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GOOD NEWS AT LAST: CONSERVATION STATUS OF THE SEEPAGE SALAMANDER (*DESMOGNATHUS AENEUS*)

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***Abstract.*—The Seepage Salamander (*Desmognathus aeneus*) is a tiny, terrestrial plethodontid with a patchy distribution across the Blue Ridge, Coastal Plain, and Piedmont physiographic provinces of the Southeastern United States. The species is of conservation concern or protected in most states within its limited geographic range, and anecdotal reports of population declines or extirpation have prompted a recent petition for federal listing under the Endangered Species Act. To assess the current status of the Seepage Salamander, we conducted 136 surveys at 101 sites, including 46 historical collection localities. Our survey results provide rare good news in this era of declining amphibian populations: we confirmed the presence of Seepage Salamanders at 78% of the historical locations surveyed and discovered new populations at 35 additional localities. Several of these new sites were within 5 km of historical collection sites where the species was not found. Encounter rates (salamanders/person hour searching) were comparable to encounter rates reported by a previous researcher in 1971. Although this species appears to be common and secure over the majority of its range (i.e., the Blue Ridge physiographic province of Georgia and North Carolina), encounter rates were lower and they occupied fewer sites across the Piedmont and Coastal Plain of Alabama and western Georgia, suggesting conservation may be warranted within these regions.**

Key Words.—amphibian declines; Appalachian Mountains; endangered species; inventory; Plethodontidae

INTRODUCTION

Given the alarming levels of declines in amphibian populations worldwide (Lips 1998; Alford and Richards 1999; Pounds et al. 1999; Kiesecker et al. 2001; Blaustein et al. 2003), baseline information on the current population status of amphibian species becomes increasingly important, particularly for those rare species whose conservation status is in question. A case in point is the Seepage Salamander (*Desmognathus aeneus*), a plethodontid salamander of the southeastern United States described in 1947 (Brown and Bishop 1947). Since its description, additional information has accrued regarding its natural history (Harrison 1967; Jones 1981; Hining and Bruce 2005); however, it ranks among the more poorly known salamander species in the USA (see brief account in Petranka 1998), and data concerning population trends are limited to anecdotal information and museum records.

The state conservation listings of the Seepage Salamander reflect this lack of knowledge. For example, within its limited range in North Carolina, *D. aeneus* is listed as "significantly rare," with a concern for population trends (LeGrand and Hall 1999); in Georgia, it is a species of special concern (Jensen et al. 2008). In South Carolina and Tennessee, it is a peripheral species, having been found at only a handful of localities in either state, and is therefore not listed in South Carolina (South Carolina DNR 2012; available from: http://www.dnr.sc.gov. [Accessed 30 July 2012]), and listed as "in need of management" in Tennessee (Niemiller and Reynolds 2012). In Alabama, it is a protected species, with a ranking of "high conservation concern" (Folkerts 2004). Recently, Adler (2011) reported that *D. aeneus* has been extirpated from its type locality (Cherokee County, North Carolina), further suggesting that this species may be experiencing population declines. Due to its relatively limited geographical distribution, presumed stringent habitat requirements, and possible threats imposed by anthropogenic habitat modification, *D. aeneus* was recently petitioned for federal protection under the Endangered Species Act (Center for Biological Diversity 2010; Petition to list 404 aquatic, riparian, and wetland species from the Southeastern United States as threatened or endangered under the endangered species act. Available from: http://www.biologicaldiversity.org [Accessed 20 July 2012]).

To address the dearth of information regarding the current conservation status of *D. aeneus*, we conducted a series of field surveys to locate populations at both historic and new localities throughout the known geographic range of the species. Our goal was to provide a thorough baseline study, estimate population persistence by determining presence or absence of *D. aeneus* at historical locations, and quantify and describe

in detail microhabitats that *D. aeneus* occupy to assist future investigations. This project complements a larger research effort designed to examine the phylogeography and molecular phylogenetics of *D. aeneus* (Beamer and Graham, unpubl. data). Here, we report rare good news regarding the conservation trends of a priority amphibian species: populations of *D. aeneus* not only persist but appear to be relatively abundant at a significant portion of their historical localities. This finding, in conjunction with the discovery of several new populations, suggests that *D. aeneus* is reasonably secure over most of its range.

MATERIALS AND METHODS

Study species.—Brown and Bishop (1947) described *Desmognathus aeneus* based on 12 specimens collected "near a small seepage branch 100 feet north of Peachtree Creek, ½ mile S.S.E. of Peachtree, Cherokee County, North Carolina." A second similar form, *D. chermocki*, was described from Alabama soon thereafter (Bishop and Valentine 1950). However, its taxonomic validity was short-lived, and *D. chermocki* was relegated to subspecific status (*D. aeneus chermocki*) just two years later (Chermock 1952). This taxon was later subsumed to the synonymy of *D. aeneus* entirely, and no subspecific designations are currently recognized (Petranka 1998). Available species accounts for *D. aeneus* (e.g., Mount 1975; Harrison 2005; Jensen et al. 2008) generally note the spotty distribution of the salamander (though local abundance) across its geographic distribution. It ranges from extreme southwestern North Carolina and southeastern Tennessee southwest through northern Georgia, largely within the Blue Ridge physiographic province (Petranka 1998); with possible disjunct populations inhabiting the Coastal Plain physiographic province (Fall Line Hills) of west-central Alabama and the Piedmont physiographic province (Talladega Uplands) of east-central Alabama (Mount 1975).

Surveys.—We conducted surveys of historical and additional, non-historical sites mostly during 2008–2012 (Appendix 1). Surveys involved one to three people searching hardwood forests and stream or seepage margins; our efforts included turning coarse woody debris, raking leaf litter, and searching through moss clumps. Surveys generally lasted one hour, and *D. aeneus* were found at most sites with suitable habitat within 15 min. Some sites received multiple visits to ensure thorough sampling over multiple years/seasons (Appendix 1). For a subset of sites (n = 50), we recorded the precise time of search effort (Table 1). Because most localities were surveyed only once, we simply counted but did not mark salamanders, although we took tail tips from 1–6 salamanders at each site for genetic analyses (unpubl. data), and we collected voucher specimens at new locations representing substantial range extensions. In each state where we conducted surveys, we consulted museum records to secure historical locality data (Auburn University Herpetological Collections [AUM], American Museum of Natural History, Georgia Museum of Natural History, North Carolina Museum of Natural Sciences, the U.S. National Museum, University of California Museum of Vertebrate Zoology, University of Alabama Museum of Natural History and the California Academy of Sciences), and we made attempts to re-survey most of these sites. After becoming familiar with the preferred habitats of *D. aeneus*, we began searching additional, non-historical localities on the basis of appropriate habitat availability.

Detailed collection records were available for two historical localities in Alabama (AUM records), which allowed us to compare historical versus current encounter rates for these particular sites. On 23 June 1971, Donovan and Folkerts (1972) collected a large series (n = 70) of *D. aeneus* from these localities for

TABLE 1. Survey effort and encounter rates for *Desmognathus aeneus* from historical collections by G. W. Folkerts (June 1971) and from a subsample of sites surveyed during the current study. The asterisk means sites were also included within the "GA/AL Piedmont and Coastal Plain" sample below.

Study	Number of Salamanders Encountered	Search Time (person hour)	Number of Salamanders/ Person Hour	Number of Sites
Folkerts' Alabama sites				
Folkerts 1971	70	6.0	11.7	2
this study 2012*	8	2.0	4.0	2
Other sites surveyed, this study				
GA/AL Piedmont and Coastal Plain	30	14.0	2.1	12
GA Blue Ridge	103	7.2	14.3	19
NC Blue Ridge	330	30.0	11.0	19
Total	463	51.2	9.0[1]	50

[1]Average is for the Number of Salamanders / Person Hour

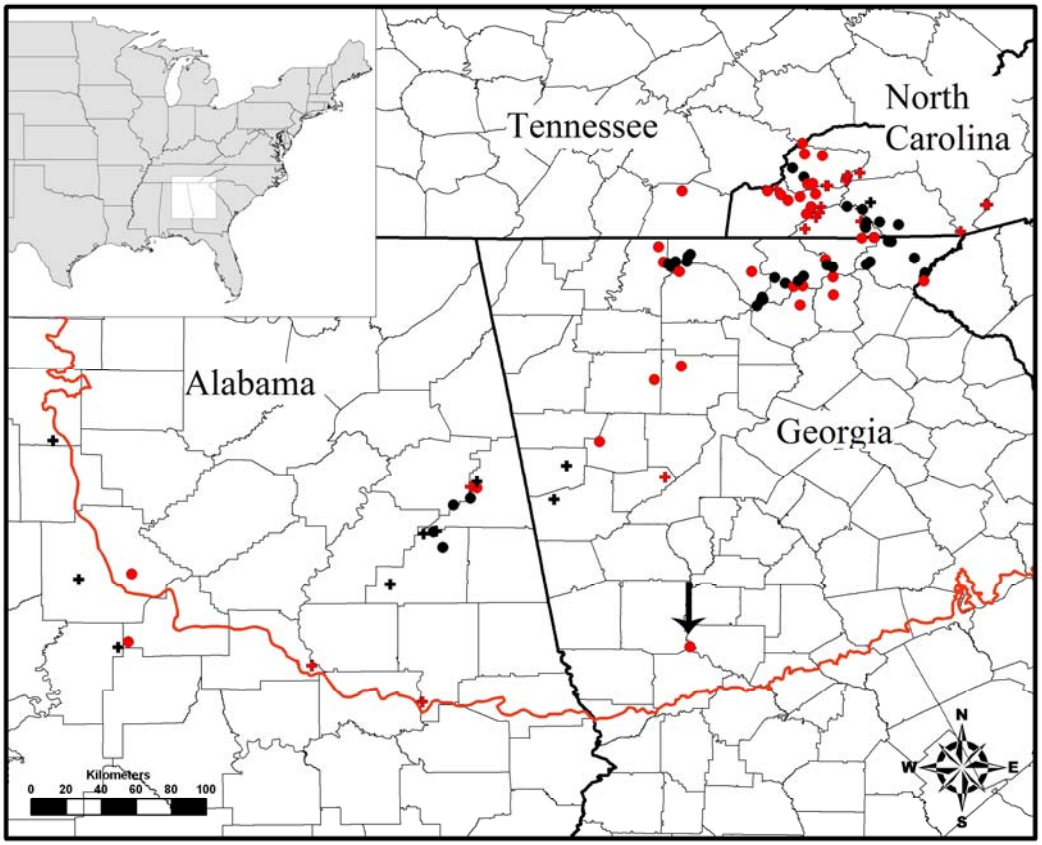

FIGURE 1. Map of localities surveyed for *Desmognathus aeneus*. Inset: location of surveyed sites within the United States. Black dots = historical sites where salamanders were observed; black crosses = historical sites where salamanders were not observed; red dots = additional, non-historical sites where salamanders were observed; red crosses = additional, non-historical sites where salamanders were not observed. The Fall Line is indicated by the red line, and a population > 100 km from any known site discovered during this research is indicated by an arrow. The clusters of dots on the right (northern Georgia, Tennessee, South and North Carolina), middle (western Georgia and eastern Alabama), and left sections of the figure (central Alabama) are respectively within the Blue Ridge, Piedmont, and Coastal Plain physiographic provinces.

a dietary analysis. Their records included information on the time period and number of collectors involved, from which we calculated encounter rates (number of salamanders/person hour; Table 1). On 20 June 2012, we revisited the two Alabama localities to document current encounter rates for salamanders at these sites. For these surveys and others conducted during June 2012 (n = 24 sites), we noted the specific microhabitat where we encountered each individual *D. aeneus* (e.g., moss mats, leaf litter, or coarse woody debris).

RESULTS

We conducted 136 surveys across all states where *D. aeneus* is known to occur for an approximate total of 100 person hours involving 101 localities; 46 historical and 55 additional non-historical sites (Fig. 1; Appendix 1). We located *D. aeneus* at 36 of the 46 (78%) historical locations surveyed. Precise locations for many historical sites were not available and limited access to private property precluded visits to others. As a result, some of the sites representing historical localities were possibly up to 0.5 km away from the original collection site. In addition, we found previously undocumented populations at 35 of 55 non-historical localities. Several of these previously undocumented populations (n = 9), including one within 3 km of the type locality, were searched due to the availability of suitable habitat near un-accessible or degraded historical locations where we did not find the species. Although it is difficult to compare past encounter rates to current encounter rates, we include these data (Table 1), which reveal general trends and may serve as a useful point of comparison for future researchers. For example, in 1971, Folkerts and

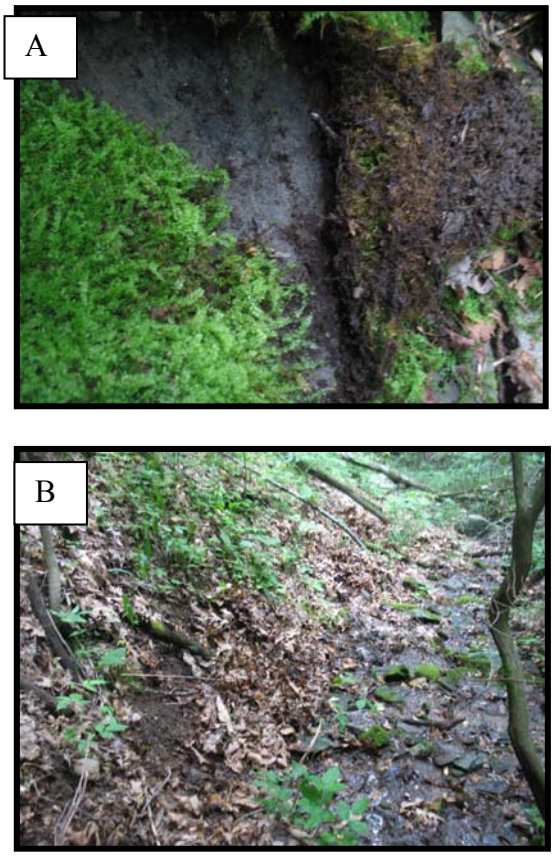

FIGURE 2. Microhabitats typically occupied by *Desmoganthus aeneus*. (A) Mosses (*Thuidium*, *Mnium*, and *Sphagnum* spp.; Petranka 1998) form carpet-like mats on rocks and clumps of vegetation in moist habitats of the Blue Ridge and seepages in other physiographic regions. The clumps are occupied by larvae, juveniles, adults, and nesting *D. aeneus*. Photograph illustrates the first author peeling back a moss mat; Seepage Salamanders are found under or within the moss mats in this fashion. (B). Leaf litter, especially along slopes or ravines of first order streams and seepages, can be raked to find seepage salamanders. Evidence of hand raking by the first author is evident in the bottom left of the photograph; a small first order stream with gravel/cobble substrate can be seen on the right. (Photographed by Sean P. Graham).

Donovan found an average of 11.66 *D. aeneus*/person hour searching, whereas we only found four/person hour at the same two sites in 2012. However, our encounter rates for 50 sites sampled in June 2012 (9.2/person hour) were similar to those of Folkerts and Donovan. Most salamanders found in June 2012 (n = 112 salamanders; n = 24 sites) were located under moss mats (45%) or leaf litter (46%), with fewer found under coarse woody debris (9%; Fig. 2).

DISCUSSION

We located *D. aeneus* at or near most of the historical sites resurveyed and at several new locations, including sites representing range extensions > 100 km (Graham 2009; see arrow in Fig. 1), as well as locations that filled distribution gaps > 100 km (Graham and Felix 2010). Although our encounter rates were lower for the only two sites for which historical encounter rates were available, overall, our encounter rates were comparable to those of Donovan and Folkerts (1972), who collected Seepage Salamanders 41 years ago (mean 11.7 salamanders per/person hour; n = 2 sites; AUM collection records). Our findings do not suggest a range-wide population decline nor does the status of this species appear to have changed historically.

Our results contrast with similar inventories of other eastern U.S. species thought to be in decline, including Southern Dusky Salamanders (*D. auriculatus*; Dodd 1998; Means and Travis 2007; Graham et al. 2010), Green Salamanders (*Aneides aeneus*; Corser 2001), and Hellbenders (*Cryptobranchus alleganiensis*; Graham et al. 2011). Unfortunately, these species can no longer be found at multiple historical locations and were characterized by extremely low encounter rates (in some cases, 90–100% of historical localities were devoid of salamanders). A recent inventory of Great Smoky Mountains National Park, which includes populations of *D. aeneus*, similarly demonstrated enigmatic declines in *Plethodon* assemblages (Caruso and Lips 2012), suggesting that even species considered to be common may in fact be in decline. These declines mirror dozens of other cases of enigmatic amphibian declines in sites throughout the world (Wake and Vrendenburg 2008), and the current status of *D. aeneus* is thus encouraging news. Because populations of *D. aeneus* appear to be numerous and secure, the species probably does not warrant listing under the Endangered Species Act, and therefore it should not distract funds or resources from more deserving species. These data can also be used to inform state status listings and similarly adjust conservation effort by state agencies.

Prior to this study, state natural heritage program status listings for this species were based on anecdotal impressions of rarity and data from museum collections, and due to the recent petition for listing under the Endangered Species Act, one might have anticipated our surveys to indicate population declines and the need for increased conservation concern. Our results do not support such a conclusion, and provide these states with quantitative data on the distribution and status of these salamanders with which they can modify or better inform their status designations. For example, *D. aeneus* is recognized as vulnerable in North Carolina (e.g., S3, defined as 21–100 extant populations, with a restricted distribution, i.e., southwestern North Carolina; North Carolina Natural Heritage Program 2010. Available from: http://www.ncdenr.gov. [Accessed 20 September 2012]). Our results support this assessment, while adding several new localities to the state. This suggests

that *D. aeneus* does not require elevated conservation concern (e.g., the status does not need to change to imperiled, or S2). Although we suspect that *D. aeneus* may maintain over 100 populations in North Carolina (depending on how one chose to define a population), the limited distribution of the salamander would preclude its designation as secure under the current criteria (S4; 100–1000 populations and widespread across the state).

In Georgia, *D. aeneus* has the same status listing as North Carolina (Georgia Natural Heritage Program 2011, Available from: http://www.georgia_wildlife.org [Accessed 20 September 2012]); however, the discovery of a number of additional populations makes it probable that over 100 populations occur in Georgia, and suggests that *D. aeneus* is more widespread in the Piedmont region of Georgia than previously assumed (Fig. 1). Considering this point and the local abundance of the species, the Georgia Natural Heritage Program may be justified in lowering the status of this species to secure (S4). In Alabama, fewer than 20 locations were known from this species historically (Mount 1975). Folkerts (2004) suggested that half of these locations no longer support the species, and therefore its status was elevated to imperiled (S2; 5–20 populations under identified threats; Alabama Natural Heritage Program 2011, Available from: http://www.alnhp.org [Accessed 20 September 2012]). Our data support this designation, but fortunately do not suggest that further elevation (e.g., to endangered, or S1) is required. The range of this species in Tennessee and South Carolina is limited to only a few counties each. Accordingly, only a handful of sites in these states were sampled. However, given the amount of suitable habitat available for the species in those states, and the fact that we located as many undocumented sites as historical locations, the status of *D. aeneus* in these states is likely either secure or unchanged.

There appears to be a habitat distinction between populations of *D. aeneus* in the northeastern portion of the species' range and the apparently disjunct populations to the southwest. In the Blue Ridge physiographic province, *D. aeneus* is more terrestrial, occupying the interface between the leaf/leaf mold layer and underlying soil, under rocks or coarse woody debris, or beneath moss mats on boulders in heavily shaded hardwood or mixed forests (Jones 1981; Bruce 1991; Harrison 1992; 2005; this study). They appear to be ubiquitous in hardwood forests throughout northern Georgia and southwestern North Carolina, and our average encounter rates (up to 14.25 salamanders/person hour; Table 1) indicate they maintain fairly high local population densities in this region. In the Blue Ridge of northern Georgia, we documented persistence of *D. aeneus* at all of the revisited historical collection localities. Conversely, the salamander's distribution is more fragmented across the Piedmont and Coastal Plain provinces in western Georgia and northern Alabama, where populations are more closely associated with low-lying seepage habitats (Graham and Smith 2010). However, *D. aeneus* still appears to be associated with microhabitats used in the Blue Ridge. Our encounter rates at southwestern sites were much lower, and we failed to locate salamanders at a higher percentage of historical localities (only 5 of 13 localities; 38%). This pattern may reflect the influence of historical factors (e.g., the southwestern sites may represent relict populations), a hypothesis we intend to test using molecular phylogeographic approaches.

To conclude, *D. aeneus* appears to be common in the Blue Ridge province of southwestern North Carolina and northern Georgia, and therefore its conservation status appears to be secure over the largest portion of its distribution. Our general impression is that most ravines, seepages, streams, and moist hardwood forests of the region contain this species. Outside the Blue Ridge, salamanders are more closely associated with permanent seepage sites, which possibly provide requisite moisture levels and microhabitats characteristic of higher elevation sites. Although *D. aeneus* still occupy many sites in western Georgia and Alabama, their conservation status is more tenuous there, and the current protection and status afforded the Alabama populations is probably warranted. Fortunately, most sites occupied by *D. aeneus* in Alabama are within Talladega National Forest, a large tract of forested public land that probably contains additional undiscovered populations. To better understand the habitat requirements and distribution of *D. aeneus* in this region, comparisons of the biotic and physical characteristics of occupied versus unoccupied seepages should be made. Such an approach should entail 1) modeling topographic features associated with high quality seepages (as a tool for locating additional populations), 2) quantifying microhabitat variables of occupied sites, and 3) identifying plant and animal associates at occupied sites to determine if they can be used as reliable indicator species of high quality seepages. With these findings, additional surveys should be conducted to better determine distribution patterns across the southwestern portion of the species' range.

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APPENDIX 1. Locations of sites surveyed (n = 101), number of times and dates that sites were visited, and total number of *Desmognathus aeneus* encountered within each site. Historical localities are indicated with an asterisk. Relatively coarse locality data are provided as a conservation measure, however, researchers interested in the precise data can acquire it with permission from the corresponding author or the curator of Auburn University Museum, where it has been accessioned as a database.

county	state	number of surveys	*D. aeneus* encountered	Date(s) surveyed	lat	long	voucher
Clay*	AL	2	13	25-Nov-2009, 21-Jun-2012	33.39	-85.77	
Clay*	AL	1	0	25-Nov-2009	33.20	-86.05	
Chilton	AL	2	0	7-Oct-2010, 19-Jan-2011	32.78	-86.45	
Cleburne	AL	2	1	28-Nov-2009, 23-Feb-2012	33.70	-85.60	
Cleburne	AL	1	0	23-Feb-2012	33.70	-85.63	
Cleburne*	AL	1	0	25-Nov-2009	33.46	-85.87	
Cleburne*	AL	1	0	21-Jun-2012	33.73	-85.60	
Cleburne*	AL	4	4	11-Mar-2010, 26-Nov-2009, 23-Feb-2012, 21-Jun-2012	33.64	-85.63	
Cleburne*	AL	3	5	25-Jan-2009, 25-Nov-2009, 20-Jun-2012	33.47	-85.82	
Cleburne*	AL	2	2	11-Mar-2010, 23-Feb-2012	33.61	-85.72	
Cleburne*	AL	2	0	25-Jan-2009, 25-Nov-2009	33.48	-85.81	
Hale*	AL	3	0	20-Sep-2008, 25-Jan-2011, 9-May-2011	32.88	-87.44	
Marion*	AL	2	0	25-Jul-2010, 26-Jan-2011	33.94	-87.78	
Tallapoosa	AL	5	0	26-Mar-2010, 8-Apr-2010, 13-Sep-2010, 26-Apr-2011, 16-Feb-2012	32.60	-85.88	
Tuscaloosa	AL	2	8	5-Mar-2006, 9-Jun-2008	33.26	-87.37	
Tuscaloosa*	AL	1	0	26-Jan-2011	33.23	-87.65	
Bartow	GA	1	4	12-Mar-2010	34.26	-84.69	AUM 38307-38310
Carroll*	GA	1	0	21-Jun-2012	33.64	-85.20	
Cherokee	GA	2	5	12-Mar-2010, 24-Mar-2010	34.33	-84.55	
Douglas	GA	1	0	19-Mar-2010	33.75	-84.63	
Fannin	GA	1	2	20-Oct-2009	34.86	-84.62	
Fannin	GA	1	6	19-Oct-2009	34.81	-84.19	
Fannin*	GA	1	4	22-Jun-2012	34.86	-84.58	
Fannin*	GA	1	4	22-Jun-2012	34.87	-84.52	
Fannin*	GA	1	4	22-Jun-2012	34.89	-84.51	
Fannin*	GA	1	3	22-Jun-2012	34.90	-84.50	
Gilmer	GA	2	11	19-Oct-2009	34.83	-84.59	

Gilmer	GA	1	11	19-Oct-2009	34.81	-84.56	
Gilmer*	GA	1	6	22-Jun-2012	34.84	-84.60	
Gilmer*	GA	1	6	22-Jun-2012	34.86	-84.58	
Gilmer*	GA	1	3	22-Jun-2012	34.85	-84.62	
Haralson*	GA	1	0	12-Mar-2010	33.81	-85.14	
Lumpkin	GA	2	3	20-Oct-2009	34.64	-83.94	
Lumpkin*	GA	1	7	23-Jun-2012	34.64	-84.16	
Murray	GA	1	1	19-Oct-2009	34.94	-84.67	
Murray	GA	1	7	19-Oct-2009	34.86	-84.64	
Paulding	GA	1	2	12-Mar-2010	33.94	-84.97	AUM 38311-38313
Rabun*	GA	1	1	20-Oct-2009	34.85	-83.60	
Rabun*	GA	1	3	20-Oct-2009	34.88	-83.35	
Rabun*	GA	1	1	23-Jun-2012	34.86	-83.58	
Rabun*	GA	1	2	23-Jun-2012	34.97	-83.49	
Rabun*	GA	1	2	23-Jun-2012	34.97	-83.47	
Talbot	GA	1	1	15-Feb-2009	32.88	-84.50	AUM 37837
Towns	GA	1	6	15-Nov-2009	34.88	-83.81	
Towns	GA	1	3	30-Apr-2003	34.99	-83.56	
Towns	GA	1	5	4-Aug-2004	34.99	-83.62	
Towns*	GA	1	1	20-Oct-2009	34.99	-83.56	
Towns*	GA	1	3	23-Jun-2012	34.84	-83.77	
Union	GA	1	6	13-Nov-2009	34.74	-83.93	
Union	GA	2	3	18-Nov-2000, 23-Sep-2001	34.74	-83.97	
Union*	GA	3	13	18-Nov-2005, 20-Oct-2009, 15-Nov-2009	34.75	-84.01	
Union*	GA	2	6	18-Nov-2005, 23-Jun-2012	34.76	-83.95	
Union*	GA	1	6	23-Jun-2012	34.66	-84.14	
Union*	GA	1	6	23-Jun-2012	34.67	-84.13	
Union*	GA	1	6	23-Jun-2012	34.68	-84.13	
Union*	GA	1	7	23-Jun-2012	34.78	-84.07	
Union*	GA	1	14	23-Jun-2012	34.79	-83.92	
Union*	GA	1	7	23-Jun-2012	34.85	-83.80	
White	GA	1	1	12-Nov-2010	34.79	-83.77	
White	GA	2	5	23-Feb-2008, 20-Oct-2009	34.69	-83.77	
Cherokee	NC	1	0	10-Nov-2009	35.15	-83.83	
Cherokee	NC	1	0	19-Jun-2010	35.24	-84.06	
Cherokee	NC	1	0	20-Jun-2010	35.12	-83.89	
Cherokee	NC	1	6	20-Jun-2010	35.23	-84.11	

Cherokee	NC	1	8	20-Jun-2010	35.21	-84.04
Cherokee	NC	1	6	19-Jun-2010	35.18	-84.00
Cherokee	NC	1	4	19-Jun-2010	35.20	-83.94
Cherokee	NC	1	6	19-Jun-2010	35.21	-83.86
Cherokee	NC	1	1	19-Jun-2010	35.15	-83.88
Cherokee	NC	1	1	20-Jun-2010	35.11	-83.91
Clay	NC	1	0	25-Apr-2010	35.07	-83.63
Clay	NC	1	0	20-Jun-2010	35.03	-83.91
Clay	NC	1	0	20-Jun-2010	35.10	-83.86
Clay	NC	1	0	20-Jun-2010	35.12	-83.84
Clay*	NC	1	4	25-Apr-2010	35.15	-83.70
Clay*	NC	1	3	20-Jun-2010	35.07	-83.60
Clay*	NC	1	4	25-Apr-2010	35.04	-83.60
Graham	NC	1	1	25-Sep-2010	35.41	-83.82
Graham	NC	1	0	12-Nov-2009	35.30	-83.70
Graham	NC	1	0	12-Nov-2009	35.28	-83.70
Graham	NC	1	0	12-Nov-2009	35.31	-83.69
Graham	NC	1	0	11-Nov-2009	35.26	-83.81
Graham	NC	1	0	11-Nov-2009	35.26	-83.80
Graham	NC	1	5	25-Sep-2010	35.42	-83.92
Graham	NC	1	1	25-Sep-2010	35.26	-83.90
Graham	NC	1	11	25-Sep-2010	35.27	-83.87
Graham*	NC	10	250	7-Jan-1996, 16-May-1998, 28-Aug-2000, 27-May-2003, 14-May-2004, 25-Aug-2005, 9-Sep-2006, 20-Sep-2008, 6-Aug-2009, 25-Sep-2010	35.35	-83.98
Graham*	NC	1	8	25-Sep-2010	35.30	-83.92
Jackson	NC	1	0	24-Apr-2010	35.02	-83.11
Macon*	NC	1	0	24-Apr-2010	35.17	-83.58
Macon*	NC	1	6	25-Apr-2010	35.13	-83.62
Macon*	NC	1	5	24-Apr-2010	35.06	-83.43
Macon*	NC	1	6	21-Sep-2008	35.07	-83.53
Swain	NC	1	0	19-Jun-2010	35.32	-83.63
Transylvania	NC	1	0	24-Apr-2010	35.16	-82.97
Transylvania	NC	1	0	24-Apr-2010	35.16	-82.98
Oconee*	SC	1	1	30-Jul-2012	34.81	-83.30
Oconee	SC	1	6	30-Jul-2012	34.76	-83.30
Blount	TN	1	5	25-Sep-2010	35.48	-83.93
Polk	TN	1	1	7-Nov-2008	35.23	-84.55