

Kansas Ornithological Society

BULLETIN

PUBLISHED QUARTERLY

Vol. 47

December, 1996

No. 4

TEMPORAL AND SPATIAL RELATIONSHIPS OF THREE CANOPY-DWELLING WARBLERS IN A MISSOURI RIVER BOTTOMLAND FOREST

John M. Schukman

From 1966-1991 the Breeding Bird Survey (BBS) shows that populations of Cerulean Warblers (*Dendroica cerulea*) significantly declined in the eastern United States while the Yellow-throated Warbler (*D. dominica*) and Northern Parula (*Parula americana*) have increased (Peterjohn et al. 1995). Since the Cerulean Warbler is a candidate for listing as threatened or endangered by the United States Fish and Wildlife Service, habitat protection is of primary importance (Robbins et al. 1992). Another management and research need is the identification of potential competitors such as the Yellow-throated Warbler and Northern Parula (Hands et al. 1989). Competition influencing the reproductive success of these warblers would be difficult to detect. However, documenting their abundance and distribution could provide insight to population structure, especially at the edge of species' breeding ranges (Wilcove and Terbough 1984).

In this paper the timing of arrival, abundance, and spatial relationships of the Cerulean Warbler, Yellow-throated Warbler, and Northern Parula in a mature bottomland hardwood forest along the Weston Bend of the Missouri River in northeast Kansas are compared. This location is at or near the western edge of their respective breeding ranges (AOU 1983); the Cerulean Warbler and Yellow-throated Warbler are rare breeders in extreme eastern Kansas whereas the Northern Parula is an uncommon breeder to east-central Kansas (Thompson and Ely 1992).

Study Area and Methods

The study area (Weston Bend), a mature bottomland hardwood forest adjacent to the Weston Bend of the Missouri River, in the northeast portion of the Fort Leavenworth Military Reservation, Leavenworth County, Kansas, (39° 22' N 94° 54' W) is an area about 1.8 km² in size. Tree species commonly found include hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), sycamore (*Plantanus occidentalis*), green ash (*Fraxinus pennsylvanica*), bur oak (*Quercus macrocarpa*), pecan (*Carya illinoensis*) and boxelder (*Acer negundo*).

A weekly, full-season (2 April-9 July) strip-map census (Emlen 1984) was used to detect the abundance and territories of these species during the 1994 breeding season. A bird sighted in the same vicinity on two or more censuses was considered territorial. All but one census was completed between 0600 and 1100 hours. All individuals observed, whether territorial or not, were counted in number of birds per census. The primary census route (see Figure 1) was about 3.2 km and was traversed at 1.0-1.5 km per hour. No point counts were taken. A secondary route (5 censuses from 3 June-9 July) of about 2.3 km was traversed to determine any changes in species composition. When obvious, tree species used by these warblers were recorded. Nearest neighbor analysis was used to evaluate spatial distribution.

Results and Discussion

The Yellow-throated Warbler was detected from 9 April-9 July. The average number of individuals on the primary census was 6.07 ± 2.71 (1-10); seven birds were territorial. In comparison, during the 1991 breeding season eight birds were considered territorial on this

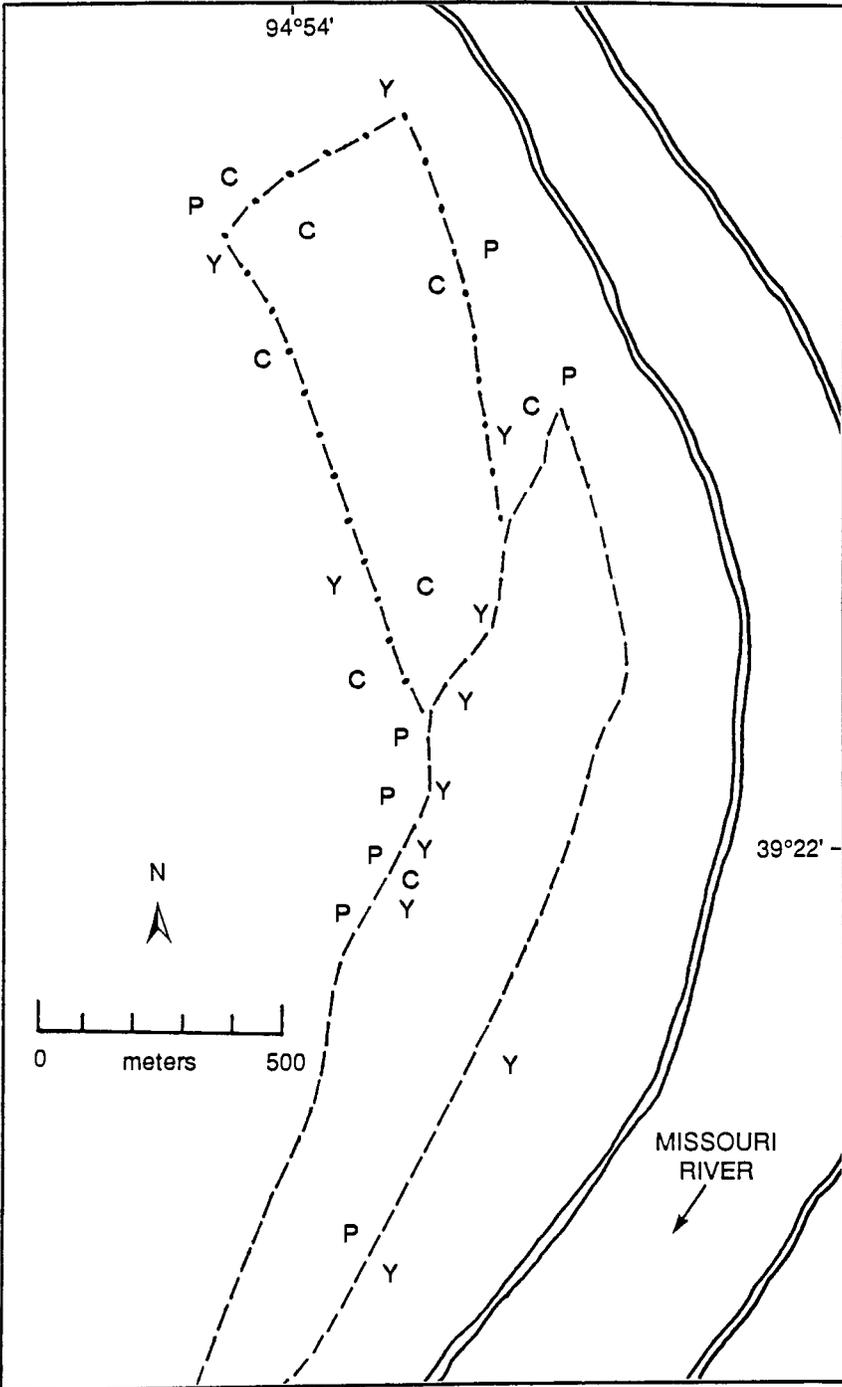


Figure 1. – Territories of the Yellow-throated Warbler (Y), Cerulean Warbler (C), and Northern Parula (P). Dashed line is primary census route and dot-dash line is secondary census route.

route (Schukman and Mouras 1992). The mean for both census routes was 11.20 ± 1.17 (10-13) and it was found that 11 birds were territorial. This species was found primarily in sycamores (28 of 30 observations) near the center of the study area.

The forest area sensitivity of the Yellow-throated Warbler is classified as unknown (Freemark and Collins 1992) although in the extreme eastern tier of Kansas counties (Thompson and Ely 1992) this species is restricted to riverine habitats with some mature sycamores in the vicinity. It was found on three Kansas breeding bird atlas blocks east of $95^{\circ} 45' W$ (unpublished data, Kansas Biological Survey). In southern Missouri this warbler is common not only in bottomland forests but also in upland pine habitat (Robbins and Easterla 1991).

On the primary census route the timing (17 April-9 July) and abundance (5.69 ± 2.84) of the Northern Parula was similar to that of the Yellow-throated Warbler. On both census routes a mean of 8.40 ± 2.24 (6-12) birds were found and eight birds were considered territorial (six on the primary and two on the secondary census, Figure 1). Tree species used by this warbler included sycamore (4), hackberry (3), cottonwood (*Populus deltoides*) (3), pecan (1) and green ash (1).

Although a recent (1980-1991) population decline is evident in the Northern Parula, long-term analyses (1966-1991) shows an increase (Peterjohn et al. 1995), and a significant increase depending upon the statistical method used (James et al. 1996). This species is probably more common in eastern Kansas than previously thought (Thompson and Ely 1992) and it was detected on 117 Kansas breeding bird atlas blocks east of $97^{\circ} 45' W$. This warbler may be more common than BBS data suggests since it has been increasing in Missouri in the past 25 years (Robbins and Easterla 1991).

The arrival of the Cerulean Warbler (14 May-1 July) is a month later compared to that of the Yellow-throated Warbler and Northern Parula. A mean of $1.38 \pm .99$ (0-3) birds was found on the primary census and 3.60 ± 1.96 (0-5) on both census routes with an estimated eight territories (three on the primary and five on the secondary census). In 1991 I found two Cerulean Warblers territorial on the primary census (pers. obser.). On late 8 July a severe thunderstorm and accompanying winds blew down many trees and limbs, including one pecan tree used by a territorial bird. No Cerulean Warblers were found on the next census (9 July, both routes), however, one was found during a non-census traverse of the study area on 12 July. Of 20 observations of this species 14 were in pecans, 3 in sycamores, 2 in cottonwood and 1 in green ash.

Observers report the Cerulean Warbler on three Kansas breeding bird atlas blocks east of $95^{\circ} 15' W$. In bottomland forests, this species can be more numerous than the Yellow-throated Warbler in Missouri (Tim Barksdale, pers. comm.), and more numerous than other *Dendroica* warblers throughout its range (Robbins et al. 1992). But significant population declines, primarily because of loss of habitat on breeding and wintering grounds, is well documented (Robbins et al. 1992, James et al. 1996).

When the arrival of the Yellow-throated Warbler and Northern Parula peaked in mid-April at Weston Bend, many Cerulean Warblers were still present in Central America (Parker 1994). This timing (see Frances and Cooke 1986) is not unexpected since the average migratory distance of the Cerulean Warbler (4000 km) is twice as far as that of either the Yellow-throated Warbler or Northern Parula (Ehrlich et al. 1988). The Yellow-throated Warbler can be double brooded in the southeastern United States whereas that of the Cerulean Warbler is unknown (Ehrlich 1988). The length of time the Cerulean Warbler was observed at Weston Bend probably afforded fewer breeding opportunities compared to that of the Yellow-throated Warbler or Northern Parula. Furthermore, pairing success may be reduced at peripheral sites, such as Weston Bend, because males may not attract mates (Faaborg et al. 1995).

All three warblers were detected at two locations but no interspecific interaction was observed. If competition were a factor, at least some interaction between the Cerulean and the Yellow-throated Warbler might have been minimized by tree species selection, where >90% of Yellow-throated Warbler observations were in sycamores and 70% of the Cerulean Warbler sightings were in pecans. However, nearest-neighbor analysis shows a random distribution of territories ($2=2.57$, $df=4$, $p>.05$). Zimmerman and Tatschl (1975) found bird species richness at Weston Bend was similar to eastern floodplain forests but that the densi-

ty of individuals was lower. Low density may be another factor that may reduce interspecific interactions at Weston Bend.

Monitoring the abundance of these warblers not only at the edge of their respective breeding ranges, but also in core habitats where densities are higher, could contribute to metapopulation analyses and subsequent management recommendations (Freemark et al. 1995).

Acknowledgments

I thank Chris Hobbs and Galen Pittman for contributing field observations, and Bill Busby and an anonymous reviewer for comments on the manuscript. Paul Hamel provided helpful advice on the study of these warblers.

Literature Cited

- American Ornithologists' Union. 1983. Checklist of North American birds. 6th ed. Washington: American Ornithologists' Union.
- Emlen J. T. 1984. An observer-specific, full-season, strip-map method for censusing song-bird communities. *Auk* 101:730-740.
- Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. *The birder's handbook. A field guide to the natural history of North American birds.* Simon and Schuster, Inc., New York.
- Faaborg, J., M. Brittingham, T. Donovan, and J. Blake. 1995. Habitat fragmentation in the temperate zone. *in Ecology and management of Neotropical birds.* (T. E. Martin and D. M. Finch, eds) Oxford University Press, New York.
- Frances, C. M., and F. Cooke. 1986. Differential timing of spring migration in wood warblers (Parulinae). *Auk* 103:548-556.
- Freemark, K. E., and B. Collins. 1992. Landscape ecology of birds in temperate forest fragments. pp. 443-454 *in Ecology and conservation of neotropical migratory landbirds* (J. M. Hagan III and D. W. Johnston, eds) Smithsonian Institution Press, Washington, D. C.
- Freemark, K. E., J. B. Dunning, S. J. Hejl, and J. R. Probst. 1995. A landscape ecology perspective for research, conservation, and management. *in Ecology and management of Neotropical migratory birds.* (T. E. Martin and D. M. Finch, eds) Oxford University Press, New York.
- Hands, H. M., R. D. Drobney and M. R. Ryan. 1989. Status of the Cerulean Warbler in the northcentral United States. Missouri Coop. Fish and Wildlife Res. Unit. Univ. of Missouri, Columbia.
- James, F. C., C. E. McCullough, and D. A. Wiedenfeld. 1996. New approaches to the analysis of population trends in land birds. *Ecology* 77:13-27.
- Parker, T. A. III, 1994. Habitat, behavior and spring migration of Cerulean Warbler in Belize. *Am. Birds* 48:70-75.
- Peterjohn, B. G., J. R. Sauer, and C. S. Robbins. 1995. Population trends from the North American breeding bird survey. *in Ecology and management of Neotropical migratory birds* (T. E. Martin and D. M. Finch, eds) Oxford University Press, New York.
- Robbins, C. S., J. W. Fitzpatrick and P. B. Hamel. 1992. A warbler in trouble: *Dendroica cerulea*. *in Ecology and conservation of neotropical migrant landbirds* (J. M. Hagan III and D. W. Johnston, eds) Smithsonian Institution Press, Washington, D. C.
- Robbins, M. B. and D. A. Easterla. 1991. *Birds of Missouri: their distribution and abundance.* Univ. Missouri Press, Columbia.
- Schukman, J. M. and T. Mouras. 1992. Probable breeding of the Yellow-throated Warbler (*Dendroica dominica*) in northeast Kansas. *Kansas Orni. Soc. Bull.* 43:27-30.
- Thompson, M. C. and C. A. Ely. 1992. *Birds in Kansas, Volume 2.* Univ. Kansas Mus. Nat. Hist., Public Education series No. 12.
- Wilcove, D. S., and J. W. Terbough. 1984. Patterns of population decline in birds. *Am. Birds* 38: 10-13.
- Zimmerman, J. L., and J. L. Tatschl. 1975. Floodplain birds of Weston Bend, Missouri River. *Wilson Bull* 87: 196-206
- 14207 Robin Rd, Leavenworth, KS 66048