



## Forest Stand Improvement for Cerulean Warbler WV Job Sheet – Code 666 Commercial harvest in mature stands

### Definition

The manipulation of species composition, stand structure, or stand density by cutting or killing selected trees or understory vegetation to achieve desired forest conditions or obtain ecosystem services.

### Purpose

Enhance forest habitat for Cerulean Warblers (Figure 1) and other forest wildlife species by creating openings in the canopy and promoting the growth and regeneration of preferred tree species.



*Figure 1. Male Cerulean Warbler, Monongahela National Forest, Randolph County, West Virginia; Photo: Matt Shumar*

### Condition Where Practice Applies

All land where the quantity and quality of trees can be enhanced.

Characteristics of forest stands pre-treatment (Figure 2):

- ridge-top or upper slope topography
- $\geq 80\%$  forest cover within a 1.5-mile radius around the centroid of the stand
- within a contiguous deciduous forest stand  $\geq 60$  acres
- uniform and closed-canopy structure
- $> 90$  ft<sup>2</sup> basal area per acre
- $\geq 40$  ft<sup>2</sup> basal area per acre of preferred tree species  $\geq 16$ " DBH (white oak, chestnut oak, hickory, sugar maple, cucumber magnolia, tulip poplar, black locust, or black cherry)
- grapevines present



*Figure 2. Ridge-top deciduous forest with basal area 121 ft<sup>2</sup> per acre featuring large DBH ( $\geq 16$ " ) trees; Photo: Patrick McElhone*



## Post-harvest Specifications

### Basal Area

Retain 40-90 ft<sup>2</sup> basal area per acre (optimally 50-60 ft<sup>2</sup> basal area per acre). Depending on landowner objectives 20-40 ft<sup>2</sup> basal area per acre may be suitable if the harvested stand is surrounded by higher basal area (>50 ft<sup>2</sup> per acre) stands.

### Residual Trees

In general, residual trees should be of sufficient quality that they will survive to meet landowner objectives for the stand, whether that includes a future harvest or wildlife habitat. Residual tree characteristics include:

- optimally white and chestnut oak, but hickory, sugar maple, cucumber magnolia, tulip poplar, black locust, and black cherry also preferred
- ≥16" DBH
- vigorous crown, dominant or co-dominant
- >30% live crown ratio
- no epicormic branches
- no low forks, cankers, insect damage, or other visible indications of poor survivability

### Grapevine retention

Cerulean Warblers use grapevines for nest construction and nest and fledgling cover. Nest sites usually have about two times as many grapevines (3-4 vines/0.1 acre) as random locations in the surrounding stand (1-2 vines/0.1 acre). Retain as many grapevines as possible while ensuring residual tree health and safe working conditions.

## Silvicultural Systems

A silvicultural system is a planned series of treatments for tending, harvesting, and re-establishing a forest stand. The type of silvicultural system selected depends on many factors. These may include the owner's objectives for the woodlot, the environmental conditions, the age class of the stand, and the tree species present and desired for the future. Different types of commercial harvests can achieve residual basal areas (RBA) that are suitable for Cerulean Warblers (40-90 ft<sup>2</sup> per acre, optimally 50-60 ft<sup>2</sup>). The following silvicultural practices are ordered by their potential to benefit Cerulean Warblers.

### Shelterwood harvest

#### Target RBA: 40-60 ft<sup>2</sup> per acre

Shelterwood harvests (Figure 3) are often compatible with promoting oak regeneration and generally result in the greatest increase in Cerulean Warbler density and intermediate levels of nest success. However, complete overstory removal during the second stage of a shelterwood harvest will substantially reduce numbers of mature forest species including Cerulean Warbler, Wood Thrush, Acadian Flycatcher, and Worm-eating Warbler. If managing for forest birds, retain the residual canopy as long as possible and until adjacent habitat has been enhanced with shelterwood or other types of harvests and colonized by Cerulean Warblers.



**Figure 3.** Shelterwood harvest (4 years after seed cut), basal area 46 ft<sup>2</sup> per acre; Photo: Jim Sheehan



## Group selection

### Target RBA: 60-80 ft<sup>2</sup> per acre

Group selection (Figure 4) as part of an uneven-aged system can improve Cerulean Warbler habitat and would likely remain suitable longer than single-tree selection. The small group openings provide for diverse canopy structure and understory development. This approach advances stands toward late successional structure beneficial to many avian species. Many stands contain natural groups of trees that lend themselves to group selection. To benefit Cerulean Warblers, consider harvesting groups of non-preferred, diseased, or damaged trees. If possible, remove groups of trees adjacent to retained grapevine arbors. Although Cerulean Warblers prefer canopy gaps of 400-1,000 ft<sup>2</sup>, groups approximately 0.15 acres in size are acceptable because the surrounding canopy will fill gaps quickly.



*Figure 4. Group selection harvest; Photo: James Kochendorfer*

## Modified even-age harvest

### Target RBA: 20-40 ft<sup>2</sup> per acre

Modified even-aged regeneration (Figure 5) can be used to create future, and possibly even present, opportunities for Cerulean Warbler habitat. Where Cerulean and Golden-winged Warbler breeding ranges overlap (Fayette, Raleigh, McDowell, Webster, and Wyoming counties), modified even-aged harvests may provide habitat for both species. Leaving large ( $\geq 16$ " DBH) trees in a harvested stand can lead to development of multi-aged stands favored by Cerulean Warblers, especially if the residual trees are clustered within the harvested stand. If residual trees are evenly dispersed throughout the harvested stand, Cerulean Warblers are likely to aggregate around the border of the harvested stand rather than within it. Modified even-age harvest stands achieve more complex canopy structure earlier in their development than similar single-aged stands and the residual trees, especially when clustered, allow for some use of the stand by forest birds.



*Figure 5. Even-aged harvest (2 years after harvest) with residual canopy trees, basal area 34 ft<sup>2</sup> per acre; Photo: Than Boves.*



## Precautions

### Understory regeneration

Presence of dense mid- and under-story vegetation is beneficial to Cerulean Warblers. The existing understory condition and composition should be considered during pre-harvest inventories and the ability to regenerate preferred species should be anticipated. This is especially important in areas with an abundance of deer, non-native plant species, or non-preferred tree species. Harvested stands  $\geq 10$  acres may overwhelm deer browsing and allow regeneration of preferred species. Leaving logging slash (logging debris and tree tops) and dragging slash over cut stumps (coppicing) may also protect regeneration from deer browsing.

### Woodland Protection

It is important for landowners to recognize threats to the health and productivity of their woodlands. Some of these threats, especially those posed by damaging wind, drought, and other weather conditions, cannot be controlled by landowners. However, landowners can participate in the protection of their woodlands from insect pests, diseases, uncontrolled fire, and livestock grazing.

### Uncontrolled Fires

Uncontrolled fires, or wildfires, may cause considerable damage to unprotected woodlands. In West Virginia, rapidly spreading and dangerous crown fires that kill mature trees outright are usually rare. However, ground fires are prevalent, especially in early spring before trees have foliated and in the fall after leaves have fallen. Ground fires may kill saplings and damage the bark and trunks of mature trees. Scars, or cat-faces, left on tree trunks by even relatively “cool” fires may significantly reduce the value of timber cut from the trees. Fire damage also reduces tree growth rates and makes trees more susceptible to insects, diseases, and drought.

### Livestock Grazing

Livestock grazing may be the most damaging and yet most preventable of all threats to woodland health and productivity. Cattle and other livestock may cause serious immediate damage to seedlings, saplings, and ground vegetation; what is not browsed by livestock will be trampled. In just a few years, the understory may be completely absent or replaced by less valuable species, such as ironwood and hawthorn. At the same time, livestock compact forest soils which in turn damages mature trees. Within 10 years, continued grazing causes weakening and mortality of the trees.

In addition, woodlands make very poor pasture; studies have shown that livestock lose weight when grazed in woodlands. Therefore, grazed woodlands result in loss of both livestock and natural resources values.

### Other Concerns

The method, felling direction, and timing of tree cutting should provide a safe work environment and protect sensitive areas such as vernal pools, riparian zones, cultural resources and structures.

Slash and debris left on the site after treatment will not present an unacceptable fire, safety, environmental, or pest hazard. Such remaining material will not interfere with the intended purpose or other management activities.

Potential landowner and operator liability should be assessed before forest stand improvement activities begin.

## Operation and Maintenance

Prepare an Operation and Maintenance plan for the site and review it with the operator. The plan will describe actions that must be taken to ensure that the practice is applied correctly during its design life. As a minimum, include periodic inspections for assessment of insects, disease, and other pests, storm damage, and damage by trespass. Inspect roads to control erosion on forest roads, skid trails, landings,



and adjacent areas by installing/maintaining vegetative and structural practices. Treatments needed for pests—see Additional Criteria to Improve and Sustain Forest Health and Productivity section in this document. Treatments needed for storm damage—use NRCS CPS Code 384, Woody Residue Treatment, to appropriately treat slash and debris. Treatments for damage by trespass: use NRCS CPS Code 472, Access Control, to prevent future damage.

## Additional Resources

[Cerulean Warbler Management Guidelines for Enhancing Breeding Habitat in Appalachian Hardwood Forests](http://amjv.org/documents/cerulean_guide_1-pg_layout.pdf). Appalachian Mountains Joint Venture, Blacksburg, VA. [http://amjv.org/documents/cerulean\\_guide\\_1-pg\\_layout.pdf](http://amjv.org/documents/cerulean_guide_1-pg_layout.pdf)

[Enhancing Cerulean Warbler Habitat in the Appalachians: A Guide for Foresters](http://amjv.org/documents/Cerulean_FS_Foresters_Version_Final_(1).pdf). Appalachian Mountains Joint Venture, Blacksburg, VA. [http://amjv.org/documents/Cerulean\\_FS\\_Foresters\\_Version\\_Final\\_\(1\).pdf](http://amjv.org/documents/Cerulean_FS_Foresters_Version_Final_(1).pdf)

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harvest in mature stands**

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.

<b>Client:</b>	<b>Farm #:</b>		
<b>Field(s):</b>	<b>Tract #:</b>		
<b>Designed by:</b>	<b>Location:</b>		
<b>WV Registered Professional Forester No.:</b>	<b>Orientation/Aspect:</b>		
<b>Date:</b>	<b>Total Acres:</b>		
<b>LANDOWNER OBJECTIVES AND EXPECTED OUTCOMES/DESIRED FUTURE CONDITION:</b>			
<b>EXISTING CONDITIONS:</b>			
<b>PREFERRED TREE AND UNDERSTORY SPECIES:</b>			
<input type="checkbox"/> White Oak	<input type="checkbox"/> Chestnut Oak	<input type="checkbox"/> Hickory	<input type="checkbox"/> Sugar Maple
<input type="checkbox"/> Cucumber Magnolia	<input type="checkbox"/> Yellow Poplar	<input type="checkbox"/> Black Cherry	<input type="checkbox"/> Black Locust
<b>TYPE OF TREATMENT</b>			
<input type="checkbox"/> Shelterwood	<input type="checkbox"/> Group selection	<input type="checkbox"/> Modified even-age	
<input type="checkbox"/> Other (specify):			
<b>TREATMENT SPECIFICATIONS/STOCKING GUIDELINES</b>			
Spacing, density, size class, number and amounts of trees and understory species to be retained Stocking guidelines shall contain stocking in terms of basal area, spacing or trees per acre by species and size class distribution. The method, felling direction and timing of tree cutting shall protect residual trees, wetlands, cultural resources, improvements and utilities.			
<b>HERBICIDE USE</b>			
Herbicide Treatment Needed: YES <input type="checkbox"/> NO <input type="checkbox"/> FOLLOW ALL LABEL DIRECTIONS WHEN USING HERBICIDES. If yes, the following is required:			
<input type="checkbox"/> Refer to attached herbicide recommendations <input type="checkbox"/> Win-PST Risk Assessment (to be completed by NRCS) attached or included			
<b>TREATMENT DATES:</b>			
<b>OPERATION AD MAINTENANCE</b>			
Periodic inspections during and after treatment activities are necessary to ensure that purposes are achieved and resource damage is minimized, e.g., assessment of insects, disease and other pests, storm damage, and damage by trespass. The results of inspections shall determine the need for additional treatment under this practice. <u>This practice is a pre-commercial improvement treatment. A plan for improved harvesting will need to be developed prior to harvesting in this area.</u> Follow-up and ongoing management activities will be needed to obtain the desired results. Always wear protective gear and clothing when working in the woods. A hard hat should be worn at all times. Inspect the area during treatment to check for damage to the residual stand and following treatment to monitor growth rates and overall health of the stand.			
<b>ADDITIONAL NOTES AND FUTURE STAND NEEDS</b>			
<b>ANTICIPATED HARVEST-REGENERATION STRATEGY</b>			
<input type="checkbox"/> Uneven-aged (e.g. single-tree selection, group selection, etc.) _____			
<input type="checkbox"/> Even-aged (e.g. clear-cut, seed-tree, shelterwood, etc.) _____			



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.

Questions regarding the planning, application or maintenance of the Forest Stand Improvement (666) practice should be directed to:

Name:

Contact information:

**Planner Certification**

This plan meets the requirements of West Virginia NRCS Conservation Practice Standard – Forest Stand Improvement (*Code 666*).

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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