

Enhancing Cerulean Warbler Habitat in the Appalachians: A Guide for Foresters



A publication of the Appalachian Mountains Joint Venture, www.amjv.org



The Cerulean Warbler is a migratory songbird of eastern North America and has its densest breeding populations in the Appalachian Mountains Joint Venture (AMJV) region. Over the past century, habitat loss and changes in the composition and structure of the remaining forests in both North and South America has led to a sharp decline in the Cerulean Warbler population at a rate of three percent per year since 1966. Habitat loss in South America is due to conversion of native forests to farms and coffee plantations. Foresters and landowners can develop habitat with characteristics that are favorable for Cerulean Warblers and a variety of wildlife. The [*Cerulean Warbler Management Guidelines for Enhancing Breeding Habitat in Appalachian Hardwood Forests*](#) provides land managers in the region with recommendations based on the best available science for retaining and enhancing habitat for Cerulean Warblers and a diverse avian community.



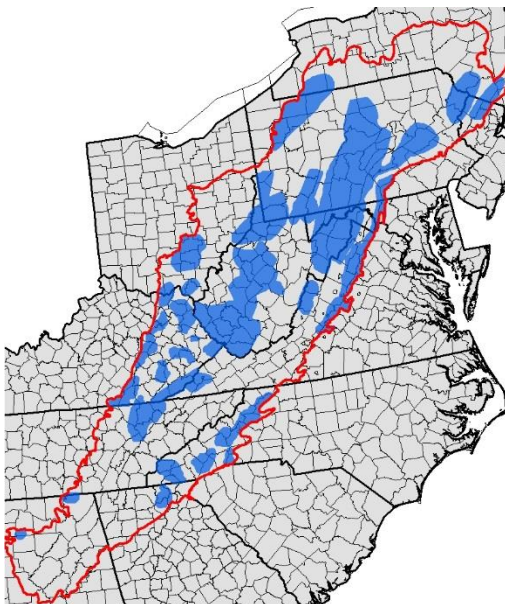
Adult Cerulean Warbler feeding chick; Wayne Miller.

A Changing Habitat

Many of the forests present in the Appalachian region developed after mass cutting occurred in the late 19th and early 20th centuries. Most of these present-day forests are over-stocked and very uniform, with closed canopies that lack the variety of habitat structure required by many songbirds, including Cerulean Warblers. This imperiled species prefers:

- Mature forests containing tall deciduous trees with open canopies that allow sunlight to reach the forest floor, promoting the growth of saplings, shrubs, and other vegetation;
- Structure that provides both exposed perches where they can broadcast their song and foliage for foraging and concealing nests;
- Oak and hickory-dominated forests along ridges and steep, upper slopes; and
- Internal forest edges such as narrow roads, edges of timber harvests, canopy gaps, and trails.

Cerulean Warbler Forest Management Project



Cerulean Warbler Focal Areas within the Appalachian Mountains Joint Venture.

Recommendations largely derived from the Cerulean Warbler Forest Management Project, which allowed the scientific community to experimentally test forestry methods to enhance habitat. The study took place on seven sites across four states. Stands in each site, located in oak-dominated, closed-canopy mature forests, underwent treatments that mimicked a preparatory cut, shelterwood harvest, or overstory removal. Each treatment was 25 acres in size and was compared to undisturbed mature forest, and sites were monitored to determine how Ceruleans responded to various harvest intensities. Major findings from the project included:

- Across all stands, Cerulean density generally increased or remained constant based on short-term responses to harvests;
- Habitat enhancements in heavily forested regions, where local Cerulean densities were low (less than five territories per 25 acres), and along ridgetops and upper slopes were deemed most effective;
- Retaining Residual Basal Area (RBA) levels of 40-90ft² (50-60ft² optimal) per acre after harvesting trees in 25-acre units created a forest structure generally favorable for Cerulean Warblers;
- The “No-harvest” option was most favorable for sustaining populations in mature forest stands with already high Cerulean densities (greater than five territories per 25 acres).

Forest Management Recommendations

Foresters can use silviculture to develop stands that are favorable for Cerulean Warblers while consistent with sustainable forest management goals of promoting oak regeneration. Recommendations include:

- Harvest in forested regions with greater than 70 percent forest cover at the six mile scale and in Cerulean Warbler focal areas.
- Shelterwood harvests with RBA levels of 40-90ft² (50-60ft² optimal) per acre of dominant/co-dominant crown classes generally result in increased Cerulean Warbler density and intermediate levels of nest success (Figure 1). Complete overstory removal during the final stage of a shelterwood harvest will reduce numbers of mature forest bird species. Retain residual canopy until adjacent habitat has been enhanced with shelterwood or other harvest types and colonized by Cerulean Warblers.
- Where feasible, favor white oak, chestnut oak, hickories, sugar maple, and cucumber magnolia (preferred nest and forage trees) in the residual stand and do not retain red maple or oak of the red oak group. Retain the largest diameter individuals of the preferred species as residual trees. Retain some grape vines when possible, as they provide nest material and additional cover from predators.
- Creation canopy openings using crown thinning or shelterwood seed cut methods to provide favorable canopy structure.
- Plan a series of adjacent shelterwood cuts so that Cerulean Warbler habitat is available nearby when one stand is ready for an overstory removal. Presence of favorable regeneration conditions in each stand should drive timing of treatments for that stand. Maintaining white and chestnut oak dominance in the residual stand is a primary consideration; presence of sufficient advance regeneration of white and chestnut oaks are important considerations in management. Presence of Cerulean Warblers should drive timing and location of treatments on the landscape.
- Presence of dense understory vegetation is beneficial to Cerulean Warblers; understory condition should be considered during pre-harvest inventories, especially in areas of high deer density.
- Modified even-age regeneration that leave some large-diameter residual stems (10-30 sq ft/acre of dominate/co-dominate crown classes) in a harvest unit may in time lead to the development of multi-aged stands (Figure 2) favored by Cerulean Warblers. Such stands achieve more complex canopy structure earlier in their development than similar single-aged stands and will provide productive habitat for Golden-winged Warblers in areas where the two species overlap.
- Crop-tree release can accelerate development of crop-trees on higher quality sites. The practice is typically applied in 15 to 20 year-old stands. It can allow for earlier canopy differentiation by accelerating growth of dominant stems.



Figure 1: Shelterwood harvest (4 yrs post harvest) with approximately 45 sq. feet RBA; Jim Sheehan.



Figure 2: Modified even-age regeneration stand with approximately 20 sq. feet RBA; Than Boves.

Associated Species

Other species will benefit from habitat management for Cerulean Warblers. Heavy (20-30 sq. ft. RBA of dominate/co-dominate crown classes) and medium intensity harvests (50-60 sq. ft. RBA of dominate/co-dominate crown classes) increased abundance and diversity of shrub-nesting species including Hooded Warbler, Indigo Bunting, Yellow-breasted Chat, Kentucky Warbler, and Eastern Towhee. Certain canopy-nesting species such as Bluegray Gnatcatcher generally increased in abundance at medium levels of canopy removal. Such harvesting can enhance habitat for Golden-winged Warblers, Chestnut-sided Warblers, Field Sparrow, and many species of forest-dwelling bats.

For More Information

Cerulean Warbler Management Guidelines for Enhancing Breeding Habitat in Appalachian Hardwood Forests, www.amjv.org

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