened & Endangered Species – considerations for threatened and endangered species, including the direct relationship with biological diversity:

No threatened or endangered species were found during the site visit and forest inventory, however that does not mean they are not present in the area. Check with your state wildlife agency and USFWS Threatened and Endangered Species program to find out what the threatened and endangered species are in your area. Assistance is available in determining if an endangered species lives on your property.

Although very few occur in West Virginia, there are certain species of plants and animals which have been placed on the U.S. Fish and Wildlife Service (USFWS) list of "Threatened or Endangered Species" in accordance with the Federal Endangered Species Act of 1973.

Check with your state wildlife agency and/or Natural Heritage program to find out what the threatened and endangered species are in your area. Assistance is available in determining if an endangered species lives on your property. Natural Heritage programs keep records about the location and biology of many species. They make this information available to landowners, businesses, organizations and government agencies. West Virginia has a threatened and endangered species coordinator, who can help you to make informed decisions as you implement your plan and manage your land. You should contact the:

West Virginia Division of Natural Resources Wildlife Diversity and Natural Heritage Program Post Office Box 67
Elkins, WV 26241-0067
Phone: (304) 637-0245
FAX: (304) 637-0250
Email: Brian.P.Streets@wv.gov

Federally Endangered Species for West Virginia:

- Indiana Bat (*Myotis sodalist)*
- Virginia Big-eared Bat (*Corynorhinus townsendii virginianus)*
- Gray Bat (*Myotis grisescens)*, accidental – not seen since 1991
- Eastern Cougar (*Puma concolor couguar),* probably extirpated
- Clubshell (*Pleurobema claua)*
- Fanshell (Cyprogenia stegaria)
- James Spinymussel (*Pleurobema collina)*
- Pink Mucket Pearlymussel (*Lampsilis abrupta)*
- Tubercied-blossom Pearlymussel (*Epioblasma torulosa eorulosa)*
- Northern Riffleshell (*Epioblamsa torulosa rangiana)*
- Harperella (*Ptilirnnium nodosum [fluviatile])*
- Northeastern Bulrush (*Scirpus ancistrochaetus)*
- Running Buffalo Clover (*Trifolium stoloniferum)*
- Shale Barren Rockcress (*Arabis serotina)*

Federally Threatened Species for West Virginia:

- Bald Eagle *(Haliaeetus leucocephalus)*
    - (DELISTED but still addressed under the Bald and Golden Eagle Protection Act)
- Flat-Spired Three Toothed Landsnail *(Triodopsis platysayoides)*
- Cheat Mountain Salamander *(Plethodon netting)*
- Northern Long Eared Bat *(Myotis septentrionalis)*
- Virginia Spiraea *(Spiraea virginiana)*
- Small Wholred Pogonia *(Isotria medeoloides)*

It is advisable to limit or to curtail most forest management activities when they occur in close or immediate proximity to the known habitat of threatened and endangered species. Critical habitat is defined as: specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species, and that have been formally described in the Federal Register. An area designated as critical habitat is not a refuge or sanctuary for the species. Listed species and their habitat are protected by the Act whether or not they are in an area designated as critical habitat

The U.S. Fish and Wildlife Service and the West Virginia Division of Natural Resources through the Natural Heritage Program are the agencies responsible for the monitoring and protection of these species in West Virginia. A list of endangered and threatened species can be obtained from the U.S. Fish & Wildlife Service in Elkins, West Virginia, or by contacting Natural Heritage Program, West Virginia Wildlife Resources, P.O. Box 67, Elkins, WV 26241, telephone number: 304-637-0245. Natural Heritage programs keep records about the location and biology of many species. They make this information available to landowners, businesses, organizations and government agencies. West Virginia has a threatened and endangered species coordinator, who can help you to make informed decisions as you implement your plan and manage your land.

For a list of state-listed threatened and endangered species, go to https://wvdnr.gov/plants-animals/rare-threatened-endangered-species/.

See appended IPAC report provided to landowner along with other pertinent information.

Timber Sale Admin.

Timber Harvesting - a general over of timber harvesting:

Commercial harvests can be conducted to remove mature sawtimber, trees of poor form or quality and undesirable species. It is recommended that trees to be cut be marked by a professional forester and that a sales agreement be prepared to assure the use of good logging practices (refer to Supplemental

Materials). A preliminary cruise of the standing timber has been made along with an estimate of the existing timber volume on the tract and wildlife diversity, recreational potential and water resources, which stands should be harvested and in what order. The timber related results of this cruise are shown in the General Cruise Information Table. The proposed harvest cuts should leave adequate residual volume for another harvest in 10 to 12 years while meeting the silvicultural needs of the stand and the wildlife needs for the area along with the landowners objectives and economic desires. The quality of the standing timber should also be improved by these harvest operations, through the removal of a large portion of the undesirable species and trees of poor form or quality.

Figure 9. It is recommended to have a forester mark each tree to be harvested during a timber sale. Stock photo not of Client's property.

Note: All loggers are required to be licensed to log in West Virginia. They must also have at least one person who has been certified on the operation. Loggers must erect a sign showing the logger's name and license number. It should be in the log landing at all times. The logger must also notify the West Virginia Division of Forestry of his/her operation.

Roads

Several stands on the tract are inaccessible at the present time; however, several roads will be constructed on the property during the scheduled harvest operations. The locations of these roads should be planned and laid out prior to harvest. These should be constructed in strategic locations to provide access to the majority of stands for future forest management work (refer to Best Management Practices). On completing each harvest cut, the roads and landings should be seeded to a mixture of perennial grasses, legumes and appropriate wildlife seed mixtures. Necessary water diversion measures should be installed. Properly maintained access roads will also serve as excellent firebreaks and fire access roads, should the need for fire suppression develop in the fixture. These roads also provide opportunities for woodland recreation such as hunting, fishing, horseback riding, etc.

Timber Sale Checklist For Forest Landowners

DESCRIPTION OF THE HARVEST SITE GUARANTEED BY LANDOWNER

- Surveyed property lines (possible legal description)
- Property lines verified with neighboring boundaries
- Cutting boundaries designated with a margin of safety when near property boundaries
- Clearly designated cutting boundaries within the land holding

DESCRIPTION OF THE TIMBER TO BE SOLD

- By marked tree designation (single tree selection, crop tree release, etc.)
- By merchantable timber designation
- By species designation
- By clearcut (must be boundary designation)

- By diameter limit
- All require volume estimates (with the appropriate scale specified in each case)

PROTECTING THE PROPERTY (note have the logger register the logging operation with the DOF)

- Off-site water pollution restrictions
- Soil protection
- Waterways - protective measures (specify use of BMP's)
- Residual tree damage restrictions
- Structures to protect (fences, bridges, culverts, etc.)
- Reclamation of critical area requirements
- Removal of trash provision
- Logger obligations for fire prevention, suppression and damages

MINIMIZING THE DAMAGE

- Road planning requirements
- Equipment specifications and restrictions
- Wet weather operation restrictions
- Subletting of contract restrictions
- Landowner approval, restrictions for roads, skid trails and log landing locations
- Penalty clauses for excessive damage to residual timber stand

RETIRING THE ROAD SYSTEM

- Provisions for water diversion structures
    - Requirements for waterbars on skid trails and broad-based dips on haul roads if future access is required
- Requirements for roadside ditching
    - Providing for culverts and bridges at stream crossings
- Requirements for final grading of road, out-sloping and crowning
- Requirements for lime, fertilizer, seed and mulch where required

OWNERSHIP, HANDLING, AND DISPOSAL OF WOOD WASTE

- State who owns tree tops and slash during the contract period
- Provide for disposal of wood waste following harvest
- Provisions for cleanups of log landings

PROVIDING FOR GOOD BUSINESS PRACTICES

- State how much time allowed for removal of timber (term of contract and provisions for extensions)
    - State the amount, method, and time of payment
- Provide for liability responsibilities in case of accidents
- State proper names and signatures
- Provide for penalties for cutting of unmarked trees (usually two to three times the stumpage value)
- Make special provisions for building sawmills and other facilities on premises
- Provide a statement of how the buyer will have access to the property (ingress and egress)

- Provide for methods for making additions or changes in contracts (require approval in writing by both parties)
- Provide for third party designations to settle contract disputes

Preparing To Sell Forest Products

BEFORE YOU SELL THE TIMBER

- Know your boundaries
- Contact professional foresters for a timber cruise and a plan
- Learn what you have in the way of species, quality, volume, logging limitations and accessibility

OBTAIN INFORMATION REGARDING MARKETS

- Who is buying the timber?
- What are some prices being paid?

THE TIMBER SALE INVOLVES DEVELOPMENT OF A PROSPECTUS THAT INCLUDES

- Description of timber sale
- A timber showing date
- Bid opening date
- Outlines of some pertinent contract provisions

THE CONTRACT SHOULD INCLUDE

- Legal description
- Timber for sale description
- Method of payment
- Length of contract
- Special provisions for damage, road developments, restrictions, etc.

THE HARVEST INVOLVES (register the job with the appropriate agency)

- Planning the job with the logging contractor to locate:
    - Timber concentrations
    - Haul roads
    - Landings and skid trails
    - Maintaining buffers (no cut areas)
    - Planning for water control structures
    - Determining development of permanent roads vs. temporary roads

MONITORING THE ACTIVE LOGGING JOB INVOLVES

- Watching for contract compliance
- Checking on damages
- Maintenance of water control structures

ENDING THE HARVEST INCLUDES

- Smoothing and water barring skid roads
- Smoothing and draining landings

- Smoothing and draining haul roads
- Cleaning or removing water control structures
- Seeding areas disturbed

THE WEST VIRGINIA FOREST WATER QUALITY PROGRAM

- Is not statutory
- Water siltation, however, is illegal
- Includes an educational program
- Incorporates logging registration
- Monitors compliance

Water & Wetlands - a general description of the water and wetland resources as well as vernal pools on the property:

Any use of heavy equipment near open water and/or stream banks will adhere to state Best Management Practices (BMPs) and ensure an adequate buffer from logging trail to water in order to ensure water quality and prevent any possible erosion and/or sedimentation.

Wetlands are extremely important for water quality, and they provide unique habitats for fish and wildlife. These are an important forest resource component for overall health of the forest system. Ephemeral or seasonal wetlands – also called vernal pools - are typically small and tucked within the forest cover. Vernal pools periodically dry up and do not contain fish. This drying may occur annually or just during drought years. However, these ephemeral pools provide unique habitat for amphibians like salamanders and frogs, as well as many other species of wildlife. Many landowners find that wetlands improve the aesthetics and overall enjoyment value to their land. It is especially important to protect permanent and ephemeral wetland areas for the health of the forest and the environment.

Make sure BMPs for Streamside Management Zone (SMZ) are strictly followed and maintain a >50% canopy cover for the first 35’ measured as horizontal distance perpendicular to the water beginning at the top of the bank, or wetland edge. A light selection harvest can occur above the 35’ horizontal distance up to 100’ slope distance. Strict adherence to the WV Silvicultural BMPs so the Streamside Management Zone will be protected to prevent exposure of mineral soil and subsequent erosion. Equipment operation in this area should be limited to points where the stream must be crossed. Pulling cut trees from this area is permitted by cable. When mineral soil is exposed it shall be stabilized immediately by seeding and mulching, as well as any other additional measures that may be necessary to prevent sediment from entering the stream.

Please refer to wvforestry.com https://wvforestry.com/pdf/DOFbmpManual2018.pdf for detailed information on protecting soil and water quality.

Water and wetland areas are identified on the maps provided within this forest management plan. The topographic maps contain blue lines of USGS-recognized streams and waterbodies, as well as an additional wetland area map layer provided from the state GIS office.

Unique West Virginia Wildlife Habitats[60]

With associated rare & non-game species, & habitat recommendations

Important Habitats – Habitat Recommendations	All habitats ranked as High Priority by WVDNR SWAP for the wildlife species dependent on them:
Caves and karst (limestone bedrock region that incorporates sinkholes, springs, sinking streams, limestone ledges) – Plan timber harvests with buffers around karst features and caves to maintain habitat elements (woody debris, shade, mast producing trees) utilized by SGNC in caves. Give extra attention to protect water quality and flow of 'sinking streams' that once underground are primary habitat for many cave-restricted species	Some species in West Virginia's caves occur nowhere else in the world, and many others are restricted to caves in the Central and Southern Appalachians. Over 75 SGNC require this habitat type and include Indiana (FE) and Virginia big-eared bats (FE), Allegheny woodrats, WV spring salamander, and numerous cave-dwelling invertebrates such as the Madison Cave isopod (FT), spiders, snails, and beetles.
Hemlock Forests – Treat healthy specimens to protect against hemlock wooly adelgid infestations to conserve representative stands (Contact a WVDA Forest Entomologist for treatment information)	If not infested by hemlock woolly adelgid: Habitat for at least 19 SGNC, including Indiana bat (FE), Allegheny woodrat, wood thrush, Cooper's Hawk
Wetlands (forested headwater spring seeps, seasonal woodland (vernal) pools, floodplain forests, forest and shrub swamps, bogs) – Protect existing wetlands from conversion. Protect all wetlands from direct impacts of equipment. Plan timber harvests so that local hydrology (i.e. flow into or from the wetland) is not altered, good water quality is maintained in feeder springs or streams, and the encroachment of invasive plants is limited. Conserve forested wetlands over long term through excellent forest practices.	Habitat for the northeastern bulrush (FE), and over 45 SGNC includes bald eagles, Virginia big-eared (FE), other bats, multiple salamanders, frogs, insects, small mammals, and birds. Virginia spiraea (FT) and running buffalo clover (FE) occur in the open rocky river scour zones adjacent to floodplain forests in the New, Gauley, and Bluestone River Basins. Also, critical places to protect for their contribution to watershed hydrology and ecosystem services that regulate water quantity and quality. The number and acreage of floodplain forest systems has been severely diminished in the state and few intact floodplain forests exist.
Calcareous Forests (forests on soils derived from limestone and dolomite) – Protect existing stands from conversion to non-forest uses, conserve forest type over long run through excellent forestry practices; plan timber harvests to minimize encroachment of invasive plants.	Habitat for at least 21 SGNC including Virginia big-eared bat (FE), running buffalo clover (FE), Allegheny woodrat, cerulean warbler.
Cliffs, rock outcrops, and Talus (sparsely vegetated rock exposures, many with all three components together) – Plan timber harvests with a buffer around these systems to maintain the habitat elements (woody debris, perches, and mast producing trees) needed by SGNC and to prevent direct impacts to SGNC by equipment.	At least 18 SGNC such as the Virginia big-eared bat (FE), flat-toothed three-spired landsnail (FT) (a Cheat River Gorge endemic), peregrine falcon, and timber rattlesnakes.
Red Spruce Forest – Protect and maintain spruce stands, release naturally regenerating spruce within northern hardwood stands, plan timber harvests to minimize encroachment of invasive plants	Habitat for 20 SGNC, including Cheat Mountain Salamander (FT), West Virginia north flying squirrel (until recently FE), northern saw-whet owl).
Woodlands (student trees, open canopy), native grasslands, and glades (herbaceous openings) on shallow soils of shale, limestone or sandstone (non- forest because of hot and dry conditions) – Protect sites from development (e.g. road construction, quarrying), plan timber harvest in adjacent stands to minimize encroachment of invasive plants.	Harbor several herbaceous plant species that are restricted to these habitats, including shale barren rockcress (FE) that occur nowhere else in the world except in the Central Appalachians. Wildlife habitat for Virginia big-eared bat (FE), and many species of butterflies and beetles ranked as SGNC.

[60] 2015 WVDNR State Wildlife Action Plan; *SGNC: Species in Greatest Need of Conservation, FT: Federally Threatened, FE: Federally Endangered*

Glossary[61]

Basal area – the cross-sectional area of a single stem, including the bark, measured at breast height. The cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed per unit of land area.

Board foot – the amount of wood contained in an unfinished board one inch thick, 12 inches long, and 12 inches wide, abbreviated bd ft. Board foot volume is a measure of merchantability…

Clearcut – the cutting of essentially all trees, producing a fully exposed microclimate for the development of a new age class.

DBH – the diameter of the stem of a tree measured at breast height (4.5 ft.) from the ground.

Diameter limit cut – the removal of all merchantable trees above or below a specified DBH that can vary according to species, with or without the cutting of cull trees.

Even-aged stand – a stand of trees composed of a single age class in which the range of the tree ages is usually +/- 20% of rotation.

Forest succession – The gradual supplanting of one community of plants by another.

Pole – a tree of a size between a sapling and a mature tree.

Quadratic mean diameter – the diameter corresponding to their mean basal area.

Sawtimber – trees or logs cut from trees with minimum diameter and length and with stem quality suitable for conversion to lumber.

Seedtree cut – the cutting of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in a fully exposed microenvironment.

Shelterwood cut – the cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment.

Silviculture – the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Snag – a standing, generally unmerchantable dead tree from which the leaves and most of the branches have fallen.

Stand – a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

Stocking – an indication of growing-space occupancy relative to a preestablished standard.

Thinning – a… treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality…

[61] *The Dictionary of Forestry,* SAF

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Appendix A: Literature[62]

Invasive Species Control

INVASIVE PLANTS OF OHIO

Fact Sheet 9 Japanese Honeysuckle & Asian Bittersweet

Lonicera japonica, Celastrus orbiculatus

JAPANESE HONEYSUCKLE

DESCRIPTION:

Japanese honeysuckle is a vine with entire (sometimes lobed), oval-oblong, opposite leaves from 1 ½ -3 inches long. In Ohio, the plants are semi-evergreen with leaves persisting into late winter or early spring. The stems are usually hairy and hollow, reaching a length of 30 or more feet. Flowers are tubular, with five fused petals, white to pink, turning yellow with age, very fragrant, and occur in pairs along the stem at leaf junctures from April through June. The many-seeded black fruit is pulpy and matures in autumn. Identification is essential to avoid confusion with the native honeysuckle vines (*L. dioica, L. reticulata*); the native species bear fruit at the ends of stems and the upper leaves of the stem are joined together.

JAPANESE HONEYSUCKLE

Asian or Oriental bittersweet is a vine with finely-toothed, rounded, alternate leaves, up to 4 inches long. The stems often have noticeable lenticels and may reach a length of 60 feet. Plants produce small greenish flowers in axillary clusters (from most leaf axils), and each plant can produce large numbers of fruits. The fruit is a conspicuous, yellow, 3-valved capsule that splits open at maturity revealing three red-orange seeds. The increasingly rare native bittersweet (*C. scandens*) can be distinguished by its elliptical-shaped leaves and the flowers and fruit which arise at the tips of stems. American bittersweet has fewer, larger clusters of fruits, whereas Oriental bittersweet is a prolific fruit producer with multiple fruit clusters emerging at many points along the stem. Unfortunately, hybrids of the two species occur which may make accurate identification more difficult.

Japanese honeysuckle was introduced to New York in 1806 as an ornamental plant, for erosion control and wildlife forage and cover. Cultivars of Japanese honeysuckle are available. Asian bittersweet is native to eastern Asia and was introduced into the U.S. in the 1860s as an ornamental plant. It is often associated with old homesites, from which it has escaped into surrounding natural areas. Oriental bittersweet is still widely planted and maintained as an ornamental vine, further promoting its spread.

[62] Some literature may pertain to specific states, but information within them is relevant to this property regardless of state published in/for.

HABITAT:
Both Japanese honeysuckle and Asian bittersweet thrive in disturbed areas such as roadsides, fencerows, forest edges, and forest gaps. Areas of special concern are woodland edges, early successional forests, and riparian corridors. Although preferring sunny areas, both are shade tolerant and can live in marginal habitats until favorable conditions arise.

INVASIVE CHARACTERISTICS:
Japanese honeysuckle and Asian bittersweet are fast-growing trailing or climbing woody vines capable of covering large areas of ground or extending into the treetops. They can severely damage native plant populations by limiting available sunlight, constricting nutrient flowing stems and weighing down treetops which increases the likelihood of wind damage. Both are prolific seed producers; seeds are often dispersed by birds. The root systems are very persistent and capable of extensive root suckering.

ASIAN BITTERSWEET

CONTROL:
Mechanical: Hand-pulling can be effective for small populations. Care must be taken to remove the entire plant, including the roots; all plant materials should be bagged and taken off-site. Plants can also be cut or mowed, but they should be cut low as they may re-sprout; repeated cutting or mowing is usually needed for effective control.

ASIAN BITTERSWEET

Chemical:
Foliar application of systemic herbicides such as Roundup, AquaNeat, Razor, Accord, and Rodeo can be very effective, especially if applied in the early spring or late fall when other native vegetation is dormant (to minimize impacts on non-target plants). Some herbicides are approved for wetland/aquatic use (e.g., Aquaneat, Accord, Rodeo), while others should only be used in upland sites. The most effective treatment time occurs after flowering/seed set and before the plant goes dormant for the winter. To be most effective, many herbicides require a penetrating or sticking agent such as Nu-Film- P.

Biological:
No biological controls are currently available for Japanese honeysuckle or Asian bittersweet.

Credits and additional information:
Plant Conservation Alliance-Alien Plant Working Group
Ohio Department of Natural Resources, www.ohiodnr.gov
The Nature Conservancy, Ohio Chapter
OIPC website, www.oipc.info

Note: Maps of species' ranges are based on records as of 2010.

THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

F-69-11

Controlling Non-Native Invasive Plants in Ohio's Forests: Autumn Olive (*Eleagnus umbellata*) and Russian Olive (*Eleagnus angustifolia*)

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Division of Forestry

Autumn and Russian olive are non-native, upright, deciduous shrubs that commonly reach heights up to 20 feet tall. Both species are widely distributed in the United States, since planting began in the mid-1800's to provide food and cover for wildlife, ornamental use, road bank stabilization, erosion control, strip mine reclamation, and shelterbelts. These shrubs form nitrogen-fixing root nodules, which allow them to grow on a wide variety of sites including nutrient-poor soils. They are among the first plants to leaf out in the spring and can grow vigorously in full sunlight, which can allow them to aggressively suppress native plants. Autumn and Russian olive are commonly found invading woodland edges, the interior of open woodlands, early successional woodlands, and abandoned agricultural fields. They do not grow well in dense forests or wet soils.

Identification

The most prominent characteristic of both species is the silvery scaling (Figure 1) that covers the young stems, leaves, flowers, and fruits. This makes both species conspicuous from a distance.

Figure 1. Autumn olive leaves, showing silvery leaf underside.

Leaves

Autumn olive: elliptical to egg-shaped; 2 to 4 inches long and ½ to 1¼ inches wide; dark green to grayish green on upper surface with dense, silvery scales on the underside. Leaves are arranged alternately along stems and have un-toothed, wavy margins.

Russian olive: lance-shaped or oblong; 1½ to 3¼ inches long and 3/8 to ¾ inch wide; dull gray-green above with dense, silvery scales coating both sides. Leaves are arranged alternately along stems and have un-toothed, wavy margins (Figure 2).

Figure 2. Russian olive leaves.

Flowers

Conspicuous clusters along twigs at the base of leaves, appearing early spring to early summer. Creamy-colored to light yellow with silvery exterior; bell-shaped and aromatically fragrant (Figure 3).

Figure 3. Autumn olive flowers.

Fruits

Autumn olive: ¼-inch silvery, juicy berries dotted with brown scales that ripen to red or pink when mature in fall. Single-seeded fruit are borne on short stalks (Figure 4).

Russian olive: 3/8- to ½-inch long, elliptical, dry, mealy yellow-brown berries with silvery scales that become shiny when mature in late summer and fall. Fruits persist throughout the winter. Seeds remain viable in the soil for approximately three years.

Figure 4. Autumn olive fruit.

Twigs

Silvery or golden brown, scaly when young, often thorny or with short spines at the tips (more typical of Russian olive).

Control Methods

When trying to control or eliminate a woody, non-native invasive shrub like autumn or Russian olive, several methods may be considered. The method used depends on plant size, size of the infestation (area), and a landowner's comfort level with a particular method. For a more detailed description of the methods covered below, see OSU Extension fact sheet *Controlling Undesirable Trees, Shrubs, and Vines*, OSU Extension Forestry Fact Sheet F-45, and *Herbicides Commonly Used for Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland*, F-45 Supplement-06.

Environmental note: Many of the following herbicides are labeled to be mixed with a penetrating basal oil, diesel fuel, or kerosene as their carrier agent. The choice to utilize a methylated, seed oil-based basal oil instead of diesel fuel or kerosene will result in a more environmentally friendly practice. However, read the label to ensure that use of a basal oil is appropriate for the herbicide you have chosen.

Mechanical Control

Small infestations of small plants can be pulled, dug, cut, or mowed fairly easily. Pulling or digging of small plants is most effective if done following a rain. Cutting and mowing is most effective when initiated in early summer, when stored food reserves are at their lowest. In order to achieve effective control, pulling or digging must be done so that every root is removed. While this is perhaps impossible, if it is repeated frequently, small shrubs can ultimately be eliminated once their food reserves are exhausted. The key to this type of control method is to be vigilant.

Mechanical treatment alone is usually not completely effective in controlling medium- to large-size shrubs. Simply cutting the shrub off at the base will cause prolific sprouting and increase the number of stems. An effective strategy for controlling autumn and Russian olive is to kill both the above ground portion and the root system, which eliminates the potential for sprouting. This is most effectively achieved through herbicide use.

When infestations are so dense that access to the area is difficult, landowners may elect to use mechanical means of removing large plants and vast numbers of plants. Whether using a skid steer, tractor, or some other piece of equipment to pull the shrub out of the ground, realize that some follow-up maintenance will be needed. Care needs to be taken to ensure that any damage to the residual forest stand is minimal, and a follow-up application of a foliar herbicide should be applied when the remaining roots begin to sprout (Table 1). Also, be cautious of the timing of removal. Removing vast numbers of plants may result in a large area of disturbed soil, so care should be taken to minimize any erosion potential created when the plants are removed.

Foliar Spraying

Foliar spraying is a method of control in which a dilute concentration of herbicide is sprayed directly on the leaves. Herbicides need to be applied sometime after the plant is in full leaf and before the onset of fall color in order to maximize effectiveness. Herbicides are generally applied to wet the leaves but not to the point of runoff.

Exercise caution when applying foliar herbicides. This method should only be used when the target plants are within easy reach of the sprayer. Spraying directed at taller or otherwise less accessible plants can damage or kill valuable non-target plants through herbicide drift or overspray. Herbicides recommended for foliar spraying of autumn and Russian olive in a forest setting are listed in Table 1.

Several other herbicides—including Tordon 101 and Banvel—have been used successfully to control autumn olive by foliar spraying, but because of the potential for significant damage to non-target species due to the active ingredients in these herbicides, they have limited use in a forest setting.

Table 1. Foliar herbicides recommended for control of autumn and Russian olive.

Common Name	Example Brand Names	Comments[1]
glyphosate	Roundup herbicides, Accord herbicides, and other herbicides containing at least 41% glyphosate	Apply solution of 2% herbicide (vol/vol) in water when leaves are green; add a surfactant if not in herbicide.
2,4-D + triclopyr	Crossbow	Apply solution of 1.5% herbicide (vol/vol) in water.
triclopyr	Garlon 3A	Apply solution of 2% herbicide (vol/vol) in water; use non-ionic surfactant.
	Garlon 4, Garlon 4 Ultra, Tahoe 4E, Remedy	Apply solution of 1% herbicide (vol/vol) in water; surfactant may be used.
imazapyr	Arsenal	Apply solution of 1% herbicide (vol/vol) in water + non-ionic surfactant.

Basal Spraying With Herbicide

A basal application for autumn and Russian olive refers to the spraying of a labeled herbicide mixed with an oil-based carrier on the lower 12–18 inches of the main stems. The herbicide is sprayed, ensuring that the main stems are wet but not to the point of runoff. Basal bark treatments should only be applied when the areas to be treated are dry and not frozen. The basal bark treatments recommended in Table 2 should be applied during the dormant season. Due to the spreading growth habit of autumn and Russian olive, access to the lower stem portions of the shrub is not always easy to achieve. Care should be taken to ensure that the chemical being applied is reaching the lower stem portions of the shrubs and not merely being applied in its general vicinity.

Cut-Stump Herbicide Treatment

Cut-stump treatments are very effective for controlling many undesirable woody shrubs (Table 3), and they work well on autumn and Russian olive. This method involves cutting the shrub off close to the ground and applying an herbicide to the cut surfaces (and sometimes the bark) with a spray bottle, paintbrush, roller, or wicking device. Treatments made late in the growing season (July–September) or during the dormant season are the most effective. Always apply to stumps that are dry and not frozen.

Whether to use an oil- or water-soluble herbicide depends on the timing of the herbicide application after the cut. Herbicides carried in water should be applied to the outer third of the top of the stump **within minutes** of making the cut.

Utilize an oil soluble herbicide when planning to cut, then return later to treat the stumps. Apply the oil-soluble herbicide to the entire top and sides of the cut stump, but not to the point of excessive runoff.

Summary

Label recommendations should always be followed to maximize the potential for successful control. At a minimum, monitor treated shrubs for two years to determine if complete control has been achieved. Shrubs that re-sprout or are not completely killed by the first treatment will warrant a follow-up treatment.

Herbicides, like all pesticides, are approved (labeled) for specific uses by the Environmental Protection Agency. Approved uses and application methods are listed and described on the pesticide's label. The herbicides listed in this fact sheet were appropriately labeled at the time of publication. Because pesticide labeling may change at any time, you should verify that a particular herbicide is still labeled for your intended use. At the time of this writing, copies of most herbicide labels and Material Safety and Data Sheet (MSDS) could be obtained online at the Crop Data Management System web site (**www.cdms.net/manuf/manuf.asp**). Others are available through the individual manufacturer's web site. Ohio State University Extension and the Ohio Division of Forestry do not endorse any of the products mentioned and assume no liability resulting from the implementation of these recommendations.

[1]Comments are not intended to be a substitute for the herbicide labels. To ensure the safe and effective use of the herbicides recommended in this publication, read the label and MSDS.

Table 2. Herbicides recommended for basal spraying of autumn and Russian olive.

Common Name	Example Brand Names	Comments[1]
triclopyr	Garlon 4, Garlon 4 Ultra, Tahoe 4E, Remedy	20% Garlon 4 + 10% penetrate (e.g. Cide-Kick II) in diesel oil, fuel oil, kerosene, or basal oil (penetrate not needed with basal oil).
	Pathfinder II	Apply full strength as would an oil-carried herbicide.
imazapyr	Chopper, Stalker	8–12 oz. in a gallon of diesel oil or penetrating oil.
2,4-D + triclopyr	Crossbow	4% Crossbow in diesel oil, fuel oil, or kerosene.

Table 3. Herbicides recommended for cut-stump treatment of autumn and Russian olive.

Common Name	Example Brand Names	Comments[1]
glyphosate	Roundup, Accord, and others; (choose product with 20% active ingredient)	Apply 20% glyphosate mixed in water to outer third of cut stem/stump surface immediately after cutting (timing is critical).
triclopyr	Garlon 3A, Tahoe 3A	Apply full strength.
	Garlon 4, Garlon 4 Ultra, Tahoe 4E, Remedy	20% in basal oil, fuel oil, diesel, or kerosene.
	Pathfinder II (a ready-to-use product)	Apply full strength.
imazapyr	Chopper, Stalker	Apply 8–12 oz. in a gallon of penetrating oil or diesel oil.
2,4-D + triclopyr	Crossbow	Apply 4% Crossbow in diesel oil, fuel oil, or kerosene.
picloram + 2,4-D	Tordon RTU, Pathway	Apply full strength.
	Tordon 101	Apply Tordon 101 diluted 1:1 with water.

Figure 5. Autumn olive shrub.
Credit: James H. Miller, USDA Forest Service, bugwood.org

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INVASIVE PLANTS OF OHIO

Fact Sheet 1 — Amur, Morrow's & Tatarian Honeysuckle

Lonicera maackii, L. morrowii, L. tatarica

AMUR HONEYSUCKLE

DESCRIPTION:
Amur, Morrow's and Tatarian bush honeysuckles are upright, deciduous shrubs that range from 6 to 15 feet in height at maturity. Older stems have hollow pith (center). Two native bush honeysuckles, bush honeysuckle (*Diervilla lonicera*) and Canada fly honeysuckle *(Lonicera canadensis)* may be confused with these non-natives; proper identification is necessary. Branches of the native species have solid stems, while the non-natives have hollow pith.

The 1-2½ inch leaves are opposite along the stem and short-stalked. Amur honeysuckle has dark green leaves that end in a sharp long-pointed tip; the leaf underside has hair along the veins. Morrow's and Tatarian both have oval to egg-shaped leaves. The underside of Morrow's leaves is consistently hairy, while Tatarian lacks hair.

Pairs of tubular flowers less than an inch long are borne along the stem in the leaf axils. Amur flowers have very short, pubescent peduncles (stems). Morrow's peduncles are long and pubescent, while Tatarian's are long and glabrous (smooth). Flowering generally occurs from early to late spring. Yellow to dark-red berries mature from late August to October. Showy pink honeysuckle (*L. x bella)* is an invasive hybrid of Morrow's and Tatarian with showy pink flowers.

AMUR HONEYSUCKLE

Amur honeysuckle is native to China, Russian Far East, Korea, and Japan. Morrow's honeysuckle is native to Korea and Japan. Tatarian honeysuckle is native to Russia, Central Asia, and China. Tatarian honeysuckle was introduced into North America in 1752; Amur and Morrow's honeysuckles came in the late 1800s, as ornamental plants. Subsequently, they were promoted for wildlife cover and soil erosion control, in addition to landscaping.

MORROW'S HONEYSUCKLE

HABITAT:

These non-native bush honeysuckles are relatively shade-tolerant, invading mesic to moist woods as well as forest edges, abandoned fields, prairie remnants, pastures, and other open, upland habitats. Woods that have been grazed or disturbed are more susceptible to invasion. Morrow's honeysuckle is capable of invading bogs, fens, lakeshores, and sandy plains. Amur honeysuckle prefers limestone-based soils.

INVASIVE CHARACTERISTICS:

Amur, Morrow's, and Tatarian bush honeysuckles fruit prolifically and are highly attractive to birds, which widely disseminate seeds across the landscape. Deer also disperse seeds. Cut stems will resprout vigorously. These shrubs shade native vegetation since they leaf out earlier in the spring and drop their leaves later in the fall than native plants. It has been documented that birds nesting in honeysuckle suffer greater nest predation than those nesting in native shrubs.

CONTROL:

Mechanical: Hand removal of seedlings or small plants may be effective for light infestations, but care should be taken to remove the entire plant and minimize soil disturbance. In shaded forest habitats, where bush honeysuckles tend to be less resilient, repeated cutting to ground level, during the growing season, may result in high mortality. Cutting must be repeated at least once annually or bush honeysuckles will often form stands that are more dense and productive than they were prior to cutting. For thickets of seedlings or small saplings, repeated mowing or bush-hogging may be effective.

MORROW'S HONEYSUCKLE

TATARIAN HONEYSUCKLE

Prescribed burning may be used to control bush honeysuckles growing in open habitats, if there is enough fuel. In all instances, control should be initiated prior to the seed dispersal period (late summer to early autumn) to minimize reinvasion of treated habitats.

Chemical control:
Selective herbicide application is the most effective control method for woody invasive plants. Herbicides can be applied to the foliage (low volume or high volume during the growing season), cut stems (at the time of cutting), or to the bark of the lower portions of the stems/trunks. Herbicides for foliar application include Roundup, AquaNeat, Glypro, Rodeo, Razor, and Escort. Herbicides for cut stem or basal bark application include Garlon 4, Stalker, Pathfinder, and Pathway.

Well-established stands of bush honeysuckles are best managed by cutting the stems to ground level and painting or spraying the stumps. Foliar application should only be used when the ambient temperature is above 65 degrees F. All three bush honeysuckle species leaf out early in the spring and hold their leaves late into the fall, creating ideal times for foliar herbicide application particularly in large monotypic stands. To be most effective, many herbicides require a penetrating or sticking agent.

TATARIAN HONEYSUCKLE

2010

SHOWY PINK HONEYSUCKLE, a hybrid

2010

Biological: No biological control agents are currently available for these plants.

Note: Maps of species' ranges are based on records as of 2010.

Credits and additional information:
Plant Conservation Alliance-Alien Plant Working Group
Ohio Department of Natural Resources, www.ohiodnr.gov
The Nature Conservancy, Ohio Chapter
The Ohio State University Extension, http://woodlandstewards.osu.edu
OIPC website, www.oipc.info

F-45-97

THE OHIO STATE UNIVERSITY EXTENSION

Extension FactSheet

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Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland

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Timber stand improvement is the removal or deadening of undesirable vines, shrubs, and trees in a forest stand. It is a major forest management tool to help woodland owners achieve their management objectives. Once ownership objectives are identified, the less desirable trees can be removed to favor the growth of those that better satisfy the owner's objectives (e.g., quality timber, wildlife habitat, etc.). At the same time, woody plants that pose a threat to human health or safety, such as poison ivy, can be eliminated. Several timber stand improvement techniques can also be used to create standing dead trees to provide various types of wildlife habitat such as perches, dens, and foraging trees for animals and birds.

Timber stand improvement can be accomplished by cutting the less desirable woody vegetation or by killing it in place. Undesirable trees with commercial value can be sold, making the timber stand improvement operation an income-generating forest management activity. Some undesirable trees may be used for lumber, firewood or other products. Grapevines might be used for wreaths. In most timber stand improvement operations, however, the undesirable vegetation is of little economic value or use. Although it can be cut and left in the woods, the safest and most efficient way to remove undesirable vegetation is often to kill the trees, shrubs, or vines and leave them standing.

The most effective method for killing standing trees, shrubs, and vines will usually involve the use of an herbicide. For those who prefer not to use pesticides, cutting, frilling, or girdling can be used without herbicides. However, physical methods of deadening standing trees that do not use herbicides are generally less dependable (particularly with hard-to-kill species such as red maple, hickories, and dogwoods) and require longer to be effective than those that incorporate herbicides into the treatment.

Selected Timber Stand Improvement Techniques

The remainder of this fact sheet discusses when and how to use four commonly applied timber stand improvement techniques: frilling or girdling, spaced cuts or injection, basal bark spraying, and cut stump application. Fact Sheet F-45 Supplement-97 presents herbicides commonly used with each method, along with brief recommendations for their use. As noted in in the fact sheet, these recommendations are not complete instructions; they are provided to help you select among the herbicides. It is essential that you read the entire label before using any herbicide. The label contains complete instructions for use, along with other valuable information such as personal and environmental safety considerations and procedures. Many of the labels also list information about the effectiveness of the herbicide in controlling different species of trees, shrubs, and vines. All herbicides are not equally effective in controlling different species.

Herbicides, like all pesticides, are approved (labeled) for specific uses by the Environmental Protection Agency. These approved uses are listed and described on the pesticide's label. The herbicides listed in Tables 1-5 were appropriately labeled at the time of publication (Winter 1997-98). Because pesticide labeling may change at any time, you should verify that a particular herbicide is still labeled for your intended use.

References to Tables 1-5 in the remainder of this fact sheet refer to the tables in Fact Sheet F-45 Supplement-97.

Frilling or Girdling

Girdling and frilling are methods of killing standing trees that may be done with or without an herbicide.

Girdling involves cutting a groove or notch into the trunk of a tree to interrupt the flow of sap between the roots and crown of the tree (Figure 1). The groove must completely encircle the trunk and should penetrate into the wood to a depth of at least 1/2 inch on small trees, and 1 to 1-1/2 inches on larger trees. Girdling can be done with an ax, hatchet, or chain saw. When done with an ax or hatchet, the girdle is made by striking from above and below along a line around the trunk so that a notch of wood and bark is removed. The width of the notch varies with the size of the tree. Effective girdles may be as narrow as 1 or 2 inches on small-diameter trees, and as wide as 6 or 8 inches on very large-diameter trees. When a chain saw is used to girdle, two horizontal cuts between 2 and 4 vertical inches apart are usually made completely around the tree when no herbicide is used (Figure 2) and one horizontal cut is made completely around the tree when herbicide is used (Figure 4).

Figure 1

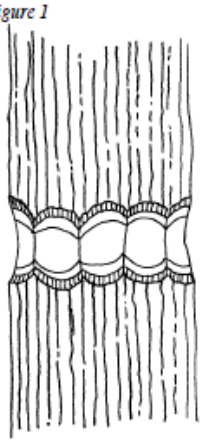
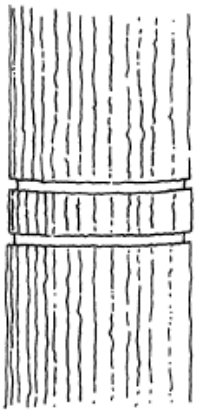


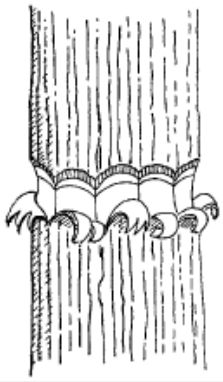
Figure 2



Frilling is a variation of girdling in which a series of downward angled cuts are made completely around the tree, leaving the partially severed bark and wood anchored at the bottom (Figure 3). Frilling is done with an ax or hatchet.

By themselves, girdling and frilling are physical methods to deaden trees that require very little equipment and may be done without herbicides. Both techniques require considerable time to carry out, particularly with an ax or hatchet. Girdling with a chain saw is much faster. The effectiveness of girdling and frilling depends on the tree species and on the size and completeness of the girdle or frill. To be effective, girdles and frills must completely encircle the tree. Because frills can heal-over more easily, girdling is usually more effective.

Figure 3

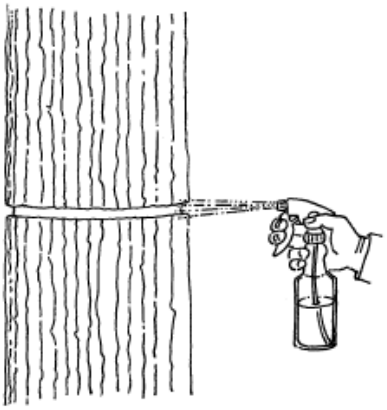


The effectiveness of both girdling and frilling can be increased by using herbicides (Table 1). With frilling and girdling, water soluble forms of herbicides are most commonly used to get maximum movement of herbicide within the plant. When using water-soluble herbicides, the herbicide/water mixture is commonly applied by squirting it on the girdle or frill until the cut surface is wet. Hand-held, pint or quart spray bottles, such as those available at local garden stores, are ideal for applying herbicide to the girdle (Figure 4). Again, note that a single, rather than double chain saw girdle is used when a water soluble herbicide is to be applied (Figure 4).

Exceptions to the above recommendation of using a water soluble herbicide for gridling and frillling are the commonly-used forestry herbicides that contain the ester formulation of 2,4-D + 2,4-DP, such as Patron 170 and Super Brush Killer. They are labeled for use with frilling in an oil carrier, and the recommendation is to fill the frill with the mixture. They are commonly applied with a backpack or hand-held, hand-pumped sprayer.

Spaced Cuts - Tree Injection

Figure 4



Tree injection involves introducing an herbicide into the undesirable tree through spaced cuts made around the trunk of the tree with an ax, hatchet, or tree injector (Figure 5). The procedure can be visualized as a discontinuous frill with a small amount of herbicide placed in each cut. With an ax or hatchet, non-overlapping horizontal cuts penetrating into the sapwood (the outer area of lighter-colored wood in the stem cross section) are made completely around the tree. Cuts are approximately 2 inches long and are spaced with their edges 1 to 3 inches apart, depending on tree species and specific herbicide being used. A small amount of herbicide is then placed in each cut (Table 2). This can be done conveniently with a pint or quart spray bottle (such as those available at garden stores). The amount of herbicide to be placed in the cut is specified on the herbicide label, but is generally 1 to 2 milliliters. There are also various tree injectors available including the "hypo-hatchet," which is a hatchet with a reservoir constructed to inject herbicide when it is struck into the tree.

Tree injection is generally more effective than mechanical girdling or frilling without herbicide because of the use of the herbicide. However, on difficult-to-control species, such as red maple, hickories and dogwoods, a continuous frill or girdle with herbicide may be necessary to obtain acceptable control. For this reason, many commercial TSI (timber stand improvement) contractors routinely use a single chain saw girdle with herbicide on all species to maximize effectiveness.

As with most of the herbicides suggested for use with girdling and frilling, the herbicides for tree injection are mostly water-soluble materials that move vertically and horizontally within the tree to complete a chemical girdle.

Figure 5

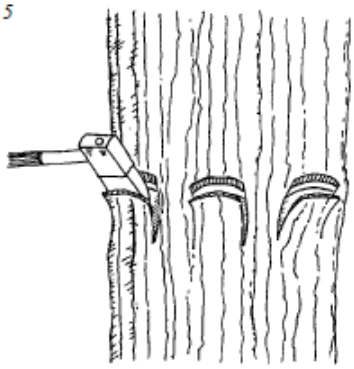
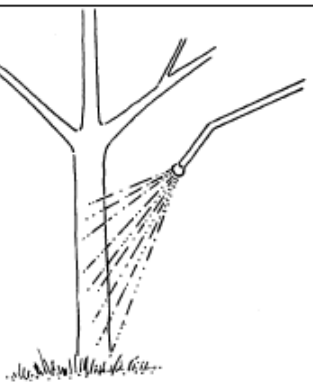


Figure 6



Basal Bark Spray

Basal spraying, or basal bark as it is sometimes referred to, is a technique to deaden small trees, shrubs, and occasionally vines by spraying the lower 12 to 18 inches of the trunk with an herbicide (Figure 6). The intent is for the herbicide to penetrate the bark and kill the tree and any basal buds that might sprout. Herbicides used for basal spraying are generally applied in oil carriers (Table 3). The technique is effective on trees less than 4 to 6 inches in diameter. As bark becomes rougher and thicker, the techniques becomes less effective. Care must be taken when the herbicide is applied to minimize the amount that runs into the soil. This is important not only from an environmental quality standpoint, but also to avoid damaging nontarget trees. The roots of trees often extend well out beyond their crowns. It would not be at all unusual for the roots of an adjacent desirable tree to extend below the trunk of a tree being basal sprayed. If excess amounts of herbicide were applied to the treated tree, the adjacent desirable tree could absorb the herbicide and be killed or seriously damaged.

Cut Stump

When a tree or vine is cut, there is a high probability that the stump will sprout. When this is undesirable, the sprouting can be eliminated by treating the cut stump with an herbicide. Herbicide can be applied to the stump in many ways, the most common being to spray with a backpack or hand-held sprayer.

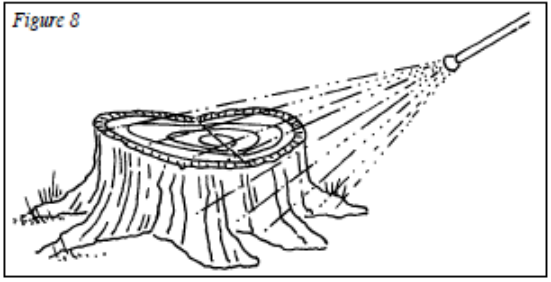
How much of the stump needs to be treated depends on the formulation of herbicide used. Many of the herbicides labeled for cut stump application are water soluble (Table 4). With these materials it is not necessary to treat the entire stump. The critical area of the stump that must be treated to prevent sprouting is the sapwood and bark of the stump's cut surface (Figure 7). Stump treatment with water soluble herbicides must be done immediately after cutting the tree or vine in order to be effective. If treatment is delayed, adequate downward movement of the herbicide will not occur and sprouting will not be eliminated.

Some herbicides labeled for cut stump application are formulated to be mixed with oil (Table 5). These materials do not move readily within the plant, but penetrate the bark. To be effective in suppressing stump sprouting, the entire stump, particularly the bark and exposed roots, must be thoroughly sprayed (Figure 8). Timing is less critical with these materials because they are not so dependent on movement downward from the cut surface to distribute the herbicide. In situations where immediate treatment of stumps is not possible, an herbicide in an oil carrier should be used rather than one in a water carrier.

Treatment with an oil-carried herbicide is also recommended in the spring when treating species that exhibit a spring "sap flow," such as the maples (*Acer*), grape (*Vitis*) and ironwood (*Ostrya*). Water-carried herbicides will usually not be adequately absorbed to be effective during the spring "sap-flow."

Figure 7

Figure 8



Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Keith L. Smith, Director, Ohio State University Extension.

1/98-des

USDA United States Department of Agriculture

Pest Alert

Emerald Ash Borer

Emerald ash borer (*Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae)) is a wood-boring beetle from Asia that was identified in July 2002 as the cause of widespread ash tree (*Fraxinus* spp.) decline and mortality in southeastern Michigan and adjacent parts of Ontario, Canada. Larval feeding between the bark and sapwood disrupts transport of nutrients and water in a tree, causing dieback of the branches and eventually death of the tree. Tens of millions of ash trees in forest, rural, and urban areas have already been killed, and many more are rapidly declining from this pest.

Emerald ash borer (EAB) infestations have since been confirmed in all or parts of 24 States and the Canadian Provinces of Ontario and Quebec. While most of the detections have occurred in eastern North America, the insect has been found as far west as Colorado. New EAB detections in other areas are likely as surveys continue (see www.emeraldashborer.info/ for periodic updates). Evidence indicates that EAB is often established in an area for several years before it is detected.

The broad distribution of this pest in the United States and Canada is primarily due to commerce and the inadvertent transport of infested ash firewood, unprocessed logs, nursery stock, and other ash commodities. Federal and State quarantines now regulate the movement of these products from the infested areas to areas not known to have EAB.

Identification

Adult beetles (Fig. 1) are slender, elongate, and 7.5 to 13.5 mm (0.3 to 0.5 in.) long. They generally have dark, metallic emerald green wing covers and bodies that are bronze, golden, or reddish green. The dorsal side of the abdomen is metallic purplish red and can be seen when the wings are spread (Fig. 2). Males are smaller than females and have fine hairs, which the females lack, on the ventral side of the thorax. The prothorax, the segment behind the head and to which the first pair of legs is attached, is slightly wider than the head and the same width as the wing covers. Adult EAB are generally larger and brighter green than the native North American *Agrilus* species.

Larvae reach a length of 26 to 32 mm (1.0 to 1.3 in.), are white to cream colored, and dorso-ventrally flattened (Fig. 3). The brown head is mostly retracted into the prothorax, and only the mouthparts are visible. The abdomen has 10 segments, and the last segment has a pair of brown, pincer-like appendages.

Figure 1. Adult emerald ash borer

Figure 2. Purplish red abdomen on adult beetle.

Figure 3. (Bottom to top) Second, third, and fourth stage larvae.

Figure 4. Gallery of an emerald ash borer larva

Biology

EAB generally has a 1-year life cycle. In the upper Midwest, adult beetles begin emerging in May or early June. Beetle activity peaks between mid June and early July, and continues into August. Adults probably live for about 3 weeks, although some have survived for more than 6 weeks in the laboratory. Beetles generally are most active during the day, particularly when it is warm and sunny, and move to protected locations in bark crevices or cling to foliage during inclement weather.

Adult beetles feed on ash foliage, usually leaving small, irregularly shaped patches along the leaf margins, causing negligible damage to the tree. At least a few days of feeding are needed before beetles mate, and an additional 1 to 2 weeks of feeding may be needed before females begin laying eggs. Females can mate multiple times. Each female probably lays 30 to 60 eggs during an average lifespan, but a long-lived female may lay more than 200 eggs. Eggs are deposited individually in bark crevices or under bark flaps on the trunk or branches, and soon darken to a reddish brown. Eggs hatch in 7 to 10 days.

Newly hatched larvae chew through the bark and into the phloem and cambial region of the tree. Larvae feed on phloem for several weeks, creating serpentine (S-shaped) galleries packed with fine sawdust-like frass. As a larva grows, its gallery becomes progressively wider (Fig. 4), often etching the outer sapwood. The length of the gallery generally ranges from 10 to 50 cm (about 4 to 20 in.). Feeding is usually completed in autumn.

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Prepupal larvae overwinter in shallow chambers, roughly 1 cm (0.4 in.) deep, excavated in the outer sapwood or in the bark on thick-barked trees. Pupation begins in late April or May. Newly eclosed adults often remain in the pupal chamber or bark for 1 to 2 weeks before emerging head-first through a D-shaped exit hole that is 3 to 4 mm (0.1 to 0.2 in.) in diameter (Fig. 5).

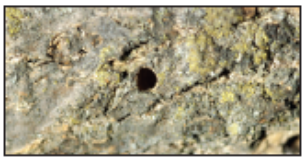

Figure 5. D-shaped hole where an adult beetle emerged.

Two-year development of EAB larvae is typical in newly infested ash trees that are relatively healthy. In these trees, many larvae overwinter as early instars, feed a second summer, overwinter as prepupae, and emerge the following summer. However, in trees stressed by physical injury, high EAB densities, or other problems, many or all larvae may develop in a single year. Whether a 2-year life cycle will occur in warmer southern States is not yet known.

Distribution and Hosts

EAB is native to Asia and is found in China and Korea. It is also reported in Japan, Mongolia, the Russian Far East, and Taiwan. In China, high populations of EAB occur primarily in *Fraxinus chinensis* and *F. rhynchophylla*, usually when those trees are stressed by drought or injury. Other Asian hosts (*F. mandshurica* var. *japonica*, *Ulmus davidiana* var. *japonica*, *Juglans mandshurica* var. *sieboldiana*, and *Pterocarya rhoifolia*) may be colonized by this or a related species.

In North America EAB has attacked only ash trees. Host preference of EAB or resistance among North American ash species may vary. Green ash (*F. pennsylvanica*) and black ash (*F. nigra*), for example, appear to be highly preferred, while white ash (*F. americana*) and blue ash (*F. quadrangulata*) are less preferred. At this time all species and varieties of native ash in North America appear to be at risk from this pest. Recently EAB was found on white fringetree (*Chionanthus virginicus*); however, its role as a susceptible host or as a secondary host in areas of high EAB densities is not fully understood and continues to be evaluated.

Signs and Symptoms

It is difficult to detect EAB in newly infested trees because they exhibit few, if any, external symptoms. Jagged holes excavated by woodpeckers feeding on late instar or prepupal larvae may be the first sign that a tree is infested (Fig. 6). D-shaped exit holes left by emerging adult beetles may be seen on branches or the trunk, especially on trees with smooth bark (Fig. 5). Bark may split vertically over larval feeding galleries. When the bark is removed from infested trees, the distinct, frass-filled, serpentine larval galleries that etch the outer sapwood and phloem are readily visible (Fig. 4 and Fig. 7). An elliptical area of discolored sapwood, usually a result of secondary infection by fungal pathogens, sometimes surrounds galleries.

Left to right:

Figure 6. Jagged holes left by woodpeckers feeding on larvae.

Figure 7. Ash tree killed by emerald ash borer. Note the serpentine galleries.

As EAB densities build, foliage wilts, branches die, and the tree canopy becomes increasingly thin. Many trees appear to lose about 30 to 50 percent of the canopy after only a few years of infestation. Trees may die after 3 to 4 years of heavy infestation (Fig. 7). Epicormic shoots may arise on the trunk or branches of the tree (Fig. 8), often at the margin of live and dead tissues. Dense root sprouting sometimes occurs after trees die.

Figure 8. Epicormic branching on a heavily infested ash tree.

EAB larvae have developed in branches and trunks ranging from 2.5 to 140 cm (1 to 55 in.) in diameter. Although stressed trees are initially more attractive to EAB than healthy trees are, in many areas all or nearly all ash trees greater than 3 cm (1.2 in.) in diameter have been colonized by this invasive beetle.

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Noel F. Schneeberger, **Steven A. Katovich**, and **Nathan W. Siegert**, forest entomologists, Northeastern Area State and Private Forestry, Forest Health Protection, USDA Forest Service

Photo credits:

David L. Cappaert and Howard Russell, Michigan State University, www.forestryimages.org

Steven A. Katovich, USDA Forest Service, www.forestryimages.org

Edward Czerwinski, Ontario Ministry of Natural Resources, www.forestryimages.org

Additional Resources

For the latest information on EAB in your area:

Contact your State Department of Agriculture, State Forester, or Cooperative Extension Office; and visit the following Web sites:

www.emeraldashborer.info

www.hungrypests.com

Northeastern Area
State and Private Forestry
11 Campus Boulevard, Suite 200
Newtown Square, PA 19073
www.na.fs.fed.us

5123

INVASIVE PLANTS OF OHIO

Fact Sheet 3 — Garlic Mustard

Alliaria petiolata

DESCRIPTION:
Garlic mustard is a biennial herb that emits a garlic-like odor from crushed leaves. In the first year, a rosette of kidney-shaped leaves hug the ground and remain green throughout the winter. Sharply-toothed, triangular leaves form on the 2-4 foot tall flower stem during the second year. White flowers with four petals bloom in clusters at the end of the stem from late April to mid June. The fruit is a long, green capsule that turns brown as the seeds mature. As the plant dies, the long, brown seed capsules at the end of a long naked stem split and release hundreds of seeds.

Garlic mustard was introduced from Europe for herbal and medicinal purposes. In 1868, it was first recorded in Long Island, New York. It is recorded from nearly every county in Ohio.

HABITAT:
Garlic mustard prefers some shade in mesic upland and floodplain forests, savannas, pastures, lawns, and along fencerows and roadsides. It invades forest edges and progresses into the interior along streams and trails.

INVASIVE CHARACTERISTICS:
In forests and woodlands, garlic mustard reduces growth of wildflowers in the early spring before canopy leaf out, and suppresses soil fungi that are mutualistic with trees. It produces large quantities of seeds that can remain viable for up to 10 years. Seeds are dispersed by water or transported by animals and humans.

Map based on records as of 2010.

CONTROL:

Mechanical: Hand-pulling is effective in small infestations. Care must be taken to insure that the entire plant, including the root system, is removed and all plant materials are bagged and taken off-site. The plant can continue to mature and produce seeds even after it has been pulled. Control should continue until the seed bank is exhausted (at least 7 years). Cutting stems when flowering can be effective in larger populations. The stems should be cut low to ensure that flowering is hampered. Cutting during flowering generally results in total mortality of the plant. However, seed heads will continue to mature and disperse seeds, so plants should either be cut into pieces or all cut materials should be removed from the site. Control in the spring, targeting first-year rosettes and second-year plants before they flower, is generally more effective than fall treatment of only first-year rosettes. Prescribed fire in late spring can be effective in large populations, particularly if conducted for several years.

Chemical: Foliar application of systemic herbicides, such as Roundup, Glypro, or AquaNeat, is effective, even in winter (to kill overwintering rosettes), as long as the temperature is at least 50 degrees F and the area remains dry for eight hours. Extreme care must be taken not to apply the herbicide on desirable plants as these products are non-selective. Herbicide application to the first-year rosettes in the late fall, winter, and early spring will minimize impacts to non-target species while they are dormant. It is crucial to spray all plants within the control area, otherwise the survivors will respond with greater growth and reproduction. If carried out in late fall or winter, it is essential to kill all rosettes in the treated areas, otherwise the survivors will grow large in the absence of competition and seed production will not be lower than in untreated areas. Spray shields may also be used to better direct herbicide and limit non-intentional drift.

Biological:
Researchers at Cornell University are investigating potential biological control agents for garlic mustard. Four weevil species that feed on stems, seeds, and root-crowns are being studied for bio-control of garlic mustard.

Credits and additional information:

Plant Conservation Alliance-Alien Plant Working Group
Ohio Department of Natural Resources, www.ohiodnr.gov
The Nature Conservancy, Ohio Chapter
Noxious Weed Control Board (WA), www.nwcb.wa.gov/siteFiles/Alliaria petiolata.pdf
The Ohio State University Extension, http://woodlandstewards.osu.edu
OIPC website, www.oipc.info

CONTROLLING GRAPEVINES:

Controlling wild grapevines is the single most important practice to accomplish in the woodlands of Ohio. Controlling vines does not always mean the total elimination of vines. Grapevines are a good source of food for wildlife. Natural arbors can be created utilizing areas where vines have heavily infested a group of trees. Create the arbor by cutting down the infested trees in an area approximately fifty to sixty feet in circumference. Leave the vines to grow over the downed trees. Control all vines around these arbors. An arbor or two every 30 to 40 acres is enough. You can also choose to leave one or two vines per acre, but don't leave any in trees that are producing nuts and berries for wildlife or those that are valuable timber species. It is a good practice to leave vines for wildlife in Beech trees, even though it is a good nut producer.

Cutting and treating vines with an acceptable herbicide is the best method of control. The practice is best done in the late fall and winter months, but any time it is accomplished is good for the trees. If vines are being cut during the spring flush of sap, any water based herbicide treatment will be flushed from the cut surface and may not be effective. **Refer to OSU Extension Fact Sheet F-45 for a list of herbicides that can be used on grapevines.**

Cut the vines at eye level and then wherever they root into the ground. Use a small chainsaw, a large lopper, or a pole chainsaw. Spray the cut surfaces with herbicide right after they have been cut. It is easiest to work as a two-person team. A water-based herbicide is the easiest and least expensive to work with. By cutting the vines at eye level, you will know they are cut at a glance and you will avoid constantly checking them in the future. It will take two to five years for the vines to fall out of the trees. There is no need to pull them from the trees once they are cut.

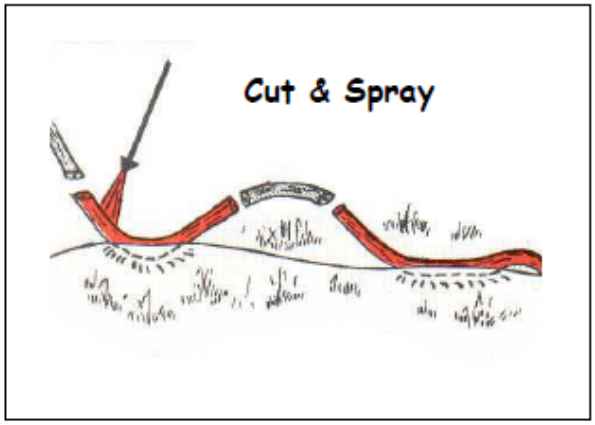
If you choose to cut, but not treat the vines with herbicide, you can expect sprouting from all but the most mature and shaded vines. If you go to the effort of cutting the vines without treating them, you will have to do the project again in the future.

Grapevine control requires approximately 4 to 6 hours to treat each acre of woodland depending on the density of the vines of course. (An acre is an area approximately 210 feet X 210 feet). Vendors can be hired to do this work at a cost of approximately $50 to $100 per acre (2003). If you need to get the work done but do not want to hire a vendor, ask those people who have permission to hunt on the property to help you with the project as a condition of their hunting privileges.

Grapevines need to be controlled on all woodland properties if landowners are using a Woodland Management Plan to keep the property qualified for either of the lower Ohio Forest Tax Law or CAUV property tax rates.

Wild grapevine control should be accomplished five years prior to a timber harvest. If they are not treated prior to a harvest, you can expect them to grow very well after a harvest once the stand has been opened up to the sunlight. Grapevines often cause severe damage and mortality to trees if they are not controlled, especially after a harvest. They have the ability to severely inhibit tree growth for decades.

Revised 10/02
Kehn



You must cut and treat the "Loops" where the vines run along the ground and root in.

INVASIVE PLANTS OF OHIO

Fact Sheet 8 — Multiflora Rose

Rosa multiflora

DESCRIPTION:
Multiflora rose is a thorny shrub with arching stems (canes). The compound leaves are divided into 5-11 sharply-toothed leaflets. The base of each leaf stalk bears a pair of fringed stipules. In late spring, clusters of showy, fragrant, white to pale pink flowers appear; each flower about an inch across. Small, bright red fruits (rose hips) develop during the summer and remain on the plant through the winter.

This rose was introduced from Japan, Korea and eastern China in 1866 as a rootstock for ornamental roses. In the 1930s, it was widely promoted as a "living fence" to confine livestock and was planted for soil conservation and wildlife programs. It is frequent throughout Ohio.

HABITAT:
Multiflora rose prefers sunny to semi-shaded habitats with well-drained soils, but can tolerate a wide range of habitats including mesic upland and flood plain woods, forest edges, old fields, savannas, prairies, fens, roadsides, fencerows and lawns.

INVASIVE CHARACTERISTICS:
Multiflora rose reproduces by seed and by forming new plants from root sprouts. Fruits are readily sought by birds which are the primary dispersers of its seeds. It has been estimated that an average multiflora rose plant may produce a million seeds per year, which may remain viable in the soil for up to twenty years.

Map based on records as of 2010.

CONTROL:

Mechanical:

Pulling or removing individual plants is effective when plants are small. A digging tool should be used to remove the entire plant. Special care should be taken to ensure that all roots are removed to prevent re-sprouting. Mowing of large shrubs can provide partial control by restricting top growth and spread, but may need to be done repeatedly. Prescribed burning can be conducted early in the growing season to control severe infestations if there is enough fuel under the shrubs.

Chemical:

Multiflora rose is generally relatively easy to control using herbicide application. Application of systemic herbicides, such as Roundup, Glypro, Escort XP, or Garlon 3A, directly to the foliage is the most effective control method. Other herbicides such as Garlon 4 may be applied to cut stems or as a basal bark application, combined with a surfactant or basal oil.

Biological:

Rose rosette virus was first found in Ohio in 1987. The virus is spread by a tiny native mite. Symptoms include red and purplish vein mosaics and dwarfed foliage. Infected plants usually die within 2-5 years of infection. This virus may have the potential for eliminating multiflora rose in areas where it grows in dense patches.

A seed-infesting wasp, the European rose chalcid (*Megastigmus aculeatus*), is another potential biocontrol. An important drawback to both the rose rosette virus and the European rose chalcid is their potential impact to other rose species and cultivars.

Credits and additional information:

Plant Conservation Alliance-Alien Plant Working Group
Ohio Department of Natural Resources, www.ohiodnr.gov
The Nature Conservancy, Ohio Chapter
Cornell University, www.invasiveplants.net
OIPC webpage, www.oipc.info

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THE OHIO STATE UNIVERSITY EXTENSION

Extension FactSheet

School of Natural Resources, 2021 Coffey Road, Columbus, Ohio 43210

Relative Effectiveness of Herbicides Commonly Used to Control Woody Vegetation in Forest Stands

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Forest stand improvement is the selective removal or deadening of less desirable trees, shrubs, and vines in a forest stand to improve the stand's species composition, age structure, condition, health, and growth. It is an important forest management practice to help woodland owners and forest managers achieve management objectives. Deadening is most often the method of choice when the removal of the less desirable trees, shrubs, and vines is not economically feasible. The most commonly used methods of deadening undesirable trees, shrubs, and vines are girdling, frilling, herbicide injection, basal herbicide spraying, and cut stump herbicide application. These techniques are described in a variety of publications, including Ohio State University Extension (OSUE) Fact Sheet F-45.

Several of these techniques require the use of an herbicide while with others the use of an herbicide is optional. When use of an herbicide is desired, the selection of a specific herbicide is usually based on a number of considerations. The first consideration is the technique being utilized. Herbicides are labeled for specific uses. An herbicide may, for example, be labeled for girdling or injection but not for basal spraying. It is important that herbicides be used only for their labeled purposes. This information is clearly stated on the herbicide label and is summarized in OSUE Fact Sheet F-45 for many of the more commonly used herbicides.

Other important considerations when selecting an herbicide include ease of use, relative availability, worker exposure, environmental safety, personal experience, and the relative effectiveness of the herbicide in controlling the target plant species. While the relative importance of these considerations may vary with the situation and the individual, it is always important to select an herbicide that will effectively control the target species.

Unfortunately, there are few published evaluations of the effectiveness of herbicides in deadening specific species of woody plant. Too often woodland owners and forest managers select an herbicide because it is readily available or is the least expensive, only to be disappointed later when control is unacceptable. Certainly cost and availability are important considerations. However, it is important to select an herbicide that will be effective, even if it is not the least expensive.

This publication contains two tables that provide estimates of the relative effectiveness of several commonly used herbicides in controlling specific woody species. The evaluations were developed from several sources, including personal experience, manufacturers' recommendations, and several publications[1].

The evaluations are not absolutes; many factors other than species determine how effective a particular herbicide is in controlling a particular plant *(e.g.,* the health and vigor of the plant, the amount and concentration of herbicide used, the method and season of application, etc.). The evaluations can, however, provide important guidance when personal experience with a particular plant species and/or herbicide is lacking.

Table 1 should be used as a guide to the relative effectiveness of all of the listed herbicides when frilling or girdling (or injecting, if so labeled). It can also be used as a guide to the effectiveness of the water-soluble herbicides in the table (all but 2,4-D + 2,4-DP) in preventing sprouting when applied to a stump immediately after cutting. Table 2 should be used as a guide to the relative effectiveness of the oil soluble herbicides listed when applied as basal sprays or as cut stump treatments to prevent sprouting.

In both tables relative control is categorized as susceptible (S), intermediate (I), and resistant (R), or occasionally borderline between two categories *(e.g.,* S-I). A ranking of Susceptible means that the particular species is usually susceptible to the herbicide, and little if any retreatment should be necessary. A ranking of Intermediate means that while not usually as effective as an herbicide ranked S, the herbicide will kill a high proportion of the

treated stems. When an herbicide ranked I is used, a portion of the stems may require retreatment. A ranking of Resistant means that the herbicide will usually provide relatively poor control of that particular species. Where no estimate is provided (a blank in the table), no evaluation is implied. The blank simply means we do not have enough information or experience to provide a reasonable estimate of control.

When using an herbicide the importance of careful, proper application according to label directions cannot be over stressed. Not only will this minimize personal and environmental risks, but it will maximize herbicide effectiveness. In particular, the care and skill with which herbicides classified as I or S-I are applied can dramatically impact their effectiveness.

[1] Including: Anderson, D. and M. McGlamery. 1992. Brush Control in Illinois. Chapter 23. In: 1992. *Illinois Pest Control Handbook;* and Arnold, G. and g. LaBarage. 1994. Weed Control in Non-Cropland Areas. Ohio State University Extension (OSUE) Bulletin 821-9.

Table 1. Relative effectiveness in controlling woody vegetation of selected herbicides injected or applied to a frill or girdle according to label recommendations. Also the relative effectiveness of all of the water soluble herbicides in the table (all except 2,3-D + 2,4-DP) when applied to stumps immediately after cutting to prevent sprouting. Note that specific example products may be labeled for only some of the listed applications. Be sure to check the label of the individual product to verify that it is labeled for your intended use.

SPECIES	TRICLOPYR (*e.g.*, Garlon 3A)	PICLORAM (*e.g.*, Tordon & Pathway)	IMAZAPYR (*e.g.*, Chopper, Stalker, & Arsenal)	2,4-D + 2,4-DP (*e.g.*, Patron 170)	GLYPHOSATE (Accord, Roundup Rodeo, Glyphos, Glypro, & Glyphomax Herbicides, and many others)
Alder	S	S	S	I	I
Apple	S	S	S	I	I
Ash	S	S-I	S	I-R	S-I
Ash, Green	S	S-I	S	I	S-I
Ash, White	S	S-I	S	I	I-S
Aspen	S	S	S-I	S	I
Balsam Poplar	S	S	S-I	I	I
Basswood	S	S	S	I	I
Beech, American	S	S-I	I-S	I	S-I
Birch	S	S	S	S-I	I
Blackgum	S	S	S	S-I	I
Boxelder	R	S-I	S	I	I
Cherry	S-I	S	S	S-I	I
Cottonwood, E.	S	S	S	I	I-S
Crabapple	S	S	S	S-I	I
Dogwood	S	S-I	S	S-I	I
Elderbery	S	S	S	R	I
Elms	S-I	S-I	I-R	I	I
Grapes, Wild	S	S	S	S	I
Hackberry	S	S	R	I	I
Hawthorn	S	S-I	S	I	I
Hazel, American	S	S		I	I
Hickory	S	S	S	I	I
Honeylocust	I-R	S	I-S	S	I
Honeysuckle	S	S	S	I	I
Hophornbeam, E.	S	S	I	I-R	I
Hornbeam, A.	S	S	I	I-R	I

Table 1 (continued). Relative effectiveness of selected herbicides.

SPECIES	TRICLOPYR (*e.g.*, Garlon 3A)	PICLORAM (*e.g.*, Tordon & Pathway)	IMAZAPYR (*e.g.*, Chopper, Stalker, & Arsenal)	2,4-D + 2,4-DP (*e.g.*, Patron 170)	GLYPHOSATE (Accord, Roundup Rodeo, Glyphos, Glypro, & Glyphomax Herbicides, and many others)
Locust, Black	S	S	R	I	I
Maple	S-I	S-I	S	I	R-I
Maple, Red	S-I	S-I	S	I	R-I
Maple, Silver	S	S	S	I	R-I
Maple, Sugar	S	S-I	S	I	R-I
Mulberry, Red	S	S	S	I	I
Oaks	S	S	S	S-I	S
Olive, Autumn	S	S	I	I	I
Olive, Russian	S	S	I	I	I
Osage Orange	S-I	S-I	R	I	R
Persimmon, E.	S-I	S	S	I	I
Plum	S-I	S-I	S	I	I
Poison Ivy	S	S	S		R
Poplar, Yellow	S	S	S		S
Prickly-Ash	I-S	S	S-I		I-R
Redbud, E.	S	S-I	S		I-R
Rose, Multiflora	S	S	S		S
Sassafras	S	S	S	I	I
Serviceberry		S	S-I		I
Sumac	S	S	S	S-I	I
Sweetgum	S	S-I	S		S
Sycamore	S	S	S		S
Tree of Heaven	S	S-I	S	R	I
Trumpetcreeper	R	I-S	S		I
Virginia Creeper	I	S-I	S		I
Walnut, Black	S	S	S-I	S-I	S-I
Willow	S	S	S	I	I

Table 2. Relative effectiveness in controlling woody vegetation of selected oil-soluble herbicides applied as a basal spray or cut stump treatment according to label recommendations.[1]

SPECIES	TRICLOPYR (*e.g.*, Garlon 4)	IMAZAPYR (*e.g.*, Chopper, Stalker)	2,4-D + 2,4-DP (*e.g.*, Patron 170)
Alder	S	S	I-R
Ash, White	S	S	R
Aspen	S	S	S
Balsam Poplar	S	S	S-I
Beech, American	S-I	I-S	S-I
Birch	S	S	I-S
Boxelder	I-S	S	I
Cherry	S-I	S	I-R

Table 2 (continued). Relative effectiveness in controlling woody vegetation of selected oil-soluble herbicides applied as a basal spray or cut stump treatment according to label recommendations.[1]

SPECIES	TRICLOPYR (*e.g.*, Garlon 4)	IMAZAPYR (*e.g.*, Chopper, Stalker)	2,4-D + 2,4-DP (*e.g.*, Patron 170)
Cottonwood, E.	S-I	S	R
Dogwood	S-I	S	I-R
Elderbery	S	S	S-I
Elms	S-I	I-R	S-I
Grapes, Wild	S-I	S	I
Hackberry	I-R	R	S
Hawthorn	S-I	S	I
Hickory	S-I	S	I-R
Honeylocust	S	I-S	I
Honeysuckle	S	S	S
Locust, Black	S	R	I
Maple	S-I	S	I
Maple, Red	S-I	S	R
Maple, Silver	S	S	I
Maple, Sugar	S	S	I
Mulberry, Red	S-I	S-I	I-R
Oaks	I-R	S	S
Osage Orange	R	R	I-R
Persimmon, E.	S	S	I-R
Plum	I-R	S	S-I
Poison Ivy	I-S	S	I
Poplar, Yellow	S-I	S	S
Rose, Multiflora	S-I	S	I
Sassafras	S-I	S	I-R
Sumac	I	S	I-R
Sweetgum	S-I	S-I	R
Sycamore	S	S-I	S-I
Tree of Heaven	S	S	I-R
Trumpetcreeper	I-R	S	R
Virginia Creeper	S	S	R
Willow	S	S	S

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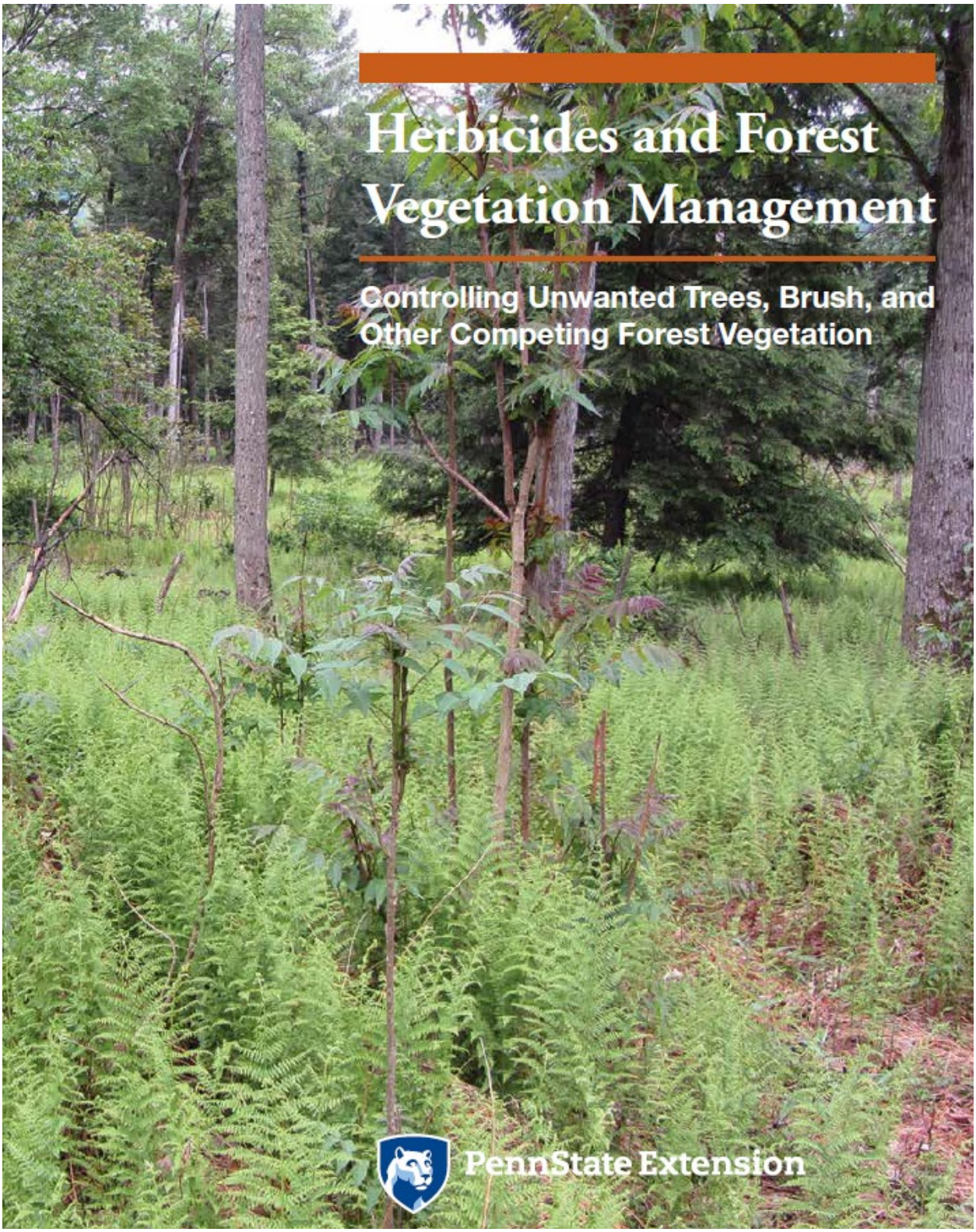
Herbicides and Forest Vegetation Management
Controlling Unwanted Trees, Brush, and Other Competing Forest Vegetation
PennState Extension

Prepared by David R. Jackson, forest resources educator, and James C. Finley, professor of forest resources.

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Introduction

There are a number of ways to manage vegetation: manual, mechanical, biological, cultural, and chemical. Integrated vegetation management (IVM) uses a combination of these approaches. This publication examines the use of herbicides to manage forest vegetation and provides information to address some misconceptions concerning herbicide use in forests. Forestry labeled herbicides are effective and environmentally sound; however, their use remains controversial. Out of necessity, forest landowners and resource managers increasingly turn to herbicides for vegetation management.

Many factors are increasing the need for vegetation management using herbicides. These factors include vegetation interfering with forest regeneration, poorly planned and executed timber harvesting practices, declining pulpwood markets, and increasing abundance of invasive plant species. Let us briefly examine each of these factors.

1. Dense shade cast by ferns interferes with seedling survival and establishment after germination. Excessive frond litter and root mats can also prevent adequate seedling germination and development.

Interfering vegetation consists of plants that inhibit the germination and growth of seedlings by casting dense shade on the forest floor. Interfering plants benefit from specific light conditions and selective browsing preferences by deer that remove or reduce native plants and provide growing space for more competitive species.

Poorly planned and executed timber harvests, known as "high grading," leave behind trees with low commercial value. This has resulted in a shift toward less desirable tree species and poorer quality trees in our woodlots. With declining markets for small diameter trees, many overstocked stands that would benefit from thinning are not receiving treatment. Thinning improves tree growth and insect and disease resistance. Lastly, the increasing abundance of invasive plants directly influences the ability of forests to retain native plant and wildlife diversity. Herbicides, when properly applied, can address all these issues safely, efficiently, and economically.

Herbicides are a proven safe and effective method for managing forest vegetation and are appropriate for achieving many objectives, including regeneration establishment, increased timber production, enhanced wildlife habitat, nonnative plant control, and road and facility maintenance. When properly applied, herbicides can increase property value, productivity, aesthetics, and utility. However, understand that choices exist. A well-developed and implemented integrated pest management plan will include alternative vegetation control approaches with and without the use of herbicides. This publication will help you identify the most efficient, environmentally sound, and cost-effective solution for addressing your forest vegetation management needs.

2. Poorly executed timber harvests often leave behind trees of low commercial value.

3. Shady understory conditions and a low browsing preference by deer foster striped maple development.

4. Grasses can reduce regeneration potential by casting heavy shade and providing cover for seed-eating small mammals.

5. Mountain laurel and bracken fern form dense thickets that interfere with forest regeneration.

Choosing the Right Forestry Herbicide and Application Method

No single herbicide, rate, or application method works for all vegetation management needs. Each situation requires advanced assessment to ensure that the lowest risk, most efficient, and most cost-effective control program is chosen. For a given situation the soil type, plant species, density, and size affect the herbicide prescription. Additional factors such as time of year and weather conditions are important because they affect plant growth, herbicide uptake, and translocation.

Herbicide summaries are available on the Penn State Extension Forest Vegetation Management Website (**extension.psu.edu/natural-resources/forests/vegetation-management**). The summaries will help you quickly compare herbicides commonly used in forestry and registered for use in Pennsylvania. They convey key points from the product label and allow you to select those products best suited to your situation. Always carefully read and follow the product label directions, precautions, and restrictions before applying any pesticide.

The first consideration when selecting an herbicide is the target plant's location. Some examples of sites are

6. Invasive plants, like Japanese barberry and stiltgrass shown here, reduce native plant and wildlife diversity.

rights-of-way, wildlife openings, forests, wetlands, and industrial sites. The product label lists currently labeled sites. Applying a pesticide to a site not listed on the label is illegal.

The Environmental Protection Agency (EPA) approves pesticide use and establishes restrictions. Only certified applicators can apply "restricted use" pesticides. Restricted use pesticides have a prominently displayed statement on the product label (see "Specimen Label" below). The restricted use statement indicates the specific hazard of that pesticide. For example, a product may be harmful to humans, livestock, wildlife, or the environment. Other reasons for restricted use labeling include toxicity to non-target plants at low concentrations, posing a ground or surface water hazard, or having the potential to move off site.

Pesticides not containing the restricted use statement are referred to as "general use." General use pesticides do not require applicator certification as long as the product is applied to property owned or rented by the applicator or their employer. Virtually all forest vegetation control involves the application of general use herbicides. This provides forest landowners an opportunity to address vegetation management needs on their own properties without becoming certified. Herbicide handling and use carries with it the responsibility to read, understand, and follow label directions.

Always consider product selectivity when choosing an appropriate herbicide. Selectivity refers to the resistance various classes of plants have to an herbicide. This will ensure that targeted species can be controlled by the chosen product. For example, some herbicides only control broadleaf weeds and woody vegetation and will not control grasses. Some herbicides are so selective that they can be applied directly over nontarget plants. On the other hand, broad-spectrum herbicides are non-selective. Broad-spectrum herbicides can control all classes of plants. To protect nontarget plants, exercise care when applying these types of products.

Herbicide activity is an important consideration when selecting a product. Activity refers to how the product enters the plant—whether through the foliage, stem, or roots. Some herbicides have more than one type of activity. When treating vegetation in the forest understory, be sure the product will not affect the overstory trees through soil activity.

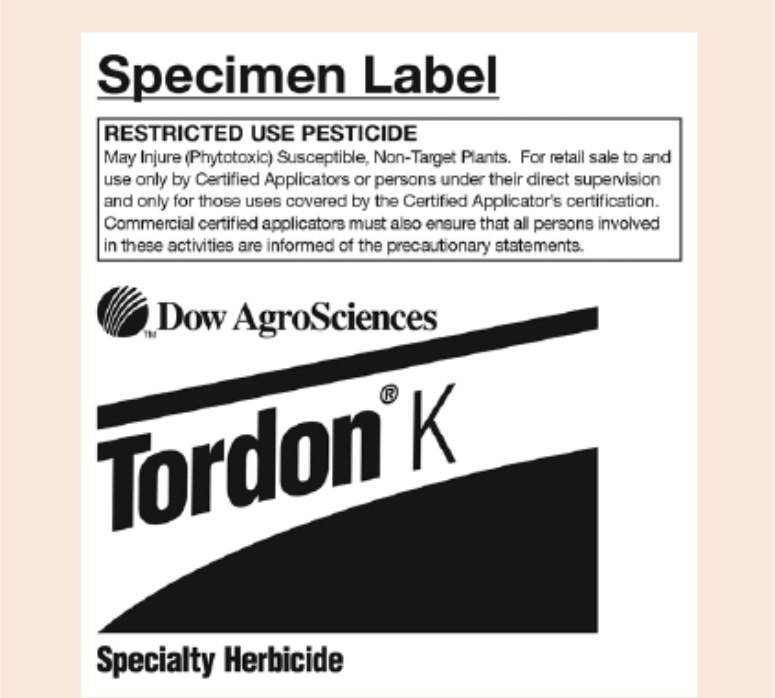
The size and number of stems, number of acres, and time of year will influence your application method choice (see "Forest Herbicide Application Methods" on page 8). For example, if trees to be controlled are greater than 8 inches in diameter, a frill girdle or stem injection application method is appropriate. If the site contains 40 acres of fern in the understory, a ground foliar broadcast treatment using mechanization such as a skidder-mounted mist blower is the most appropriate application method.

The product label is your best source for application methods, rate information, and time of year. Be sure to select the application method that will use the least amount of product to control targeted plants.

Before applying any herbicide, it is important to properly calibrate equipment. A calibration check will show the amount of product applied under given field conditions and involves making a trial run over a known area and measuring the amount of material applied. By adjusting equipment to control application volume or chemical concentration the proper rate is obtained. Calibration is important because

- applying herbicide at rate greater than labeled is illegal;
- nozzles and other equipment settings may vary depending on operating conditions;
- cost-effective applications need to be made at proper rates.

Applicators of restricted use products must be certified and have a level of competence to ensure proper handling and application.



Forest Herbicide Application Methods—Cut Surface Treatments

Frill Applications (Hack and Squirt)

Use a hatchet or similar device to make frill or cut at a downward angle at proper spacing, following label recommendations. Cuts should penetrate through the bark into the living tissue or sapwood (the outer area of lighter-colored wood in the stem cross section) and produce a cupping effect to hold herbicide. Spray measured quantity into cuts using a squirt bottle. Do not allow material to run out of cut. Not recommended for use during periods of heavy sap flow.

Uses
Generally used to control individual trees greater than 5 inches in diameter.

7. Hatchet, with ground down bit, and spray bottle for hack and squirt applications.

8. Make cuplike incisions at angle, to hold herbicide, spaced evenly around tree.

Stem Injection

Use a hatchet or lance-type tree injector calibrated to deliver the proper amount of herbicide with each blow. Following label recommendations, penetrate through the bark into the living tissue or sapwood (the outer area of lighter-colored wood in the stem cross section) at properly spaced intervals. Not recommended for use during periods of heavy sap flow.

Uses
Generally used to control individual trees greater than 5 inches in diameter.

9. Hypo-hatchet blade showing injector port.

10. Hypo-hatchet injects calibrated volume with each blow.

11. The E-Z Ject lance injects herbicide capsules into stems.

12. Compression stroke implants capsule through bark.

Cut Stump

For water-soluble herbicide mixtures, spray or paint the living tissue or sapwood (the outer area of lighter-colored wood in the stem cross section) of stumps immediately after cutting. If using an oil-soluble mixture, treatments can be applied to stumps up to 1 month following cutting. In this case, spray the sides of the stump to the root collar and the sapwood around the entire circumference of the cut surface until thoroughly wet, but not to the point of runoff.

Uses
Used to control resprouting of hardwood stumps.

13. Treat only the living tissue or sapwood area of large stumps.

14. For small stumps, treat the entire surface.

Forest Herbicide Application Methods—Stem

Basal Bark

Using a low-pressure backpack sprayer, thoroughly wet the lower 12 to 15 inches of the stem completely around tree, including the root collar area. Do not spray to the point of runoff.

Uses
Generally used to control thin-barked trees when they are less than 6 inches in diameter at the base.

15. Basal bark treatments use an oil carrier to penetrate the bark.

16. For small trees, spray from ground line to a height of 12 to 15 inches.

continued on next page

Forest Herbicide Application Methods—Foliage

Foliar Spray

Using aerial or ground spray application equipment such as a helicopter, skidder, or backpack sprayer, mist herbicide mixture onto the foliage of targeted plants. Direct the spray to evenly cover plant foliage. Do not spray to the point of runoff.

Uses
Used to control many woody plants, herbaceous weeds, ferns, grasses, and vines.

17. Use a backpack sprayer to mist spray evenly over plants.

18. Mechanical air-blast sprayer treats understory vegetation up to 20 feet in height.

Forest Herbicide Application Methods—Soil

Basal Soil

Using an exact-delivery spotgun applicator, direct the spray at the soil within 2 to 3 feet of the target plant root collar, or in a grid pattern across the entire treatment area. The square grid pattern can range from 3 to 6 feet between soil application spots.

Uses
Used as a treatment to control many annual and perennial weeds and woody plants.

19. Spotgun dispenses measured volume with each trigger pull.

20. Spot spray mix to soil around plant base.

Forestry Herbicide Toxicity

Many people believe that any product referred to as a "pesticide" is highly toxic and unsafe at any application rate. This is simply not the case for forestry herbicides. Research and development have produced effective, low risk, and environmentally friendly products when applied and used according to the label. Active ingredients used in forestry have passed rigorous EPA testing for toxicity and environmental fate.

Toxicity refers to a product's ability to cause injury or illness to living organisms. A pesticide's acute toxicity is the basis for assigning its toxicity category. Acute toxicity is based on a single, short-term exposure by one of three routes—swallowing (ingestion), breathing (inhalation), or through the skin (dermal). Acute toxicity is usually expressed as LD_{50} (lethal dose 50). This is the amount of the product lethal by ingestion to 50 percent of a population of test animals (usually rats) under laboratory conditions. LD_{50} values are expressed in milligrams of pesticide per kilogram of body weight (mg/kg). The larger the LD_{50} value, the less toxic the chemical.

The LD_{50}, or acute toxicity value, is the basis for assigning the signal word (see Table 1, page 12). Signal words must appear in large letters on the front panel of every pesticide label. They are "Caution," "Warning," "Danger," or "Danger-Poison" with skull and crossbones. The designation indicates the relative acute toxicity to humans and other animals. Signal words allow the user to quickly assess the acute toxicity rating. They also assist the user in selecting the least toxic product that will provide the desired level of plant control.

Table 2, page 12, provides the signal words and acute oral toxicity values for many commonly used forestry herbicide active ingredients. To provide a basis for comparison of relative acute toxicity, the table includes LD_{50} values for commonly used products such as table salt and caffeine.

How can a product be so effective at killing plants and have such a low toxicity to humans, wildlife, and fish? For example, products containing glyphosate have an LD_{50} value greater than 5,000 mg/kg, which is practically nontoxic. Yet, glyphosate is one of the most effective active ingredients in forestry herbicides. Herbicide effectiveness relates to the mode of action. In general, forestry labeled herbicides use biochemical pathways unique to plants. These pathways do not occur in humans or animals, providing very low toxicity and extremely effective herbicides.

Table 1. Signal Words and Symbols.

By law, every pesticide label must include a signal word. The signal word gives the user an immediate indication of the product's acute toxicity to humans and animals. The signal word is found on the front panel of the product label along with the statement "Keep Out of Reach of Children." Signal words allow the user to select the least toxic chemical that will provide the desired control level.

Caution	Product is slightly toxic or practically nontoxic either orally, dermally, or through inhalation; or it causes slight eye or skin irritation. Acute oral LD_{50} values are greater than 500 mg/kg.
Warning	Product is moderately toxic either orally, dermally, or through inhalation; or it may cause moderate eye and skin irritation. Acute oral LD_{50} values range from 50 to 500 mg/kg.
Danger	Without the skull and crossbones symbol, this word is used on products that cause severe skin irritation or eye damage, more so than what the acute oral LD_{50} might suggest.
Danger-Poison (skull and crossbones)	Displayed with a prominent skull and crossbones to indicate that the product is highly toxic based on either oral, dermal, or inhalation toxicity. Acute oral LD_{50} values range from a trace to 50 mg/kg.

Note: LD_{50} is the quantity or dose of a chemical lethal to 50 percent of test animals under laboratory conditions. It is expressed in milligrams (mg) of chemical per unit of body weight, expressed in kilograms (kg).

Source: Hock, W. K., ed. 1996. *Pesticide Education Manual: A Guide to Safe Use and Handling.* 3rd ed. University Park, Pa.: The Pennsylvania State University.

Table 2. Relative Toxicity of Common Forestry Herbicides.

Common Name (active ingredient)	Signal Word	Acute Toxicity (LD_{50})
Clopyralid (e.g., Transline)	Caution	>5,000
Fosamine (e.g., Krenite)	Caution	>5,000
Glyphosate (e.g., Roundup)	Caution	>5,000
Imazapyr (e.g., Arsenal)	Caution	>5,000
Metsulfuron methyl (e.g., Escort)	Caution	>5,000
Picloram (e.g., Tordon)	Caution	>5,000
Sulfometuron-methyl (e.g., Oust)	Caution	>5,000
Hexazinone (e.g., Velpar)	Danger	1,690
Dicamba (e.g., Vanquish)	Caution	757–1,707
Triclopyr (e.g., Garlon)	Caution or Danger	630–729
2,4-D (e.g., DMA 4 IVM)	Danger	375–666
Compare to: Sodium Chloride (table salt)		3,000
Acetaminophen (Tylenol)		1,944
Ibuprofen (Motrin)		636
Malathion		290
Carbaryl (Sevin)		230
Caffeine		192
Nicotine		50

Toxicity based on the active ingredient's oral LD_{50} value for rats. Actual LD_{50} values may vary by products depending on percentage of active ingredient, formulation, and inert ingredients. Be sure to check the Material Safety Data Sheet for the product you are using.

Sources:
Crop Data Management Systems, Inc. (CDMS): **www.cdms.net/Home.aspx**
National Pesticide Information Retrieval System (NPIRS): **state.ceris.purdue.edu**
The Vermont SIRIMSDS Index: **hazard.com/msds/index.php**
Extension Toxicology Network (EXTOXNET): **extoxnet.orst.edu/ghindex.html**

Personal Protective Equipment

Personal protective equipment (PPE) reduces exposure to pesticides. The type of PPE used depends on the product and the type of application. The greatest risk of pesticide exposure occurs when handling concentrates during mixing and loading. Failing to follow appropriate safety precautions and application procedures can lead to exposure. Pesticide container labels specify the minimum amount of PPE recommended by the manufacturer. Exceeding the manufacturer's recommendations for PPE lowers exposure risks.

Always check the label for the required PPE for the product you plan to use.

21. Minimum protection consists of long-sleeved shirt, long pants, shoes, and socks.

22. Some forestry herbicides may require additional PPE including protective eyewear and chemical-resistant gloves.

23. Other products require mixers to wear coveralls or chemical-resistant aprons.

Forestry Herbicide Application: Talking Points

All of us need to be concerned about the long-term impacts of our forest management practices and the use of herbicides. After reviewing the chemical properties and product safety, we can draw the conclusion that proper use according to the label may improve forest productivity and not adversely affect biodiversity. The environmental impacts of forestry herbicide applications are generally minimal[1] for the following reasons:

1. Forestry herbicides are applied at very low rates (2 ounces to 2 quarts per acre) and on a very small percentage of the land annually.
2. Generally, only one application is made over an 80- to 100-year rotation for hardwood regeneration establishment.
3. Forestry herbicides are very low in acute toxicity. Of the 11 active ingredients listed in Table 2, page 12, LD_{50} values range from 375 to more than 5,000 mg/kg, classifying them as moderately toxic to practically nontoxic.
4. Essentially all of our vegetation control needs in forestry can be accomplished through the use of "general use" herbicides. There is little need to use restricted use products.
5. Forestry herbicides do not bioaccumulate in the food chain. When ingested, these chemicals pass very quickly through the body and are excreted in urine and feces.
6. Forestry herbicides are biodegradable and do not persist in the environment. All of these chemicals have relatively short half-lives and undergo biological decomposition.
7. The potential human health risks from forestry herbicides are negligible. They are less hazardous than manual and mechanical methods of vegetation control.

These points provide a strong argument for using forestry herbicides. Despite the relatively low risk to humans, animals, and the environment, practicing care and environmental stewardship during application is essential to ensure continued product availability. Remember to always read and follow the label—it is a legal document.

[1] Revised from K. McNabb, *Environmental Safety of Forestry Herbicides*, Alabama Cooperative Extension System, 1997.

Silvicultural Objectives and Chemical Control Methods for Forestry

Land managers can use forestry herbicides to increase forest productivity by controlling competing and interfering vegetation. In general, herbicide applications reduce competition and improve survival and growth. Herbicides can control herbaceous and woody competing vegetation for natural or artificial regeneration, as well as for timber stand improvement practices and thinning.

Forest Stand Improvement

Objective
Remove poorly formed trees and/or undesirable species from a forest stand to make room for more desirable growing stock. Regulates species composition and improves stand quality.

Herbicide Application Methods
Frill Girdle (Hack and Squirt)
Stem Injection
Basal Bark
Foliar Spray

24. Hack and squirt application used to kill undesirable standing tree.

25. Spot treatments control undesirable understory vegetation.

26. Basal bark treatment to control grape vine (*Vitis* spp.).

27. Basal bark applications are effective at removing poorly formed, thin-barked trees.

continued on next page

WARNING: With any type of residual tree control, the herbicide can potentially spread to adjoining trees of the same species by root grafts. Restricting treatments to species different from those considered crop trees will minimize the potential for damage.

Silvicultural Objectives and Chemical Control Methods for Forestry (continued)

Precommercial Thinning

Objective
To control stand density and species composition by thinning dense stands of conifers or hardwoods. Increases individual tree growth by reducing stand density-allowing for crown expansion.

Herbicide Application Methods
Frill Girdle (Hack and Squirt)
Stem Injection
Basal Bark

CAUTION: Functional root grafts can occur between trees of the same species allowing herbicide to move to untreated trees.

28. Hack and squirt application releases desirable crop trees in hardwood poletimber.

29. Overstocked white pine stand thinned using hack and squirt.

Site Preparation

Objective
To control preexisting competing herbaceous and interfering woody vegetation prior to planting or establishing natural regeneration. Creates conditions conducive to the establishment and growth of desired species.

Herbicide Application Methods
Foliar Spray
Basal Bark
Basal Soil

30. KMC track skidder with air-blast sprayer treats understory vegetation.

31. Understory vegetation controlled to encourage natural regeneration.

32. Basal bark application eliminates competition from undesirable saplings.

33. Foliar herbicide application removes dense shade cast by hay-scented fern.

Release Operations

Objective
To free young stands of planted or naturally established seedlings from competing or interfering vegetation that threatens to suppress growth. Gives the released trees enough light and growing space to develop.

Herbicide Application Methods
Frill Girdle (Hack and Squirt)
Stem Injection
Cut Stump
Foliar Spray
Basal Bark

34. Pine release using skidder-mounted air-blast sprayer.

35. Aerial pine release operation with helicopter and support truck.

36. Spot treatments control grass and weed competition around planted seedlings.

37. Dormant season treatments of Japanese stiltgrass release hardwood seedlings.

Invasive Plant Control

Objective
To remove invasive plants that influence the forest's ability to retain native plant and wildlife diversity. Invasive plants are best controlled early when they are identified and before they have opportunities to spread.

Herbicide Application Methods
Frill Girdle (Hack and Squirt)
Stem Injection
Cut Stump
Foliar Spray
Basal Bark
Basal Soil

38. Foliar spot applications manage invasive shrubs, like this autumn olive.

39. Basal bark application used to control tree-of-heaven.

Herbicide Summaries

A summary of forestry-labeled herbicides registered for use in Pennsylvania is available on the Penn State Extension Forest Vegetation Management Website (**extension.psu.edu/natural-resources/forests/vegetation-management**). The site contains informative summaries of herbicides effective at controlling competing vegetation in Northeastern hardwood and coniferous forests.

The following are also provided on the Forest Vegetation Management Website:

- An overview of integrated vegetation management (IVM) including cultural, mechanical, biological, and chemical control
- An outline of herbicide treatment guidelines
- A listing of herbicide manufacturers, distributors, and applicators for Pennsylvania
- A table providing herbicides by application method
- A table listing herbicides commonly used in forestry by active ingredient with associated product summaries

Forest Vegetation Management Website:
extension.psu.edu/natural-resources/forests/vegetation-management

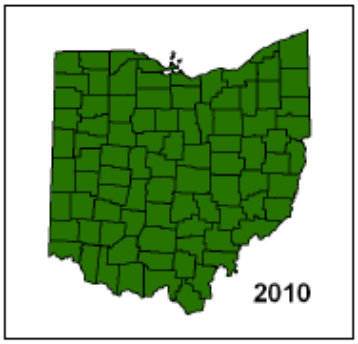
INVASIVE PLANTS OF OHIO

Fact Sheet 17 — Tree-of-Heaven

Ailanthus altissima

DESCRIPTION:
This rapidly growing non-native, dioecious tree can reach a height of 80 feet. Bark is gray to brownish-gray, turning nearly black with age. Twigs are light chestnut-brown. Leaves are pinnately compound with 11-41 leaflets. Each leaflet has an entire margin except for one or more glandular teeth at the base of the leaflet. Large terminal flower clusters are pale yellow to greenish. Flat, twisted, winged fruits each containing a single central seed are produced on female trees in late summer to early fall and may remain on the trees for long periods of time. All parts of the tree, especially the leaves and flowers, have a "burned nut" or "rancid peanut butter" odor. Young plants can be confused with sumac and black walnut, which do not have the unpleasant odor.

Map based on records as of 2010.



Tree-of-Heaven was introduced from China as a garden plant in Philadelphia in 1784. By the mid-1800s, it was well-established as a nursery tree because of its ability to grow nearly anywhere. During the gold rush, Chinese immigrants introduced it to California as a medicinal plant. Tree-of-Heaven is found throughout Ohio and poses the greatest threat to younger, successional or disturbed forest areas.

HABITAT:
Tree-of-Heaven thrives in disturbed soils, urban and natural areas, and in any habitat except wetlands. It can be found in many urban areas, including alleys, sidewalks, parking lots, and streets. In natural areas, Tree-of-Heaven invades forest edges, successional forests, tree-fall gaps in mature woods, dunes, and old fields. It can be a major invader following timber harvests and prescribed burns.

INVASIVE CHARACTERISTICS:
One mature female tree can produce as many as 350,000 wind-dispersed seeds per year. These seeds are easily airborne or can be transported by water and birds. Germination is high. Mature trees also reproduce extensively by root suckers and

Seedlings on forest floor

sprouts from cut stumps. Sapling growth can reach 3-4 feet a year, outgrowing nearly all native trees and out-competing natives for light and nutrients. The roots give off the toxin, Ailanthone, which inhibits the growth of other plants. It is somewhat shade-tolerant and grows quickly when taking advantage of gaps in the forest canopy caused by windfalls, logging, and defoliation due to insect pests.

CONTROL:

Mechanical: Young seedlings may be pulled or dug up, preferably when soil is moist. Care must be taken to remove the entire plant including all roots and fragments, as these will typically re-grow. Cutting alone is usually counter-productive because *Ailanthus* responds by producing large numbers of stump sprouts and root suckers. Cutting large seed-producing female trees may at least temporarily reduce the spread of fruits. However, in general, mechanical control is not recommended for this species.

Chemical: Selective herbicide application is the most effective control method for woody invasive plants, especially those that have extensive root systems like Tree-of-Heaven. Herbicides can be applied to the foliage (low-volume or high-volume during the growing season), cut stems, hack-and-squirt, or to the bark of the base of the stems/trunks. Systemic herbicides such as Roundup, Glypro, AquaNeat, Garlon 3A, Razor, and Escort are effective for foliar treatment (particularly Escort), while Garlon 4, Stalker, Pathfinder, and Pathway can be used for cut-stem, hack-and-squirt, or basal bark treatment. To be most effective, most herbicides require a penetrating or sticking agent. It is relatively easy to kill the above-ground portion of *Ailanthus* trees; however, a residual herbicide is needed to kill the extensive root system. The basal bark and hack-and-squirt methods work best on larger stems during the fall and late winter/early spring. The cut stump method is useful in areas where the trees need to be removed from the site. However, felling trees is usually less effective in killing the root system, slower, and more labor intensive.

Biological: *Ailanthus* webworm (*Atteva punctella*) has been found in southwest Ohio, feeding exclusively on Tree-of-Heaven. This moth has several overlapping generations each season and may be an effective biological control. Several fungal pathogens are being investigated as potential biological controls for *Ailanthus*.

Credits and additional information:

Plant Conservation Alliance-Alien Plant Working Group
Ohio Department of Natural Resources, www.ohiodnr.gov
The Nature Conservancy, Ohio Chapter
The Ohio State University Extension, http://woodlandstewards.osu.edu
OIPC website, www.oipc.info

IPaC U.S. Fish & Wildlife Service

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Virginia and West Virginia

Local offices

Virginia Ecological Services Field Office

(804) 693-6694

6669 Short Lane
Gloucester, VA 23061-4410

West Virginia Ecological Services Field Office

(304) 866-3858
(304) 866-3852

6263 Appalachian Highway
Davis, WV 26260-8061

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Indiana Bat Myotis sodalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

Crustaceans

NAME	STATUS
Madison Cave Isopod Antrolana lira Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4162	Threatened

Flowering Plants

NAME	STATUS
Harperella Ptilimnium nodosum Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3739	Endangered

Northeastern Bulrush Scirpus ancistrochaetus Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6715

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts

For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

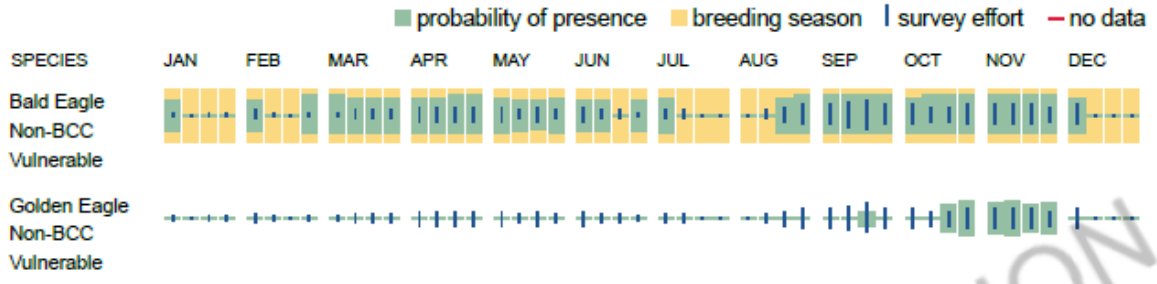
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report

On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service). The incidental take of migratory birds is the injury or death of birds that results from, but is not the purpose, of an activity. The Service interprets the MBTA to prohibit incidental take.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

Black-capped Chickadee Poecile atricapillus practicus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 10 to Jul 31
Canada Warbler Cardellina canadensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Cerulean Warbler Setophaga cerulea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 27 to Jul 20
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Chuck-will's-widow Antrostomus carolinensis This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Jul 10
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere
Kentucky Warbler Geothlypis formosa This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
Prairie Warbler Setophaga discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31

Prothonotary Warbler Protonotaria citrea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

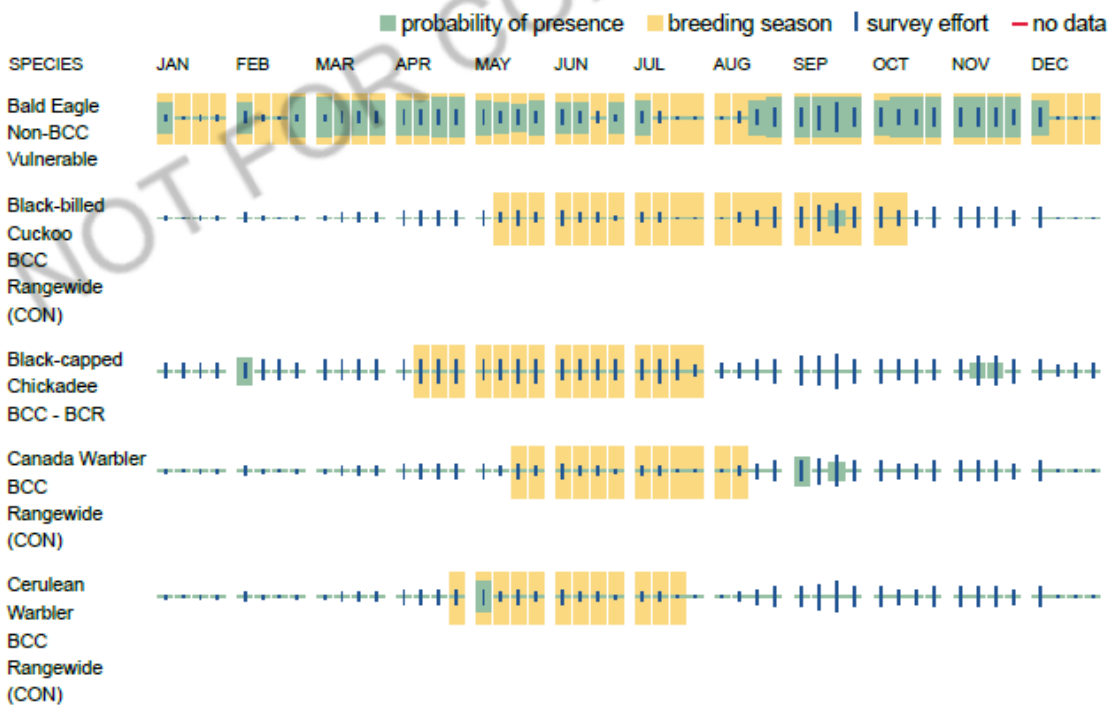
Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

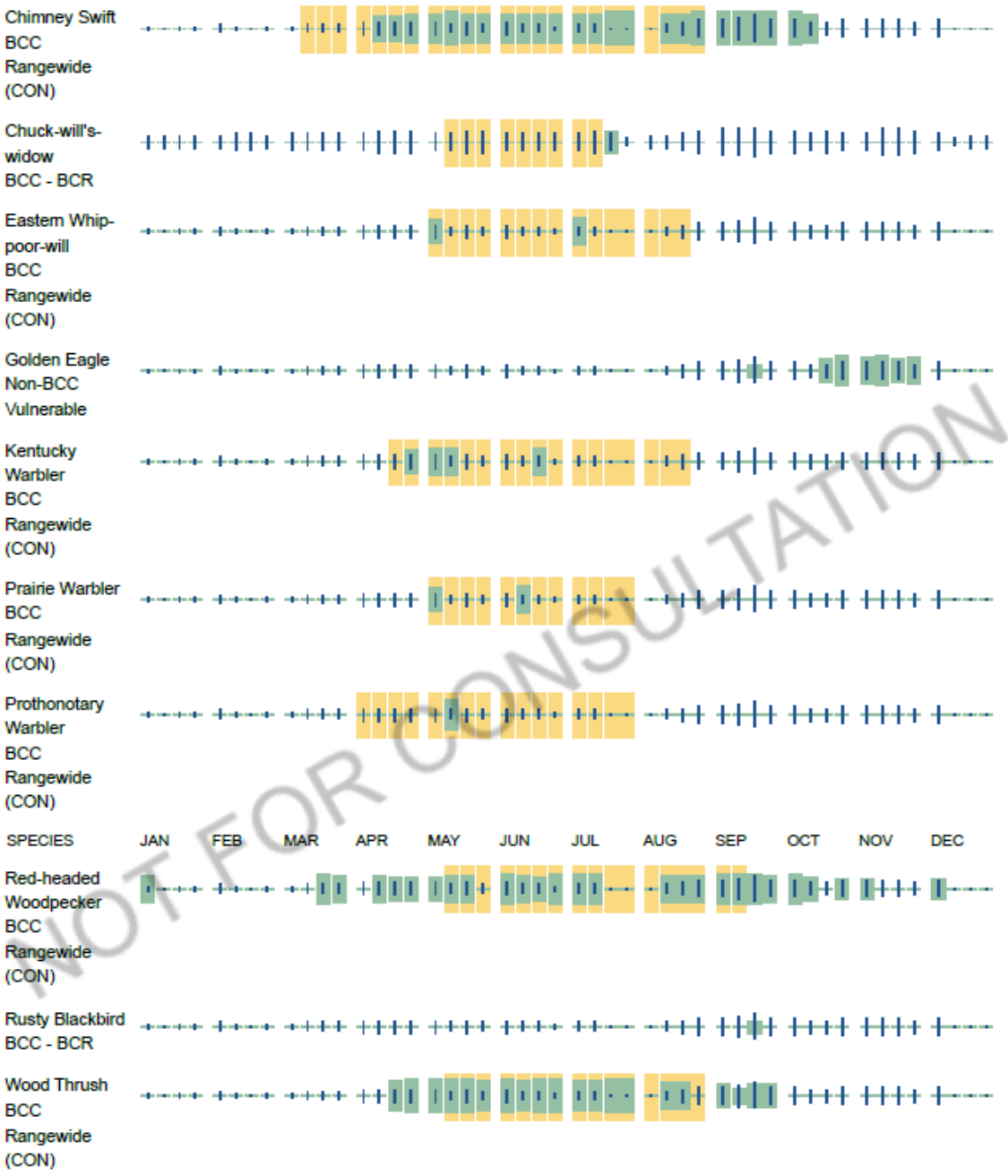
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as "Vulnerable". See the FAQ "What are the levels of concern for migratory birds?" for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird

species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND
PFO1A

FRESHWATER POND
PUBHh

RIVERINE
R2UBH
R4SBC
R3UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

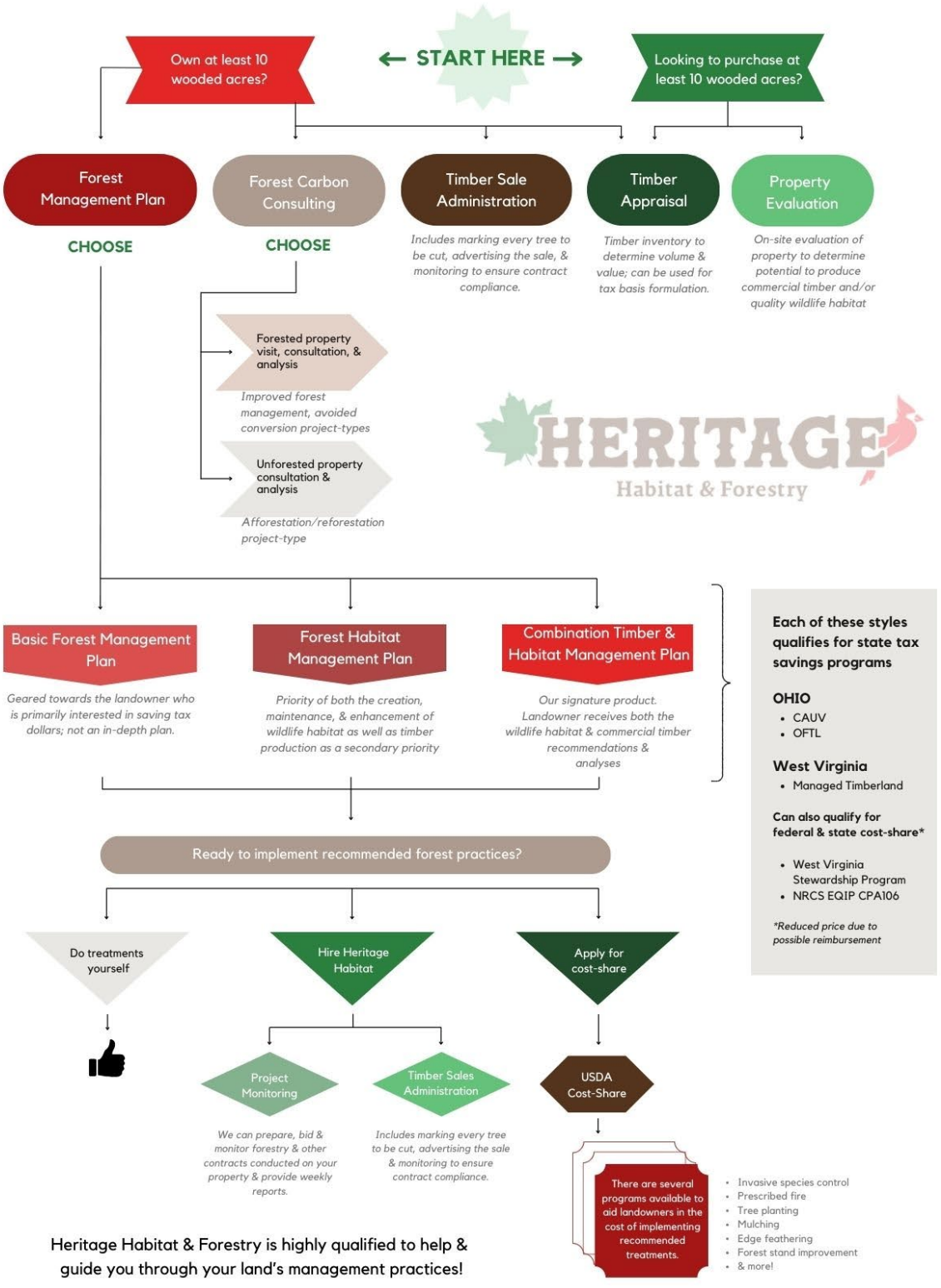
Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Company Name	Anew Climate	Appalachian Carbon Exchange	Bosland Growth	Forest Carbon Works	American Forest Foundation / The Nature Conservancy	Finite Carbon	Finite Carbon	Green Assets	LandYield	Living Carbon	NativState	Working Trees
Program Name	Natural Climate Solutions	TBA	Healing Mine-Scarred Landscapes	Forest Carbon Works Conserve	Family Forest Carbon Program (FFCP)	CORE Carbon	Natural Climate Solutions	Forest Carbon	LandYield	Living Carbon Reforestation Program	NativState	Working Trees
Program Type	All nature-based solutions	TBA	Afforestation / Reforestation	Improved Forest Management (IFM)	Improved Forest Management (IFM)	Improved Forest Management (IFM)	Improved Forest Management (IFM), Afforestation / Reforestation, Avoided Conversion	Avoided Conversion (AC) & Improved Forest Management (IFM)	Improved Forest Management (IFM)	Afforestation / Reforestation (A/R)	Improved Forest Management (IFM) & Afforestation / Reforestation (A/R)	Silvopasture
Marketplace	Compliance & voluntary programs available	TBA	Voluntary	Voluntary	Voluntary	Voluntary	Compliance & voluntary programs available	Compliance & voluntary programs available	Voluntary	Compliance & voluntary programs available	Compliance & voluntary programs available	Voluntary
Registry & Protocol	All	TBA	Verra (VM0047)	Verra (VM00003)	Verra	ACR Small Non-Industrial Private Forest Landowner Methodology	All	Compliance Projects: California ARB Voluntary Projects: ACR	ACR Small Non-Industrial Private Forest Landowner Methodology	ACR & Verra (VM0047)	ACR IFM 2.0 & 2.1	Verra

Active States & Regions	U.S. & Canada	TBA	OH, PA, & WV	Entire U.S.	**Central Apps:** PA, WV, & MD, OH **Midwest:** MN, WI, & MI **Northeast:** ME, NH, MA, CT, NY, & VT **Southern Apps:** TN, KY, AL, GA, NC, SC, VA	US Southeast and US Northeast	U.S. & Canada	Non-federal land in U.S.	Eastern U.S.	Entire U.S.	Central & eastern U.S.	Eastern U.S.
Minimum Acreage	5,000 forested acres	TBA	200 unforested acres (need not be contiguous)	40 forested acres	30 contiguous forested acres	40 forested acres	5,000 forested acres	Varies by project type, typically 5,000+ acres across all tracts	40 forested acres	200 unforested acres (need not be contiguous)	40 forested acres	No minimum
Ineligible Properties	Federal-owned	TBA	Publicly owned land or any land that is already forested with > 20% canopy cover	Publicly owned (gov't, state, municipality)	Non-private lands, plantations, silvopastoral systems, non-commercially viable forests, forests less than 30 acres, legal encumbrances that restrict harvesting	Publicly owned assets; Sites with legal restrictions preventing harvesting; sites already enrolled in carbon projects; sites with >5,000 acres	Federal-owned property or any property where commercial harvesting is legally restricted	Federal-owned	Sites with legal restrictions that prevent timber harvesting, or already enrolled, publicly owned, &/or more than 5,000 acres	Forested (>10% canopy cover)	No conservation easements	Previously reforested in past 10 years, highly organic soils, & land being converted directly from rowcrops
Method of Credit Assessment	Combination of remote sensing & permanent field survey plots	TBA	Monitoring via field inventory and remote sensing	Combined remote sensing & field inventory	5-yr monitoring cycles using installed monitoring plots on selected properties	Remote sensing	Combination of remote sensing & permanent field survey plots	Credits are generated on an annual basis, with an onsite re-inventory required every 5-6 years.	Remote sensing in combination with ground data from USFS FIA	5-yr monitoring cycles using both ground-based & remote sensing techniques in-house	Timber inventory plots	Mobile phone application. Landowner indicates where trees are at planting and periodically remeasure
Contract Length	10 reporting periods (1-5 year periods)	TBA	Harvest restrictions for 60 years. Must remain permanently forested.	60 – 125 years	20 years	Variable depending on offers from CORE Project Proponents (40-year commitment to ACR)	Flexible; typically 10 reporting periods	Varies, typically 15-20 years	40 years	40 years	40 years	30 years
Contract Terms	Landowner agreeing to sustainable forest management practices	TBA	Site preparation and tree planting costs are fully covered.	Improved forest management practices that maximize carbon storage & sequestration; harvesting is allowed over contract duration	If landowner decides to harvest in contract area, they must follow modified harvest guidelines	20-year harvest deferral for first 20 years of project.	Terms & key requirements disclosed during due diligence & completion of project feasibility analysis	Legal commitment to keep land in sustainably managed forestry for life of project	20-year harvest deferral. After the project's first 20 years, landowner will also be permitted to harvest growth in excess of Y20 carbon stocks.	Fully cost-covered site preparation & tree planting	Selective timber harvesting permitted or deferring harvests for length of contract	Planting of trees and monitoring growth over time
Key Requirements	Length of contract commitments vary upon protocol	TBA	Recordation of conservation easement on the reforested area. Sustainable harvest in compliance with a forest management plan is allowed after 60 years.	Harvest flexibility (10% carbon stocking set aside for climate smart forestry practices); 60-year commitment (25 years crediting-payments + 35-year monitoring)	Harvest restriction of 25% total basal area / 10% reduction of average QMD, & others	40-year project commitment to ACR with no harvesting for the first 20 years.	Terms & key requirements disclosed during due diligence & completion of project feasibility analysis	Timber can typically be harvested within annual forest growth. Projects require a 40 to 100+ year commitment	Enrolled forestland must have merchantable volume. 40-year commitment with no harvesting for the first 20 years.	Harvest restrictions for length of contract, no grazing for up to 5 yrs. Allows selective tree thinning operations.	Harvest restrictions for length of contract	No pre-existing grants (EQIP)
Payment Calculation	Netback structure based upon the actual offset sales	TBA	Up-front payment to landowner ($/acre amount) plus share of carbon revenue over the 60-year contract term.	Productivity & reassessment to allow for market growth	Rate per acre depends on cover type/practice that the land is eligible for. Fixed for 20 years.	Variable depending on offers from CORE Project Proponents	Terms & key requirements disclosed during due diligence & completion of project feasibility analysis	Revenue share based on carbon credit sales	First 3-years landowners get paid generally $20-40/ac/yr. After year-3 landowners will get paid 55% of market value from sale of credits.	Landowner payment independent of credit quantity. Fixed payment structure.	Based on royalty percentage, determined by acreage size, re-assessed annually	Option of guaranteed payment for first 15 years, or market rate

Landowner Assistance	Anew ensures everything is implemented & in compliance with the project. Landowner controls all forest management activities.	TBA	Bosland Growth has expertise in land, forestry, and restoration, enabling it to develop and manage the reforestation program. Reforestation costs fully covered.	Sales Team & Professional Foresters working in all parts of the country	Participation & enrollment free for landowners, free expert consultation with forest professionals, financial assistance for management plans that are customized for your unique goals for your land, & payments to help reach your goals	Variable depending on offers from CORE Project Proponents	Finite ensures project complies with program requirements; landowner retains control of forest management	Green Assets has a dedicated team of experts, including Certified Foresters & wetland scientists who will provide guidance to landowners on management activities.	LandYield covers all costs so landowners pay nothing to enroll. Landowners need to complete the application and provide necessary ownership documentation while Landowners need to fill out quarterly attestations about any forest activity.	In-house land & forestry experts. Full reforestation costs covered.	Landowner receives forest management plan, management assistance & wildlife habitat development assistance	Working Trees can connect landowner with technical advisors if needed
Permitted Firewood Removals	Yes	TBA	Yes, with restrictions	Yes	Yes, with restrictions	Yes	Yes	Yes	Yes	Yes	Yes	Yes, but notice required
What Makes Program Unique?	Anew develops, markets, & sells the offsets on behalf of the landowner	TBA	Implementation of the Forestry Reclamation Approach, a proven method based in scientific research & experience, to ensure that trees succeed & new forests thrive.	Harvest flexibility, market growth (revenue share) options in payments, durable & quality credit generation (almost entirely removal credits)	Pays landowners to implement practices on their land that promote carbon sequestration. Technical assistance, forest management education, & more provided to landowners	Allows landowners to selectively enroll stands they want to include in a potential project; real time estimates for revenue potential of projects	Full-service forest carbon project developer. Finite never takes ownership, control, or discretion of landowner's carbon credits. Quality, integrity, & additionality are of critical importance.	Landowners working with landowners. Tailored program developed for each unique property.	Allows landowners to selectively enroll only the stands they want in the program, & issue high-quality credits Fortune 500 companies desire	High-quality reforestation & habitat restoration of degraded or unproductive lands, focus on Appalachia, working with a strong team of local & national expert partners, high quality genetics & improved tree varieties	Small landowner-focused, boots-on-the-ground assessments, & additional assistance in forest management	The only agroforestry project in the U.S.
To Learn More	Email Tommie Elder telder@anewclimate.com or Josh Strauss jstrauss@anewclimate.com	TBA	boslandgrowth.com or email knoop@boslandgrowth.com	Forestcarbonworks.com & chestnutcarbon.com	familyforestcarbon.org	corecarbon.com	finitecarbon.com or email Dylan Jenkins djenkins@finitecarbon.com	Visit green-assets.com or email Drew Hall dhall@green-assets.com	LandYield.com	livingcarbon.com/land or email land@livingcarbon.com	nativstate.com	farming.workingtrees.com
Source	*Merrick McKinley, RPF, Director, Natural Climate Solutions*	TBA	*Michael Knoop, Vice President, Bosland Growth*	*Sarah Ford, Forest Carbon Works*	*Ian Forte, Senior Forestry Manager, Brittany VanderWall, Senior Forestry Manager, AFF*	*Daniel Crawford, VP, Commercial Operations*	*Dylan Jenkins, ACF, CF, VP Origination*	*Rob Eckenrode, CF, PWS, Lead Forest Carbon Analyst*	*Josh Fain, LandYield Director*	*Saskia Versteeg, Former Head of Land & Partnerships, Living Carbon*	*Tim White, RF, ACF, VP of Forestry, NativState*	*John Foye, Co-founder, Working Trees*

How Can **Habitat & Forestry Management** Help <u>You</u>?



Questions? Reach out today

(330) 419-1769 | HeritageHabitatCo@gmail.com

HeritageHabitatCo.com

Soil Reports emailed as separate files due to large size

MANAGED TIMBERLAND FACT SHEET

Managed Timberland is a Tax Incentive Program

West Virginia is 79 percent timberland (12 ½ million acres). The majority of this land is owned by small private landowners. This living and growing renewable resource has a major influence on our environment and supports an industry which is growing in both jobs and economic value.

The State of West Virginia recognizes the value of managing this resource. Through proper management, the potential losses to wildfire, insect, disease and exploitation can be reduced. This tax incentive approach was enacted to encourage landowners to actively manage their forest land thereby increasing the amount and quality of the resource.

Everyone benefits because managed timberland is much more productive than non-managed timberland. In addition to increased income, it creates a diverse environment, including wildlife habitat, and overall use and appreciation of the land. Proper management encourages business, which means jobs for many people and income for the landowner and local communities.

The appraised value of Class II, III and/or IV forested property is reduced under Managed Timberland. It is based on the ability of the land to produce future income according to its use and productive potential, market comparables and market analysis.

How to File for Managed Timberland

The **initial CONTRACT** for Managed Timberland Property Valuation **is due before July 1 of any year**. This Contract is good until cancelled in writing by the landowner. However, when property is withdrawn from the Managed Timberland Incentive Program, a new Contract must be filed before the property can be reinstated.

A separate Contract must be filed for each ownership in each County. In case of multiple owners, either all owners involved must submit notarized signatures or one may sign for all if provided a Power of Attorney, a copy of which must accompany the Contract. A professional forester may apply on behalf of client(s), but must provide a contract signed by the owners(s).

The **annual APPLICATION** for Certification as Managed Timberland **must be submitted** to the Division of Forestry **between March 1 and September 1 of each year** to remain in the Managed Timberland Tax Incentive Program.

A separate Application for Certification must be filed for each ownership in each County. The Application for Certification can be filed by the owner or professional forester managing the land.

Requirements

I. Ten contiguous wooded acres, minimum.
II. Management plan.
III. No harvesting activities until a management plan is in place.
IV. All owners must be in agreement

Management Plan

The Contract states that the land is being used in a planned timberland management program and is devoted primarily to forest use. In compliance with the Law, the owner may;

(1) File a notarized document that the land is being protected and managed. (Demonstration of the plan must be made available upon request.)

OR

(2) Submit a plan prepared by a professional forester and intention to follow that plan.

Most private timberland owners can receive up to 75 percent cost sharing assistance for plans, and in some cases a free plan. Information on cost sharing and management plans can be obtained from the West Virginia Division of Forestry.

If a plan does not exist when the Contract is filed, it is anticipated that a plan can be developed by the end of the second year after filing the Contract. Until a plan has been prepared, harvesting activities cannot be conducted. This guarantees that regeneration is planned and that the harvest is carried out in a way that will provide regeneration.

Once land is placed under a Managed Timberland Contract, all management activities must be as specified in the plan. This ensures that the land will produce continuous crops of timber on a perpetual basis. Using the forest management plan will maximize the productivity of the forest for the owner.

If the County Assessor or the Tax Commissioner has cause to believe that a plan is not being followed, a request is made to the Division of Forestry for an inspection to determine if the land qualifies for the program and the plan is being followed. "Falsification of certification or failure to follow a professionally prepared plan will result in loss of valuation as managed timberland.

Need More Information and Forms

If you have any questions, please call Jean Miller (304) 558-2788 Option 2, or write the WV Division of Forestry, 7 Players Club Dr., Charleston, WV 25311.

The Managed Timberland Program Contract, Application, and Instructions can be found at the WV Division of Forestry website at www.wvforestry.com, Managed Timberland.

S:\Shared\Managed Timberland\Webpage Information\MT Fact Sheet (rev 7-12)

Mail to:
Division of Forestry
7 Players Club Dr.
Charleston, WV 25311

APPLICATION
FOR CERTIFICATION AS MANAGED TIMBERLAND

THE UNDERSIGNED DOES HEREBY CERTIFY THAT, TO THEIR BEST KNOWLEDGE (BASED ON CURRENT INFORMATION), THE INFORMATION SHOWN WITHIN THIS APPLICATION IS A TRUE AND ACCURATE REPRESENTATION OF THE MANAGED TIMBERLAND ACREAGE AS DEFINED IN W.VA. CODE §11-1C-2-b AND §11-1C-10-d-1, THAT THE VARIOUS PARCELS ARE BEING MANAGED FOR MULTIPLE USE UNDER A MANAGEMENT PLAN THAT IS IN ACCORDANCE WITH THE BEST MANAGEMENT PRACTICES FOR FORESTRY AS OUTLINED IN THE WEST VIRGINIA FOREST PRACTICE STANDARDS AND THE BEST MANAGEMENT PRACTICES FOR WATER QUALITY AS OUTLINED IN THE WEST VIRGINIA NON-POINT SOURCE MANAGEMENT PROGRAM, ACCORDING TO A PLAN THAT WILL MAINTAIN THE PROPERTY AS MANAGED TIMBERLAND.

By* _____ (Printed Name)
Signature _____
Title _____
Address _____
_____
Phone No. _____
Date _____
Email _____

By _____ (Printed Name)
Signature _____
Title _____
Address _____
_____
Phone No. _____
Date _____
Email _____

STATE OF _____
COUNTY OF _____, TO WIT

THE FOREGOING APPLICATION FOR CERTIFICATION AS MANAGED TIMBERLAND WAS SIGNED BY _____, AND ACKNOWLEDGED BEFORE ME THIS _____ DAY OF _____, _____.

MY COMMISSION EXPIRES _____

_____
NOTARY PUBLIC

(FOR DIVISION OF FORESTRY USE ONLY)

THE ABOVE APPLICATION AS MANAGED TIMBERLAND FOR THE PROPERTIES INDICATED ON THE REVERSE IS HEREBY APPROVED THIS _____ DAY OF _____

BY _____ OF THE WEST VIRGINIA DIVISION OF
AUTHORIZED SIGNATURE
FORESTRY.

* If there is more than one owner, then all owners must be listed unless one individual has power of attorney privilege or authority to sign on behalf of all others. Use additional sheets if needed

WVDOF-F7 (Rev. 8/2019) S:\Shared\Managed Timberland\Webpage Information\MT Application

TAX YEAR _____ PAGE _____ OF _____

PROPERTIES INVOLVED IN MANAGED TIMBERLAND

COUNTY _____ *OWNER(S) NAME(S) _____

District	Tax Map	Parcel Number	Sub-parcel Number	Managed Timberland Acreage	% of Ownership	+	Residual Acreage**	=	Total Parcel Acreage

(SHADED AREAS FOR OFFICE USE ONLY)

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*If there is more than one owner, then all owners must be listed and must sign on front unless one individual has power of attorney privilege or authority to sign on behalf of all others.

** RESIDUAL ACREAGE IS OTHER ACREAGE NOT INVOLVED IN TIMBER MANAGEMENT PROGRAM, SUCH AS: HOMESITE, PASTURE, TILLABLE, ETC. FOR THOSE PROPERTIES WHERE RESIDUAL ACREAGE IS LISTED, INFORMATION IDENTIFYING THE USE OF THE NON-MANAGED ACREAGE IS REQUIRED.

ALL OF THE ABOVE DATA CAN BE OBTAINED FROM INFORMATION AVAILABLE AT THE COUNTY ASSESSOR'S OFFICE

APPLICATIONS FOR CERTIFICATION MUST BE SUBMITTED TO THIS OFFICE BY SEPTEMBER 1.

MANAGED TIMBERLAND PROGRAM

Instructions for Completing the Contract and Application

CONTRACT FORM

1. You must have a minimum of **10 wooded acres** before submitting the completed contract. The land cannot be designated as subdivision. If you are in doubt, please contact your county assessor's office.
2. **Sign** and have your signature **notarized by** a notary public. All owners of the property must sign the document unless a power of attorney is submitted for the one signature. Your signature(s) and that of the notary public must be original signatures. Out of state notarization must comply with that particular state's requirements for mailing documents out of state (i.e. embossed seal, notary stamp, or no seal).
3. Please provide a mailing address to which we can mail any further correspondence, as well as a day time telephone number.
4. Send the **originally signed and notarized** contract to the Division of Forestry, 7 Players Club Dr., Charleston, WV, 25311. The document must be postmarked with a date **on or before July 1** of the upcoming tax year.

APPLICATION FORM

1. The application is the second document required for managed timberland consideration. This form identifies the property and is filed on a yearly basis.
2. **Sign** and have your signature **notarized** by a notary public. Again, all owners of the property must sign the document unless a power of attorney letter is submitted for the one signature. Your signature(s) and that of the notary public must be original signatures. Out of state notarization must comply with that particular state's requirements for mailing documents out of state (i.e. embossed seal, notary stamp, or no seal).
3. On the **reverse side** of the form you will be asked to **identify each parcel** of land by filling in the district, tax map number, parcel number, and acreage. If you do not know what this information should be, please phone your county assessor's office for assistance.
4. Send the **originally signed and notarized** application to the Division of Forestry, 7 Players Club Dr., Charleston, WV, 25311. The document must be postmarked with a date **on or before September 1** of the upcoming tax year.

PLEASE NOTE: YOU MAY MAIL BOTH THE CONTRACT AND THE APPLICATION TOGETHER TO THE DIVISION OF FORESTRY, BUT THE ENVELOPE MUST BE POSTMARKED ON OR BEFORE THE **JULY 1 DATE**.

CONTRACT
for
Managed Timberland Property Valuation

The undersigned does hereby acknowledge that the land in _____ County, owned by _____, as detailed on certification form(s), is devoted primarily to forest use and that there are sufficient numbers of commercially valuable species of trees to constitute at least forty percent normal stocking of forest trees well distributed over the growing site, and hereby contracts with the West Virginia Division of Forestry to use the real estate in a planned program of multiple purpose forest management, including erosion control during timbering operations (1992 Logging Sediment Control Act), in accordance with the West Virginia Forest Practices Standards and the West Virginia Silvicultural Non-point Source Management Program, and with the understanding that by so doing, the said property will be valued by the State Tax Commissioner according to the land's potential for growing timber instead of a generalized market value. The undersigned further contracts to annually certify in writing to the West Virginia Division of Forestry that the property continues to meet the definition of managed timberland as set forth in §11-1C-2-b and §11-1C-10-d-1 of the Code of West Virginia.

By* _____ (Printed Name)
Signature _____
Title _____
Address _____
_____
Phone No. _____
Date _____

By _____ (Printed Name)
Signature _____
Title _____
Address _____
_____
Phone No. _____
Date _____

STATE OF _____
COUNTY OF _____, TO WIT

The foregoing contact with the West Virginia Division of Forestry to manage certain timberlands under a multiple-use plan so as to maintain the acreage as timberland was signed by _____ and acknowledged before me this _____ day of _____

My Commission expires _____

_____
Notary Public

(FOR DIVISION USE ONLY)

The above contract to perpetuate the use of certain lands as managed timberland under the multiple-use plan is hereby approved this _____ day of _____

by _____ (Authorized Signature), _____ (Title) of the West Virginia Division of Forestry.

* If there is more than one owner, then all owners must be listed unless one individual has power of attorney privilege or authority to sign on behalf of all others. Use additional sheets if needed

Mail completed forms to: WV Division of Forestry, 7 Players Club Dr., Charleston, WV 25311

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Table 1
Minimum Number of Trees Required Per Acre to Determine 30 Square Feet of Tree Basal Area of 40% Stocking for Classification as Forest Land

D.B.H. Range	D.B.H. in 2" Classes	Basal Area Per Tree	Per Acre	Per 1/5 Acre	Per 1/10 Acre
up to 2.9"	Seedlings		400	80	40
3.0-4.9"	4	0.0873	400	80	40
5.0-6.9"	6	0.1964	153	31	15
7.0-8.9"	8	0.3491	86	17	9
9.0-10.9"	10	0.5454	55	17	6
11.0-12.9"	12	0.7854	38	8	4
13.0-14.9"	14	1.0690	28	6	3
15.0" +	16+	1.3962	21	4	2

NOTE:
(a) Area 1/5 acre; circle, diameter 105'4"; square 93.4" per side.
(b) Area 1/10 acre; circle, diameter 74'6"; square 66'.
(c) Number of seedlings present may qualify on a percentage basis; Example, 100 seedlings would be equivalent of 7.5 square feet of basal area (25% x 30 - 7.5).
(d) Seedlings per acre are based on total pine and hardwood stems. Where intensive pine management is practiced, a minimum of 250 well distributed pine seedlings will qualify.

Privacy Notice:
The West Virginia Division of Forestry collects and processes certain personal information as needed for appropriate and customary business purposes. Personal information may be disclosed to other State agencies or third parties as necessary in the normal course of business or to comply with federal or state laws, including Freedom of Information Act requests. If you have questions about our use of personal information, please contact us at 304-558-2788.

Appendix B: Data

PlotID	TreeNum	SpecName	DBH	ProdName	HmObs
17	0		0		0
17	1	White Oak	13	Small Saw	16
17	2	White Oak	23	Lg Saw	8
17	3	Black Oak	22	Cull	0
17	4	Blackgum	7	Pulpwood	0
17	5	White Oak	21	Cull	0
17	6	White Oak	30	Cull	0
17	7	White Oak	26	Cull	0
17	8	White Oak	20	Lg Saw	16
17	9	White Oak	15	Small Saw	16
17	10	White Oak	24	Small Saw	16
13	0		0		0
13	1	Virginia Pine	12	Small Saw	8
13	2	N. Red Oak	19	Med Saw	16
13	3	Yellow-Poplar	12	Cull	0
13	4	White Oak	28	Cull	0
13	5	Blackgum	13	Small Saw	8
13	6	Black Oak	18	Med Saw	24
13	7	Chestnut Oak	11	Cull	0
13	8	N. Red Oak	16	Med Saw	24
13	9	White Oak	7	Pulpwood	0
13	11	Red Maple	15	Small Saw	8
13	12	N. Red Oak	17	Cull	0
16	0		0		0
16	1	Yellow Buckeye	16	Med Saw	8
16	2	Norway Spruce	13	Small Saw	8
16	3	Yellow-Poplar	21	Lg Saw	32
16	4	Norway Spruce	10	Pulpwood	20
16	5	Norway Spruce	9	Pulpwood	15
16	6	Norway Spruce	8	Pulpwood	15
16	7	Yellow Buckeye	15	Cull	0
16	8	Yellow Buckeye	16	Med Saw	16
49	0		0		0
49	1	Black Oak	14	Cull	0
49	2	Pitch Pine	21	Lg Saw	16
49	3	Pitch Pine	20	Lg Saw	16
49	4	Scarlet Oak	23	Cull	0

49	5	Scarlet Oak	19	Small Saw	8
49	6	Pitch Pine	17	Small Saw	24
49	7	Pitch Pine	16	Small Saw	24
59	0		0		0
59	1	Scarlet Oak	23	Lg Saw	16
59	2	Red Maple	5	SubMerch	0
59	3	Chestnut Oak	10	Cull	0
59	4	N. Red Oak	22	Small Saw	16
59	5	Red Maple	8	Pulpwood	0
59	6	Red Maple	6	Pulpwood	0
59	7	Red Maple	7	Pulpwood	0
59	8	Red Maple	6	Pulpwood	0
59	10	Scarlet Oak	20	Lg Saw	16
33	0		0		0
33	1	Red Maple	16	Med Saw	8
33	2	Chestnut Oak	15	Small Saw	16
33	3	White Oak	24	Lg Saw	32
33	4	Chestnut Oak	15	Small Saw	24
34	0		0		0
34	1	White Oak	25	Lg Saw	24
34	2	White Oak	29	Cull	0
34	3	White Oak	25	Cull	0
42	0		0		0
42	1	Chestnut Oak	18	Cull	0
42	2	Chestnut Oak	20	Cull	0
42	3	N. Red Oak	25	Small Saw	16
42	4	Black Oak	14	Small Saw	16
42	5	N. Red Oak	20	Small Saw	16
42	6	Chestnut Oak	12	Small Saw	8
42	7	Blackgum	6	Cull	0
42	8	Red Maple	7	Cull	0
54	0		0		0
54	1	Blackgum	5	SubMerch	0
54	3	Red Maple	14	Small Saw	24
54	4	Yellow-Poplar	9	Pulpwood	20
54	5	Chestnut Oak	20	Cull	0
54	6	Yellow-Poplar	8	Pulpwood	15
54	7	White Oak	22	Lg Saw	16
54	8	White Oak	19	Cull	0
54	9	Yellow-Poplar	18	Med Saw	32
54	10	Blackgum	6	Pulpwood	0
54	11	Red Maple	18	Med Saw	32
54	12	Yellow-Poplar	13	Small Saw	16

54	13	White Oak	24	Lg Saw	16
54	14	Yellow-Poplar	17	Med Saw	32
54	15	Yellow-Poplar	18	Small Saw	32
85	0		0		0
85	1	Chestnut Oak	14	Small Saw	24
85	2	Scarlet Oak	17	Cull	0
85	3	Chestnut Oak	7	Pulpwood	0
85	4	Chestnut Oak	15	Small Saw	24
85	5	Chestnut Oak	7	Pulpwood	0
85	6	Chestnut Oak	14	Cull	0
85	7	Chestnut Oak	10	Pulpwood	15
85	8	Chestnut Oak	14	Small Saw	16
85	9	Chestnut Oak	13	Small Saw	16
85	10	Chestnut Oak	16	Small Saw	24
85	11	Chestnut Oak	22	Cull	0
22	0		0		0
22	1	Sweet Birch	12	Small Saw	8
22	2	White Oak	22	Lg Saw	16
22	3	Yellow-Poplar	30	Lg Saw	24
22	4	Yellow-Poplar	14	Small Saw	40
22	5	Yellow-Poplar	12	Cull	0
22	6	Yellow-Poplar	12	Small Saw	32
22	7	N. Red Oak	12	Small Saw	24
22	8	Sugar Maple	12	Small Saw	8
21	0		0		0
21	1	Red Maple	16	Med Saw	16
21	2	Red Maple	8	Pulpwood	20
21	3	Sourwood	8	Pulpwood	35
21	4	White Oak	30	Lg Saw	32
40	0		0		0
40	1	Yellow-Poplar	26	Lg Saw	32
40	2	Yellow-Poplar	22	Lg Saw	32
40	3	Yellow-Poplar	20	Lg Saw	32
40	4	Yellow-Poplar	12	Small Saw	24
40	5	Yellow-Poplar	26	Lg Saw	32
40	6	Yellow-Poplar	24	Lg Saw	32
40	7	Yellow-Poplar	20	Lg Saw	40
40	8	Yellow-Poplar	24	Lg Saw	16
40	9	N. Red Oak	14	Small Saw	16
40	10	Yellow-Poplar	16	Med Saw	32
40	11	Yellow-Poplar	26	Lg Saw	32
45	0		0		0
45	1	Chestnut Oak	10	Pulpwood	30

45	2	Chestnut Oak	6	Pulpwood	0
45	3	Red Maple	8	Pulpwood	35
45	4	Chestnut Oak	8	Pulpwood	30
45	5	Scarlet Oak	12	Small Saw	16
45	6	Sweet Birch	16	Med Saw	32
45	7	American Basswood	30	Lg Saw	32
45	8	Sweet Birch	16	Med Saw	16
45	9	Chestnut Oak	6	Pulpwood	0
45	11	Yellow-Poplar	32	Lg Saw	40
35	0		0		0
35	1	American Basswood	18	Med Saw	32
35	2	Cucumbertree	16	Med Saw	24
35	3	Cucumbertree	8	Pulpwood	20
35	4	Yellow-Poplar	30	Lg Saw	48
35	5	Cucumbertree	12	Small Saw	16
35	6	Cucumbertree	14	Small Saw	16
35	7	Yellow-Poplar	28	Lg Saw	48
35	8	Yellow-Poplar	18	Med Saw	32
35	9	Yellow-Poplar	40	Lg Saw	56
35	10	Sweet Birch	24	Lg Saw	16
35	11	E. Hophornbeam	12	Small Saw	8
37	0		0		0
37	1	Blackgum	8	Pulpwood	20
37	2	Black Oak	18	Med Saw	32
37	3	Black Oak	16	Med Saw	16
37	4	Red Maple	8	Pulpwood	25
37	5	N. Red Oak	14	Small Saw	16
27	0		0		0
27	1	Blackgum	12	Small Saw	16
27	2	American Beech	8	Pulpwood	15
27	3	Yellow-Poplar	22	Lg Saw	40
27	4	Blackgum	20	Lg Saw	16
27	5	Yellow-Poplar	26	Lg Saw	40
27	6	Red Maple	8	Pulpwood	25
27	7	Red Maple	18	Cull	0
27	8	Yellow-Poplar	26	Lg Saw	32
28	0		0		0
28	1	Yellow-Poplar	14	Small Saw	32
28	2	Sweet Birch	8	Pulpwood	35
28	3	Yellow-Poplar	16	Med Saw	32
28	4	Yellow-Poplar	18	Med Saw	32

28	5	Yellow-Poplar	18	Med Saw	24
28	6	Red Maple	12	Small Saw	16
28	8	Red Maple	8	Pulpwood	35
10	0		0		0
10	1	Blackgum	6	Pulpwood	0
10	2	Blackgum	18	Cull	0
10	3	Chestnut Oak	14	Small Saw	16
10	4	N. Red Oak	26	Lg Saw	32
10	5	Blackgum	10	Pulpwood	25
10	6	Chestnut Oak	18	Med Saw	32
10	7	Pignut Hickory	12	Small Saw	16
10	8	Pignut Hickory	6	Pulpwood	0
10	9	White Oak	16	Med Saw	8
10	10	Yellow-Poplar	18	Med Saw	32
10	11	Yellow-Poplar	20	Lg Saw	32
10	12	Yellow-Poplar	30	Lg Saw	48
10	13	Yellow-Poplar	20	Lg Saw	32
10	14	Yellow-Poplar	10	Pulpwood	45
10	15	Yellow-Poplar	8	Pulpwood	30
1	0		0		0
1	1	Sycamore	24	Lg Saw	40
1	2	Sycamore	26	Lg Saw	24
1	3	Sycamore	32	Lg Saw	40
1	4	Sycamore	30	Lg Saw	40
1	5	Sycamore	44	Lg Saw	48
1	6	Sycamore	26	Lg Saw	40
1	7	Sycamore	24	Lg Saw	40
1	8	Sycamore	36	Lg Saw	48
1	9	Sycamore	18	Med Saw	32
1	10	Sycamore	22	Lg Saw	40
1	11	Boxelder	16	Cull	0
1	12	Sycamore	30	Lg Saw	48
1	13	Sycamore	26	Lg Saw	40
3	0		0		0
3	1	Black Walnut	8	Pulpwood	20
3	2	Black Walnut	14	Small Saw	16
3	3	Sycamore	24	Lg Saw	40
3	4	Black Walnut	18	Med Saw	16
12	0		0		0
12	1	Black Oak	23	Lg Saw	40
12	2	Chestnut Oak	20	Cull	0
12	3	Chestnut Oak	10	Pulpwood	15
12	4	Yellow-Poplar	21	Lg Saw	16

12	5	Chestnut Oak	27	Cull	0
12	6	Black Oak	21	Cull	0
12	7	Red Maple	9	Pulpwood	15
8	0		0		0
8	1	White Oak	13	Cull	0
8	2	White Oak	13	Cull	0
8	3	Red Maple	13	Small Saw	8
8	4	White Oak	6	Pulpwood	0
8	5	Red Maple	11	Cull	0
8	6	Yellow-Poplar	19	Med Saw	16
8	7	Red Maple	17	Med Saw	8
8	8	Red Maple	13	Cull	0
8	10	Blackgum	8	Cull	0
11	0		0		0
11	1	Yellow-Poplar	20	Small Saw	24
11	2	N. Red Oak	17	Small Saw	8
11	3	Chestnut Oak	23	Cull	0
11	4	Red Maple	9	Cull	0
11	5	Red Maple	9	Cull	0
11	6	White Oak	6	Pulpwood	0
11	7	Blackgum	6	Pulpwood	0
11	8	White Oak	16	Cull	0
11	9	White Oak	6	Cull	0
11	10	White Oak	8	Cull	0
11	11	Blackgum	15	Small Saw	8
11	12	Red Maple	9	Cull	0
11	13	Scarlet Oak	25	Cull	0
11	14	Chestnut Oak	11	Pulpwood	20
11	15	Red Maple	8	Cull	0
38	0		0		0
38	1	White Oak	28	Cull	0
38	2	Red Maple	6	Pulpwood	0
38	3	Sugar Maple	12	Small Saw	8
38	4	Yellow-Poplar	20	Lg Saw	16
38	5	Red Maple	9	Cull	0
38	6	Yellow-Poplar	20	Lg Saw	32
38	7	Red Maple	8	Cull	0
24	0		0		0
24	1	White Oak	19	Med Saw	16
24	2	Chestnut Oak	22	Lg Saw	16
24	3	White Oak	29	Cull	0
24	4	Black Oak	15	Small Saw	8
24	5	Chestnut Oak	19	Cull	0

24	6	Red Maple	5	SubMerch	0
24	7	Red Maple	6	Pulpwood	0
18	0		0		0
18	1	Red Maple	18	Med Saw	24
18	2	Yellow-Poplar	26	Lg Saw	48
18	3	Red Maple	10	Cull	0
18	4	Chestnut Oak	19	Cull	0
18	5	Chestnut Oak	21	Cull	0
18	6	Blackgum	5	Cull	0
19	0		0		0
19	1	Mockernut Hickory	16	Med Saw	16
19	2	Red Maple	9	Cull	0
19	3	Mockernut Hickory	15	Small Saw	16
19	4	Mockernut Hickory	12	Small Saw	16
19	5	Black Oak	25	Cull	0
19	6	Red Maple	10	Cull	0
19	7	Red Maple	8	Pulpwood	15
19	8	White Oak	12	Small Saw	16
19	9	White Oak	23	Lg Saw	16
19	10	White Oak	13	Small Saw	16
19	11	White Oak	20	Lg Saw	8
19	12	Mockernut Hickory	16	Med Saw	16
25	0		0		0
25	1	N. Red Oak	31	Cull	0
25	2	Yellow-Poplar	31	Cull	0
25	3	White Oak	30	Cull	0
25	4	White Oak	24	Cull	0
25	5	White Oak	26	Lg Saw	24
43	0		0		0
43	1	Chestnut Oak	15	Cull	0
43	2	Chestnut Oak	15	Small Saw	16
43	4	White Oak	18	Med Saw	16
43	5	White Oak	33	Cull	0
43	6	Virginia Pine	8	Cull	0
43	7	Virginia Pine	9	Cull	0
43	8	Red Maple	12	Cull	0
31	0		0		0
31	1	White Oak	29	Cull	0
31	2	White Oak	16	Med Saw	16
31	3	White Oak	20	Lg Saw	16

31	4	Black Oak	26	Cull	0
31	5	Mockernut Hickory	15	Small Saw	16
31	6	Red Maple	13	Small Saw	16
31	7	Black Oak	28	Lg Saw	16
31	8	Yellow-Poplar	23	Lg Saw	32
31	9	Mockernut Hickory	17	Med Saw	16
31	10	Mockernut Hickory	16	Med Saw	16
41	0		0		0
41	1	Red Maple	19	Med Saw	8
41	2	Red Maple	16	Med Saw	16
41	3	Red Maple	18	Cull	0
41	4	Black Cherry	13	Cull	0
41	6	Red Maple	11	Pulpwood	15
41	7	Black Cherry	25	Lg Saw	16
41	8	Black Cherry	15	Small Saw	8
41	9	Sourwood	10	Cull	0
41	10	Red Maple	6	Pulpwood	0
41	11	Red Maple	20	Lg Saw	16
41	12	Yellow-Poplar	30	Lg Saw	24
51	0		0		0
51	1	Yellow-Poplar	12	Small Saw	16
51	2	N. Red Oak	19	Small Saw	24
51	3	White Oak	15	Small Saw	8
51	4	Mockernut Hickory	12	Small Saw	8
51	6	Yellow-Poplar	24	Lg Saw	48
51	7	Yellow-Poplar	18	Med Saw	8
51	8	Yellow-Poplar	24	Lg Saw	48
51	9	Yellow-Poplar	24	Lg Saw	32
51	10	Yellow-Poplar	14	Small Saw	16
51	11	Yellow-Poplar	22	Lg Saw	40
51	12	Yellow-Poplar	28	Lg Saw	24
51	13	Yellow-Poplar	20	Lg Saw	16
52	0		0		0
52	1	Black Oak	26	Lg Saw	16
52	2	Black Cherry	24	Cull	0
52	3	Black Cherry	17	Cull	0
52	4	White Oak	11	Pulpwood	15
52	5	Black Cherry	14	Small Saw	16
52	6	White Oak	31	Cull	0
53	0		0		0

53	1	Chestnut Oak	22	Lg Saw	32
53	2	Chestnut Oak	20	Lg Saw	24
53	3	Chestnut Oak	20	Lg Saw	24
53	4	White Oak	15	Small Saw	24
53	5	Virginia Pine	16	Med Saw	32
53	6	Chestnut Oak	19	Med Saw	24
53	7	Chestnut Oak	24	Lg Saw	16
64	0		0		0
64	1	Red Maple	28	Cull	0
64	2	Black Oak	26	Lg Saw	24
64	3	Black Oak	17	Cull	0
64	5	Black Oak	17	Med Saw	16
64	6	Red Maple	7	Pulpwood	0
64	7	Black Oak	20	Small Saw	16
64	8	Yellow-Poplar	22	Cull	0
64	9	Yellow-Poplar	20	Cull	0
64	10	Yellow-Poplar	10	Pulpwood	30
65	0		0		0
65	1	Scarlet Oak	25	Lg Saw	16
65	2	Chestnut Oak	14	Small Saw	16
65	3	Red Maple	9	Cull	0
65	4	Scarlet Oak	19	Med Saw	24
65	5	Scarlet Oak	16	Med Saw	24
65	6	Red Maple	5	SubMerch	0
65	7	Chestnut Oak	16	Med Saw	8
65	8	Chestnut Oak	25	Cull	0
65	9	Chestnut Oak	25	Lg Saw	24
75	0		0		0
75	1	Blackgum	25	Cull	0
75	2	Blackgum	6	Pulpwood	0
75	3	N. Red Oak	14	Small Saw	24
75	4	N. Red Oak	7	Pulpwood	0
75	5	Chestnut Oak	14	Small Saw	24
75	6	N. Red Oak	20	Lg Saw	16
75	7	Black Oak	18	Med Saw	24
75	8	Scarlet Oak	17	Cull	0
74	0		0		0
74	1	Chestnut Oak	19	Med Saw	16
74	2	Red Maple	5	SubMerch	0
74	3	Blackgum	6	Pulpwood	0
74	4	Chestnut Oak	16	Med Saw	24
74	5	Blackgum	7	Pulpwood	0
74	6	Chestnut Oak	10	Pulpwood	20

74	7	Blackgum	9	Pulpwood	15
23	0		0		0
23	1	Yellow-Poplar	20	Lg Saw	24
23	2	Yellow-Poplar	20	Lg Saw	32
23	3	Virginia Pine	14	Small Saw	24
23	4	Yellow-Poplar	14	Small Saw	24
23	5	Yellow-Poplar	20	Lg Saw	24
23	6	Yellow-Poplar	28	Lg Saw	24
14	0		0		0
14	1	Red Maple	12	Small Saw	16
14	2	Red Maple	14	Pulpwood	30
14	3	Black Oak	16	Med Saw	32
14	4	White Oak	20	Lg Saw	24
14	5	Yellow-Poplar	22	Lg Saw	40
14	6	Red Maple	10	Cull	0
14	7	Red Maple	24	Cull	0
15	0		0		0
15	2	Yellow-Poplar	24	Lg Saw	40
15	3	Red Maple	14	Small Saw	16
15	4	Red Maple	8	Pulpwood	35
15	5	Red Maple	6	Pulpwood	0
15	6	Red Maple	20	Lg Saw	24
15	7	Red Maple	12	Small Saw	16
15	8	Red Maple	10	Pulpwood	30
30	0		0		0
30	1	White Oak	22	Lg Saw	16
30	2	White Oak	14	Small Saw	24
30	3	White Oak	12	Small Saw	24
30	4	Chestnut Oak	14	Small Saw	24
30	5	N. Red Oak	12	Small Saw	16
30	6	N. Red Oak	22	Lg Saw	32
30	7	White Oak	20	Lg Saw	32
30	8	White Oak	18	Cull	24
30	9	White Oak	18	Med Saw	16
30	10	Blackgum	12	Small Saw	16
30	11	White Oak	20	Lg Saw	24
30	12	White Oak	14	Small Saw	16
29	0		0		0
29	1	Yellow-Poplar	38	Lg Saw	40
29	2	Yellow-Poplar	18	Med Saw	16
29	3	Scarlet Oak	12	Small Saw	8
29	4	Yellow-Poplar	20	Lg Saw	40
29	5	Red Maple	12	Cull	0

29	6	Red Maple	12	Small Saw	16
29	7	Red Maple	8	Pulpwood	25
29	8	Red Maple	18	Med Saw	16
29	9	Red Maple	10	Pulpwood	30
29	10	Red Maple	12	Small Saw	16
29	11	Yellow-Poplar	28	Lg Saw	32
29	12	Yellow-Poplar	24	Lg Saw	32
29	13	Red Maple	8	Pulpwood	15
29	14	Yellow-Poplar	28	Lg Saw	32
29	15	Yellow-Poplar	28	Lg Saw	24
39	0		0		0
39	1	Sweet Birch	12	Small Saw	8
39	2	Yellow-Poplar	14	Small Saw	32
39	3	Yellow-Poplar	16	Med Saw	32
39	4	Red Maple	18	Med Saw	32
39	5	American Beech	6	Pulpwood	15
50	0		0		0
50	1	N. Red Oak	16	Med Saw	24
50	2	Scarlet Oak	16	Cull	0
50	3	Chestnut Oak	16	Med Saw	16
50	4	N. Red Oak	8	Pulpwood	25
50	5	Chestnut Oak	12	Small Saw	16
50	6	Chestnut Oak	10	Pulpwood	25
50	7	Chestnut Oak	8	Pulpwood	20
50	8	Chestnut Oak	10	Pulpwood	25
50	9	Chestnut Oak	24	Lg Saw	16
50	10	Chestnut Oak	10	Pulpwood	25
50	11	Chestnut Oak	8	Pulpwood	15
62	0		0		0
62	1	Scarlet Oak	22	Lg Saw	24
62	2	Black Oak	22	Lg Saw	32
62	3	Scarlet Oak	14	Small Saw	16
62	4	White Oak	14	Small Saw	24
62	5	White Oak	12	Small Saw	24
62	6	White Oak	18	Med Saw	24
62	7	Scarlet Oak	18	Cull	0
62	8	Scarlet Oak	22	Lg Saw	16
62	9	White Oak	14	Small Saw	16
20	0		0		0
20	1	Red Maple	20	Lg Saw	16
20	2	Chestnut Oak	28	Lg Saw	32
20	3	Chestnut Oak	12	Small Saw	16
20	4	Chestnut Oak	20	Lg Saw	24

9	0		0		0
9	1	Chestnut Oak	30	Lg Saw	32
9	3	N. Red Oak	36	Cull	0
9	4	Black Oak	22	Lg Saw	24
9	5	Scarlet Oak	24	Lg Saw	24
6	0		0		0
6	1	Black Oak	16	Med Saw	16
6	2	Chestnut Oak	24	Lg Saw	32
6	3	White Oak	32	Lg Saw	24
6	4	Black Oak	22	Lg Saw	32
6	5	White Oak	26	Cull	0
7	0		0		0
7	1	Scarlet Oak	22	Lg Saw	8
7	2	Scarlet Oak	24	Lg Saw	32
7	3	Chestnut Oak	12	Small Saw	8
7	4	Chestnut Oak	10	Pulpwood	20
4	0		0		0
4	1	Black Oak	16	Med Saw	32
4	2	Black Oak	18	Med Saw	16
4	3	N. Red Oak	24	Lg Saw	32
4	4	Black Oak	18	Med Saw	8
4	5	White Oak	14	Cull	0
4	6	White Oak	14	Small Saw	16
4	7	Red Maple	14	Small Saw	16
4	8	Red Maple	8	Pulpwood	30
4	9	Red Maple	8	Pulpwood	30
2	0		0		0
2	1	Pignut Hickory	6	Pulpwood	0
2	2	Chestnut Oak	28	Lg Saw	32
2	4	Chestnut Oak	20	Lg Saw	16
2	5	Yellow-Poplar	20	Lg Saw	32
2	6	Chestnut Oak	22	Lg Saw	24
2	7	Yellow-Poplar	30	Cull	0
2	8	Yellow-Poplar	20	Cull	0
2	9	Chestnut Oak	22	Lg Saw	24
5	0		0		0
5	1	Chestnut Oak	20	Lg Saw	32
5	2	Blackgum	10	Pulpwood	35
5	3	Chestnut Oak	26	Lg Saw	40
5	4	Yellow-Poplar	8	Pulpwood	30
5	5	Black Walnut	18	Med Saw	24
69	0		0		0
69	1	Alianthus	10	Cull	0

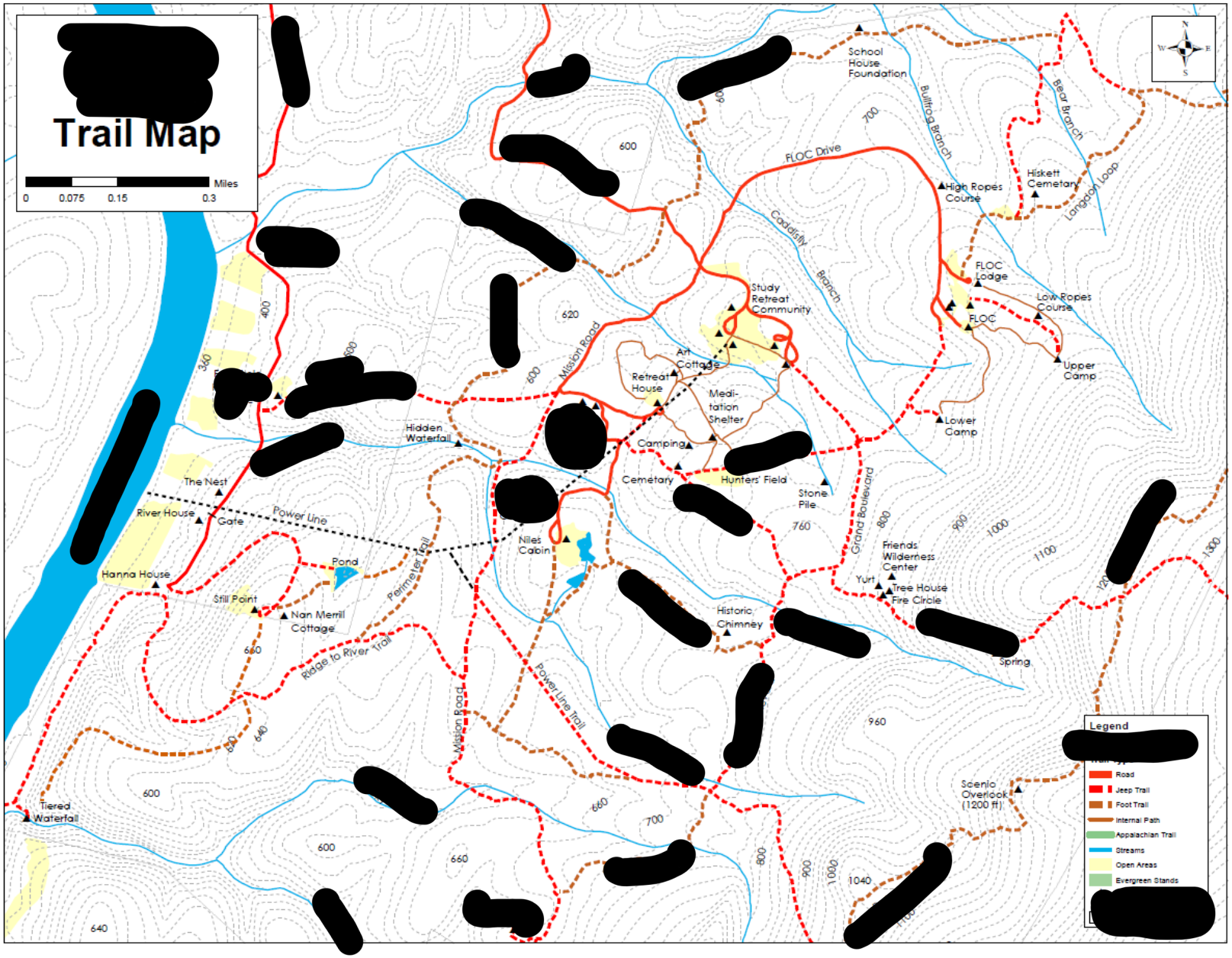
69	2	Red Maple	13	Cull	0
69	3	Shagbark Hiclory	8	Pulpwood	15
69	4	N. Red Oak	33	Cull	0
69	5	Red Maple	13	Cull	0
69	7	N. Red Oak	32	Cull	0
69	8	Red Maple	6	Pulpwood	0
69	9	Red Maple	8	Pulpwood	0
69	11	Mockernut Hickory	6	Pulpwood	0
69	12	Alianthus	10	Cull	0
58	0		0		0
58	1	Red Maple	8	Cull	0
58	2	N. Red Oak	15	Small Saw	24
58	3	Sassafras	5	Cull	0
58	4	N. Red Oak	11	Cull	0
58	5	N. Red Oak	17	Med Saw	16
58	6	Sassafras	8	Cull	0
58	7	N. Red Oak	10	Pulpwood	20
58	8	Pitch Pine	16	Med Saw	24
58	9	Scarlet Oak	17	Cull	0
58	10	N. Red Oak	6	Pulpwood	0
48	0		0		0
48	1	Chestnut Oak	11	Pulpwood	15
48	2	Pitch Pine	18	Cull	0
48	3	Blackgum	8	Pulpwood	15
48	4	Red Maple	6	Pulpwood	0
48	5	Chestnut Oak	11	Pulpwood	20
48	6	Pitch Pine	16	Med Saw	16
48	7	Red Maple	7	Pulpwood	0
48	8	N. Red Oak	24	Cull	0
48	9	Blackgum	5	SubMerch	0
48	10	Chestnut Oak	8	Pulpwood	15
48	11	Chestnut Oak	7	Pulpwood	0
93	0		0		0
93	1	Red Maple	16	Med Saw	8
93	2	N. Red Oak	17	Med Saw	24
93	3	Red Maple	8	Cull	0
93	4	Red Maple	6	Pulpwood	0
93	5	Blackgum	5	SubMerch	0
93	6	Blackgum	5	SubMerch	0
93	7	Chestnut Oak	21	Lg Saw	24
93	8	Chestnut Oak	21	Cull	0
99	0		0		0

99	1	Scarlet Oak	22	Cull	0
99	2	Scarlet Oak	12	Cull	0
99	3	Black Oak	18	Med Saw	16
99	4	Blackgum	8	Pulpwood	0
99	5	Blackgum	7	Cull	0
99	6	N. Red Oak	12	Cull	0
99	7	N. Red Oak	16	Med Saw	16
99	8	Scarlet Oak	15	Cull	0
92	0		0		0
92	1	Scarlet Oak	12	Cull	0
92	2	Pitch Pine	15	Small Saw	32
92	3	Pitch Pine	18	Med Saw	24
92	4	Chestnut Oak	17	Med Saw	16
92	5	Blackgum	5	SubMerch	0
92	6	Scarlet Oak	16	Med Saw	16
92	7	Scarlet Oak	14	Small Saw	16
92	8	Black Oak	18	Med Saw	16
92	9	Black Oak	18	Cull	0
84	0		0		0
84	1	Chestnut Oak	12	Cull	0
84	2	Blackgum	5	SubMerch	0
84	3	Black Oak	10	Cull	0
84	4	Blackgum	9	Pulpwood	15
84	5	Chestnut Oak	14	Small Saw	8
84	6	N. Red Oak	14	Cull	0
84	7	N. Red Oak	14	Cull	0
84	8	Blackgum	6	Pulpwood	0
84	9	Pitch Pine	18	Med Saw	16
61	0		0		0
61	1	Chestnut Oak	30	Lg Saw	16
61	2	Red Maple	10	Pulpwood	20
61	3	N. Red Oak	14	Small Saw	24
61	4	N. Red Oak	22	Lg Saw	32
61	5	Chestnut Oak	14	Pulpwood	8
61	6	Chestnut Oak	20	Lg Saw	16
61	7	Chestnut Oak	32	Cull	0
72	0		0		0
72	1	Chestnut Oak	28	Lg Saw	24
72	2	Chestnut Oak	16	Med Saw	8
72	3	Pignut Hickory	8	Pulpwood	20
72	4	Pignut Hickory	8	Pulpwood	20
72	5	Scarlet Oak	24	Lg Saw	32
72	6	Scarlet Oak	24	Lg Saw	32

72	7	Chestnut Oak	30	Lg Saw	32
72	8	White Oak	16	Med Saw	8
82	0		0		0
82	1	Blackgum	12	Pulpwood	15
82	2	Pitch Pine	20	Lg Saw	24
82	3	Scarlet Oak	16	Med Saw	32
82	4	Scarlet Oak	16	Med Saw	32
82	5	Scarlet Oak	20	Lg Saw	24
73	0		0		0
73	1	Scarlet Oak	16	Med Saw	16
73	2	Pitch Pine	22	Lg Saw	40
73	3	Blackgum	6	Pulpwood	0
73	4	Blackgum	6	Pulpwood	0
73	5	Black Oak	16	Med Saw	16
73	6	Chestnut Oak	8	Pulpwood	25
73	7	Chestnut Oak	8	Pulpwood	25
73	8	Chestnut Oak	14	Small Saw	32
73	9	Scarlet Oak	18	Med Saw	16
83	0		0		0
83	1	Chestnut Oak	12	Small Saw	8
83	2	Chestnut Oak	12	Small Saw	8
83	3	Pitch Pine	16	Med Saw	16
83	4	Blackgum	8	Pulpwood	15
83	5	Chestnut Oak	12	Small Saw	8
83	6	Blackgum	6	Pulpwood	0
83	7	Blackgum	6	Pulpwood	0
91	0		0		0
91	1	Scarlet Oak	26	Lg Saw	40
91	2	Red Maple	6	Pulpwood	0
91	3	Scarlet Oak	26	Lg Saw	32
90	0		0		0
90	1	Chestnut Oak	10	Pulpwood	25
90	2	Chestnut Oak	12	Pulpwood	25
90	3	Chestnut Oak	12	Pulpwood	25
90	4	Chestnut Oak	8	Pulpwood	20
90	5	Chestnut Oak	14	Small Saw	8
90	6	Pitch Pine	14	Small Saw	24
90	7	Blackgum	8	Pulpwood	20
90	8	Blackgum	6	Pulpwood	0
90	9	Pitch Pine	12	Small Saw	16
90	10	Pitch Pine	12	Small Saw	16
90	11	Pitch Pine	8	Pulpwood	15
90	12	Pitch Pine	12	Small Saw	16

81	0		0		0
81	2	Red Maple	6	Pulpwood	0
81	3	Blackgum	6	Pulpwood	0
81	4	Red Maple	8	Pulpwood	30
81	5	Red Maple	8	Pulpwood	30
81	6	Red Maple	6	Pulpwood	0
81	7	Red Maple	6	Pulpwood	0
81	8	Red Maple	8	Pulpwood	25
81	9	Red Maple	12	Small Saw	8
81	10	Red Maple	6	Pulpwood	0
81	11	Chestnut Oak	10	Pulpwood	30
81	12	Red Maple	14	Cull	0
80	0		0		0
80	1	Blackgum	8	Pulpwood	25
80	2	Red Maple	12	Small Saw	8
80	3	Red Maple	6	Pulpwood	0
80	4	Blackgum	12	Small Saw	8
80	5	Scarlet Oak	14	Small Saw	16
71	0		0		0
71	1	Chestnut Oak	16	Cull	0
71	2	Scarlet Oak	16	Med Saw	16
71	3	Chestnut Oak	18	Med Saw	16
71	4	Scarlet Oak	16	Med Saw	16
71	5	Red Maple	8	Pulpwood	25
71	6	Scarlet Oak	16	Med Saw	16
71	7	Chestnut Oak	12	Cull	0
60	0		0		0
60	1	Blackgum	6	Pulpwood	0
60	2	Scarlet Oak	10	Pulpwood	25
60	3	Scarlet Oak	12	Small Saw	16
60	4	Pitch Pine	10	Pulpwood	15
60	5	Pitch Pine	12	Small Saw	16
60	6	Chestnut Oak	10	Pulpwood	20
60	7	Chestnut Oak	12	Small Saw	8
70	0		0		0
70	1	Scarlet Oak	12	Pulpwood	30
70	2	Blackgum	8	Pulpwood	20
70	3	Scarlet Oak	16	Med Saw	24
70	4	Chestnut Oak	8	Pulpwood	15
70	5	Chestnut Oak	16	Med Saw	16
70	6	Blackgum	8	Pulpwood	15
57	0		0		0
57	1	Blackgum	12	Small Saw	16

57	2	Blackgum	12	Small Saw	16
57	3	Blackgum	12	Small Saw	16
57	4	Blackgum	14	Small Saw	16
57	5	Blackgum	10	Pulpwood	35
57	6	Red Maple	10	Pulpwood	40
46	0		0		0
46	1	Red Maple	8	Pulpwood	20
46	2	Chestnut Oak	16	Cull	0
46	3	Chestnut Oak	20	Lg Saw	32
46	4	Black Cherry	12	Cull	0
46	5	Black Cherry	10	Cull	0
36	0		0		0
36	1	Scarlet Oak	20	Cull	0
36	2	Chestnut Oak	24	Lg Saw	24
36	3	Chestnut Oak	30	Lg Saw	16
36	4	Scarlet Oak	22	Lg Saw	16
36	5	Scarlet Oak	16	Med Saw	8
36	6	Scarlet Oak	20	Lg Saw	24
47	0		0		0
47	1	Black Oak	22	Lg Saw	32
47	2	Black Oak	24	Lg Saw	16
47	3	Blackgum	8	Pulpwood	20
47	4	Sweet Birch	8	Pulpwood	25
47	5	N. Red Oak	10	Pulpwood	30
47	6	Sweet Birch	12	Small Saw	16
47	7	Black Oak	28	Lg Saw	32
26	0		0		0
26	1	Scarlet Oak	16	Cull	0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Trail Map
Miles
0 0.075 0.15 0.3
N
W E
S
School House Foundation
Buffalo Branch
Bear Branch
FLOC Drive
High Ropes Course
Hiskett Cemetary
Langdon Loop
Coaldale Branch
FLOC Lodge
Low Ropes Course
FLOC
Upper Camp
Lower Camp
Study Retreat Community
Art Cottage
Retreat House
Medi-tation Shelter
Mission Road
Hidden Waterfall
Camping
Cemetary
Hunters' Field
Stone Pile
Grand Boulevard
Friends Wilderness Center
Yurt
Tree House
Fire Circle
Historic Chimney
Spring
Scenic Overlook (1200 ft)
The Nest
River House
Gate
Power Line
Hanna House
Pond
Still Point
Nan Merrill Cottage
Perimeter Trail
Ridge to River Trail
Niles Cabin
Power Line Trail
Tiered Waterfall
Legend
[redacted]
Road
Jeep Trail
Foot Trail
Internal Path
Appalachian Trail
Streams
Open Areas
Evergreen Stands
[redacted]