

Cutting Edge Research for Ceruleans

By Petra Bohall Wood

West Virginia's forests are home to a small woodland bird called the cerulean warbler. Its name comes from the sky blue color on the back of the male; the female's back is bluish-green. The cerulean warbler breeds in mature deciduous forests throughout the eastern United States. It typically nests and forages high in the tree canopy; much higher than most other warblers. After the breeding season, this tiny bird, which only weighs 0.3 ounce, makes a long annual trek to spend the winter on the mid-slopes of the Andes Mountains in northern South America.

The Cerulean Warbler is one of the species of highest concern in the eastern United States because of a small total population size and significant declines in numbers throughout its range. Over the last 50 years, scientists estimate that the abundance of this bird has declined about 70 percent on its breeding grounds. Biologists believe several factors contribute to the cerulean warbler's decline, including loss and degradation of forested habitat on the breeding and wintering grounds. The amount of forest in the landscape is important but so is the quality of the forest.

Numerous studies in recent years have attempted to identify actions, particularly habitat management, that would help conserve this species and ensure its existence into the future. In fact, an international meeting of the Cerulean Warbler Technical Group was held in Morgantown, West Virginia in 2006 to begin developing and implementing a cerulean warbler conservation action plan. To find out more about cerulean warblers and conservation efforts for these birds on their breeding and wintering grounds, check out the following Web sites:

- http://www.fws.gov/Midwest/eco_serv/soc/birds/cerw/index.html
- <http://www.srs.fs.usda.gov/egc/>



Male cerulean warbler perching on red bud tree.

Currently, ceruleans are most abundant in the central Appalachian Mountain region. West Virginia is a stronghold for the species. In many parts of the breeding range, cerulean warblers live in forests associated with river valleys, particularly where tall trees emerge above the forest canopy. In mountainous regions like West Virginia, they are much more common on and near the tops of ridges, particularly in areas where oak and hickory trees predominate.

Although cerulean warblers breed in mature deciduous forests, not just any forest will do. They seem to prefer areas where gaps in the tree canopy allow vegetation to grow at many levels above the ground. Although researchers are not certain why gaps are important, they suspect several reasons. The male cerulean often sings from tall canopy trees where his song will carry farther. His territorial defense song would carry further near a gap in the canopy. Another reason may be that canopy breaks allow for growth of long-limbed branches high in the upper canopy where females typically build their nest. Finally, ceruleans feed on insects found on leaves and twigs, and occasionally capture insects in flight similar to a

flycatcher. The vegetation at various levels in canopy gaps may result in more insect prey, making these breaks attractive places to forage.

A recent study completed at the Lewis Wetzel Wildlife Management Area by researchers and students from West Virginia University found that all cerulean warbler territories had small treefall canopy gaps within them. These gaps occur when trees die or fall down from some natural cause. Many of the territories also contained breaks in the canopy from human disturbances such as narrow dirt roads and trails. Some of the ceruleans on this site used a trail as the edge of their territory. A summary of this study can be found online at <https://eidr.wvu.edu/etd/documentdata.eTD?documentid=4596>.

Several other studies in the eastern United States have provided anecdotal evidence that creating some canopy breaks in a closed canopy forest improves the habitat quality and increases use by these birds. This suggests that harvesting timber might be a useful tool for forest management to benefit cerulean warblers. However, limited detailed information is currently available about how ceruleans respond to the many different forest management practices found in eastern deciduous forests. We know that some gaps in the canopy are beneficial but we do not know how many are too many.

Consequently, biologists began a forest management experiment on seven different study areas in West Virginia, Ohio, Kentucky and Tennessee with the objective of identifying forest management approaches that are compatible with cerulean warbler conservation. The West Virginia study areas include the Lewis Wetzel Wildlife Management Area in Wetzel County, private lands in Wyoming County, and part of the Monongahela National Forest in Randolph County. Each study area includes four plots, each approximately 50 acres in size, of mature deciduous forest.

The research teams collected data during the 2005 and 2006 breeding seasons on all of the study plots before any timber harvesting occurred. They collected data on abundance of cerulean warblers as well as all other bird species that occur on the plots by conducting point counts. This allows them to document changes in the bird community over time. Researchers map territories to determine the density of cerulean territories on each plot.

Biologists know that just because a bird is present in an area does not mean that the habitat is of high enough quality for a bird to build a nest or to



Aerial photo showing moderate timber cutting in middle and uncut buffers at each end.

successfully hatch its young. So researchers find and monitor nests of ceruleans on each plot to quantify nesting success. This is not an easy task because they nest so high in the canopy. Additionally, researchers capture males and mark them with colored leg bands so that they can determine if individuals move away from the timber harvests and if they return to the study area in subsequent years. This gives them an estimate of annual survival rates for these birds. All of these measures provide baseline data (before timber harvest) that can be compared to the post-harvest data.

The research group identified three types of sound timber harvesting methods that commonly occur in the Central Appalachians as the focal harvest treatments for our study. They also selected these harvests so that they could compare heavy, moderate and light canopy disturbance. The three harvest types consisted of: a heavy even-age cut with approximately 20 square feet of residual basal area (BA) per acre, a shelterwood cut with approximately 55 square feet of residual BA per acre (moderate disturbance), and a single-tree selection cut with approximately 75–80 square feet residual BA per acre. The residual basal area is a measure of the number of mature canopy trees that are left on the plot after the timber harvest is complete. One plot on each



Male cerulean warbler with leg band.

Greg George

site remained unharvested to serve as a reference plot. Harvests were implemented on the center 25 acres of each treatment plot between August 15, 2006 and April 1, 2007. The remaining 25 acres were left as uncut buffers on each plot. The aerial photo of the moderate harvest shows the trees remaining in the harvest and the uncut buffer at each end of the sampling plot.

During the 2007 and 2008 breeding seasons, the research teams at each study area are collecting data on how cerulean warblers respond to each harvest. They will address a variety of questions with these data. For example, do ceruleans continue to forage and nest in each of these harvests or do they move to the uncut buffer? If they do nest in one of the harvest treatments, are they as successful at producing offspring as nests in uncut forests? Which of the harvests has greater cerulean abundance and nesting success? For ceruleans nesting in the uncut buffer, does nesting success differ if the adjacent harvest is heavy or light? What is the survival rate of ceruleans using each harvest treatment compared to the uncut buffers or the uncut reference area? Answers to these types of questions will allow managers to plan timber harvests in a way that minimizes negative effects on ceruleans and maximizes positive effects.

This study is a tremendous cooperative effort by researchers, biologists, and wildlife and forest managers. It includes students from four universities, personnel from four state natural resource agencies, two national forests (US Forest Service), and the U.S. Fish and Wildlife Service, timber industry staff, and representatives from the National Council for Air and Stream Improvement and the National Fish and Wildlife Foundation. This study hopes to identify ways that wildlife managers can use forest management to improve breeding habitat for the cerulean warbler.

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Heavy harvest plot at Lewis Wetzel Wildlife Management Area