

**A Review of the Amphibians of the  
Jim Timmerman Natural Resources  
Area, Oconee and Pickens Counties,  
South Carolina**



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**Cover Photograph:** The Wood Frog, *Rana sylvatica*, is perhaps the most abundant ranid species in the Jim Timmerman Natural Resources Area. Large numbers aggregate at breeding ponds during late winter rains. Photograph © by Richard D. Bartlett.

## A Review of the Amphibians of the Jim Timmerman Natural Resources Area, Oconee and Pickens Counties, South Carolina

RICHARD R. MONTANUCCI\*

"In the end, our society will be defined not only by what we create, but by what we refuse to destroy." – John C. Sawhill

**Abstract** - Thirteen species of salamanders and nine species of frogs and toads are recorded from the Jim Timmerman Natural Resources Area in South Carolina. Additionally, eight species of salamanders and five species of frogs are listed as potentially occurring within the boundaries of the property. *Pseudotriton montanus* (Mud Salamander) is considered rare on the property due to the scarcity of suitable habitat and is known only from historical records. *Ambystoma maculatum* (Spotted Salamander) may utilize non-breeding habitat on the property, but known breeding sites are located off the property near the southern boundary. *Desmognathus fuscus* (Northern Dusky Salamander) is apparently absent from the property, and perhaps from the entire escarpment and mountain region in South Carolina. Current range maps of *D. fuscus*, based on historical records, suggest a continuous distribution through this region, but a re-examination of pertinent museum specimens reveals that all records from the escarpment and mountains of South Carolina are based on erroneous identifications. *Hemidactylium scutatum* is known from only two localities in Pickens County near the southern boundary of the property. It is considered rare and patchily distributed in the upstate. *Cryptobranchus alleganiensis* is apparently absent from the property as well as the entire upstate. Its purported presence in South Carolina is based on one specimen record from the Lake Tugaloo section of the Savannah drainage system. *Rana palustris* (Pickerel Frog) is uncommon, and *Rana sphenoccephala* (Southern Leopard Frog) is known only from historical records, and may now be extinct within the property. The reported isolate of *Bufo terrestris* in Pickens and Greenville counties has not been verified following field surveys. It is hypothesized that the several upstate records are based on anomalous specimens of *Bufo americanus*. The diverse amphibian fauna of the Jocassee Valley was extirpated when the valley was flooded following completion of the Jocassee Dam in 1972.

### Introduction

The Jim Timmerman Natural Resources Area (JTNRA), also known as the "Jocassee Gorges Tract," was purchased in 1998 by the State of South Carolina from Duke Power Company (Abella et al. 2003). The property is managed by the South Carolina Department of Natural Resources (Hall 2004). Our knowledge of the amphibian fauna (frogs, toads, and salamanders) of the area is based on museum records, literature records, and periodic collections my students and I have made. The herpetology of this

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region of South Carolina is of great interest to herpetologists because it is in this area where the faunas of the Piedmont and Blue Ridge provinces meet, and in some cases, interact genetically and ecologically. However, no comprehensive survey of the amphibian fauna of the JTNRA has been attempted since Bruce's (1965) work in the upper Piedmont and southeastern escarpment of the Blue Ridge Mountains bordering the Carolinas.

To date, thirteen species of salamanders (ca. 39% of the state's salamander fauna) and nine species of frogs and toads (ca. 30% of the state's frog fauna) are recorded from the JTNRA property. Additionally, eight species of salamanders and five species of frogs are listed as potentially occurring within the boundaries of the property. Some potential occurrences represent species from the Piedmont that may enter the property along its southern boundary; others are not likely to occur within the property but are listed because of their uncertain status or restricted distribution in extreme western South Carolina. The creation of Lake Jocassee following completion of Jocassee Dam in 1972 probably eliminated populations of some Piedmont species that may have penetrated the Blue Ridge Physiographic province by way of the Keowee River drainage system.

It is anticipated that future surveys will lead to the discovery of additional species within the JTNRA. Also, new species of salamanders might be discovered through detailed taxonomic studies. In recent years, new cryptic species of salamanders have been revealed using molecular genetic technology (e.g., Anderson and Tilley 2003, Camp et al. 2002, Harrison and Guttman 2003). The purpose of this report is to review pertinent information on the occurrence of amphibians on the JTNRA property and to identify important problems for future research. This report serves as a working document subject to revision as further studies improve our basic knowledge of the amphibian fauna of the area.

As previously mentioned, the region embraced in the present report has for many years attracted the attention of herpetologists who have placed specimens from this area in their respective institutional collections. With construction of Jocassee Dam, changes in the routing and numbering of a principal roadway through Pickens County—SC Route 11—seriously altered the integrity of the data accompanying specimens collected along the original course of Route 11 prior to its rerouting to its present course several miles to the south (Fig. 1). Anyone attempting to revisit localities of specimens collected along Route 11 during the 1950s, for example, would search in vain along the new route of this highway. The present paper will serve as an aid in relocating collecting sites on the original SC Route 11, which is now County Road 100.

### **Site Description**

The JTNRA encompasses approximately 32,000 acres (13,000 ha) along the southern Blue Ridge Escarpment in Pickens and Oconee Counties, SC. The eastern boundary of the property abuts Table Rock State Park in the

southern corner and extends north to Sassafras Mountain. Southwestward, the property includes the lower Cane and lower Eastatoee Creeks. To the northwest, the property extends across the upper arm of Lake Jocassee, encompassing part of the Musterground Mountain area of Oconee County (Fig. 1). Elevations on the property range from 3554 ft (1083.5 m) on Sassafras Mountain to about 800 ft (243.9 m) along the Eastatoee Creek in the Lower Eastatoee Management Unit.

The topography of the tract is typical of the southern Blue Ridge Escarpment, consisting of mountain peaks deeply incised by fast-flowing rivers. Much of the property in Pickens County lies within the Eastatoee Creek drainage system; smaller areas are drained by Cane Creek and Laurel Fork Creek, and in a small area of the southeast by the Oolenoy River. Although the name "Jocassee Gorges" is commonly applied to the tract, only one of the escarpment gorges, the Eastatoee Gorge, lies within the boundaries of the property. However, several streams on the property, including Cane Creek, Emory Creek, Laurel Fork Creek, and Willis Creek deeply dissect the surrounding landscape and contain biotic elements very similar to those of the classic escarpment gorges (Gaddy 1998). The well-known escarpment

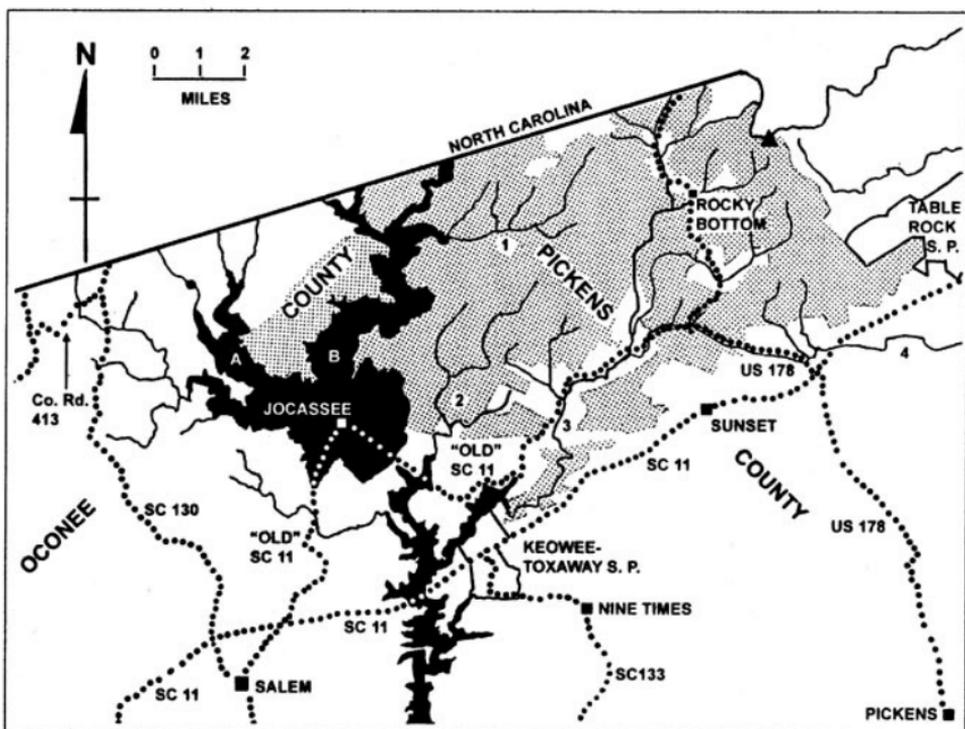


Figure 1. The Jim Timmerman Natural Resources Area shown with shading. Drainage systems are: 1. Laurel Fork Creek, 2. Cane Creek, 3. Eastatoee Creek, and 4. Oolenoy River. The solid triangle marks location of Sassafras Mountain. Lake Jocassee has two major arms, the Whitewater (A), and the Toxaway (B). The solid circle marks location of the lower falls of the Whitewater River. The remaining segment of "old" SC Route 11 east of the reservoir area in Pickens County is now County Road 100. "S. P." designates state park.

gorges are located in North Carolina and include the Whitewater, Thompson, Bearcamp, Horsepasture, and Toxaway gorges. In South Carolina, small segments of the Whitewater and Thompson gorges occur within the easement lands to the northwest of Lake Jocassee currently held by Duke Power Company.

The south-facing orientation of the Blue Ridge Escarpment exposes it to moist southerly air masses from the Gulf of Mexico that funnel upwards through the deep gorges, depositing between 75 and 100 inches of precipitation annually (see rainfall data for the region in Cooper [1963]). The annual rainfall rates in this area are higher than in any other area east of the Mississippi River (Billings and Anderson 1966). The combination of rugged topography and high precipitation has produced closed canopy forests and deeply incised streams with numerous waterfalls and spray cliffs, resulting in an array of habitats favorable to amphibians. Indeed, the southern Appalachian region, including the gorges area, has long been recognized as an important center of evolutionary diversification of plethodontid salamanders (Bruce et al. 2000, Hairston 1949).

### Ecological Role of Amphibians in Forest Communities

Amphibians play a key role as middle- and upper-level predators in natural communities, consuming large quantities of insects and other invertebrates, and a lesser quantity of small vertebrates. Dusky salamanders (*Desmognathus*) attain high densities and biomasses in small streams that lack fish, and probably perform a predatory role similar to that of fishes in larger stream segments (Petranka 1998). Larvae of ambystomatid salamanders are important predators in vernal pond communities and may influence the abundance of aquatic invertebrates as well as other amphibians (Petranka 1998). Woodland salamanders are often the most abundant vertebrate animals in forest communities, reaching very high densities. Burton and Likens (1975a) estimated the maximum density of *Plethodon cinereus* (Green) (Northern Red-back Salamander) to reach about 27,200 individuals per hectare at the Hubbard Brook Experimental Forest in New Hampshire. The authors determined that the biomass of four salamander species (including *P. cinereus*) exceeds the combined total biomass of birds and mammals in the experimental forest. The density of *Plethodon glutinosus* (Green) (Slimy Salamanders) at two study sites in Maryland and two in Pennsylvania, ranged from 4180 to 8440 individuals per hectare (Semlitsch 1980).

Most species of salamanders (including their juvenile stages) are sufficiently small that they can feed on minute insects and other invertebrates that fall below the lower size limit consumed by birds and mammals. Salamanders efficiently (60%) convert the energy in this food into their own body tissues, which are higher in protein content than that of birds and mammals (Burton and Likens 1975b). In turn, salamanders are preyed upon

by small snakes, woodland birds, and small mammals and therefore are an important link in the food chain in forest communities and are a source of high quality energy. According to Burton and Likens (1975b), salamanders are not important either as agents of nutrient input and output or as sinks for intra-ecosystem nutrient cycles for all nutrients except possibly sodium. Their primary role in nutrient cycling appears to be the regulation of invertebrate populations that mechanically break down forest floor litter.

Amphibian species are experiencing significant population declines on a global scale, and these trends have been occurring for several decades (Houlahan et al. 2000). Amphibians are sensitive to anthropogenic disturbances in the environment, and it has been proposed that amphibians are important bio-indicators of ecosystem health (Wake 1991). They occupy both terrestrial and aquatic habitats and are particularly vulnerable to chemical pollutants because of their highly permeable skin (Duellman and Trueb 1986). The amphibian epidermis is involved in both respiration and water balance; cutaneous respiration often supplements pulmonary, buccopharyngeal, and branchial respiratory modes, and is facilitated by a thin, moist, vascularized epidermis (Feder and Burggren 1985). The amphibian epidermis can rapidly absorb toxic substances (e.g., pesticides, herbicides, heavy metals, and chemical fertilizers) from the surrounding air, soil, and water. The highly permeable epidermis also renders amphibians vulnerable to dehydration. For example, the desiccation of terrestrial microhabitats and the concomitant rise in ambient temperatures following the removal of forest canopy can create potentially lethal conditions for amphibians. Plethodontid salamanders, because they are lungless and depend largely on cutaneous respiration, are especially susceptible to fluctuations in moisture and ambient temperature of their microhabitats. Based on a suite of characteristics, they are considered to be appropriate organisms for monitoring the integrity of North American forest ecosystems (Welsh and Droege 2001). The diversity and abundance of salamanders in the southern Appalachian region has been influenced historically by anthropogenic disturbances including land clearing for agriculture and timber harvesting, and in some cases, population recovery from such disturbances requires many decades (Ash 1988, Hyde and Simons 2001, Petranka 1998). In this regard, understanding how past land use practices have affected the present distributional patterns and abundance of salamanders in the Jim Timmerman Natural Resources Area should be a focus of future studies to provide important information for land management decisions.

### Collecting History

Scientific collecting of the herpetofauna has been carried out at many localities within the escarpment region of South Carolina over the years, but the largest collections were made in the Jocassee Valley and immediate vicinity, and smaller numbers of specimens were collected from Rocky

Bottom and nearby Sassafras Mountain. Between 1925 and the present, more than 75 biologists and their assistants representing about fifteen scientific institutions visited the Jocassee Valley and vicinity. Those workers collected in excess of 1377 amphibian specimens representing nine species of frogs and 13 species of salamanders, including both terrestrial and stream-dwelling forms. Schwartz (1957) characterized the Jocassee Valley as decidedly montane, reminiscent of the southern Blue Ridge Mountains, but the valley floor lay at about 1000 feet elevation. His assessment of the herpetofauna was that it represented an assemblage of both montane and Piedmont species. He described the valley as being surrounded by steep hills and mountain slopes (Fig. 2), with numerous small streams and springs, as well as deep, shaded ravines which offered suitable microhabitats for amphibians, especially salamanders. Schwartz noted that the shaded ravines of the southwestern slopes of the valley were densely covered with *Rhododendron maximum* L. (rhododendron) and *Kalmia latifolia* L. (mountain laurel), and supported stands of *Fagus grandifolia* Ehrhart (American beech), *Liriodendron tulipifera* L. (tulip tree), *Acer rubrum* L. (red maple) and *Oxydendrum arboreum* (L.) (sourwood). The forest of the northeastern side of the Jocassee Valley had a more open character and the dominant species was the eastern *Pinus strobus* (white pine). However, more typical of xeric ridges and disturbed areas of the JTNRA today are the *Pinus virginiana* P. Miller (Virginia Pine), *Pinus pungens* Lambert (Table Mountain Pine), and *Pinus rigida* P. Miller (pitch pine)], with natural stands of white pine being confined to mesic, shaded coves (Hall 2004).

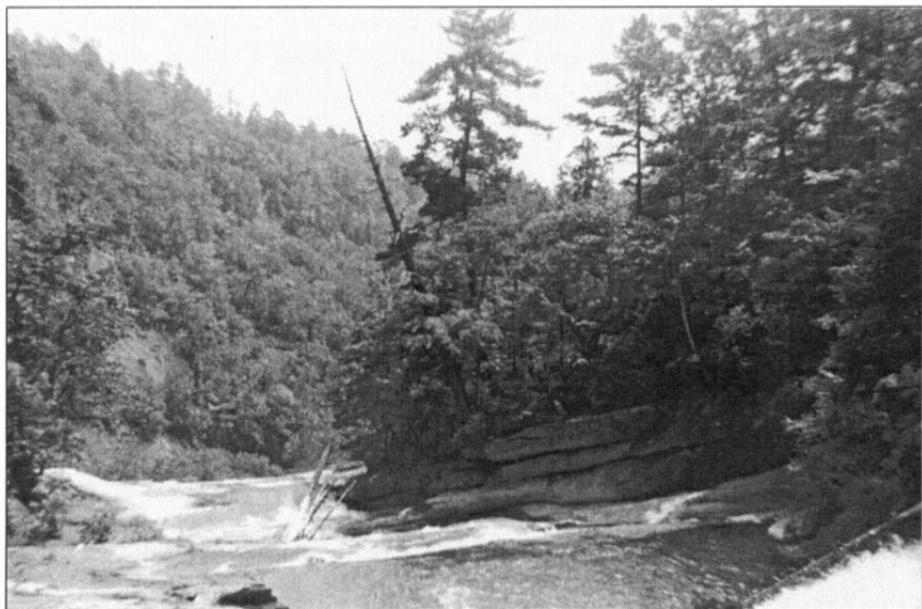


Figure 2. Whitewater River near its confluence with the Toxaway River during summer of 1953. Steep forested slopes in background supported a diverse salamander fauna. Photo courtesy of Randa Cobb Sanders.

A number of sites in the Jocassee Valley were of interest to amphibian collectors. Camp Jocassee, a summer camp for girls (Fig. 3), was located between the confluence of the Whitewater and Toxaway rivers (Hembree 2003). A pond on the property (Fig. 4) was an important breeding site for *Notophthalmus viridescens* (Rafinesque) (Eastern Newt). Several species of anurans, including *Rana catesbeiana* Shaw (Bull Frog), *Rana clamitans* Latreille (Green Frog), *Bufo fowleri* Hinckley (Fowler's Toad) and *Bufo americanus* Holbrook (American Toad) were found in the vicinity as well. Temporary pools near Jocassee and along the road that ran parallel to the



Figure 3. (A) Entrance of Camp Jocassee, a summer camp for girls, and (B) girls enjoying the Whitewater River during summer of 1953. Photo courtesy of Randa Cobb Sanders.

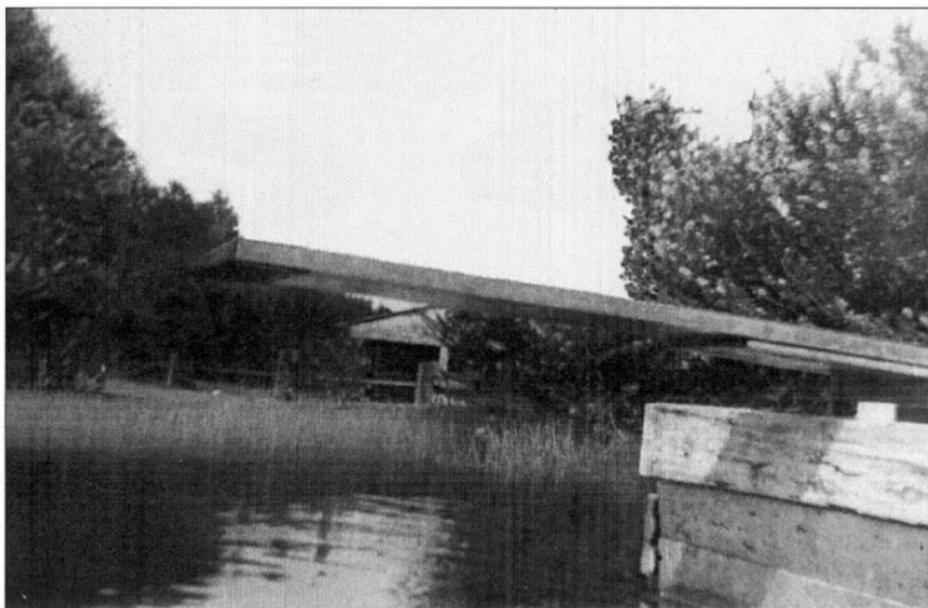


Figure 4. The pond at Camp Jocassee during summer of 1953. The shallow area along shoreline with emergent vegetation (background) was a breeding area of several species of frogs and the Eastern Newt. Photo courtesy of Randa Cobb Sanders.

Whitewater River were used as breeding sites for *Rana sylvatica* LeConte (Wood Frog) (Quinby 1954). The area of shaded ravines and spring runs on the south side of the Whitewater River, across from the girls' camp, provided excellent collecting for numerous species of terrestrial and stream-dwelling salamanders; *Desmognathus monticola* Dunn (Seal Salamander), *D. ocoee* Nicholls (Ocoee Salamander), and *Plethodon metcalfi* Brimley (Woodland Salamander) were especially abundant there. The Thompson River Gorge between Coley Creek and the North Carolina state line was another good collecting area for salamanders, both stream-dwelling and terrestrial forms, including the relatively rare *Aneides aeneus* Cope and Packard (Green Salamander). This segment of the Thompson River was part of the "Jocassee Club," an exclusive fishing area that also included a portion of the Whitewater River below the lower falls (Fig. 5); the property was leased from Duke Power Company by local fishermen (Hembree 2003).

Franklin W. Sherman (1877–1947) was one of the first scientists to collect amphibians in the Jocassee Valley (Fig. 6). He was a professor of entomology and zoology at Clemson College (Sanders and Anderson 1999), and his collections, which span the time period between 1925 and 1944, were accomplished with the assistance of Clemson College students and notable colleagues such as A.B. Grobman, M.K. Hecht, M.B. Mittleman, H. Trapido, and others. These collections were deposited at Clemson College (now Clemson University), the Charleston Museum, and the North Carolina State Museum; smaller numbers of Sherman's specimens also found their



Figure 5. Footbridge over the Whitewater River between the lower falls and fork of the Thompson River during summer of 1953. This section of the river formed part of the "Jocassee Club," a fishing area leased from Duke Power Company. Photo courtesy of Randa Cobb Sanders.

way to the Carnegie Museum and Cornell University. Sherman is credited with collecting the paratypes of *Plethodon clemsonae* (= *P. metcalfi*) (Brassy-flecked Woodland Salamander) in the company of J.A. Berly, also of Clemson College, who collected the type specimen (Brimley 1927b). Sherman was also the collector of the type specimen of Red-legged Woodland Salamander, which was named *Plethodon shermani* Stejneger in his honor (Stejneger 1906).

Albert Schwartz (1923–1992) became curator of zoology at the Charleston Museum in 1952 (Sanders and Anderson 1999). Although his collecting efforts were concentrated in the Coastal Plain of South Carolina, Schwartz led several collecting trips to the Jocassee Valley and nearby southern Blue Ridge Mountains, accompanied by Julian R. Harrison, John A. Quinby, Thomas Uzzell, and others. According to collection records, about 16 biologists and their assistants collected amphibians in the Jocassee Valley for the Charleston Museum in the 1950s and 60s.

Other important collections of amphibians from the Jocassee area are housed in the Auburn University Museum of Natural History and the Museum of Zoology at the University of Michigan. Both institutions derived these collections in part through acquisitions from Clemson University. Field studies of the botany and zoology in the Jocassee Valley came to an end in 1972 when the Jocassee Dam was completed and the valley was inundated (Fig. 7).



Figure 6. Franklin Sherman, at age 51, professor of zoology and entomology at Clemson College. Photo, taken in August of 1929, courtesy of the Special Collections, Clemson University Libraries.

Relatively small collections of amphibians were made in the vicinity of Rocky Bottom. More than 267 specimens of amphibians, including seven species of frogs and 12 species of salamanders, were collected by more than 24 biologists and their assistants between 1927 and the present. These collections included both terrestrial and aquatic species of salamanders as well as frogs. The first collections from Rocky Bottom were apparently

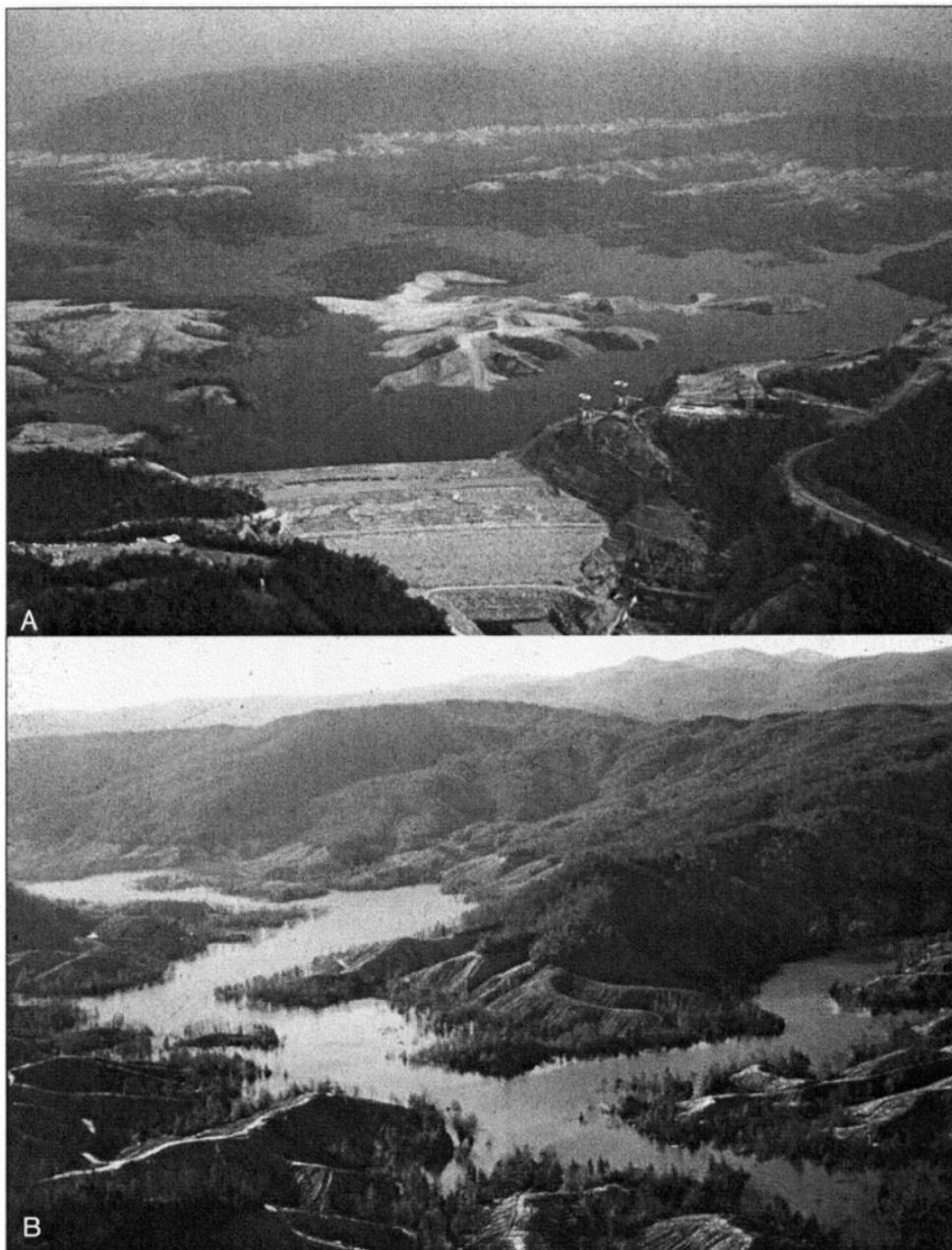


Figure 7. (A) Jocassee Dam near completion; a 200-ft. strip cleared by bulldozers at the calculated high water line can be seen in the distance. (B) View from Jumping-Off Rock as water fills the channel of the Toxaway River. Photos courtesy of the late William R. (Randy) Geddings, Sr.

made by Franklin Sherman and G.E. Hudson in 1927, followed by S.K. Johnson in 1929. Another important figure in South Carolina natural history was Edward Burnham Chamberlain (1895–1986), who held the position of curator of zoology at the Charleston Museum from 1924 to 1952 (Sanders and Anderson 1999). Chamberlain collected amphibian specimens near Rocky Bottom during the years 1929, 1930, 1932, and 1935. The majority of Chamberlain's collections were deposited in the Charleston Museum. On the basis of information obtained from collection records, about 10 scientific researchers for the Charleston Museum collected in the vicinity of Rocky Bottom in the early to mid-1950s. Although the bulk of specimens from Rocky Bottom are housed in the Charleston Museum, other important institutions with material from that locality include the Auburn University Museum of Natural History, the Museum of Zoology at the University of Michigan, the National Museum of Natural History, and the North Carolina State Museum.

Sassafras Mountain, the highest peak (3554 ft. elevation) in South Carolina, is proximate to Rocky Bottom, and many of the same researchers worked in both areas. Easy access to Sassafras Mountain was made possible by the Sassafras Mountain Road (Pickens County Road 199), known today as the F. Van Clayton Memorial Highway. Sassafras Mountain was visited by about 27 scientific collectors between 1935 and the present. More than 368 specimens of amphibians, representing five species of frogs and nine species of salamanders were collected over that period of time. Although both terrestrial and aquatic salamanders comprise the collections from Sassafras Mountain, the preponderance (253 specimens or 69%) of the total of these collections is represented by the terrestrial woodland salamander, *Plethodon metcalfi*. The strong collecting bias toward woodland salamanders can be largely attributed to one person, Richard Highton, a well-known systematist specializing in the genus *Plethodon* (Bruce et al. 2000). Highton collected at Sassafras Mountain during the years 1966, 1968, 1971, 1972, 1973, and 1984; his collections are deposited in the National Museum of Natural History. Other major institutional collections with amphibian specimens from Sassafras Mountain include the Charleston Museum and the North Carolina State Museum.

### Species Accounts

The following accounts are presented by scientific name in alphabetical order. Species known to occur within the JTNRA are listed first, followed by species that potentially occur within the property. Each account includes a brief diagnostic description, distribution and habitat requirements, and remarks. The remarks section addresses status, extra-limital records, and conservation and management issues. Locality information can be found in the species accounts and Appendix 1.

## Salamanders

### *Ambystoma maculatum* (Shaw) (Spotted Salamander)

*Description.* A stout-bodied salamander, up to 249 mm (10 inches) total length. Dorsum is steel gray to black with two irregular rows of large, round, yellow spots. Spots on the head may be yellow or bright orange to red.

*Distribution and habitat.* This species has a statewide range in South Carolina (Petranka 1998). Its distribution is patchy adjacent to the JTNRA tract and elsewhere (R.R. Montanucci, pers. observ.). Historically, this species was found in the vicinity of Jocassee, but inundation of the Jocassee Valley extirpated populations there. Spotted Salamanders have been observed on SC Route 11 near the southern boundary of the JTNRA (Lower Eastatoee Management Unit), and may occur in portions of the Eastatoee Valley, but no breeding sites have been found on the property. The adjacent Keowee-Toxaway State Park affords both breeding and non-breeding habitat for this species. Woodland vernal ponds (ca. 1 m deep) are the primary breeding sites of this species (Petranka 1998). Adults are sequestered below ground in adjacent deciduous forest habitat for most of the year. Breeding migrations occur during the first warm rains in late winter or early spring. This species has an aquatic, pond-type larval stage.

*Remarks.* Breeding adults near the southern boundary of the JTNRA usually cross SC Route 11, moving to and from breeding ponds which occur outside the property. I have observed these breeding migrations during January and February. Road mortality sustained by the breeding population during these migrations can be high and can potentially result in local extinction (for amphibian examples, see Fahrig et al. 1995). Construction of residential developments along the shores of Lake Keowee has led to increased vehicular traffic on SC Rtes. 11 and 133. To minimize road mortality, I recommend the installation of tunnel systems along sections of these roadways where the salamanders cross. Such tunnel systems have been used successfully for Spotted Salamanders elsewhere (Jackson and Tynning 1989).

### *Aneides aeneus* Cope and Packard (Green Salamander)

*Description.* A dorsoventrally flattened salamander up to 140 mm (5.5 inches) in total length. The dorsum is dark gray with bright green or yellow-green irregular lichen-like patches. The legs are relatively long, and the tips of the toes are square and slightly expanded.

*Distribution and habitat.* In South Carolina, this species is restricted to the upper Piedmont and mountains (Petranka 1998). It prefers crevices in large rock outcrops and cliff faces shaded by hardwood forest. It also inhabits large, old trees that have holes and cracks in the bark that serve as suitable retreats (Gordon 1967). J.L. Waldron and W.J. Humphries (2005) determined that these salamanders occupy rock crevices during the winter months and move into large trees adjacent to outcrops in the spring; they return to rock crevices in late fall. This species lays terrestrial eggs that hatch into metamorphosed young.

*Remarks.* The Green Salamander was first reported from near Jocassee, as well as Sassafras Mountain, by Gordon (1952). Schwartz (1954) provided additional collection sites from the vicinity of Jocassee. His historic records (documented by specimens deposited in the Charleston Museum) represent populations that were destroyed by the creation of Lake Jocassee. Records outside the JTNRA include sites in the Keowee-Toxaway State Park, Table Rock State Park (Pinnacle Mountain; Brimley 1927a), and immediately south of the community of Sunset on the "Nine Times" tract, owned by Crescent Land Resources, Inc. The distribution of the Green Salamander in the JTNRA is apparently patchy. The extent to which this salamander uses old trees has yet to be fully determined, but it may have been more widespread in the region prior to the logging of old growth forests (Wilson 2003).

### ***Desmognathus monticola* Dunn (Seal Salamander)**

*Description.* A robust salamander reaching a maximum total length of 149 mm (6 inches). The dorsum is buff colored to light brown with darker vermiculations. In many individuals, the vermiculations are reduced to small spots or are almost absent. The sides of the body may have several rows of white spots, and these may extend onto the sides of the tail. The posterior two-thirds of the tail is sharply keeled. The belly is white, occasionally with faint melanophores encroaching ventrolaterally. The toe tips usually have dark, cornified friction pads (Petranka 1998), but the pads may be inconspicuous or lacking (usually front toes) in some individuals.

*Distribution and habitat.* In South Carolina, this species occurs in both the Blue Ridge Mountains and Piedmont (Bruce 1965, Petranka 1998). It is common in the mountains, and has rather aquatic habits, living beneath rocks along the edges of small streams in hardwood forests. It is also found in springs and seepages. It may move considerable distances from streams during heavy rains. This species has an aquatic larval stage that forages as a benthic insectivore in the stream.

*Remarks.* This species is common throughout the JTNRA. I have observed nocturnal terrestrial movements during rains from January through March and as late as the first of May. Records from the Piedmont (where this species is less common) include: Anderson County: Clemson University's Fants Grove Wildlife Management Area; Oconee County: junction of Little River Road and SC Route 130, Martin Creek area of Hartwell Reservoir; Pickens County: 1 mile W of Shady Grove Junction (Nine Times) on SC Route 133, 3.2 miles S of Six Mile, along Six Mile and Wild Cat creeks in Clemson University Experimental Forest (North Forest), "Clemson College" (= Clemson University). These Piedmont records, including Martin Creek and Clemson College, have been verified by examination of the voucher specimens. The Clemson specimens were collected by F. Sherman in 1925 and 1926, but no additional specimens from the main campus have been taken since. Some peripheral records in the Piedmont may be the result of fish bait releases in the past.

Although stream siltation is probably detrimental to the aquatic larval stage, the short duration of the larval stage (eight to eleven months; Juterbock 1984, Organ 1961) suggests that population recruitment can occur rapidly once the stream habitat has recovered.

### ***Desmognathus ocoee* Nicholls (Ocoee Salamander)**

*Description.* A moderately small salamander, reaching 111 mm (4.5 inches) in total length. The tail is slightly longer than the body and is round in cross-section; the tail base near the vent is as wide, or wider, than its height. If the tail is regenerated, it is usually more keeled than the original. The dorsal color pattern is variable, but usually includes a series of dorsal blotches which are paired or set in zigzag fashion. The blotches vary from pale brown or gray to pale yellow or red. Old, large males are usually melanistic. Toe tips usually lack cornifications.

*Distribution and habitat.* In South Carolina, this species occurs in the Blue Ridge Mountains and upper Piedmont of the state (Petranka 1998, Tilley and Mahoney 1996). It is more or less terrestrial in its habits, preferring wet rock faces, seepage areas, springs, and forest floor adjacent to small streams (Petranka 1998). At low elevations, these salamanders are found where the microhabitat is saturated with water, but at higher elevations they can be found farther away from water due to increased humidity (Hairston 1949).

*Remarks.* This species is common in the JTNRA, but becomes less common in the upper Piedmont. It occurs in the vicinity of Wild Cat and Six Mile creeks in the Clemson University Experimental Forest. This species was formerly known as *Desmognathus ochrophaeus*, but Tilley and Mahoney (1996) reclassified the populations in South Carolina, adjacent western North Carolina, and Georgia as *D. ocoee* Nicholls (1949).

### ***Desmognathus quadramaculatus* (Holbrook) (Black-belly Salamander)**

*Description.* A large, robust salamander, reaching a maximum total length of 210 mm (8 inches). The dorsum is usually uniform dark brown or black; the belly is black, and the lower sides of the body have one or two rows of small white spots. The tail is relatively short and strongly keeled. The toe tips are black and cornified.

*Distribution and habitat.* In South Carolina, this species occurs in the upper Piedmont and Blue Ridge Mountains (Martof et al. 1980, Petranka 1998). It is abundant along headwater tributaries as well as larger trout streams where individuals may be found under rocks. Also, these salamanders often rest on wet rock faces or ledges near waterfalls. The aquatic larvae live beneath rocks and small logs in fast-flowing sections of streams, and feed on a variety of aquatic insects and invertebrates.

*Remarks.* This is a rather aquatic species found in virtually all streams in the JTNRA. Highest population densities are reached in small, unsilted streams with abundant rocks and cobble (Petranka 1998). Wilson (1995) noted that it is usually found at elevations greater than 500 m (1650 ft).

Bruce (1965), however, found it ranging down to 197 m (650 ft) elevation in the Piedmont. Records at the lower elevations include: Oconee County: 0.2 mi. N of Newry; Pickens County: Clemson University campus, Martin Creek area of Hartwell Reservoir.

This species may be strongly impacted by stream siltation which eliminates aquatic invertebrate prey and destroys the microhabitat of the larvae. Furthermore, the relatively long duration of the larval period may reduce the resilience of this species following habitat degradation. In western North Carolina, the larval period lasts two to four years with the majority of individuals metamorphosing after three or four years of growth (Bruce 1985a, 1988, 1989). As many as four cohorts of larvae may be extinguished by a siltation event, depending on its severity and extent, and recruitment may not begin until three to four years after the stream substratum has recovered.

### ***Eurycea guttolineata* (Holbrook) (Three-lined Salamander)**

*Description.* A long, slender salamander, reaching a maximum total length of 200 mm (8 inches). It has a black median stripe and a black dorsolateral stripe on the left and right sides of the body. The dorsolateral stripes begin behind the eyes and extend along the sides of the tail to its tip. The median black stripe terminates near the tail base. The three longitudinal black stripes are separated by tan or a yellowish tan ground color.

*Distribution and habitat.* Its distribution is statewide in South Carolina (Petranka 1998). It inhabits streams along bottomland hardwoods in the Piedmont, and is restricted to larger valleys in the mountains (Martof et al. 1980). This species is usually found below elevations of 800 m (2640 ft), but according to Petranka (1998), it reaches 1000 m (3300 ft) in some areas of the southern Appalachians. Individuals can be found in stream bottomlands under logs and rocks, often near the water's edge. Occasionally this species is found a great distance from standing water, but always in damp retreats (Wilson 1995).

*Remarks.* Nocturnal terrestrial activity occurs during spring, fall, and early winter rains. This species is not abundant in the JTNRA.

### ***Eurycea wilderae* Dunn (Blue Ridge Two-lined Salamander)**

*Description.* A slender salamander reaching a maximum total length of 121 mm (5 inches). It is pale yellow to reddish orange in color with a dark dorsolateral stripe on each side of the body, extending from the head through the body to at least midway down the tail. Beyond the midpoint of the tail, the stripes may be broken into a series of short segments and spots. The middorsal area may have a linear series of spots.

*Distribution and habitat.* In South Carolina, this species occurs in the Blue Ridge Mountains and upper Piedmont (Kozak and Montanucci 2001), where it inhabits springs, seeps, and small streams. Adults may be found under logs and rocks in adjacent forest. Terrestrial activity occurs during heavy fall rains. The aquatic larvae are benthic insectivores that forage in slow-moving pools

in streams. The larvae are sequestered beneath rocks during the day, but emerge at night to forage. This species is common in the JTNRA.

*Remarks.* This species may be less impacted than others by stream siltation due to its short larval period; the duration is one to two years in the southern Appalachians (Bruce 1982a, 1982b, 1985b; Voss 1993). Thus, a maximum of two cohorts of larvae may be eliminated by a siltation event (depending on severity and extent), but recruitment may resume in one or two years after the stream habitat has recovered.

On the basis of allozyme analysis, Kozak and Montanucci (2001) determined that *E. wilderae* appears to be genetically isolated from *E. cirrigera* where they meet in the Piedmont in Anderson County.

### ***Gyrinophilus porphyriticus* (Green) (Spring Salamander)**

*Description.* A moderately stout salamander reaching a maximum total length of 220 mm (8.5 inches). The dorsum varies from yellowish, reddish orange to salmon or light brown, with numerous, scattered dark flecks or stipples. There is a pale stripe, bordered below by a dark line, extending from the anterior corner of the eye to the nostril on either side of the broadly truncate snout.

*Distribution and habitat.* In South Carolina, it is restricted to the upper Piedmont and mountains (Petranka 1998). It inhabits springs, seeps, and small headwater streams. In the JTNRA, it is found throughout the property in suitable habitat. The lowest recorded elevation in the South Carolina Piedmont for *Gyrinophilus* is 199 m (653 ft) at a small spring-fed stream near the Saluda River, 8.6 miles east from Belton (by Holiday Dam Road), Anderson County (AMNH 100034–37).

*Remarks.* At lower elevations on the JTNRA property, these salamanders are characterized by a flecked pattern (subspecies *dunni*), but at higher elevations the salamanders show a stippled pattern that gradually intergrades with the spotted pattern of the high-elevation subspecies *danielsi* (Brandon 1966; R.R. Montanucci, pers. observ.).

In the JTNRA property, this species is expected to be relatively abundant in streams that historically have sustained little or no siltation impacts from logging. Nonetheless, the Spring Salamander is generally less common than other species of stream-dwelling salamanders, perhaps because it feeds on smaller salamanders as well as invertebrates, thereby occupying a higher trophic position than other species. The aquatic larvae are sensitive to siltation, requiring cold, clean streams with gravel bottoms and flat rocks for shelter. The larval period is long, with a modal duration of four years in western North Carolina (Bruce 1980). Severe stream siltation could eliminate four or more cohorts of larvae, and recruitment could be delayed by as much as four or five years following stream habitat recovery.

Old records from Abbeville and Columbia, SC, originally published by Cope (1889) and subsequently cited in Dunn (1926), Pickens (1927), Penney (1952), and Brandon (1966) have never been verified. Kenneth Tighe (Smithsonian Institution, Washington, DC, pers. comm.) informs me that the

Abbeville record (USNM 4716) is erroneous and pertains to a specimen from Georgia. The Charleston Museum has a specimen identified as *Gyrinophilus* from "Green Hole," an abandoned quarry in the Piedmont near Columbia. Julian Harrison (College of Charleston, Charleston, SC, pers. comm.) examined this specimen and stated that it is in rather poor condition and is probably not *Gyrinophilus*, but may be a *Desmognathus*. Peachtree Rock, a property owned by The Nature Conservancy in the Sandhills near Columbia, consists of a series of sandstone outcrops with a small waterfall that could harbor this species. However, Julian Harrison (pers. comm.) thinks it doubtful, and larvae collected in the pool below the waterfall are apparently *Pseudotriton*.

### ***Notophthalmus viridescens* (Rafinesque) (Eastern Newt)**

*Description.* The aquatic adults have lungs and lack gills, and reach a maximum length of 140 mm (5.5 inches). The dorsal color is pale brown to olive or dark green with several (usually 4 to 6) red spots bordered by black on either side of the midline. The belly is yellow with black spots. The skin is smooth, and the tail is laterally compressed with a tail fin. The terrestrial subadults (called red efts) are reddish brown to bright orange-red and also have series of red spots as in the adults. The eft's skin has a granular texture due to the presence of numerous epidermal glands that produce toxic secretions.

*Distribution and habitat.* This salamander has a statewide range (Petranka 1998) and is relatively common in the JTNRA. Adults occur in marshy areas, small ponds, and pools near streams. The terrestrial efts require damp hardwood forest habitat and forage in leaf litter for tiny insects and other invertebrates.

*Remarks.* Adults show strong site fidelity for their breeding ponds (Gill 1979). I have observed movements of red efts during the day in August (during and after rains) as well as during rains at night in April and October.

### ***Plethodon metcalfi* Brimley (Woodland Salamander)**

*Description.* This species reaches a maximum total length of about 184 mm (7 inches). The dorsum is entirely black, the belly is a dark gray, and the throat is somewhat lighter than the belly in populations north and east of Lake Jocassee. Populations occurring immediately west of Lake Jocassee have considerable brassy flecking on the dorsum, but there is a rapid clinal decrease in brassy flecking northward into the higher elevations of western North Carolina (Bruce 1967).

*Distribution and habitat.* In South Carolina, this species occurs in the upper Piedmont and adjacent mountains (Highton and Peabody 2000, Petranka 1998). It occurs throughout the southeastern escarpment area of the Blue Ridge, descending to below 303 m (1000 ft) elevation (Bruce 1965). This terrestrial salamander prefers mesic deciduous forest with substantial leaf litter and numerous decaying logs, rocks, and small mammal burrows for shelter and egg-laying sites.

*Remarks.* Prior to inundation of the Jocassee Valley, salamanders with typical black coloration were found 1.4 miles east and 1.2 miles northeast of the settlement of Jocassee, whereas those with brassy flecks were found at Jocassee as well as points to the northwest. Presently, brassy-flecked salamanders are concentrated in suitable habitat along SC Route 130, between 2.3 miles and 7.3 miles N of SC Route 11 (at elevations between 333 m [1099 ft] and 573 m [1891 ft]). Some specimens with faint brassy flecks can be found within that area. However, between 7.7 miles and 8.4 miles N of Route 11, individuals are predominantly black with only small amounts of brassy flecking. The majority of specimens found along Oconee County Road 413 (Wigington Road), at elevations between 737 m (2430 ft) and 784 m (2586 ft), are entirely black or nearly so.

The presence and abundance of both *Plethodon metcalfi* and *P. teyahalee* (see following account) on the JTNRA property have probably been influenced by past land use practices. Forest management and harvesting methods such as clear-cutting and replacing mature hardwoods with pine plantation are believed to negatively impact these salamanders (Ash 1995; Petranka et al. 1993, 1994; Petranka 1998). Population surveys should be conducted for various tracts within the property having differing histories of forest management. It is anticipated that the highest densities of Woodland Salamanders will be found in mesic hardwoods that have escaped intensive logging due to inaccessibility.

*Plethodon metcalfi*, formerly a subspecies of *Plethodon jordani*, was given full species rank by Highton and Peabody (2000). It and *P. teyahalee* are broadly sympatric over much of the escarpment area (Bruce 1967). Bruce found evidence of hybridization between the two species only at Moody Springs (34°56'45"N, 83°05'30"W) in Oconee County. A Piedmont population of *P. metcalfi* along SC Route 133 between Nine Times and SC Route 183 declined precipitously in 1996 and years following, but *P. teyahalee* in the same area remained relatively stable during that period. In the fall of 2004, numbers of *P. metcalfi* were observed, suggesting that recovery was taking place (R.R. Montanucci, pers. observ.). Bruce (1967:77) implied that moisture may be a limiting factor for *P. metcalfi*, and this could explain the disappearance of this species at some Piedmont localities following a period of prolonged droughts. By contrast, the high annual rainfall of the escarpment region, combined with the topography of deep gorges, sustain moist microhabitats suitable for this species.

#### ***Plethodon teyahalee* Hairston (Southern Appalachian Salamander)**

*Description.* A moderately large salamander reaching a maximum total length of 210 mm (8.4 inches). The dorsum is grayish black with scattered, small white or yellowish spots. Larger white spots may extend as a concentrated band along the sides of the body. The belly is gray and the throat is a paler hue than the belly (Petranka 1998).

*Distribution and habitat.* This species inhabits mesic deciduous forest, and ranges up to 1550 m (5115 ft) elevation (Petranka 1998). In South

Carolina, it is largely restricted to Abbeville, Anderson, Pickens, and Oconee counties (Highton 1983). It is an entirely terrestrial salamander and requires numerous decaying logs, rocks, and small mammal burrows for shelter and egg-laying sites. It is also found in small stands of pine if decaying logs and other surface cover are present.

*Remarks.* *Plethodon teyahalee* is a member of the slimy salamander species complex, and was previously known as *P. oconaluftee* Hairston 1993 (see Petranka 1998). Bruce (1965) reported it throughout the escarpment region of the Blue Ridge Mountains. This species occurs widely in the JTNRA, but its relative abundance at differing elevations and its ecological relationships with *P. metcalfi* are in need of study. On the basis of my limited field observations, it appears that *P. teyahalee* can tolerate slightly drier conditions than can *P. metcalfi*.

### ***Pseudotriton montanus* Baird (Mud Salamander)**

*Description.* This species of rather stout-bodied salamander reaches 195 mm (7.5 inches) total length. Specimens from the upper Piedmont of South Carolina typically have a brown dorsum with many small, round dark dorsal spots that are widely separated. The belly is salmon pink and may be flecked with darker pigment. The dorsum is dull reddish brown in young specimens and usually becomes dark brown and the dorsal spots become faint or completely disappear in old, large individuals. The iris of the eye is typically brown.

*Distribution and habitat.* These salamanders, which have a statewide range in South Carolina (Petranka 1998), prefer sluggish, meandering streams with muddy substrates in bottomland hardwood forest. They hide in burrows in muck or mud along the edges of streams, bogs, seepages, or springs. They may also be found under logs and moss mats adjacent to such aquatic microhabitats.

*Remarks.* Prior to the formation of Lake Jocassee, the Mud Salamander was collected near Jocassee in the Jocassee Valley. It was also collected at Rocky Bottom by E.B. Chamberlain in 1935 (see Appendix 1). There are no recent records for this species within the JTNRA property boundaries. The Mud Salamander is considered rare and probably localized due to the scarcity of suitable microhabitat within the property. Muddy seeps along small streams and springs within the property should be searched for this species. The nearest records outside the JTNRA are: 1.4 miles W of Shady Grove Junction (Nine Times), and on SC Route 133, 0.4 miles N of junction with SC Route 183.

### ***Pseudotriton ruber* (Latreille) (Red Salamander)**

*Description.* This species of rather stout-bodied salamander reaches a maximum total length of 180 mm (7 inches). The dorsum is bright red or orange with numerous back spots. The belly is salmon red. The mouth is bordered with varying amounts of black flecking and some white dots. The iris of the eye is usually yellow, but can be reddish gold or brown. The dorsal red color changes ontogenetically to dark brown in most old adults.

*Distribution and habitat.* This salamander occurs throughout most of the Piedmont and the mountains in South Carolina (Petranka 1998). Adults live in springs, seepages, and in leaf packs along spring-fed brooks, as well as in more terrestrial situations under logs or rocks (Bruce 1978). Nocturnal terrestrial activity occurs during warm rains in the early spring and fall (R.R. Montanucci, pers. observ.). The aquatic larvae congregate in slow-moving sections and pools of streams where they are sequestered within leaf packs, bottom debris, and aquatic plants (Petranka 1998).

*Remarks.* The Black-chin Red Salamander (subspecies *schrenki*) occurs throughout the JTNRA. Along the southern boundary of the property as well as Keowee-Toxaway State Park and areas south of SC Route 11, some specimens are typical *schrenki*, but many specimens show much less black pigmentation around the mouth and appear to be intergrades with the nominate race, *P. r. ruber*. Reduced black chin pigmentation is seen in some specimens from the Lower Eastatooee Management Unit (Roy F. Jones Road [County Road 143]) of JTNRA and from Table Rock State Park.

How stream siltation affects the aquatic larval stage is uncertain. Although the larval period is moderately long, lasting 27 to 31 months in western North Carolina (Bruce 1972), the larvae are not dependent on rock and gravel substrates for either shelter or as foraging areas; nonetheless, sedimentation could lower the density of invertebrate prey of the larvae.

### Species of Possible Occurrence

#### *Ambystoma opacum* (Gravenhorst) (Marbled Salamander)

*Description.* This species of stout-bodied salamander reaches a maximum total length of 127 mm (5 inches). The dorsum is shiny black with conspicuous silvery white crossbands (Petranka 1998). This pattern is somewhat duller in the female.

*Distribution and habitat.* In South Carolina, this species has a statewide distribution, but it is rare in the Blue Ridge physiographic province (Martof et al. 1980), and its distribution is patchy in the Piedmont (R.R. Montanucci, pers. observ.). It is known to occur in upland forests (Petranka 1998), and therefore may be present in lower elevation areas of the JTNRA if vernal ponds for breeding are available. This species reaches its greatest densities in bottomland hardwood forest (Petranka 1998). These salamanders hide beneath logs on the forest floor adjacent to small ponds and streams.

*Remarks.* Phillip Jones (South Carolina Department of Natural Resources, Columbia, SC) has a photographic record of this species, ostensibly from one of the streams above Lake Jocassee. However, the precise location cannot be confirmed, and there is a possibility that the salamander was photographed at Jones Gap State Park in Greenville County. To the south of the JTNRA, a population is known to inhabit bottomland forest along Eighteen Mile Creek, between Pendleton and Clemson.

***Ambystoma talpoideum* (Holbrook) (Mole Salamander)**

*Description.* This stout salamander with large limbs, a short tail, and a large head reaches a maximum total length of 122 mm (5 inches). The ground color is light brown, light bluish gray, dark gray or blackish, with light gray specks on the dorsum and sides (Martof et al. 1980, Petranka 1998).

*Distribution and habitat.* Disjunct populations occur in the Coastal Plain, Piedmont, and Blue Ridge physiographic areas of the Carolinas (Martof et al. 1980, Petranka 1998). Beyond the Coastal Plain, this species occurs in upland hardwood forest or mixed pine-hardwood forest adjacent to vernal ponds or other suitable breeding sites (Petranka 1998). Outside the breeding season, adults spend much of their time in underground burrows in hardwood forest.

*Remarks.* This salamander is known from several localities in the mountains of western North Carolina as well as the upper Piedmont of Greenville County, SC (Murdock and Rayner 1985, Petranka 1998). Its known range lies generally north and east of the JTNRA, but there is a possibility that it occurs within the property boundaries.

***Cryptobranchus alleganiensis* (Daudin) (Hellbender)**

*Description.* This salamander species is one of the largest in North America, reaching a maximum total length of over 740 mm (29 inches). It is characterized by a flattened head and body, small eyes, short, stout legs, and a laterally compressed tail. A prominent fleshy fold of wrinkled skin extends along the sides of the body. The adult lacks gills.

*Distribution and habitat.* Petranka (1998) depicts a distribution that extends from southern New York to northeastern Mississippi and includes extreme western South Carolina, westward to southern Missouri and northern Arkansas. Hellbenders are aquatic and prefer large, clear, fast flowing streams with ample shelter in the form of large, flat rocks, snags, and logs.

*Remarks.* The occurrence of this species in South Carolina is based on a single record from Tugaloo Lake, an impoundment on the Tugaloo River. The salamander was caught with hook and line by a fisherman in 1970 and photographed by a South Carolina DNR officer. According to Edmund D. Brodie (Utah State University, Logan, UT, pers. comm.) and C. Kenneth Dodd (US Geological Survey - Florida Integrated Science Center, Gainesville, FL, pers. comm.) the specimen was subsequently preserved and deposited in the Museum of Zoology at the University of Michigan. However, the specimen cannot be located in that institutional collection. A photograph of the specimen can be found in Dodd (1977).

All of the streams known to be inhabited by Hellbenders are of Mississippi drainage (Martof et al. 1980). In North Carolina, numerous suitable streams with Atlantic drainage all apparently lack the Hellbender. The natural occurrence of Hellbenders in the Tugaloo and Chattooga rivers (part of the Savannah River system which has Atlantic drainage) is therefore questionable. All locality records for this species in northern Georgia, with one exception, are in streams draining northward into the Tennessee River

system. The single exception is a report by Neill (1957) who collected a Hellbender near Wylie (= Wiley), Rabun County, GA. The Tiger River, which flows near Wiley, empties into the Tallulah River. If Hellbenders occur in the Tallulah River, then their presence in the Tugaloo River might be expected. Julian Harrison (pers. comm.) and several others briefly searched for Hellbenders along a portion of the Tugaloo River below the dam. No Hellbenders were found, but the habitat looked promising. Recently, a school teacher from Toccoa, GA, reported seeing as many as five Hellbenders in a large pool in the Chattooga River below Sock-Em Dog Falls; the sighting will be investigated (J. Humphries, Clemson University, Clemson, SC, pers. comm.).

Petranka's (1998) distribution map depicts a widespread occurrence of the Hellbender in extreme western South Carolina, apparently including the JTNRA property. But despite the presence of appropriate habitat in the Whitewater and Thompson Rivers (only small sections of flowing water above Lake Jocassee remain within South Carolina), these streams have Atlantic drainage, and therefore Hellbenders are unlikely to occur in them. Nonetheless, a fisherman reported having seen Hellbenders in the Thompson River and the Whitewater River upstream from NC Route 281 (J. Humphries, pers. comm.). The occurrence of Hellbenders in the Savannah River drainage system requires further corroboration by voucher specimens. If Hellbenders are actually present in this drainage system, it would raise the question as to whether their occurrence is natural or due to human activities. Hellbenders sometimes enter water intakes of trout farms and could be subsequently released in other drainage systems during trout stocking; this may explain extralimital records for the Hellbender (J. Humphries, pers. comm.).

### ***Desmognathus aeneus* Brown and Bishop (Seepage Salamander)**

*Description.* A tiny salamander, reaching a total length of about 57 mm (2.25 inches). A yellowish or reddish brown band extends down the back, bordered by a darker color on either side. There is a Y-shaped mark on the back of the head that may continue posteriorly as a faint line or series of dots; or the back may have a faint herringbone pattern (Martof et al. 1980, Petranka 1998).

*Distribution and habitat.* This species occurs as isolated, local populations from southwestern North Carolina and eastern Tennessee to northern Georgia and north-central Alabama (Harrison 1992). In South Carolina, it is known only from Oconee County at Reedy Branch and Camp Branch (Livingston et al. 1995) within the Chattooga drainage system. This species is found under wet leaf litter or moss near seepages, springs, or small streams in hardwood forest.

*Remarks.* Whether this species occurs outside the Chattooga drainage system in South Carolina remains to be determined. There is abundant suitable habitat (e.g., seepages and small streams) for this species in the JTNRA.

***Desmognathus fuscus* (Rafinesque) (Northern Dusky Salamander)**

**Description.** This salamander reaches a maximum total length of 141 mm (5.5 inches). The color pattern is highly variable. In the Piedmont of South Carolina, young specimens usually have five to eight pairs of yellowish or reddish dorsal blotches. In older specimens, these blotches merge to form a wide, longitudinal dorsal band having a dark wavy or scalloped border on either side. In males, the dorsal band may be yellow, tan, or dark brown; old males are often entirely dark brown. In females, the band is usually yellow or reddish orange. The base of the tail is rounded, is higher than wide posterior to the vent, and the distal portion of the tail is somewhat compressed. The tail is less compressed than in *D. monticola*, and the toe tips lack dark cornifications.

**Distribution and habitat.** According to Petranka (1998), the range of *D. fuscus* in South Carolina includes much of the Piedmont and mountains and it is generally scarce above 1200 m (3960 ft.) elevation. However, my students and I have not found this species at any mountain locations in South Carolina. It is abundant along streams in the upper Piedmont, being found under rocks and logs at or near the water's edge, and it appears to tolerate stream siltation to some degree.

**Remarks.** Current range maps (Conant and Collins 1998, Petranka 1998) show a continuous distribution through the upper Piedmont and mountains of South Carolina, but this medium-sized species is apparently absent or rare in the JTNRA and perhaps other portions of the escarpment region. Historical records of *D. fuscus* from the vicinity of Jocassee (Oconee County) as well as from near Rocky Bottom and Sassafras Mountain (Pickens County) involve erroneous identifications (Table 1). One record (CUSC 189) from the Whitewater Falls area near the North Carolina state line is also problematic. The specimen appears to be *D. ocoee*, but the identification is not certain. Also, the locality information for this specimen may be incorrect, as it was among a number of specimens with missing and partial tags. *Desmognathus monticola*, which is relatively abundant on the property, may competitively exclude *D. fuscus* from much of the escarpment area; alternatively, the species may be limited by habitat conditions. Lower elevation sites along the southern boundary of the JTNRA property should be searched for *D. fuscus*. The nearest locality record is about 5 miles (straight line distance) from the southern boundary of the property; it is based on a single specimen collected on SC Route 133, 3 mi. N of SC Route 183 (see Appendix 1). Less than two miles farther north near Nine Times, I collected another *Desmognathus* specimen (NCSM 64157) that appears to be *D. ocoee*. Petranka (1998) depicts a zone of contact between the subspecies *D. fuscus* and *D. conanti* extending through western South Carolina. Karlin and Guttman (1986) suggested that *D. conanti* be regarded as a distinct species, and recently it has been accorded specific rank (Bonett 2002, Titus and Larson 1996). In light of these recent studies, the taxonomic status of any *fuscus*-like populations

discovered on the JTNRA property should be carefully evaluated. An additional systematic problem outside the property involves possible hybridization between *D. ocoee* and *D. fuscus* (or *conanti*?) in the Six Mile Creek–Wildcat Creek area of the Clemson University Experimental Forest.

### *Desmognathus marmoratus* (Moore) (Shovel-nosed Salamander)

**Description.** This species is a moderately large, robust salamander, reaching 143 mm (> 5.5 inches) total length. The dorsal ground color of individuals from South Carolina is usually dark brown to almost black with two rows of irregular, pale yellowish or grayish blotches. The belly is pale in sub-adults and usually grayish in adults. The tips of the toes are dark ventrally. The tail is laterally compressed and has a keel. The internal nares produce slits in the roof of the mouth, rather than rounded openings as in other *Desmognathus* species (Bishop 1943, Petranka 1998).

**Distribution and habitat.** The Shovel-nosed Salamander ranges from southwestern Virginia (Whitetop Mountain) southward through western North Carolina, northeastern Georgia, and adjacent South Carolina (Martof et al. 1980, Petranka 1998). In South Carolina, this species is restricted to the Chattooga River drainage system in Oconee County (Martof 1962, Petranka 1998). Shovel-nosed Salamanders (both larvae and adults) require cool, well-oxygenated “trout streams.” In the southern Appalachians, at elevations below 1220 m (4026 ft), this species is usually found in second- and

Table 1. Identification of specimens originally listed as *Desmognathus fuscus* from the JTNRA property in institutional collections. Museum acronyms are listed in Appendix 1. Determinations (Det.) are by Richard R. Montanucci (RRM) and Julian R. Harrison (JRH).

Museum number	Locality	Identification	Det.
AMNH A-51983	Jocassee	<i>D. monticola</i>	RRM
AUM 17788 – 90	1 mi. S of Rocky Bottom	<i>D. ocoee</i>	RRM
ChM 29.158.33	Rocky Bottom	<i>D. monticola</i>	JRH
ChM 35.141.5	Rocky Bottom	<i>D. ocoee?</i>	JRH
ChM 53.169.10	Jocassee	<i>D. monticola</i>	JRH
ChM 54.2.14	Jocassee	<i>D. monticola</i>	JRH
ChM 54.43.9	1.1 mi. below Sassafras Mtn.	<i>D. monticola</i>	JRH
CM 131639 – 42	11 mi. N of Pickens	<i>D. monticola</i>	RRM
CM 131643	11 mi. N of Pickens	<i>D. ocoee</i>	RRM
CM 131644 – 46	11 mi. N of Pickens	<i>D. monticola</i>	RRM
CM 131647	11 mi. N of Pickens	<i>D. quadramaculatus</i>	RRM
CU 3611A	3–4 mi. below Sassafras Mtn.	<i>D. monticola</i>	RRM
CU 3611B	3–4 mi. below Sassafras Mtn.	<i>D. ocoee</i>	RRM
CU 3611C, D	3–4 mi. below Sassafras Mtn.	<i>D. monticola</i>	RRM
CU 3611E	3–4 mi. below Sassafras Mtn.	<i>D. quadramaculatus</i>	RRM
FMNH 87584	Jocassee	<i>D. ocoee?</i>	RRM
MVZ 52717 – 18	Jocassee	<i>D. ocoee</i>	RRM
NCSM 37113	9.6 mi. N of Salem	<i>D. monticola</i>	RRM
UF 17177	Jocassee	<i>D. monticola</i>	RRM
UF 782	Jocassee	<i>D. ocoee</i>	RRM
UMMZ 98612	17 mi. NNW of Pickens	<i>D. ocoee</i>	RRM
UMMZ 98613 A-C	17 mi. NNW of Pickens	<i>D. monticola</i>	RRM
UMMZ 137169 – 81	Jocassee	<i>D. monticola</i>	RRM

third-order streams with moderate to fast-flowing currents. The salamanders are sequestered beneath angular rocks in areas of loose gravel and cobble bottoms and they avoid sand or silt substrates (Martof 1962).

*Remarks.* Much of the geographic range of the Shovel-nosed Salamander includes streams that ultimately drain into the Gulf of Mexico. The presence of this salamander in South Carolina can be explained by a Pleistocene stream capture event in which the Chattooga River shifted its original course from the ancient Chattahoochee drainage to the present Savannah River system (Voss et al. 1995). This same capture event could perhaps account for the presence of *Cryptobranchus alleganiensis* in the Savannah River system, if indeed the species occurs there (see *C. alleganiensis* account). Although numerous streams in the JTNRA provide the specialized microhabitat requirements of *D. marmoratus*, its occurrence within the property is considered doubtful. Two relevant locality records for this species in Pickens County, Abner Creek near Rocky Bottom (NCSM 61854) and 2.25 miles NNW of Dacusville (NCSM 43200), are erroneous. Examination of the voucher specimens revealed that they are *D. quadramaculatus* (A. Braswell, North Carolina Museum of Natural Sciences, Raleigh, NC, pers. comm.).

Pronounced geographic variation in morphology and pigmentation led Martof (1956) to propose as many as five subspecies, but none is currently recognized (Petranka 1998). However, Voss et al. (1995) detected fixed allelic differences at eight of sixteen genetic loci between populations in the Tennessee River and in the Chattahoochee–Savannah River drainages. Hence the Georgia and South Carolina populations merit recognition as a distinct species, for which the name *Desmognathus roboratus* (Martof 1956) is available.

### ***Hemidactylium scutatum* (Temminck and Schlegel) (Four-toed Salamander)**

*Description.* This relatively small salamander reaches 95 mm (3.5 inches) total length. The dorsum is rusty brown, and the sides of the body are whitish gray. This species is easily identified by its enamel white belly with scattered black spots, four toes on each hind foot, and a constriction at the base of the tail.

*Distribution and habitat.* In South Carolina, the distribution of this salamander is patchy and populations are widely scattered within the Piedmont and Blue Ridge physiographic provinces (Martof et al. 1980). It prefers bogs, shallow vernal pools, and marshy areas with emergent vegetation and moss mats (Petranka 1998). Adults can be found under logs and moss mats near water but may retreat underground during hot, dry conditions.

*Remarks.* This species is known from the vicinity of Nine Times (Shady Grove Junction) and from boggy situations along Poe Creek near Keowee-Toxaway State Park in Pickens County. At present, there are no records from the JTNRA property. The conservation status of this relatively uncommon species needs to be reviewed.

***Plethodon serratus* Grobman (Southern Red-backed Salamander)**

*Description.* This small, woodland salamander reaches 127 mm (5 inches) in total length. It is dark brown with a broad red or orange-red stripe extending down the back; the edges of the stripe are straight or weakly serrate. Occasional individuals lack the stripe and are brown with some small red specks scattered over the back, sides and belly. On the basis of electrophoretic analysis, Highton and Webster (1976) and Highton and Larson (1979), recommended treating *P. serratus* (formerly a subspecies of *P. cinereus*) as a distinct species.

*Distribution and habitat.* This species occurs in the mountains south and west of the French Broad River, but it has not been reported from South Carolina (Martof et al. 1980, Petranka 1998). In the southern Appalachians of western North Carolina, *P. serratus* inhabits mesic hardwood forest with abundant leaf litter and logs for shelter. These salamanders can be found under cover objects from early November through March, but are increasingly difficult to find during warm weather (Camp 1988, Petranka 1998). Adults have been found near Highlands, NC, in early October (R.R. Montanucci, pers. observ.).

*Remarks.* Bruce (1967) stated that *P. serratus* is apparently confined to the upper reaches of the Whitewater and Chattooga drainage systems above 3000 ft. (910 m) elevation. He collected specimens from Flat Mountain (1060 m [3500 ft]), Little Terrapin Mountain (1060 m [3500 ft]), and Cashiers (1000 m [3300 ft]), as well as Granite City (35°02'39"N, 83°08'24"W; 969 m [3200 ft]) (Bruce 1965, 1967). In North Carolina, R.W. Van Devender (Appalachian State University, Boone, NC, pers. comm.) has collected this species along Horse Cove Road below Highlands, near Sapphire (close to the Jackson-Transylvania County line), about 1 mile east of Sapphire and near Rainbow Falls, about 3.5 miles (straight-line distance) from the South Carolina state line. This salamander should be sought in the region east of US Route 178, where five mountain crests (including two in Table Rock State Park) exceed 910 m (3000 ft) elevation and may harbor this species.

The Charleston Museum has a specimen from North Carolina, near Ellicott Rock. Richard C. Bruce and Richard Highton identified the specimen as *P. serratus*. However, J. Harrison stated (pers. comm.) that the specimen resembles *Plethodon websteri* from McCormick County, SC, and mentioned the possibility that *P. websteri* might be found in the upper Piedmont of South Carolina. Therefore, any small *Plethodon* resembling these two species discovered on the JTNRA property should be analyzed genetically to confirm its taxonomic identity.

**Frogs and Toads*****Bufo americanus* Holbrook (American Toad)**

*Description.* This species of large toad reaches a maximum snout-vent length of 107 mm (4.25 inches). The body is broad and the snout is rounded. The dorsal ground color is variable and may be brown, gray, olive, or rusty

red, with or without a light vertebral stripe. Dark, dorsal spots each enclose one or two warts. Large, pointed warts are present on the dorsal surfaces of the hind legs, especially the shanks. Large, oblong parotoid glands on either side of the head are connected to the postorbital ridge by a spur, or separated from it by a gap. The cranial crests are well developed.

*Distribution and habitat.* This toad occurs through much of the Piedmont and Blue Ridge Mountains of South Carolina (Conant and Collins 1998). *Bufo americanus* inhabits a variety of forested habitats as well as meadows, fields, and agricultural lands. Flat rocks, logs, and loose soil with leaf litter provide shelter for adults. According to Martof et al. (1980), shallow ponds and temporary pools are used for breeding, which takes place in late winter and early spring (February or March).

*Remarks.* This species is abundant in the JTNRA property and can be observed in numbers at night during late winter and early spring rains.

### ***Bufo fowleri* Hinckley (Fowler's Toad)**

*Description.* This species of medium-sized toad reaches a maximum snout-vent length of 82 mm (3.25 inches). The dorsum is brown, olive, or gray with a light vertebral stripe; occasional specimens are brick red. The dorsum has large, irregular dorsal spots that enclose three or more small warts. The cranial crests and postorbital ridges are reduced in size and its large parotoid glands touch the postorbital ridges. This species was previously regarded as a subspecies of *Bufo woodhousii*, but based on the work of Sullivan et al. (1996), which revealed distinct call characteristics, many authors now recognize Fowler's toad as a separate species.

*Distribution and habitat.* This species occurs throughout the Piedmont and mountains of South Carolina, but is absent from most of the Coastal Plain (Conant and Collins 1998, Martof et al. 1980). The Charleston Museum has specimens from the upper Coastal Plain from Chesterfield, Lexington, Orangeburg, and Sumter Counties (J. Harrison, pers. comm.). It is found in a variety of mesic forested habitats as well as meadows, fields, and agricultural lands. It breeds in March to May, laying its eggs in ponds and in the shallows of lakes and streams. This adaptable species is tolerant of most land-use practices (Wilson 1995).

*Remarks.* *B. fowleri* is relatively common in the JTNRA, but does not usually appear as early in the season as *B. americanus*. It occasionally hybridizes with *B. americanus*. In a series of ten toads collected in 2.5 mi S of Jocassee in 1954, one was a hybrid and the remaining nine were *B. americanus*, according to records in the Charleston Museum.

### ***Hyla chrysoscelis* Cope (Gray Tree Frog)**

*Description.* This tree frog reaches a maximum snout-vent length of 62 mm (2.5 inches). The dorsum is gray-brown, gray, or whitish gray with darker irregular markings. There is usually a whitish blotch under the eye, and the concealed portions of the hind legs are bright yellowish orange. The skin has a granular appearance due to the presence of many small warts. The tips of the toes have expanded pads.

*Distribution and habitat.* This species has a statewide distribution (Martof et al. 1980) and occurs in a wide variety of forested habitats including various hardwood communities, mixed pine-hardwoods, and recently disturbed habitats dominated by shrubs, vines, and herbaceous growth (Wilson 1995). Small shallow ponds with emergent vegetation around the perimeter are utilized for breeding.

*Remarks.* This species is relatively common in the JTNRA; it can be both heard calling at breeding sites and found crossing roads at night during March.

### ***Pseudacris crucifer* (Wied-Neuwied) (Spring Peeper)**

*Description.* This species is a small frog reaching a maximum snout-vent length of only 35 mm (1.5 inches). The dorsum is pinkish tan or tan to brown with a somewhat darker X-shaped marking in the center of the back and a bar between the eyes. The tips of the toes have expanded pads. The skin is relatively smooth. The undersurfaces are buff, yellowish, or cream colored.

*Distribution and habitat.* Spring peepers are found throughout South Carolina, occupying a variety of habitats (Martof et al. 1980). In the JTNRA, these frogs can be found in hardwood forest, living under forest litter and within brushy undergrowth adjacent to aquatic habitats. The species prefers small, shallow ponds and wet marshy areas with shallow puddles as breeding sites.

*Remarks.* This species is abundant in the JTNRA property and can be seen crossing roads at night during rains in late winter and early spring (February to May).

### ***Rana catesbeiana* Shaw (Bull Frog)**

*Description.* The largest North American frog, *R. catesbeiana* reaches a maximum snout-vent length of 200 mm (8 inches). The dorsum is uniform green to olive brown with faint blotches. There is a narrow fold of skin dorsal and posterior to the tympanum, but a dorsolateral body fold is lacking. Darker bands and blotches are usually present on the dorsal surfaces of the hind legs. The tympanum is relatively large and the throat is yellow in males. The venter is immaculate or is light with dark markings (Sanders 1984).

*Distribution and habitat.* This species has a statewide distribution and occurs in a variety of habitats (Martof et al. 1980). It is generally an aquatic species that requires permanent bodies of water, e.g., large ponds, lakes, and streams.

*Remarks.* Bullfrogs are widespread in the JTNRA and often venture overland some distances from water during rainy nights. Bruce (1965) recorded this species throughout the southeastern escarpment of the Blue Ridge from 424 to 909 m (1400 to 3000 ft) elevation.

### ***Rana clamitans* Latreille (Green Frog)**

*Description.* This species reaches a maximum snout-vent length of 86 mm (3.5 inches). The dorsum is brown to greenish brown usually with small dark dorsal spots or blotches. The ventral surfaces are white with dark mottling on the throat and undersurfaces of legs. The dorsolateral skin folds terminate about midway on the body.

*Distribution and habitat.* This frog has a state-wide distribution, occurring in a variety of habitats. It is semi-aquatic and is usually associated with semi-permanent aquatic habitats such as small ponds, bogs, marshy meadows, and floodplain pools.

*Remarks.* Bruce (1965) recorded this species throughout the southeastern escarpment of the Blue Ridge, up to 909 m (3000 ft) elevation. It is relatively common in and near appropriate aquatic habitats in the JTNRA as well as the Eastatoee Valley.

### ***Rana palustris* LeConte (Pickerel Frog)**

*Description.* This species is moderately large frog reaching a maximum of 87 mm (3.5 inches) in snout-vent length. The dorsal ground color is light brown with two parallel rows of large, square, dark brown spots between the dorsolateral skin folds. The folds are light in color and extend to the groin. The belly is white and the concealed surfaces of the thighs and groin are bright yellow.

*Distribution and habitat.* This frog occurs through much of the state, but it is apparently absent from a large portion of the lower Piedmont and upper Coastal Plain (Conant and Collins 1998). It can be found in a variety of aquatic habitats including bogs, marshes, and wet meadows and grassy areas near shaded streams. This species is usually associated with *Liriodendron tulipifera* L. (yellow poplar), *Fagus grandifolia* Ehrhart (American beech)-*Acer rubrum* L. (red maple), and *Quercus alba* L. (white oak)-*Q. rubra* L. (red oak) forests in the upper Piedmont and Blue Ridge Mountains (Wilson 1995).

*Remarks.* Populations of Pickerel Frogs appear to be scattered and patchily distributed throughout their range, including the southeastern escarpment of the Blue Ridge. Although present within the JTNRA property, the species is not abundant. Historically, it occurred in the Jocassee Valley, but populations there were extirpated with inundation of the valley. Records outside the JTNRA include Cherry Hill Campground, Oconee State Park, 5.5 mi. W of Walhalla at Isaqueena Falls, and 2.4 mi. W of Tamassee in Oconee County and the Eastatoee Valley in Pickens County (see Appendix 1 for additional records). The conservation status of this relatively uncommon species needs to be reviewed.

### ***Rana sphenoccephala* Cope (Southern Leopard Frog)**

*Description.* This frog reaches a maximum snout-vent length of 90 mm (3.5 inches). It is a relatively slender, long-legged frog with distinct whitish dorsolateral skin folds extending the entire length of the body. The dorsum is green or brown, or a combination of both colors with large, rounded, dark brown spots. There is a white spot in the center of the tympanum.

*Distribution and habitat.* *R. sphenoccephala* is distributed statewide and occurs in a variety of shallow freshwater habitats (Conant and Collins 1998, Wilson 1995). It breeds in permanent and semi-permanent woodland ponds, beaver ponds, pools in floodplain areas, and marshes. This frog forages for

insects on land, at times venturing considerable distances from water (Martof et al. 1980).

*Remarks.* The range map of Martof et al. (1980) suggests the absence of this species from the extreme western portion of Oconee County, SC. Bruce (1965) did not collect this frog during his survey of the southeastern escarpment of the Blue Ridge Mountains, but it is known historically from near the settlement of Jocassee at 242 m (800 ft) elevation (Schwartz 1957). The impoundment of Lake Jocassee may have eliminated this species from a major part of its range within the escarpment region. In 1930, the species was also collected by E.B. Chamberlain near Rocky Bottom, but there are no recent records for the JTNRA property. Its conservation status in the upstate of South Carolina and its current distribution within the JTNRA need to be determined.

### ***Rana sylvatica* LeConte (Wood Frog)**

*Description.* The Wood Frog reaches a maximum snout-vent length of 83 mm (3.25 inches). The dorsum varies from pale tan to brown or reddish pink, with a dark brown patch or "mask" extending back from the eye. Females are often pink in color (Wilson 1995). Dorsolateral skin folds are present and extend the length of the body.

*Distribution and habitat.* In South Carolina, this species occurs in the Blue Ridge Mountains and upper Piedmont (Conant and Collins 1998). It inhabits mesic, mixed hardwood forest and occasionally is found in white pine-*Tsuga canadensis* (L.) (eastern hemlock) and upland pine forest associations (Wilson 1995), and often far from open water (Martof et al. 1980). Breeding sites include small ponds, pools adjacent to streams, and in marshy meadows.

*Remarks.* In the JTNRA property and adjacent mountains, this species is quite abundant and populations appear to be stable. Egg masses were observed near Jocassee in February and March and near Rocky Bottom in February (Quinby 1954 and Charleston Museum records). In January and February, I have observed dozens of these frogs moving toward breeding sites during rains at night. I have found egg masses in a marshy meadow adjacent to Oconee County Road 413 and NE of Rocky Bottom in February. Two locality records are known from the extreme southeastern range limit of this species in the Piedmont. A population along the west side of Little River one mile N of Newry (Bruce 1965) was apparently extirpated with the creation of Lake Keowee. Another population situated in the Clemson University Experimental Forest (near Lake Issaqueena) is still extant and successfully breeding (R.R. Montanucci, pers. observ.).

## **Species of Possible Occurrence**

### ***Acris crepitans* Baird (Northern Cricket Frog)**

*Description.* This species attains a maximum snout-vent length of 35 mm (1.5 inches). Its skin has a slightly warty appearance. The dorsal pattern consists of a dark triangle between the eyes and a mid-dorsal stripe or Y-shaped stripe that varies in color from bright green to yellow, russet, gray or brown.

*Distribution and habitat.* This is a Piedmont species that ranges over much of South Carolina, but is absent from most of the Coastal Plain (Martof et al. 1980). In the mountains, it appears to be restricted to the major valleys. It prefers open grassy margins of ponds and marshy areas, but also occurs along the open banks of sluggish or intermittent streams. Shallow-water areas are used for breeding.

*Remarks.* During the survey by Bruce (1965), this species was only collected along the Little River near Newry, Oconee County, at an elevation of 212 m (700 ft); he did not record its presence anywhere in the mountains of South Carolina. The Northern Cricket Frog has been collected at Table Rock State Park (see Appendix 1), and observed south of Sunset on the Nine Times Tract (Crescent Resources, Inc.), Pickens County. Additional records are 5.9 miles S of Walhalla and 3.3 miles N of Seneca (Oconee County), and at Wildcat Creek and the margins of Lake Issaqueena in the Clemson University Experimental Forest (Pickens County). Historically, it may have ranged from the Piedmont into the Jocassee Valley, although there are no early records to support this conjecture. It will likely be found at lower elevations on the JTNRA property. The southernmost portions of the property should be surveyed for this species.

### ***Bufo terrestris* (Bonnaterre) (Southern Toad)**

*Description.* This toad reaches a maximum snout-vent length of 98 mm (4 inches). It is easily recognized by its high interorbital crests with protuberant knobs at their rear. Also, a small ridge separates the parotoid gland from the postocular ridge. This toad is usually brown in color, but may vary from nearly black to red; some individuals have a pale middorsal stripe. The belly is grayish, and the chest has small spots.

*Distribution and habitat.* In South Carolina, this toad occurs in the Coastal Plain, but apparently there is also an isolated population in the mountains and upper Piedmont (Conant and Collins 1998). Within its range in the Coastal Plain, the species is abundant in a variety of habitats, e.g., pine woods, *Liquidambar styraciflua* L. (sweet gum)-*Quercus phellos* L. (willow oak), and maritime forest (Wilson 1995), and shows a preference for sandy, friable soils (Martof et al. 1980). During daylight hours, these toads hide in shallow burrows which they themselves often construct.

*Remarks.* Chamberlain (1939) mentions several records of *Bufo terrestris* from the upstate of South Carolina, including Anderson, Anderson County, which apparently was based on a specimen or specimens sent to E.D. Cope at the US National Museum (USNM) by Charlotte Paine. It has been suggested that Anderson may simply have been the shipping point of the specimens collected by Paine. Also mentioned by Chamberlain is Greenville, Greenville County, from the files of the USNM. However, J. Harrison (pers. comm.) has searched the USNM records and the species is not listed from Greenville. In a 1938 letter to Chamberlain, H. Trapido stated that the species was collected 6 miles NNW of Easley, and at the base of "Table Mountain" (Chamberlain 1939). The latter is clearly

a reference to "Table Rock Mountain" as indicated in Trapido's original correspondence and in the Charleston Museum record cards (J. Harrison, pers. comm.). Trapido indicated in another letter to Chamberlain that the identification of specimens from the two localities was confirmed by A.H. Wright. Julian Harrison (pers. comm.) examined additional specimens in the Charleston Museum that appear to be *Bufo terrestris* from Table Rock Mountain, Pickens County (ChM 50.46.17), and Bald Rock, Caesar's Head, Greenville County (ChM 34.264.5). These records, if valid, would raise the possibility that *Bufo terrestris* occurs within the eastern portions of the JTNRA property. My recent collecting in the eastern portions of the JTNRA and Table Rock State Park has yielded about 58 toads, but none were *B. terrestris*. The occurrence of an isolate of *B. terrestris* in the upper Piedmont and mountains of South Carolina seems problematic inasmuch as this species is essentially a denizen of the Coastal Plain. An alternative explanation is that the specimens in question are actually *Bufo americanus* with exaggerated development of the cranial knobs. Two lines of evidence support this hypothesis. First, the upstate records are of single individuals collected from widely separated localities rather than a series of specimens from single locations. Secondly, Sanders (1961) determined that the cranial club or knob is a composite structure derived from enlargement of the parietal spur fused with a rather triangular otoparietal plate. Of relevance to the question of identity, Sanders states (p. 150): "Care must be taken not to mistake the simulation of a parietal club for the actual prominence. Such imitations are frequently seen in individuals of *B. americanus*, far removed from the range of *B. terrestris*, wherein the parietal spur is somewhat enlarged, due usually to bony irregularities or anomalies."

### ***Gastrophryne carolinensis* (Holbrook) (Eastern Narrowmouth Toad)**

*Description.* This toad reaches a maximum snout-vent length of 38 mm (1.5 inches). It is a small, plump animal with smooth skin, a small head and short limbs; it has a pointed snout and a transverse skin fold posterior to the head. The dorsum varies from reddish brown to brown or gray, with darker irregular markings. The belly is mottled with gray.

*Distribution and habitat.* In South Carolina, this species has a statewide distribution (Martof et al. 1980). It is most abundant in the Piedmont and Coastal Plain portions of the state, and appears to be largely absent from the Appalachian Mountains. Bruce (1965) did not record this species from the southeastern escarpment of the Blue Ridge Mountains. This is a secretive amphibian spending most of its time in burrows, under logs or other surface debris. It is associated with a variety of forested habitats. Breeding sites include emergent vegetation zones of shallow water pools, marshy areas, swamps, and lakes.

*Remarks.* This species has not been recorded from the JTNRA, but may occur in the lowermost portions of the property along its southern boundary.

***Pseudacris triseriata* (Wied-Neuwied) (Upland Chorus Frog)**

*Description.* This frog reaches a maximum snout-vent length of 35 mm (1.5 inches). The dorsal field is brown or gray with three parallel dorsal stripes; these stripes may be broken into rows of spots, or completely absent in some individuals. There is a dark stripe extending from the snout through the eye to the groin, and a light line along the upper lip.

*Distribution and habitat.* In South Carolina, *P. triseriata* occurs widely throughout the Piedmont and upper Coastal Plain, and there is an isolate in the lower Coastal Plain (Conant and Collins 1998). Martof et al. (1980) reported its occurrence at low elevations in the mountains. This species prefers marshy meadows and moist hardwoods. It breeds in semi-permanent pools of small ponds and boggy areas.

*Remarks.* The range map of Martof et al. (1980) depicts its occurrence in the Blue Ridge physiographic province of South Carolina. Although Bruce (1965) did not record this species during his survey of the southeastern escarpment region of the Blue Ridge, there are a number of records from the upper Piedmont and mountains, including Table Rock State Park (see Appendix 1). Therefore, this species should be sought in appropriate habitat in the JTNRA, especially in the eastern and southern portions of the property.

The subspecies *P. t. feriarum* (Baird), which occurs in our region, is recognized by some researchers as a separate species from *P. triseriata*. The two differ somewhat in dorsal pattern and in hind limb length, but have similar calls and are reported to intergrade where their ranges meet (Conant and Collins 1998). I provisionally retain *feriarum* as a subspecies of *P. triseriata* until more data are available.

***Scaphiopus holbrooki* (Harlan) (Eastern Spadefoot Toad)**

*Description.* This toad reaches a maximum snout-vent length of 72 mm (3 inches). The dorsum is grayish or blackish brown. Two yellowish lines originating at each eye extend posteriorly and together form a lyre-shaped pattern or a misshapen hourglass on the back. The toad has a distinct tympanum, a small, rounded parotoid gland above the tympanum, and a spade-like, black horny projection on the inner border of the foot. The eye has a vertical pupil.

*Distribution and habitat.* According to Conant and Collins (1998), this species occurs throughout the state, but Martof et al. (1980) considered it absent from much of the upper Piedmont, with only scattered populations in the Blue Ridge Mountains. The species prefers sandy soils in lowlands or river valleys, and it is associated with various forest types as well as disturbed habitats, e.g., abandoned fields.

*Remarks.* A population isolate depicted in the distribution map of Martof et al. (1980) appears to include the JTNRA, but appropriate habitat is essentially lacking within the property. Bruce (1965) did not find it in the upper Piedmont or southeastern escarpment of the Blue Ridge Mountains. The few known Piedmont records appear to be associated with the Seneca River, and according to Wilson (1995), this species may have penetrated the

Piedmont along river valleys where sandy soils provide suitable substrate for burrowing. C. Kenneth Dodd (pers. comm.) collected this species immediately west of Clemson along SC Route 93 (USNM 246797-246801). Carl Putnam (Belton, SC, pers. comm.) observed the species less than one mile west of Dodd's collection site. Other adjacent records include the Seneca River between Clemson and Lake Issaqueena (AUM 15848-15853) and the Seneca Marina, 1.9 mi. WSW of Clemson (AUM 17434). These museum records span the years 1967 to early 1973, after the completion of Hartwell Dam and Reservoir in 1963, but there are no other, more recent records for this area. Historically, Eastern Spadefoot Toads may have been associated with natural sand levees flanking the Seneca River and other Piedmont streams, and used ephemeral pools as breeding sites. This habitat was inundated following construction of the reservoir and most populations were presumably extirpated. The post-reservoir records may simply represent small, remnant, non-breeding populations that persisted for a period thereafter. If breeding populations still survive, they may be found along tributary stream basins that afford both sandy soils and seasonally flooded bottoms (e.g., upper reaches of Twelve-Mile Creek).

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**Appendix 1.** Locality records for amphibians collected within, or adjacent to, the Jim Timmerman Natural Resources Area are provided below. Records are also listed for amphibian species that potentially occur within the property or that have uncertain status, or are otherwise problematic. The following museum acronyms are used: American Museum of Natural History (AMNH); Auburn University Museum of Natural History (AUM); Carnegie Museum (CM); The Charleston Museum (ChM); Clemson University Museum of Natural History (CUSC); Cornell University Museum of Vertebrates (CU); Field Museum of Natural History, Chicago (FMNH); Florida Museum of Natural History, University of Florida (UF); Furman University Zoological Collection (FUZC); Georgia Museum of Natural History (GMNH); Milwaukee Public Museum (MPM); Museum of Comparative Zoology, Harvard University (MCZ); Museum of Vertebrate Zoology, University of California at Berkeley (MVZ); National Museum of Natural History (USNM); North Carolina State Museum of Natural Sciences (NCSM); University of Kansas Museum of Natural History (KU); and University of Michigan Museum of Zoology (UMMZ).

The majority of my field collections (about 300 specimens) have been deposited in the AMNH, CUSC, and NCSM. Amphibian specimens collected by my students and me that are not yet deposited in an institutional collection are designated RRM. My sight records based on specimens actually collected, identified, and released are designated RRM-s; my photographic vouchers are designated as RRM-p. Other sight records include Mary S. Bunch (MSB-s), John E. Cely (JEC-s), J.V. Dennis (JVD-s), L.L. Gaddy (LLG-s), John Garton (JG-s), P. McMillan (PM-s), C. Putnam (CP-s), D. Snyder (DS-s), J.A. Sorrow (JAS-s), and Scott A. Stegenga (SAS-s).

In the decades prior to inundation of the Jocassee Valley, field collections from E or NE of the settlement of Jocassee were made along the "old" SC Route 11. This route (known as SC 288 on the 1939 road map) is now designated County Road 100 in Pickens County, and takes a rather tortuous path (SE as well as ENE) from where Jocassee once stood. The new highway is situated well to the south of the previous route (see Fig. 1). In some of the records below, road numbers and directions from settlements have been changed from the original data entry for purposes of clarity.

In the records below, references to SC Route 11 pertain to the "new" SC Route 11 (Cherokee Foothills Scenic Highway), unless indicated otherwise.

### *Ambystoma maculatum*

Oconee County:

Jocassee: ChM 54.21.9.

Pickens County:

SC Route 11, between US Route 178 and SC Route 133: RRM-s

SC Route 11 at Poe Creek Crossing: RRM-s

SC Route 11 at jct of SC Route 133: CUSC 1284; NCSM 64095.

1.3 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1516

1.5 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 466; NCSM 64097.

1.8 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 33.

W of Shady Grove Junction (Nine Times), on SC Route 133: CUSC 1285, CUSC 1287-1290, CUSC 1517.

Between Shady Grove Junction (Nine Times) and SC Route 11, on SC Route 133: CUSC 1281-1282.

On SC Route 133, 0.3 mi. N jct. with SC Route 183: CUSC 1283.

SC Route 133 and Keowee Baptist Church Rd.: CUSC 1192.

***Ambystoma opacum***

See species account for locality information.

***Ambystoma talpoideum***

See species account for locality information.

***Aneides aeneus***

Oconee County:

Lower Whitewater Falls: DS-s.

Thompson River Gorge, between Coley Creek and NC state line: FMNH 245463.

Lake Jocassee at Horsepasture River, on NE slope of drainage: JAS-s.

1.8 mi. SE of Jocassee: ChM CA4279–CA4280.

1.9 mi. NW of Jocassee: ChM CA4281.

2.1 mi. NW of Jocassee: ChM CA4282.

Howard Creek, below SC Route 130: JAS-s.

2.3 to 10.4 mi. N of Salem: CUSC 171; UMMZ 136586–136589.

10.4 mi. NNW of Salem: ChM CA4274–CA4278.

Pickens County:

Near summit of Sassafras Mountain: ChM CA4268–CA4273, ChM CA4308.

3.3 mi. N of Rocky Bottom: ChM CA4283–CA4289, ChM CA4309–CA4310,  
ChM CA4302, ChM CA4304.

2.2 mi. NE of Rocky Bottom: ChM CA4303, ChM CA4305–CA4307.

6.6 mi. W of jct. US Route 178 and SC Route 11, on 11: USNM 256555–256557.

Table Rock State Park: ChM CA347–CA348, ChM CA470–CA472, ChM  
CA2599–CA2606.

Table Rock State Park at Carrick Creek.: JEC-s.

Table Rock State Park at Pinnacle Mtn.: SAS-s.

Diana Mountain: MSB-s.

Near Reedy Cove Falls: JVD-s.

Little Eastatoee Creek: CP-s; LLG-s.

Granitic cliff on Eastatoee Creek: LLG-s.

***Cryptobranchus alleganiensis***

See species account for locality information.

***Desmognathus aeneus***

See species account for locality information.

***Desmognathus fuscus***

Pickens County:

3 mi. N jct. with SC Route 183, on SC Route 133: CUSC 1301.

***Desmognathus marmoratus***

Oconee County:

0.2 mi. S of NC state line, on SC Route 107: USNM 154915.

East Fork of Chattooga River at Sloan Bridge on SC Route 107: NCSM 42833–  
42835.

East Fork of Chattooga River at Sloan Bridge Recreation Area: USNM 181191–  
181192, USNM 190686–190687.

East Fork of Chattooga River, ca. 9.2 mi. S of NC state line on SC Route 107:  
NCSM 42839–42841.

East Fork of Chattooga River, ca. 0.2 mi. S of NC state line on SC Route 107: NCSM 42836–42838.

King Creek, S of Burrell's Ford Road: CUSC 2106.

King Creek, tributary of Chattooga River: USNM 154907–154914.

Long Creek at bridge on County Road 339: NCSM 61244.

2.6 mi. SSW of Long Creek: AUM 16527–16530, AUM 17708–17713.

4.9 mi. SW of Long Creek: AUM 17704–17707.

Brasstown Creek: AUM 14103–14104, AUM 17944–17947; CUSC 156, 168; UMMZ 133137, UMMZ 135881, UMMZ 136590–136594, UMMZ 136609, UMMZ 136840–136843, UMMZ 137215–137220; USNM 256427.

Brasstown Creek, 1 mi. W of US Route 76 at mile marker 55: AUM 12084–12121, AUM 17714–17721, AUM 36578.

### *Desmognathus monticola*

#### Oconee County:

Howard Creek: CUSC 730.

West of SC Route 130, on County Road 413: CUSC 913, CUSC 915.

1.3 mi. W of SC Route 130 at small falls on County Road 413: CUSC 1496; RRM 3108.

Jocassee: AMNH 51983; ChM 53.169.10, ChM 54.2.11, ChM 54.2.14, ChM 54.21.7, ChM 54.35.54, ChM 54.35.65, ChM 54.214.9, ChM CA2113, ChM CA2204–CA 2219, ChM CA2500; FMNH 47907; GMNH 17123–17129; KU 54372, KU 54554–54558; NCSM 674–676, NCSM 38709, NCSM 38720; UF 6969, UF 17177; UMMZ 137169–137182, UMMZ 138307, UMMZ 97737.

0.3 mi. E of Jocassee: ChM CA2511–CA2519.

1.2 mi. NE of Jocassee: ChM CA2260–CA2263.

1.4 mi. N of Jocassee: ChM 54.214.6.

1.6 mi. E of Jocassee: ChM CA2502.

2 mi. WNW of Jocassee: NCSM 38725.

2 mi. N of Camp Jocassee: AUM 16519–16521.

Spring W of Whitewater River bridge at Camp Jocassee: ChM CA2242–CA2259; ChM CA2520–CA2532.

Thompson River Gorge, between Coley Creek and NC state line: FMNH 246484–246485.

Wright Creek Station, N of Jocassee: AUM 19038.

West of SC Route 130, on County Road 413: ChM CA3412–CA3413; CUSC 472.

0.6 mi. E of SC Route 107, on County Road 413: USNM 198163, USNM 271783–271785;

1.1 mi. E of SC Route 107, on County Road 413: USNM 198164, USNM 271786–271799.

0.6 mi. S of NC state line, on SC Route 130: NCSM 38721.

1.8 mi. N of SC Route 11, on SC Route 130: NCSM 64089

2.3 mi. N of SC Route 11, on SC Route 130: NCSM 64092

6.1 mi. N of Salem, on SC Route 130: NCSM 38728

10.7 mi. N of Salem, on SC Route 130: NCSM 38714.

9.6 mi. N of Salem, on SC Route 130: NCSM 37113.

#### Pickens County:

Laurel Fork Creek: CUSC 727.

Stream crossing "old" SC Route 11, 0.4 mi. E of Keowee River bridge: NCSM 38718, NCSM 38722.

- 1.1 mi. below summit of Sassafras Mtn.: ChM 54.43.9, ChM 54.43.10.  
 4 mi. below summit of Sassafras Mtn.: CU 3610.  
 3–4 mi. below summit of Sassafras Mtn.: CU 3611A, C, D.  
 Sassafras Mtn.: ChM CA416–CA418.  
 Sassafras Mtn., 0.8 mi. W of fire tower: USNM 463764–463765.  
 Rocky Bottom: ChM 29.158.33, ChM CA23–CA25.  
 Rocky Bottom: RRM 3125.  
 0.8 mi. NNE of Rocky Bottom: USNM 183816–183817.  
 0.9 mi. E of US Route 178, on Sassafras Mtn. road: ChM CA2233.  
 1.4 mi. NNE of Rocky Bottom: RRM 3141.  
 1.5 mi. NNE of Rocky Bottom: RRM 3139.  
 1.6 mi. NNE of Rocky Bottom: RRM 3142.  
 1.8 mi. NNE of Rocky Bottom: RRM-s.  
 1.9 mi. NNE of Rocky Bottom: RRM-s.  
 2.2 mi. NNE of Rocky Bottom: RRM-s.  
 2.3 mi. NNE of Rocky Bottom: RRM-s.  
 2.6 mi. NNE of Rocky Bottom: RRM 3140.  
 2.7 mi. NE of US Route 178, on Sassafras Mtn. road: ChM CA2498.  
 2.9 mi. NNE of Rocky Bottom: RRM-s.  
 3 mi. S of Rocky Bottom: NCSM 38752–38754.  
 4.9 mi. S of Rocky Bottom: NCSM 31484.  
 1 mi. W of Rocky Bottom: NCSM 38715.  
 1.2 mi. N of County Road 100 on US Hwy. 178: GMNH 29281.  
 2.6 mi. N of SC Route 11, on US Hwy. 178: RRM 3121.  
 2.8 mi. N of SC Route 11, on US Hwy. 178: RRM 3122.  
 4.5 mi. N of SC Route 11, on US Hwy. 178: RRM-s.  
 4.8 mi. N of SC Route 11, on US Hwy. 178: RRM 3123.  
 6.1 mi. N of SC Route 11, on US Hwy. 178: RRM 3124.  
 On US Route 178 near state line: GMNH 20654–20659.  
 6.5 mi. S of state line on US Route 178: GMNH 17121–17122.  
 11 mi. N of Pickens, by US Route 178: CM 131639–131642, CM 131644–  
 131646, CM 133119–133123, CM 135860.  
 13.3 mi. NNW of Pickens: UF14005–14006.  
 17 mi. NNW of Pickens: UMMZ 98613.  
 Table Rock State Park: ChM CA3562–CA3564.  
 0.5 mi. NW of SC Route 11, on County Road 143: NCSM 64091.  
 1.7 mi. N of SC Route 11, on County Road 143: NCSM 64093–64094.  
 1 mi. S of SC Route 11, on SC Route 133: NCSM 64090.  
 1 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1322.  
 Near Shady Grove Junction (Nine Times) and Shady Grove Baptist Church:  
 CUSC 1203.

### *Desmognathus ocoee*

#### Oconee County:

- 1.3 mi. W of SC Route 130 at small waterfall on County Road 413: CUSC 914,  
 CUSC 916, CUSC 1197, CUSC 1498; USNM 271916–272019.  
 1.1 mi. E of SC Route 107, on County Road 413: MCZ A-94426–94454.  
 Jocassee: ChM 53.169.8, ChM 54.2.13, ChM 54.21.8, ChM 54.35.55, ChM  
 54.214.8, ChM CA1820–CA1826; CM 133463–133468; FMNH 89476–  
 89480; GMNH 18773–18775, GMNH 18783, GMNH 20281–20284; MVZ

52717–52718, MVZ 52762–52779; NCSM 39505; UF 782, UF 1642, UF 6912, UF 6986; UMMZ 97735, UMMZ 137162–137164, UMMZ 137183, UMMZ 138306.

0.3 mi. E of Jocassee: ChM CA2695.

1 mi. N of Jocassee: UMMZ 97728.

1.2 mi. NE of Jocassee: ChM CA1709–CA1715.

1.4 mi. E of Jocassee: ChM CA2646–CA2667.

1.4 mi. N of Jocassee: ChM 54.214.5.

2 mi. WNW of Jocassee: NCSM 39743.

2 mi. W of Jocassee: GMNH 18768–18769.

11.1 mi. NW of Jocassee: ChM CA1716–1724.

Near Jocassee, S of Whitewater River bridge: USNM 186703, USNM 190667.

Spring W of Whitewater River bridge at Camp Jocassee: ChM CA1703–CA1708, ChM CA2687–CA2693.

Jocassee Valley, adjacent to Whitewater River: NCSM 39718–39720, NCSM 39746–39766.

Thompson River Gorge, between Coley Creek and NC state line: FMNH 246540–246544.

0.6 mi. S of NC state line, on SC Route 130: NCSM 58634–58636.

6.1 mi. N of Salem, on SC Route 130: NCSM 39721.

#### Pickens County:

11 mi. N of Pickens, by US Route 178: CM 131643.

13.3 mi. NNW of Pickens: UF14007–14009; UMMZ 98607.

17 mi. NNW of Pickens: UMMZ 98612.

Sassafras Mtn.: ChM CA419–CA421.

1.1 mi. below summit of Sassafras Mtn.: ChM 54.43.8.

3–4 mi. below summit of Sassafras Mtn.: CU 3611B.

Rocky Bottom: ChM CA21–CA22, ChM 29.158.34, ChM 35.141.9.

1 mi. S of Rocky Bottom: AUM 17788–17790.

3 mi. S of Rocky Bottom at Oolenoy River: NCSM 39509.

1 mi. W of Rocky Bottom: NCSM 39700.

Stream crossing “old” SC Route 11, 0.4 mi. E of Keowee River Bridge: NCSM 39699, NCSM 39740–39742.

5 mi. E of Jocassee: CM 15804.

Table Rock State Park: ChM CA345–CA346, ChM CA482–CA491, ChM CA2694.

7.7 mi. N of junction with US Route 178, on SC Route 11: RRM 3155–3156.

US Route 178 near state line: GMNH 20382–20383, GMNH 23479–23527, GMNH 23595–23738.

1.2 mi. N of County Road 100 on US Route 178: GMNH 29282.

0.5 mi. N of jct. of SC Route 288, on US Route 178: GMNH 18777–18782.

0.5 mi. S of Shady Gove Junction (Nine Times): NCSM 64157.

#### *Desmognathus quadramaculatus*

##### Oconee County:

1.3 mi. W of SC Route 130, at small falls on County Road 413: CUSC 917; RRM 3107.

County Road 413: ChM CA3407–CA3411.

0.6 mi. E of SC Route 107, on County Road 413: USNM 276140–276145.

Jocassee: ChM 53.169.7, ChM 54.21.6, ChM 54.32.29, ChM 54.2.12, ChM 54.35.63, ChM 54.131.31, ChM 54.159.34, ChM 54.214.7, ChM CA2051–CA2053, ChM CA2054–CA2064; ChM CA2496; CU 4257; GMNH 14806; KU 54755; MVZ 52832–52835, MVZ 52894; NCSM 290, NCSM 40565, NCSM 40536; UMMZ 136827, UMMZ 136893–136899, UMMZ 137165–137168.

Whitewater River near Camp Jocassee: UMMZ 193841–193844.

Camp Jocassee: CM 134023; NCSM 58380.

1 mi. N of Jocassee: UMMZ 97726.

1.2 mi. NE of Jocassee: ChM CA1366–CA1374, ChM CA2046.

1.4 mi. E of Jocassee: ChM CA1427–CA1432, ChM CA1434–CA1435.

Ravines near Jocassee: UMMZ 97736.

1.4 mi. N of Jocassee: ChM 54.214.4.

2 mi. W of Jocassee: GMNH 14982–14985.

2 mi. WNW of Jocassee: NCSM 40585.

11.1 mi. NW of Jocassee: ChM CA1400–CA1410, ChM CA2044 –CA2045.

Spring W of Whitewater River bridge at Camp Jocassee: ChM CA1344–CA1359, ChM CA1436–CA1459, ChM CA2047.

0.6 mi. S of NC state line, on SC Route 130: NCSM 40529.

7.2 mi. N of Salem, on SC Route 130: NCSM 40574–40575.

9.6 mi. N of Salem, on SC Route 130: NCSM 40522–40523.

10.7 mi. N of Salem on SC Route 130: NCSM 40525.

Bear Camp Creek, between Lower Falls and Horsepasture River: NCSM 40530.

#### Pickens County:

Stream crossing “old” SC Route 11, 0.4 mi. E Keowee River Bridge: NCSM 40524, NCSM 40535.

10.9 mi. E of Jocassee: ChM CA1426.

0.5 mi. SSW of US Route 178, on County Road 100: CUSC 1191.

3.2 mi. W of Shady Grove Junction (Nine Times): NCSM 40524, NCSM 40535.

Rocky Bottom: ChM CA1, ChM 29.158.30, ChM 30.173.7, ChM 35.141.14; UMMZ 136812–136813, UMMZ 136888–136892.

4.9 mi. S of Rocky Bottom: NCSM 31485.

3 mi. S of Rocky Bottom, along Oolenoy River: NCSM 40527.

1 mi. S of Rocky Bottom: AUM 17296–17297, AUM 17728.

1 mi. W of Rocky Bottom: NCSM 40646–40649.

1 mi. NE of Rock Bottom: ChM 55.58.6.

1.1 mi. below summit of Sassafras Mtn.: ChM 54.43.7.

3–4 mi. below summit of Sassafras Mtn.: CU 3611E.

4 mi. below summit of Sassafras Mtn.: CU 3612.

Abner Creek, near Rocky Bottom: NCSM 61854.

6.5 mi. S of state line on US Route 178: GMNH 14072–14082.

11 mi. N of Pickens, by US Route 178: CM 131647, CM 134024–134027.

13.8 mi. N of Pickens on US Route 178: ChM CA1433.

2.5 mi. N of SC Route 11, on US Route 178: RRM 3120.

13.3 mi. NNW of Pickens: UF14004.

0.5 mi. N of SC Route 11, on County Road 143: NCSM 64160.

Laurel Fork Creek: CUSC 729.

Table Rock State Park: ChM CA339–CA342, ChM CA477–CA481, ChM CA1460, ChM CA1901–CA1910, ChM CA1958, ChM CA2043, ChM CA2497, ChM CA3565–CA3568.

*Eurycea guttolineata*

## Oconee County:

Jocassee: ChM 27.144.1, ChM 27.144.14, ChM CA2709–CA2710; FMNH 45916; UMMZ 138305.

0.8 mi. NW of Jocassee: AUM 17549–17550.

1.9 mi. NW of Jocassee: ChM 53.169.3.

1.4 mi. N of Jocassee: ChM 54.214.1.

Jocassee Valley, adjacent to Whitewater River: NCSM 35691–35695, NCSM 35927; UMMZ 137185.

Bank of Horsepasture River, just above Toxaway River: NCSM 35810–35815.

Spring W of Whitewater River bridge at Camp Jocassee: ChM CA2703–CA2706.

Whitewater River, 1.5 mi. upstream from Camp Jocassee: NCSM 35732.

4.6 mi. S jct. County Road 413 on SC Route 130: CUSC 1504.

## Pickens County:

4.3 mi. E of Jocassee: ChM CA2716.

5 mi. E of Jocassee: CM 15803.

17 mi. NNW of Pickens: UMMZ 98605.

Rocky Bottom: ChM 35.141.8.

0.3 mi. NNE of Rocky Bottom: NCSM 31487.

Table Rock State Park: ChM CA363, ChM CA2637–CA2638, ChM CA2642, ChM CA2645, ChM 49.31.15, ChM 53.92.7.

2.3 mi. E of US Route 178, on SC Route 11: ChM CA2643.

2.5 mi. E of US Route 178, on SC Route 11: ChM CA2644.

1.3 mi. NW of SC Route 11, on County Road 143: NCSM 64069.

Near Shady Grove Junction (Nine Times) and Shady Grove Baptist Church: CUSC 1204.

0.7 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1292.

1.5 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: RRM 3094.

2 mi. S of SC Route 11, on SC Route 133: CUSC 1205.

*Eurycea wilderae*

## Oconee County:

Ravines near Jocassee: UMMZ 97738.

Jocassee: ChM 27.144.9, ChM 54.2.10, ChM CA2619–CA2622; FMNH 45912; UF 783, UF 1621; UMMZ 109162.

Just north of Jocassee, near Whitewater River: NCSM 37976.

1.4 mi. N of Jocassee: ChM 54.214.2.

Near Jocassee, S of Whitewater River bridge: USNM 186704–186705.

Jocassee Valley, north side of Whitewater River: FMNH 246653; NCSM 37954, NCSM 37971–37972.

Jocassee Valley, adjacent to Whitewater River: NCSM 37967.

Devil's Fork State Park near picnic area: CUSC 1196.

2.3–10.4 mi. N of Salem: UMMZ 136587.

4.8 mi. N of Salem: ChM 53.179.28.

Whitewater River near Camp Jocassee: UMMZ 193977–193980.

## Pickens County:

1.4 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1308.

0.7 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1419.

0.9 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1309.

1 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1413.

- 1.2 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1404, CUSC 1411.
- 1.4 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1406.
- 3.7 mi. NE of Shady Grove Junction (Nine Times) at Little Eastatoe Creek: AUM 32142.
- 4.6 mi. S of SC Route 11, on SC Route 133: CUSC 1412.
- County Road 100 (Cleo Chapman Road) at bridge over Eastatoee Creek: NCSM 61858.
- Eastatoee Creek, 3.1 mi. E of Eastatoee Community: AUM 21964.
- Abner Creek, near Rocky Bottom: NCSM 61855.
- Rocky Bottom: ChM 35.141.11, ChM 52.67.17.
- 10 mi. NNW of Pickens: UMMZ 98615.
- 11.3 mi. N of Pickens: ChM 54.35.39.
- Table Rock State Park: ChM CA364–CA365, ChM CA468 –CA469.

### *Gyrinophilus porphyriticus*

#### Oconee County:

- Jocassee: ChM CA3519; NCSM 42227–42229, NCSM 42696–42697; UMMZ 109179.
- 0.8 mi. NW of Jocassee: AUM 18809.
- 2 mi. W of Jocassee: GMNH 13016.
- 0.7 mi. S of Jocassee: ChM 54.35.16.
- 1 mi. S of Jocassee: ChM 53.179.22.
- Jocassee Valley, near Lower Whitewater River: NCSM 42607.
- Spring W of Whitewater River bridge at Camp Jocassee: ChM CA3522–CA3523.
- Small spring near Camp Jocassee: UMMZ 194102.
- Wright Creek Station, N of Jocassee: AUM 19037.
- 0.5 mi. S of NC state line, on SC Route 130: NCSM 42625.
- 1 mi. S of NC state line, on SC Route 130: CUSC 6.
- Coon Branch Natural Area, below Lower Whitewater Falls: RRM-p.
- 1 mi. W of SC Route 130, on County Road 413: RRM-p.
- 1.3 mi. W of SC Route 130, on County Road 413 at small waterfall: AMNH 100038–100040.
- 1.6 mi. E of SC Route 107, on County Road 413: RRM 2800.
- Near jct. of County Road 413 and SC Route 107: AMNH 100041–100042; RRM 3057.
- 0.7 mi. S of County Road 413, on SC Route 107: RRM-p.
- 2.9 mi. S of County Road 413, on SC Route 130: RRM-p.
- 5.2 mi. S of County Road 413, on SC Route 130: RRM-p.
- 6.2 mi. N of SC Route 11, on SC Route 130: RRM-s

#### Pickens County:

- 3.5 mi. NE of Jocassee: ChM 54.35.4.
- 4.9 mi. NE of Jocassee: ChM 54.35.11.
- 5.6 mi. NE of Jocassee: ChM 54.35.42.
- 10.9 mi. NE of Jocassee: ChM 54.35.27.
- Laurel Fork Creek: CUSC 687, CUSC 728.
- Summit of Sassafras Mtn.: ChM 52.67.12; GMNH 29269.
- 1.1 mi. below summit of Sassafras Mtn.: ChM 54.43.6.
- 4 mi. below summit of Sassafras Mtn.: CU 3614.
- 0.1 mi. NNE of Rocky Bottom: RRM 3053.

- 0.6 mi. NNE of Rocky Bottom: RRM-p.  
 0.8 mi. NNE of Rocky Bottom: RRM 3055.  
 0.9 mi. NNE of Rocky Bottom: RRM 3050.  
 1.5 mi. NNE of Rocky Bottom: RRM 3046.  
 1.7 mi. NNE of Rocky Bottom: RRM 3048.  
 1.9 mi. NNE of Rocky Bottom: RRM 3058.  
 2.1 mi. NNE of Rocky Bottom: RRM-s.  
 2.6 mi. NNE of Rocky Bottom: RRM 3133–3134.  
 2.7 mi. NNE of Rocky Bottom: RRM 3054.  
 2.8 mi. NNE of Rocky Bottom: RRM 3135.  
 2.9 mi. NNE of Rocky Bottom: RRM-p.  
 2.95 mi. NNE of Rocky Bottom: RRM 3136.  
 3 mi. NNE of Rocky Bottom: RRM-p.  
 Rocky Bottom: RRM-p.  
 0.7 mi. S of Rocky Bottom: RRM 3056.  
 1.1 mi. S of Rocky Bottom: RRM-p.  
 0.5 mi. N jct. of SC Route 288 and US Route 178: GMNH 13034–13035, GMNH 13067.  
 11 mi. N of Pickens, by US Route 178: CM 134880.  
 3 mi. N of SC Route 11, on US Route 178: RRM-s.  
 0.2 mi. S of SC Route 11, on SC Route 133: CUSC 53.  
 1.3 mi. S of SC Route 11, on SC Route 133: AMNH 100029.  
 1.6 mi. NW of SC Route 11, on County Road 143: RRM-p.  
 1.7 mi. NW of SC Route 11, on County Road 143: RRM-p.  
 Table Rock State Park: ChM CA467.  
 0.5 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 54.  
 3.5 mi. N of SC Route 183, near first bridge on SC Route 133: CUSC 57.  
 3.3 mi. N of SC Route 183, on SC Route 133: CUSC 1294.  
 3 mi. N of SC Route 183, on SC Route 133: AMNH 100028.  
 5.8 mi. N of SC Route 183, on SC Route 133: RRM-p.

### *Hemidactylum scutatum*

Pickens County:

- 1.05 mi. W of Shady Grove Junction (Nine Times): CUSC 49.

### *Notophthalmus viridescens*

Oconee County:

- Jocassee: ChM 54.21.5; UMMZ 138304.  
 Near Jocassee, S of Whitewater River bridge: USNM 190669.  
 Pond at Camp Jocassee: GMNH 7865–7874.  
 0.8 mi. NW of Jocassee: ChM 54.35.52.  
 1.6 mi. NW of Jocassee: ChM 54.35.3.  
 Ravines near Jocassee: UMMZ 97734.  
 0.4 mi. W of SC Route 130, on County Road 413: CUSC 1212.

Pickens County:

- 2.1 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1293.  
 0.51 mi. N of SC Route 11, on County Road 143: PM-s.  
 Rocky Bottom: ChM 35.141.2.  
 Near Rocky Bottom: NCSM 20520–20521.  
 0.4 mi. N of Rocky Bottom: ChM 53.154.22.

- 0.8 mi. NNE of Rocky Bottom: USNM 183818–183820.  
 2 mi. N of Rocky Bottom on US Route 178: ChM CA1917.  
 2.1 mi. NE of Rocky Bottom: ChM 54.21.13.  
 4.1 mi. NE of US Route 178, on County Road 199: ChM CA1553.  
 2.6 mi. S of Rocky Bottom: ChM 53.154.21.  
 4.9 mi. S of Rocky Bottom: NCSM 20518–20519.  
 Upper Cane Creek: RRM-s  
 13.3 mi. NNW of Pickens: UF14001.  
 Sassafras Mtn.: ChM 50.46.16, ChM CA422; NCSM 20522.  
 Sassafras Mtn., 0.8 mi. W of fire tower: USNM 184763, USNM 463688, USNM 463690–463722, USNM 463804–463805.  
 Table Rock State Park: ChM CA349–CA362, ChM CA1552, ChM CA1554–CA1555, ChM CA1612, ChM CA3569–CA3571, ChM 50.46.15.  
 0.5 mi. E of Table Rock Cove: ChM 49.31.16.

### *Plethodon metcalfi*

#### Oconee County:

- Jocassee: AMNH 51980, AMNH 56215–56234; ChM 53.146.5, ChM 53.161.5, ChM 53.161.6, ChM 53.169.12, ChM 53.179.44, ChM 54.2.9, ChM 54.21.1, ChM 54.32.6, ChM 54.35.53, ChM 54.35.62, ChM 54.67.1, ChM 54.104.11, ChM 54.131.10, ChM 54.131.11, ChM 54.159.31, ChM 60.64.217, ChM CA2375–CA2390, ChM CA3073–CA3074; FMNH 47707, FMNH 55682–55688, FMNH 55692, FMNH 92416, FMNH 92766; GMNH 12895–12899, GMNH 12920; KU 56154, KU 68064–68065; MCZ A-28481–28489; MPM 24561–24562; MVZ 168163; NCSM 13580, NCSM 45923, NCSM 45922; UMMZ 108896, UMMZ 138308–138311; USNM 73849, USNM 489585–489588, USNM 499122–499124.  
 1.5 mi. above Jocassee Bridge: UMMZ 136406–136407.  
 Ravines W of Whitewater River, near Jocassee: CU 4740; NCSM 13586; UMMZ 97731–97732, UMMZ 136401.  
 Near Jocassee, S of Whitewater River bridge: USNM 169637, USNM 186701, USNM 188754–188756, USNM 190662–190665.  
 1 mi. N of Jocassee: UMMZ 97729–97730.  
 0.9 mi. NW of Jocassee: ChM 54.32.5.  
 1.4 mi. NW of Jocassee: ChM 54.35.14.  
 1.5 mi. NW of Jocassee: ChM 54.32.4, ChM 54.67.2, ChM 54.104.13, ChM 54.104.15, ChM 56.27.4.  
 1.8 mi. NW of Jocassee: AUM 11694–11721, AUM 18373.  
 1.9 mi. NW of Jocassee: ChM 53.169.13.  
 2 mi. NW of Jocassee: ChM 54.35.45.  
 1.1 mi. N of Jocassee Club: ChM 53.169.14.  
 Jocassee Valley, beside Whitewater River: AUM 19041–19046.  
 Jocassee Dam Site: AUM 17883.  
 1.4 mi. E of Jocassee: ChM CA1360, ChM CA3075.  
 1.2 mi. NE of Jocassee: ChM CA1361–CA1365.  
 2.3 mi. N of SC Route 11, on SC Route 130: NCSM 64117.  
 3.2 mi. N of SC Route 11, on SC Route 130: NCSM 64113.  
 4.5 mi. N of SC Route 11, on SC Route 130: RRM-s.  
 4.6 mi. N of SC Route 11, on SC Route 130: RRM-s.  
 4.8 mi. N of SC Route 11, on SC Route 130: CUSC 1324; NCSM 11267.

- 5 mi. N of SC Route 11, on SC Route 130: CUSC 1395.  
 5.3 mi. N of SC Route 11, on SC Route 130: NCSM 64121.  
 5.5 mi. N of SC Route 11, on SC Route 130: CUSC 1507; NCSM 64120.  
 5.6 mi. N of SC Route 11, on SC Route 130: CUSC 1397–1398; NCSM 64122.  
 5.8 mi. N of SC Route 11, on SC Route 130: NCSM 64124; RRM-s.  
 6.1 mi. N. of SC Route 11, on SC Route 130: CUSC 1323; NCSM 64118, NCSM 64128.  
 7.3 mi. N of SC Route 11, on SC Route 130: NCSM 64119.  
 7.7 mi. N of SC Route 11, on SC Route 130: CUSC 1508.  
 8.4 mi. N of SC Route 11, on SC Route 130: CUSC 1396.  
 8.7 mi. N of SC Route 11, on SC Route 130: RRM-s.  
 6–8 mi. NNW of Salem: USNM 464370–464380.  
 8.7 mi. N of Salem: UMMZ 136583–136585.  
 2.3–10.4 mi. N of Salem: UMMZ 136606, UMMZ 183402.  
 9 mi. NNW of Salem, on SC Route 130: NCSM 45780.  
 5.2 mi. S jct. County Road 413, on SC Route 130: NCSM 64112.  
 1 mi. W of SC Route 130, on County Road 413: CUSC 1506; NCSM 64115.  
 1.3 mi. W of SC Route 130, on County Road 413: RRM-s.  
 2.1 mi. S jct. County Road 413, on SC Route 130: CUSC 19.  
 3.9 mi. S jct. County Road 413, on SC Route 130: CUSC 1509.  
 1.6 mi. W of SC Route 130, on County Road 413: CUSC 1326.  
 Lower Whitewater Falls: UMMZ 142916.

#### Pickens County:

- 5 mi. E of Jocassee: CM 15805–15806, CM 15808–15809.  
 Shady Grove Junction (Nine Times): CUSC 1138.  
 Rocky Bottom: ChM 29.158.35; USNM 78188.  
 1 mi. W of Rocky Bottom: NCSM 45782.  
 2.3 mi. SW of Rocky Bottom: FUZC 226–228.  
 4.9 mi. S of Rocky Bottom: NCSM 20513–20515.  
 3.3 mi. N of Rocky Bottom: ChM 53.154.23, ChM 53.179.5.  
 0.2 mi. NE of Rocky Bottom: NCSM 31486.  
 0.17 mi. NE of Rocky Bottom: NCSM 20511–20512.  
 0.8 mi. NNE of Rock Bottom: USNM 183815.  
 1.6 mi. NE of Rocky Bottom: GMNH 25130–25134.  
 4.4 mi. NNE of Rocky Bottom: NCSM 60433–60442.  
 Sassafras Mtn.: ChM CA423; NCSM 30515, NCSM 60722–60726, NCSM 64123.  
 Sassafras Mtn., 0.8 mi. W of fire tower: USNM 183823–183824, USNM 184742–184761, USNM 188788–188794, USNM 463638–463650, USNM 463655–463687, USNM 463723–463763, USNM 463770–463786, USNM 463788–463803, USNM 463806–463814.  
 Summit of Sassafras Mtn.: ChM 54.43.3, ChM 55.58.4, ChM CA3039–CA3048, ChM CA3050–CA3062, ChM CA3076–CA3086; GMNH 29247–29268, GMNH 29270.  
 0.1 mi. below summit of Sassafras Mtn.: ChM CA3049.  
 0.4 mi. below summit of Sassafras Mtn.: ChM CA3063–CA3072.  
 0.8 mi. below summit of Sassafras Mtn.: ChM CA3031–CA3038.  
 0.9 mi. below summit of Sassafras Mtn.: GMNH 29271–29280.  
 1 mi. below summit of Sassafras Mtn.: CU 3608.  
 4 mi. below summit of Sassafras Mtn.: CU 3607.

1.2 mi. N County Road 100 on US Route 178: GMNH 29283–29297.

Table Rock State Park: ChM CA343–CA344, ChM CA473–CA476, ChM CA1465–CA1487.

County Road 143, near jct. of County Road 100: NCSM 64126.

0.4 mi. NW of SC Route 11, on County Road 143: RRM-s.

1.7 mi. NW of SC Route 11, on County Road 143: NCSM 64125.

1.8 mi. NW of SC Route 11, on County Road 143: RRM-s.

2 mi. NW of SC Route 11, on County Road 143: RRM-s.

### *Plethodon serratus*

See species account for locality information.

### *Plethodon teyahalee*

Oconee County:

4.5 mi. N of Salem: ChM 53.179.29.

4.9 mi. N of Salem: ChM 53.179.20.

5.9 mi. N of Salem: ChM 53.179.42.

8 mi. N of Salem: NCSM 44756.

8.7 mi. N of Salem: UMMZ 136576–136582.

9.7 mi. N of Salem: ChM 53.179.7.

3.5 mi. N of SC Route 11, on SC Route 130: RRM-s.

7.9 mi. N of SC Route 11, on SC Route 130: NCSM 64129.

Devil's Fork State Park, near picnic area: CUSC 1200.

South shore of Lake Jocassee: CUSC 1211.

Jocassee: AMNH 57980; ChM 27.144.2, ChM 53.169.9, ChM 53.179.24, ChM 53.179.43, ChM 54.32.7, ChM 54.35.64, ChM 54.104.12; FMNH 45950, FMNH 92623; GMNH 12214; MVZ 53226–53227; UMMZ 109122; USNM 489589–489590.

Jocassee, W side of Whitewater River: UMMZ 194252.

Near Jocassee, S of Whitewater River bridge: USNM 188757.

0.9 mi. NW of Jocassee: ChM 54.32.8.

2 mi. NW of Jocassee: ChM 54.35.44.

Ravines near Jocassee: UMMZ 97733.

Jocassee Valley, near Camp Jocassee: FMNH 247059.

Jocassee Valley, near lower Whitewater River: NCSM 44766–44768.

Thompson River Gorge, between Coley Creek and NC state line: FMNH 247266–247269.

1 mi. W of SC Route 130, on County Road 413: NCSM 64131–64132.

1 mi. E of SC Route 107, on County Road 413: GMNH 25137–25161.

1.2 mi. S jct. County Road 413, on SC Route 107: GMNH 29198–29200.

0.8 mi. S of jct. County Road 413 on SC Route 130: NCSM 64130.

Pickens County:

5 mi. E of Jocassee: CM 15807.

0.8 mi. N of SC Route 183, on SC Route 133: CUSC 1314.

5.1 mi. N of SC Route 183, on SC Route 133: CUSC 1422.

0.1 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1311.

0.4 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1312.

0.5 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1420.

1.8 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1423.

0.5 mi. N of SC Route 11, on US Route 178: NCSM 44763.

- 0.6 mi. SW jct. County Road 143 and County Road 100: NCSM 64184.  
0.6 mi. NW of SC Route 11, on County Road 143: NCSM 64187.  
2.4 mi. NW of SC Route 11, on County Road 143: NCSM 64185–64186.  
Rocky Bottom: ChM 30.173.8, ChM 35.141.3.  
1.6 mi. NE Rocky Bottom: GMNH 25135–25136, GMNH 29304–29310.  
2 mi. N of Rocky Bottom: ChM 50.46.14.  
2.4 mi. SW of Rocky Bottom: FUZC 640.  
4.9 mi. S of Rocky Bottom: NCSM 20516–20517.  
Summit of Sassafras Mtn.: ChM 54.43.4, ChM CA2374, GMNH 29246.  
Sassafras Mtn., 0.8 mi. W of fire tower: USNM 183821–183822, USNM  
463651–463654, USNM 463787.  
Laurel Valley Creek at US Route 178: GMNH 29298–29302.  
US Route 178 near state line: GMNH 12148.  
12.2 mi. N of Pickens: ChM 54.35.40.  
Table Rock State Park: ChM CA2373, ChM 50.46.13, ChM 53.154.24.

### *Pseudotriton montanus*

#### Oconee County:

- Jocassee: UMMZ 137184.  
1.4 mi. N of Jocassee: ChM 54.214.3.  
3.7 mi. N of Salem: ChM 53.179.18.

#### Pickens County:

- Rocky Bottom: ChM 35.141.6, ChM 35.141.13.  
1.4 mi. W of Shady Grove Junction (Nine Times): RRM-p  
0.4 mi. N of SC Route 183, on SC Route 133: RRM-p

### *Pseudotriton ruber*

#### Oconee County:

- Lake Jocassee Picnic Area: CUSC 1199.  
Jocassee: CM 39553; FMNH 48050; MVZ 53316; UMMZ 109178, UMMZ  
136595–136597, UMMZ 136600, UMMZ 136657, UMMZ 137161, UMMZ  
138312, UMMZ 138986–138998.  
0.6 mi. E of Jocassee: ChM CA3548.  
0.9 mi. E of Jocassee: ChM CA3549–CA3550.  
0.25 mi. NW of Jocassee: AUM 17293.  
0.8 mi. NW of Jocassee: AUM 17294, AUM 17547–17548, AUM 19107.  
1.5 mi. NW of Jocassee: ChM 54.104.14.  
0.6 mi. S of Jocassee: ChM 54.35.46.  
0.7 mi. S of Jocassee: ChM 53.179.23.  
1.1 mi. S of Jocassee: ChM 54.35.18.  
1.8 mi. S of Jocassee: ChM 53.179.21.  
2.5 mi. S of Jocassee: ChM 54.35.15.  
2.6 mi. S of Jocassee: ChM 54.35.5.  
Jocassee Dam Site: AUM 11922–11923, AUM 17906.  
Jocassee Valley, lower Whitewater River: NCSM 43661–43667, NCSM 43670–  
43671.  
2 mi. N of Camp Jocassee: AUM 16532–16533.  
Horsepasture River, 0.5 mi. upstream from jct. with Toxaway River: NCSM  
43669.  
W of Lake Keowee, on SC Route 11: AMNH 100080

- 2.2 mi. N of SC Route 11, on SC Route 130: RRM 2809.
- 2.3 mi. N of SC Route 11, on SC Route 130: RRM 2958.
- 2.4 mi. N of SC Route 11, on SC Route 130: RRM 2829.
- 2.8 mi. N of SC Route 11, on SC Route 130: RRM 3035.
- 3.1 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 3.4 mi. N of SC Route 11, on SC Route 130: RRM 2970.
- 3.9 mi. N of SC Route 11, on SC Route 130: RRM 2830.
- 4.4 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 5 mi. N of SC Route 11, on SC Route 130: RRM 3052.
- 5.2 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 6.4 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 7.1 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 7.9 mi. N of SC Route 11, on SC Route 130: RRM-s.
- 8.1 mi. N of SC Route 11, on SC Route 130: RRM-s.
- 8.2 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 9.6 mi. N of SC Route 11, on SC Route 130: RRM-p.
- 2.1 mi. N of Salem: ChM 53.179.17.
- 4.6 mi. N of Salem, on SC Route 130: ChM CA3541.
- 4.8 mi. N of Salem: ChM 53.179.19.
- 9.5 mi. N. of Salem: UMMZ 136599.
- 2 mi. S jct. of County Road 413, on SC Route 130: RRM-s.
- 4.7 mi. S jct. of County Road 413, on SC Route 130: RRM-s.
- 5.8 mi. S jct. of County Road 413, on SC Route 130: CUSC 1489.
- 0.2 mi. W of SC Route 130, on County Road 413: RRM 3036.
- 0.4 mi. W of SC Route 130, on County Road 413: CUSC 1486.
- 0.5 mi. W of SC Route 130, on County Road 413: RRM-p.
- 0.6 mi. W of SC Route 130, on County Road 413: RRM-p.
- 1.3 mi. W of SC Route 130, on County Road 413: RRM-s.
- 0.6 mi. E of SC Route 107, on County Road 413: RRM 3037.
- 1.9 mi. W of SC Route 130, on County Road 413: RRM 2925.
- 0.6 mi. S of NC state line on SC Route 130: NCSM 43721.

#### Pickens County:

- 5 mi. E of Jocassee: ChM CA3546–CA3547; CM 15802.
- 2.6 mi. NE of Jocassee: ChM 54.35.41.
- 2.9 mi. NE of Jocassee: ChM 54.35.43.
- 8.6 mi. NE of Jocassee: ChM 54.35.10.
- 11.8 mi. NE of Jocassee: ChM 54.35.13.
- 0.2 mi. NW of SC Route 11, on County Road 143: RRM 3044.
- 0.4 mi. NW of SC Route 11, on County Road 143: RRM 2975.
- 2.3 mi. NW of SC Route 11, on County Road 143: RRM 2976.
- 2.4 mi. NW of SC Route 11, on County Road 143: RRM 3045.
- 0.2 mi. E of County Road 143, on County Road 100: RRM 3043.
- 1.7 mi. S of SC Route 11, on County Road 49: RRM 3025.
- 2 mi. S of SC Route 11, on County Road 49: RRM 2819, RRM 2824.
- E of Lake Keowee, on SC Route 11: AMNH 100076.
- Shady Grove Junction (Nine Times): RRM 2818.
- 0.4 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1490.
- 0.6 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: RRM 2820–2821, RRM 2825.
- 1.7 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1481; RRM 3042.

Near Shady Grove Junction (Nine Times) and Shady Grove Baptist Church:  
CUSC 1202.

1.6 mi. N of SC Route 183, on SC Route 133: AMNH 100070.

0.3 mi. N jct. of Crowe Creek Road, on SC Route 133: RRM 2810.

1.1 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: RRM 2826.

1.3 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1488.

1.8 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1316.

3 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 1315.

3.4 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: AMNH 100065.

Between Shady Grove Junction (Nine Times) and SC Route 183: AMNH 100075.

0.3 mi. S of SC Route 11, on SC Route 133: AMNH 100073; CUSC 1318.

0.5 mi. S of SC Route 11, on SC Route 133: CUSC 1317.

0.8 mi. S of SC Route 11, on SC Route 133: AMNH 100072.

2.3 mi. S of SC Route 11, on SC Route 133: AMNH 100071.

US Route 178 near state line: GMNH 21472.

6.5 mi. S of state line on US Route 178: GMNH 13273.

Rocky Bottom: UMMZ 136656.

3 mi. S of Rocky Bottom on US Route 178: ChM CA3206.

1.4 mi. NE of US Route 178, on County Road 199: ChM CA3543.

3.4 mi. E of US Route 178, on County Road 199: ChM CA3545.

1.2 mi. NNE of Rocky Bottom: RRM-s.

1.5 mi. NNE of Rocky Bottom: RRM-s.

1.7 mi. NNE of Rocky Bottom: RRM 3132.

1.8 mi. NNE of Rocky Bottom: RRM 3049.

4 mi. NE of US Route 178, on County Road 199: ChM CA3544.

Summit of Sassafras Mtn.: GMNH 29245.

Sassafras Mtn.: ChM 53.133.21; CU 3615.

Sassafras Mtn., 0.8 mi. W of fire tower: USNM 184762, USNM 463689.

4 mi. below summit of Sassafras Mtn.: CU 3613

1 mi. W of Rocky Bottom: NCSM 43713.

2 mi. S of Rocky Bottom: UMMZ 130107–130108.

13.3 mi. NNW of Pickens: UF14002.

0.5 mi. N jct. of SC Route 288 and US Route 178: GMNH 13274–13276.

### *Acris crepitans*

Pickens County:

Table Rock State Park: ChM 50.46.11, ChM CA842–CA846, ChM CA847–CA851.

### *Bufo americanus*

Oconee County:

Howard Creek, off County Road 413: CUSC 731.

2.3 mi. S jct. of County Road 413, on SC Route 130: CUSC 1336.

15 mi. NW of Salem: AUM 13877–13878.

Jocassee: ChM CA518; MVZ 53330–53343.

1.6 mi. NW of Jocassee: ChM 54.35.2.

5 mi. W of Jocassee: CM 17740.

0.3 mi. E of Jocassee: ChM CA3599.

- 0.6 mi. E of Jocassee: ChM CA519.
- 0.9 mi. NE of Jocassee: ChM CA952–CA954.
- 1.2 mi. E of Jocassee: ChM CA520.
- 1.4 mi. E of Jocassee: ChM CA3597–CA3598.
- 2.5 mi. S of Jocassee: ChM 54.35.1.
- 2 mi. N of Camp Jocassee: AUM 16511.
- 2.4 mi. W of Tamassee: NCSM 47695.

Pickens County:

- Sassafras Mtn.: ChM 53.133.22.
- Summit of Sassafras Mtn.: CU 3606.
- 0.4 mi. below summit of Sassafras Mtn.: ChM CA508.
- 1.3 mi. NE of US Route 178, on County Road 199: ChM CA893–CA895.
- Rocky Bottom: ChM 35.141.15.
- 1.3 mi. N of SC Route 11, on US Route 178: RRM-s.
- 4.6 mi. N of SC Route 11, on US Route 178: RRM-s.
- 4.7 mi. N of SC Route 11, on US Route 178: RRM-s.
- 5.4 mi. N of SC Route 11, on US Route 178: RRM-s.
- 1.2 mi. S of SC Route 11, on SC Route 133: CUSC 1338.
- Table Rock State Park: ChM CA510, ChM CA896–CA897, ChM 50.46.9.
- 0.3 mi. S of Shady Grove Junction (Nine Times), on SC Route 133: CUSC 335.
- 10.1 mi. NNW of Pickens: UMMZ 98612.

*Bufo fowleri*

Oconee County:

- Jocassee: AMNH 51985, AMNH 102464–102466; ChM CA904–CA907; FMNH 45873; GMNH 2542; MVZ 67564.
- 1.2 mi. E of Jocassee: ChM CA521.
- 1.2 mi. NE of Jocassee: ChM CA955.
- 0.8 mi. NW of Jocassee: AUM 18111.
- 5 mi. W of Jocassee: CM 17741–17744.
- Jocassee, to 1.2 mi. SW: USNM 168455–168471.
- Crossroads Mtn., between Horsepasture and Toxaway Rivers: NCSM 55368–55369.

Pickens County:

- 4.7 mi. NE of Jocassee: MPM 23943.
- 11 mi. NE of Jocassee: MPM 23944.
- Rocky Bottom: ChM 35.141.15.
- Table Rock State Park: ChM CA881–CA882, ChM CA885.

*Bufo terrestris*

See species account for locality information.

*Gastrophryne carolinensis*

See species account for locality information.

*Hyla chrysoscelis*

Oconee County:

- Jocassee: ChM CA985.
- 1.3 mi. WNW of Jocassee: USNM 168472–168473.
- On SC Route 11: CUSC 473.

## Pickens County:

1.8 mi. N of SC Route 11 on US Route 178: RRM 3130.

Rocky Bottom: ChM 29.158.11.

Sassafras Mtn.: ChM CA680.

Eastatoee Valley: RRM-p.

*Pseudacris crucifer*

## Oconee County:

0.5 mi. W of SC Route 130, on County Road 413: CUSC 1345.

Jocassee: MVZ 53605-53611.

0.8 mi. NW of Jocassee: AUM 17554-17562.

## Pickens County:

1.4 mi. NNE of Rocky Bottom: RRM-s.

2.7 mi. NNE of Rocky Bottom: RRM 3137.

5.4 mi. N of SC Route 11, on US Route 178: RRM 3143.

0.5-1 mi. S of Shady Grove Junction (Nine Times), on SC Route 133: CUSC 336.

*Pseudacris triseriata*

## Oconee County:

Walhalla: ChM 53.179.34.

5.5 mi. W of Walhalla at Isaqueena Falls: AUM 17653-17655.

1 mi. E of Seneca: CUSC 1386.

3.3 mi. N of Seneca: ChM 54.32.33.

W of Clemson: CUSC 449; UMMZ 133417.

## Pickens County:

Todd's Creek, N of Clemson: CUSC 2110.

5 mi. NW of Clemson: UMMZ 136844.

2.3 mi. SSW of Six Mile: AUM 16580.

Table Rock State Park: ChM 50.46.10.

*Rana catesbeiana*

## Oconee County:

Jocassee: ChM 53.179.27, ChM CA874-CA880; MVZ 53673; UMMZ 138313-138315.

0.8 mi. NW of Jocassee: AUM 36634.

Jocassee Valley, NE bank of Whitewater River: NCSM 52108.

0.5 mi. S of jct. Whitewater and Toxaway rivers, in pond: NCSM 58219.

## Pickens County:

Rocky Bottom: ChM 35.141.18.

2.5 mi. NNE of Rocky Bottom: RRM 3138.

Sassafras Mtn.: CU 3605.

Eastatoee Creek: FUZC 96, FUZC 105.

17 mi. NNW of Pickens: UMMZ 98624.

Table Rock State Park: ChM CA336-CA337, ChM CA869-CA872, ChM CA991-CA993.

*Rana clamitans*

## Oconee County:

Jocassee: FMNH 45863; MVZ 53644; UF 6968.

0.4 mi. E of Jocassee: ChM CA3586.

1.7 mi. E of Jocassee: ChM CA533.

0.5 mi. S. of jct. Whitewater and Toxaway rivers, in pond: NCSM 52305.

Pickens County:

6.5 mi. S of state line on US Route 178: GMNH 7241.

Rocky Bottom: ChM 35.141.17.

US Route 178 and County Road 199: AUM 14109.

Table Rock State Park: ChM CA338, ChM CA3588–CA3590, ChM CA3593–CA3595.

On County Road 100, 1 mi. S of jct. with County Road 92: RRM 3088.

Eatastoe Community: CUSC 955.

2.2 mi. N of County Road 143, on County Road 100: RRM 3087.

***Rana palustris***

Oconee County:

Jocassee: ChM 53.179.26, ChM 68.25.2.

0.8 mi. NE of Jocassee: ChM 54.35.51.

Confluence of Howard and Corbin creeks, W of Lake Jocassee: JG-s.

Pickens County:

9.3 mi. N of Pickens: ChM 54.35.20.

11.8 mi. N of Pickens: ChM 54.35.48.

1 mi. N of SC Route 11, on US Route 178: NCSM 64165.

2.2 mi. NE of US Route 178, on County Road 199: ChM 68.25.6.

Table Rock State Park: ChM 49.32.9, ChM 68.25.3-5.

Eatastoe Community: CUSC 1209.

1.7 mi. N of County Road 143, on County Road 100: RRM 3086.

7.3 mi. NE of Jocassee: ChM 54.35.30.

8.1 mi. NE of Jocassee: ChM 54.35.25.

8.6 mi. NE of Jocassee: ChM 54.35.17.

8.8 mi. NE of Jocassee: ChM 54.35.50.

12.7 mi. NE of Jocassee: ChM 54.35.19.

***Rana sphenoccephala***

Oconee County:

Jocassee: ChM 54.35.59.

Pickens County:

Rocky Bottom: ChM 30.173.10.

***Rana sylvatica***

Oconee County:

1 mi. W of SC Route 130, below small waterfall on County Road 413: CUSC 1705.

0.25 mi. S of Bad Creek, on SC Route 130: CUSC 1329.

2 mi. S jct. of County Road 413, on SC Route 130: CUSC 1330.

8.1 mi. N of SC Route 11, on SC Route 130: CUSC 1333.

Pickens County:

1.5 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 465.

1.6 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 338.

1.8 mi. W of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 56, CUSC 342.

2.2 mi. NE of Shady Grove Junction (Nine Times), on County Road 49: CUSC 1332.

- 5.7 mi. S of Shady Grove Junction (Nine Times) on SC Route 133: CUSC 337.  
1.1 mi. NW of SC Hwy 11, on County Road 143: CUSC 1193.  
County Road 100 at Eastatoee Creek: CUSC 1194.  
0.4 mi. W of US Route 178, on County Road 100: CUSC 1331.  
Jct. US Route 178 and SC Route 11: CUSC 1195.  
5 mi. N, thence 9.7 mi. NW of Pickens: ChM 54.35.21.  
0.3 mi. N of SC Route 11, on US Route 178: RRM 3098.  
0.8 mi. N of SC Route 11, on US Route 178: RRM 3099.  
2.5 mi. N of SC Route 11, on US Route 178: RRM-s.  
2.8 mi. N of SC Route 11, on US Route 178: RRM-s.  
4.7 mi. N of SC Route 11, on US Route 178: RRM-s.  
5.1 mi. N of SC Route 11, on US Route 178: RRM-s.  
5.4 mi. N of SC Route 11, on US Route 178: RRM 3119.  
6.1 mi. N of SC Route 11, on US Route 178: RRM-s.  
6.7 mi. N of SC Route 11, on US Route 178: RRM-s.  
6.8 mi. N of SC Route 11, on US Route 178: RRM-s.  
Rocky Bottom: RRM 3131.  
1.4 mi. NNE of Rocky Bottom: RRM 3144.

***Scaphiopus holbrooki***

See species account for locality information.

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