

## **2000 REPORT**

### **Reconnaissance to Determine Habitat Types and Preliminary Data on the Status of Amphibians and Reptiles in the Gauley River National Recreation Area (GRNRA).**

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**Introduction:** The first year (2000) of a three-year study in the Gauley River National Recreation Area (GRNRA) was used for reconnaissance to determine the location, type and quality of habitats of amphibians, reptiles, birds, and mammals by biologists from Marshall University and Concord College. Special attention was paid to habitat of species of concern likely to be found in the area. Searches were conducted along the entire length of the GRNRA examining aquatic and terrestrial habitat types in both riparian and upland areas. Surveys for amphibians, reptiles, birds, and mammals were also conducted in representative habitats in 2000.

**Objectives:** The objectives this first year were to: (1) allow investigators to become familiar with the GRNRA area; (2) determine aquatic and terrestrial habitat types that occur in the GRNRA; (3) identify locations of specific habitats that should be studied in detail in years 2001 and 2002 to estimate species richness and population sizes.

## **Methods**

### **Amphibians and Reptiles**

Terrestrial searches consisted of turning cover objects during the day and searching surface areas with flashlights at night. Flashlights were also used during the day to examine crevices of rock outcrops. Aquatic searches were conducted in first-and second-order streams and along the edges of larger streams by turning cover objects such as rock, logs, and leaves. Searches in lentic habitats such as ephemeral pools, ponds, etc. involved making 5 sweeps in a one-meter area with a "D"-framed dipnet. Where possible sweeps were 5 meters apart (Shaffer et al. 1994). An aquarium-sized dipnet was used to sample small pools such as road-ruts. In these smaller pools, at least 5 sweeps were made per one-meter area. Adult frogs and toads were also identified by driving roads on warm nights from early spring to early summer listening for breeding choruses. Anuran breeding chorus studies were conducted using the North American Amphibian Monitoring Program (NAAMP) protocol. With this

protocol, we stopped at each breeding pond for five minutes and recorded all species calling and the number individuals per species calling.

Air and soil temperatures and relative humidity were recorded at terrestrial sites and water temperature and pH were taken at aquatic sites. Dominant herbaceous, shrub and canopy vegetation types were noted at most sites. Each animal captured was measured for snout-vent length (SVL) and total length (TL) with vernier calipers and released at the site of capture. Voucher specimens were collected for most species observed and housed at Marshall University in the West Virginia Biological Survey collection. Global coordinates of sites were determined with a handheld global positioning system (Garmin GPS 12XL Personal Navigator). Sites were plotted onto USGS 7.5 minute topographic quadrangles.

## **Results**

The major objective of the reconnaissance of the GRNRA was completed with success. The research team visited a majority of the area and a variety of habitats were observed. Habitats observed in the GRNRA were categorized into 20 categories as listed below. Habitats and the number of sites observed in each habitat are summarized in Table 1. Amphibians observed included 16 species of salamanders, seven species of frogs, and one species of toad (Table 2). Reptiles included one species of turtle, three species of lizards, and nine species of snakes (Table 2). Four species were county records (Table 3).

### **Terrestrial habitat types**

Road Cuts. These habitats are created when road construction removed a portion of a hillside. They are often open, dry, sunny areas with plentiful rocks and other cover objects that are ideal snake and lizard habitats. Road cuts are common along the old Chesapeake and Ohio (C&O) railroad bed.

Rock Piles. Rock piles are usually waste rocks discarded from road building or other construction. Rock piles are usually very open sunny areas that provide cover for snakes and lizards. This habitat type found along the C & O railroad bed along the west side of the Meadow River and south side of the Gauley River.

Riparian Floodplains. Riparian floodplains are areas along the Gauley and Meadow rivers that are periodically inundated with water. These areas consist of open, rocky or sandy substrates with little organic matter or soil. They often contain numerous small pools. Vegetation in these habitats includes species such as buttonbush (*Cephalanthus occidentalis*), St. John's Wort (*Hypericum* sp.), river birch (*Betula lenta*), and sycamore (*Platanus occidentalis*).

Railroad Tunnels. There are two tunnels through hillsides along the old

C & O railroad tracks. The dark, cool and often moist conditions found within these tunnels are conducive to some amphibian species. Animals can be found in crevices in the tunnel wall or in ditches along the road through the tunnel.

Emergent Rocks or Boulder Fields. Emergent rocks resulted from erosion of the soil exposing underlying rocks. These rocks are usually surrounded by forest. Characteristic vegetation includes Christmas ferns (*Polystichum acrostichoides*), spinulose shield fern (*Dryopteris spinulosa*), Virginia creeper (*Parthenocissus quinquefolia*). This habitat type is fairly common throughout the GRNRA and provides important habitat for the green salamander, *Aneides aeneus*, (Gordon and Smith 1949) which is listed by the West Virginia Division of Natural Resources as a species of concern.

Rock Outcrops. Outcrops are large exposed areas of bare rock formed by the erosive forces of wind and water. In the GRNRA outcrops are composed of sandstone and more than 90% of outcrops observed were either between 990-1100 feet or 1500-1650' in elevation. Rock outcrops are abundant in the GRNRA along both sides of the Gauley and Meadow rivers and provide excellent habitat for many species of reptiles and amphibians including the green salamander (Gordon and Smith 1949). These habitats are often associated with rhododendron (*Rhododendron* sp.).

Trails / Roads and Banks. Numerous roads and trails are found throughout the GRNRA that range from well-traveled roads maintained by whitewater rafting companies to old logging and mining roads accessible only by foot travel. Roads open the forest canopy resulting in dry habitats that can support thermophilic reptiles. They are often associated with other habitat types such as roadside ditches, road cuts, and wet rock faces.

Forests. Forests of varying ages cover almost the entire length of the GRNRA. Most of the area is second growth forest, however some areas of larger (presumably older) trees were found on the top of and along the western slope of Koontz Bend. These were mostly mature hemlock (*Tsuga canadensis*) forests, and some very large white oak trees (*Quercus alba*). Common tree species of lower elevation river bottom areas include: sycamore (*Platanus occidentalis*), American basswood (*Tilia americana*), and red maple (*Acer rubrum*). More mesic slopes often contain hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), magnolia (*Magnolia* sp.), tulip poplar (*Liriodendron tulipifera*) and yellow birch (*Betula alleghaniensis*). Drier slopes and ridge tops are dominated by white (*Quercus alba*), chestnut (*Quercus prinus*), and red (*Quercus rubra*) oaks.

Old Fields and Rights-of-Way. These areas consist of power line right-of-ways, abandoned farmland, or other areas maintained or occurring at an early stage of succession. These areas are often sunny, warm and dry and are good reptile habitat. Several of these areas were located in the GRNRA, mostly on ridge tops, or along roads. Areas strip-mined in the past were also placed in this

category. Dominant vegetation in these habitats often included goldenrods (*Solidago* sp.), asters (*Aster* sp.), brambles (*Rubus* sp.) and multiflora rose (*Rosa multiflora*).

### **Aquatic habitat types**

Third-order Streams. Third-order streams are fairly common in the GRNRA and include such streams as Collison Creek, Laurel Creek (North) (near Swiss on the north side of the Gauley River) Laurel Creek (South)(near Lucas on the south side of the Gauley River), and Staton Branch. These larger, high-gradient streams are habitat for the black-bellied salamander (*Desmognathus quadramaculatus*), (Petranka 1998) a species listed as a species of concern by the WVDNR, as well as other species of salamanders.

Second-order Streams. Second-order streams are found throughout the GRNRA and provide important habitat for numerous lungless salamanders of the family Plethodontidae and semi-aquatic snakes. Examples of second-order streams include: Hedricks Creek and Ramsey Branch.

First-order Streams/Intermittent Streams. These mostly unnamed streams are common in the GRNRA and are also important salamander habitats. A stream was considered intermittent if it is shown as such on the topographic map. These streams normally dry by the end of the summer and are usually small in size. They are still very important habitats for salamanders such as those in the genus *Desmognathus*.

Gauley and Meadow Rivers. The rivers provides habitat for semi-aquatic snake species and likely for some turtle species. River cooters (*Pseudemys concinna*), a species of concern in West Virginia, are known to inhabit the New River (Seidel 1982; Buhlmann and Vaughan 1991) and may be present in the Gauley River. Potential Hellbender (*Cryptobranchus alleganiensis*) and mudpuppy (*Necturus maculosus*) habitat is present within the GRNRA especially in the Meadow River. The non-seasonal fluctuations of water levels and cool water temperature of the Gauley River due to Summersville Dam may influence the abundance of some reptiles and amphibians.

Springs/Seeps. A spring or seep is where a small shallow stream emerges from the ground. These habitats are often rich in mosses and herbaceous plants and provide excellent breeding habitat for a large number of salamander species (Mitchell 1994).

Wet Rock Faces. These are rock faces, either natural or man-made that are associated with springs or other water sources that run down the surface. This habitat type can support large populations of semi-aquatic salamanders (Huheey and Brandon 1973).

Permanent Pools. This refers to lentic bodies of water that do not dry during the summer, such as beaver ponds. Few of these pools were located this year. The scarcity of this habitat type is likely due to the rugged, steep terrain found in the GRNRA. These small pools, particularly if fishless, are important in maintaining populations of some amphibian species such as mole salamanders (Ambystomatidae family) and some frog species (Mitchell et al. 1997).

Roadside Ditches and Road-rut Pools. These are the most numerous lentic aquatic habitat types within the GRNRA. These puddles form either in road ruts or along the sides of roads due to the physical barriers roads present to the drainage of water. Roadside puddles range from ephemeral puddles to permanent pools with aquatic vegetation. They provide breeding habitat for a number of frog and toad species, especially *Pseudacris* sp. as well as a number of lungless and mole salamanders.

Ephemeral Pools. Ephemeral pools are relatively scarce in the GRNRA, once again likely due the topography of the area. A pool is considered ephemeral if it is mostly dry by the end of the summer. These pools, although temporary, are very important in maintaining metapopulations of many woodland amphibians (Mitchell et al. 1997).

Flood Scars. Flood scar depressions are pools formed in the riparian zone due to the erosive qualities of a river during high water events. Several of these habitats were located along the Gauley River and present potential habitat for some frog species and possibly some turtles.

### **Quality of habitats observed**

Terrestrial Habitats. Present in the GRNRA are a wide variety of terrestrial habitats ranging from mature hemlock forests to strip-mined areas. A network of roads with varying amounts of traffic bisects the area. Roads may be beneficial to some reptiles by providing open sunny areas, and provide puddles for amphibian breeding, but the fragmentation they impose has been found to be detrimental to certain amphibian species (Gibbs 1998). The few pockets of old growth forest remaining in the GRNRA are high quality habitat for some terrestrial salamanders (Petranka et al. 1994). Of 150 sites where shrub species were noted, 34 (23%) contained species known to be exotic invasive species. Exotic invasive plant species have been found to significantly affect the ecological processes in an area (Kourtev et al. 1998). Invasive plants may pose a threat to animal species by impacting cover availability and the base of the food chain (Schmidt and Whelan 1999, Nagy et al. 1998). The most common exotic species noted were Japanese knotweed (*Polygonum cuspidatum*), garlic mustard (*Alliaria petiolata*), devils-walking stick (*Aralia spinosa*), and tree-of-heaven (*Ailanthus altissima*).

Aquatic Habitats. Aquatic habitats were dominated by streams of various sizes, which are found within the GRNRA. Ditches and puddles are common along roads and are important amphibian breeding sites. One of the most important considerations in determining water quality is chemistry and especially pH. Acidity of aquatic breeding sites has been shown to limit the breeding success of some amphibians (Freda et al. 1991). The range pH values of each aquatic habitat examined is shown in Table 4. It does not appear that this aspect of habitat quality limits the distribution of amphibians in the GRNRA. All of the pH levels are above those reported to significantly increase mortality of woodland amphibian embryos, which are generally around 4.0 – 5.0 (Freda et al. 1991).

### Literature Cited

- Buhlmann, K.A. and M.R. Vaughan (1991) Ecology of the turtle *Pseudemys concinna* in the New River, West Virginia. *Journal of Herpetology* 25: 72-78.
- Freda, J., W. J. Sadinski, and W. A. Dunson. 1991. Long term monitoring of amphibian populations with respect to the effects of acidic deposition. *Water, Air, and Soil Pollution* 55: 445-462.
- Gibbs, J. P. 1998. Distribution of woodland amphibians along a forest fragmentation gradient. *Landscape Ecology* 13: 263-268.
- Gordon, R. E., and R. L. Smith. 1949. Notes on the life history of the salamander *Aneides aeneus*. *Copeia* 1949:173-175.
- Huheey, J. E., and R. A. Brandon. 1973. Rockface populations of the mountain dusky salamander *Desmognathus ochrophaeus*, in North Carolina. *Ecological Monographs* 43:59-77.
- Kourtev, P. S., J. G. Ehrenfeld, and W. Z. Huang. 1998. Effects of exotic plant species on soil properties in hardwood forests of New Jersey. *Water, Air, & Soil Pollution* 105(1-2): 493-501.
- Mitchell, J. C. 1994. Lives of the seep. *Virginia Wildlife*. May 4-8.
- Mitchell, J. C., S. C. Rinehart, J. F. Pagels, K. A. Buhlmann, and C. A. Pague. 1997. Factors influencing amphibian and small mammal assemblages in central Appalachian forests. *Forest Ecology and Management* 96(1997): 65-76.

- Nagy, K. A., B. T. Henen, and D. B. Vyas. 1998. Nutritional quality of native and introduced food plants of wild desert tortoises. *Journal of Herpetology* 32(2): 260-267.
- Petranka, J. W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press. Washington D.C.. 587 pp.
- Petranka, J. W., M. P. Brannon, M. E. Hopey, and C. K. Smith. 1994. Effects of timber harvesting on low elevation populations of southern Appalachian salamanders. *Forest Ecology and Management* 67:135-147.
- Schmidt, K. A., and Whelan, C. J. 1999. Effects of exotic *Lonicera* and *Rhamnus* on songbird nest predation. *Conservation Biology* 13(6): 1502-1506.
- Shaffer, H.B., R.A. Alford, B.D. Woodward, S.J. Richards, R.G. Altig, and C. Gason. 1994. Quantitative sampling of amphibian larvae. In: *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians*. Ed. W.R. Heyer, M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster. Smithsonian Institution Press. 364 pp.
- Seidel, M. E. 1982. A taxonomic analysis of pseudemyd turtles (Testudines: Emydidae) from the New River, and phenetic relationships in the Subgenus *Pseudemys*. *Brimleyana* 6: 24-44.

**Table 4.** Range of pH values measured in each aquatic habitat located within the Gauley River National Recreational Area.

| Habitat Type          | pH Range | Number of samples |
|-----------------------|----------|-------------------|
| Pools*                | 6.7-7.7  | 5                 |
| Road ditch/puddles    | 4.9-10.1 | 59                |
| First-order streams** | 3.6-8.3  | 44                |
| Second-order streams  | 7.0-8.8  | 39                |
| Third-order streams   | 7.4-7.9  | 7                 |
| Gauley River          | 8.0-8.5  | 2                 |
| Springs/Seeps         | 5.2-8.0  | 14                |

\* Pools include both ephemeral and permanent.

\*\* First-order streams include intermittent streams

**Table 1.** Number of sites examined for each habitat type in Gauley River National Recreation Area.

| <b>Habitat type</b>                 | <b>Number of sites</b> |
|-------------------------------------|------------------------|
| Dry Hillsides                       | 3                      |
| Emergent Rocks or Boulder Fields    | 15                     |
| Ephemeral Pools                     | 6                      |
| First-Order Streams                 | 21                     |
| Flood Scars                         | 1                      |
| Forested Hillsides                  | 23                     |
| Gauley River                        | 4                      |
| Old Fields and Rights-of-ways       | 3                      |
| Permanent Pools                     | 5                      |
| Railroad Tunnels                    | 2                      |
| Riparian Floodplains                | 3                      |
| Road Cuts                           | 3                      |
| Roadside Ditches and Road-rut Pools | 50                     |
| Rock Outcrops                       | 27                     |
| Rock Piles                          | 6                      |
| Second-Order Streams                | 7                      |
| Springs/Seeps                       | 11                     |
| Third-Order Streams                 | 4                      |
| Trails/Roads and Banks              | 15                     |
| Wet Rock Faces                      | 5                      |
| Total number of sites               | 214                    |

**Table 2.** Number of species and individuals of each taxa found in the GRNRA.

| <b>Taxa</b> | <b>Number of<br/>species</b> | <b>Number of<br/>individuals</b> |
|-------------|------------------------------|----------------------------------|
| Salamanders | 16                           | 261                              |
| Frogs       | 7                            | 60                               |
| Toads       | 1                            | 9                                |
| Snakes      | 9                            | 37                               |
| Lizards     | 3                            | 26                               |
| Turtle      | 1                            | 4                                |

**Table 3.** County records found in the GRNRA during 2000.

| <b>Species</b>                  | <b>Common Name</b>         | <b>County</b> |
|---------------------------------|----------------------------|---------------|
| <i>Rana catesbeiana</i>         | American bullfrog          | Nicholas      |
| <i>Diadophis punctatus</i>      | Northern ring-necked snake | Nicholas      |
| <i>Eumeces laticeps</i>         | Broad-headed skink         | Nicholas      |
| <i>Ambystoma jeffersonianum</i> | Jefferson salamander       | Nicholas      |