

AMPHIBIANS OF THE NEW RIVER GORGE NATIONAL RIVER

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Introduction

The New River Gorge National River (NRGMR) is an especially interesting area for amphibian studies due to its long and varied geological history. Over many millions of years the region has been altered by uplifting and erosion. Upland regions of NRGMR provide a rich diversity of habitats for amphibian species, several of which are species of concern (West Virginia Division of Natural Resources 1990). In addition to serving as a refuge for some species, NRGMR provides a geographical barrier which limits the east-west distribution of other species. The ranges of several Appalachian salamanders extend to the NRGMR where they are replaced by closely related "sibling" species on the western slope (Highton 1972, Jewell and Pauley 1991, Bailey and Pauley 1991, and Montani and Pauley 1992). These specialized cases of distribution where species ranges meet but have little or no overlap (parapatry) provide unique opportunities for learning more about species competition and biogeography.

Grafton and Grafton (1988) reported that little information was available on species richness, frequency of occurrence, and distribution of vertebrates in the NRGMR. Green and Pauley (1987) showed that there was an obvious absence of knowledge of amphibians in those counties (Fayette, Raleigh, and Summers) within NRGMR.

METHODS

Amphibian surveys were conducted in terrestrial and aquatic habitats during the daytime and nighttime. Diurnal searches included walking through habitats, turning cover objects with "herp rakes" (a 4-pronged potato hoe), and capturing specimens by hand. Nocturnal surveys were conducted by searching terrestrial and aquatic habitats with flashlights. Nocturnal surveys were conducted from dark until approximately midnight during a rainfall or usually within 24 hours after a rainfall. Anurans (toads and frogs) were also identified by their calls.

RESULTS AND DISCUSSION

The NRGNR has a diversity of terrestrial and aquatic habitats. Terrestrial habitats include mixed deciduous forests, open areas (including old fields and fields), old roads (including haul roads), trails, railroads (active and inactive), emergent rocks, coal mines, strip mines, and rock outcrops. Most of the habitats are xeric and, as a result, some terrestrial species were found to be more active in early spring, fall, and during warm periods in winter months. Aquatic habitats include vernal pools (temporary pools), permanent pools (including beaver ponds and man-made ponds), marshes, road puddles, seeps, wet coal mines, intermittent streams, and permanent streams (first, second, and third orders). Many of the vernal pools and road puddles are located in old strip mine areas. Because of the steep terrain and xeric nature of the NRGNR, wetlands are not as common as in other areas of the state. As a result, puddles in old roads and strip mine areas provide excellent breeding habitats for many species of amphibians.

Over 1,100 sites were surveyed during the course of this study (1989-1992). Twenty-one species of salamanders were observed (Table 1). Of the 21 species observed, eight were county records (Table 2) and four are on the West Virginia Division of Natural Resources list of species of concern (WVDNR, Nongame Wildlife Program 1990). These include the Jefferson salamander (Ambystoma jeffersonianum), blackbelly salamander (Desmognathus quadramaculatus), green salamander (Aneides aeneus), and the cave salamander (Eurycea lucifuga).

The Jefferson salamander emerges from underground refugia in early spring and migrates to vernal and permanent pools and road puddles to mate and deposit eggs. While it has a statewide distribution, few populations have been located. Five populations were identified in the NRGNR.

The blackbelly salamander is a southern Appalachian species that reaches the northern limit of its known range near Kanawha Falls in Fayette County. Until this study was conducted, the status and distribution of this species in West Virginia was unknown. It was thought to be greatly reduced and possibly extirpated in certain areas of its range in the state (Green and Pauley 1987). During the four years of this study, it was found in 51 of 103 streams examined.

Turner (unpublished data) searched beyond the northern boundaries of the NRGNR during the summer of 1992 and found that the range of the blackbelly salamander extended to Turkey Creek, Fayette County. Pauley (unpublished data) surveyed bait collectors in the Hinton area and found that it has been collected from Talcott Creek on the Greenbrier River, approximately 20 miles from its confluence with the New River.

Additional studies need to be conducted to determine the total range of this species in the state.

The green salamander had not been previously reported from the NRGNR. During this study, it was found in 29 locations. The green salamander inhabits rock crevices of emergent rocks and rock outcrops. In the NRGNR, it was found to occur in habitats ranging from xeric rock cliffs near ridges to emergent rocks in coves and along the New River.

The total range of the cave salamander extends from western Virginia and West Virginia south to Georgia and Alabama and west to Missouri, Kansas, and Oklahoma (Conant and Collins 1991). In West Virginia, it was thought to be restricted to the limestone caves of Greenbrier, Monroe, Summers, and Mercer counties (Green and Pauley 1987). During the NRGNR surveys, the cave salamander was found to inhabit abandoned coal mines. Forty coal mines were surveyed and the cave salamander was found in nine. In most mines, all size classes were represented indicating that the species is probably reproducing in water pools in the mines.

Common terrestrial species of salamanders included the redback salamander (Plethodon cinereus) and two sibling species, the slimy salamander (P. glutinosus) and the Cumberland Plateau salamander (P. kentucki). The range of the Cumberland Plateau salamander is not known to extend north or east of the New River, whereas the slimy salamander is found on both sides of the river. Less common terrestrial species included the ravine salamander (P. richmondi) and Wehrle's salamander (P. wehrlei). Two common species found in terrestrial habitats within the NRGNR that either have an aquatic stage or are found in both terrestrial and aquatic habitats included the red eft (land stage of the red-spotted newt, Notophthalmus v. viridescens) and the mountain dusky salamander (D. ochrophaeus).

Common stream species included the seal salamander (D. monticola), northern dusky salamander (D. f. fuscus), southern two-lined salamander (E. cirrigera), longtail salamander (E. l. longicauda) and the northern spring salamander (Gyrinophilus p. porphyriticus). Species frequently observed in vernal and permanent pools and other wetlands including marshes and road puddles were the red-spotted newt (N. v. viridescens), spotted salamander (A. maculatum), four-toed salamander (Hemidactylium scutatum), northern red salamander (Pseudotriton r. ruber), and midland mud salamander (P. montanus diastictus).

Two species of toads and seven species of frogs were observed in the NRGNR (Table 3). Toads included the eastern American toad (Bufo a. americanus) and Fowler's toad (B. woodhousii fowleri). The American toad was the common species in upland aquatic habitats and the Fowler's toad was the most

common species in the lower elevations. While both species inhabit vernal pools and other small wetland habitats during the breeding season, they were most commonly found mating and depositing eggs in road puddles.

Chorus frog and treefrog species observed included the northern spring peeper (Pseudacris c. crucifer), mountain chorus frog (Pseudacris brachyphona), and gray treefrog (Hyla chrysoscelis). The northern spring peeper was observed in all types of lentic breeding habitats from permanent ponds to road puddles. The mountain chorus frog was found most commonly in road puddles. There are two sibling species of gray treefrogs, H. chrysoscelis and H. versicolor, known to occur in West Virginia. Hyla chrysoscelis is found in the Appalachian Plateau and H. versicolor occurs east of the Allegheny Mountains. Studies have shown that these two species are in sympatry in Mercer County and possibly in the southern part of the NRGNR. Because the extent of overlap of their ranges in the NRGNR has not been determined, all gray treefrogs were considered to be H. chrysoscelis. Gray treefrogs breed in small pools, including road puddles.

Four species of true frogs were identified in the NRGNR. These included the bullfrog (Rana catesbeiana), green frog (R. clamitans melanota), wood frog (R. sylvatica), and the pickerel frog (R. palustris). The bullfrog was observed in New River and the riparian zone but not in upland habitats. The other species were found (eggs, larvae, subadults, or adults) in nearly all types of lentic habitats.

Amphibian habitats in the NRGNR, like most areas of West Virginia, have been disturbed by timbering, coal mining, and recreational activities. However, in the NRGNR some of these disturbed areas such as puddles in old railroads and haul roads and ditches along the sides of these roads provide breeding habitats for several species of amphibians. Vernal pools in old strip mine sites are commonly used by amphibians during both breeding and nonbreeding seasons. Old field areas in strip mine sites and other disturbed areas provide habitat for several species of amphibians. Abandoned deep mines were used by several species of salamanders including the cave salamander.

Literature Cited

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Table 1. Salamanders found in the New River Gorge National River.
Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)
Spotted Salamander (<i>Ambystoma maculatum</i>)
Red-spotted Newt, Red Eft (<i>Notophthalmus v. viridescens</i>)
Northern Dusky Salamander (<i>Desmognathus f. fuscus</i>)
Mountain Dusky Salamander (<i>Desmognathus ochrophaeus</i>)
Seal Salamander (<i>Desmognathus monticola</i>)
Blackbelly Salamander (<i>Desmognathus quadramaculatus</i>)
Redback Salamander (<i>Plethodon cinereus</i>)
Ravine Salamander (<i>Plethodon richmondi</i>)
Cumberland Plateau Salamander (<i>Plethodon kentucki</i>)
Slimy Salamander (<i>Plethodon glutinosus</i>)
Wehrle's Salamander (<i>Plethodon wehrlei</i>)
Four-toed Salamander (<i>Hemidactylium scutatum</i>)
Northern Spring Salamander (<i>Gyrinophilus p. porphyriticus</i>)
Midland Mud Salamander (<i>Pseudotriton montanus diasticus</i>)
Northern Red Salamander (<i>Pseudotriton r. ruber</i>)
Green Salamander (<i>Aneides aeneus</i>)
Southern Two-lined Salamander (<i>Eurycea cirrigera</i>)
Longtail Salamander (<i>Eurycea l. longicauda</i>)
Cave Salamander (<i>Eurycea lucifuga</i>)

**Table 2. Salamander County records in the
New River Gorge National River.**

Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)	Fayette
Mountain Dusky Salamander (<i>Desmognathus ochrophaeus</i>)	Fayette
Cumberland Plateau Salamander (<i>Plethodon kentucki</i>)	Fayette; Raleigh
Wehrle's Salamander (<i>Plethodon wehrlei</i>)	Fayette
Four-toed Salamander (<i>Hemidactylium scutatum</i>)	Fayette
Midland Mud Salamander (<i>Pseudotriton montanus diastictus</i>)	Fayette
Green Salamander (<i>Aneides aeneus</i>)	Summers
Cave Salamander (<i>Eurycea lucifuga</i>)	Fayette

Table 3. Toads and Frogs found in the New River Gorge National River.
Eastern American Toad (<i>Bufo a. americanus</i>)
Fowler's Toad (<i>Bufo woodhousii fowleri</i>)
Gray Tree Frog (Complex) (<i>Hyla versicolor/Hyla chrysoscelis</i>)
Mountain Chorus Frog (<i>Pseudacris brachyphona</i>)
Northern Spring Peeper (<i>Pseudacris c. crucifer</i>)
Bullfrog (<i>Rana catesbeiana</i>)
Green Frog (<i>Rana clamitans melanota</i>)
Wood Frog (<i>Rana sylvatica</i>)
Pickerel Frog (<i>Rana Palustris</i>)