Powell Mountain Karst Preserve:

Biological Inventory of Vegetation Communities, Vascular Plants, and Selected Animal Groups

Interim Report
July 2009- October 2009

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For:

The Cave Conservancy of the Virginias

Date:

15 November 2009

Introduction

The Cave Conservancy of the Virginias contracted with the Virginia Department of Conservation and Recreation, Division of Natural Heritage in 2008 to conduct a biological inventory of vegetation communities, vascular plants, and selected animal groups within the Powell Mountain Karst Preserve. The project period began in January 2009 and culminates in a final report summarizing the findings of the inventory due April 2010.

The scope of work set forth in the contract called for a number of tasks to be completed during the contract period including field surveys of bat hibernacula, mist netting, cave invertebrate sampling, general non-cave invertebrate sampling, botanical survey, and vegetation community classification.

This interim report summarizes the progress of field work, and incorporates the results available from surveys and identifications made during the July-October report period. All results will be compiled in the final report due April 2010.

Methods and Results

Natural Community Inventory

No additional field work was conducted by Natural Heritage vegetation ecologists during this report period. Additional analysis of previously collected data will continue and results will be provided in the final report due April 2010.

Botanical Inventory

In addition to field work conducted in May (previously reported), Natural Heritage botanist John Townsend conducted field work June 30, 31, and July 1 as well as 28-29 September, 2009 in order to cover the summer and fall-flowering periods on the PMKP property. A list of all observed plants was recorded, and specimens were collected to verify identifications if field identification was not possible. Final identifications are still pending on some specimens (particularly those not seen in a reproductive state during the surveys), but slightly over 400 vascular plant taxa (species, subspecies, and varieties) are expected to be documented on PMKP property when the list is finalized. A list of these species will be provided in the final report due April 2010.

No additional species of conservation significance have been confirmed on the property. The state-rare shrub *Crataegus mollis* (downy hawthorn; G5/S1) was previously reported from near the opening to Omega Cave.

Sterile specimens of another *Crataegus* collected on the property resemble a taxon on the DCR-DNH rare plant list but it is not known if the plant can be identified without fertile material.

Summer Bat Inventory

In addition to previously reported mist net inventory conducted 9-11 June, mist netting was also conducted during 30-31 June, 22-23 September, and on 22 October. During the 30-31 June and 22-23 September surveys, a single 2 x 6 m net was placed just down-slope of the entrance of Omega Cave, and two additional nets (18 x 18 ft: and 6 m x 9 m) were placed along the road on either side of the camp area. A harp trap was also used during 22-23 September surveys, and the entrance of Omega (Blowing) Cave was sealed off with nylon netting to funnel bats into the harp trap. The harp trap was largely unsuccessful, and few bats were seen actually trying to leave the cave. On 22 October, only two 2 x 6 m nets were set just down-slope of the Omega Cave entrance.

Similar to results reported for early June surveys, the single mist net set just down-slope of the Omega entrance continued to be the most productive. The majority of bats captured at PMKP in this report period were *M. septentrionalis* (32), followed by *P. subflavus* (18), *M. lucifugus* (13), *M. leibii* (4), and a single *E. fuscus*. Table 1 Shows number of bats by species and sex for each survey period including 9-10 June surveys. Bats captured were banded using colored, individually numbered plastic arm bands.

Table 1. Number of bats by species and sex for each mist net survey period , June-October 2009 at PMKP

	Myotis septentrionalis	*Myotis lucifugus*	*Myotis sodalis*	*Myotis leibii*	*Eptesicus fuscus*	*Perimyotis subflavus*
*9-10 June 2009	45 m 1 f	4 m	1 m	5 m	1 m	1 m
30-31 June 2009	9 m	3 m 1 f	0	0	1 escaped	0
22-23 September 2009	12 m 7 f	8 m 1 f	0	3 m	0	12 m 6 f
22 October 2009	4 m	0	0	1 m	0	0
Totals	**60 m 8 f**	**15 m 2 f**	**1 m**	**9 m**	**2**	**13 m 6 f**

m=male f=female
* previously reported

Additional information and tabulated data collected during bat surveys will be submitted with the final report due April 2010.

Cave invertebrate inventory

Invertebrate inventory for cave species was scheduled to begin earlier in spring 2009, however, due to concerns related to the spread of White Nose Syndrome, this work was delayed. Two cave invertebrate surveys were conducted during the first report period, one in Parson's Cave on 27 May, the second in Franklin's Pit on 11 June.

Wil Orndorff, and Bill Balfour conducted an additional survey in Parson's Cave on 20 August, and placed 3 pitfall traps (8 oz. plastic cups) in two different areas of the cave, The pitfalls were baited with cheese and/or canned cat food. The traps were checked on 21 August, and again on 25 August by Chris Hobson, Bil Balfour, and Rocky Parsons. Pitfall traps were removed on 23 September. All specimens captured using this technique were preserved, processed, and will be identified as possible prior to the final report submission.

Among the invertebrate collections were stygobitic flatworms, diplurans, spiders, aquatic isopods (*Caecidotea* sp.), millipeds, and amphipods (*Stygobromus cumberlandus*). Identifications of invertebrates collected are pending expert review, and will be provided in the final report. Additional cave invertebrate surveys are planned for November-February 2010, and the results of those surveys will be reported during subsequent interim reports, or in the final report.

Bat hibernacula survey

Due to concerns over the potential spread of White Nose Syndrome to bats hibernating in caves at PMKP, surveys were postponed. These surveys are scheduled to be performed during the upcoming hibernation season from November 2009-February 2010. Results of these surveys will be provided in the final report due April 2010.

Bird/herp/millipede/butterfly inventory

In addition to previously reported survey results, work continued during June 29-31, July 28-30, August 20-21, 25 August, September 22-23, and October 21-23.

A total of 56 bird species have been recorded to date, including several species of neotropical migrant songbirds, most notably Black-throated Green Warbler, Cerulean Warbler, Worm-eating Warbler, American Redstart, Hooded Warbler, and Black and White Warbler. Baltimore Oriole, Ruby-throated Hummingbird, Acadian Flycatcher, Purple Finch, and Hermit Thrush are among other birds of interest. A full list of bird species encountered at PMKP will accompany the final report.

To date 10 species of salamanders have been documented on site, including the Cumberland salamander (*Plethodon kentucki*), and the watchlisted green salamander (*Aneides aeneus*). The green salamander (G3G4 S3) is typically found on sandstone rock

outcrops, and is known from relatively few sites where it inhabits limestone, including the rock outcrops above Parson's Cave. This species has also been documented on limestone in "The Cedars" area of Lee County, Virginia. Several additional sightings of this species were documented at PMKP from August-October, also in association with Parson's Cave outcrops. A full list of salamanders documented at PMKP will be included in the final report.

Cumberland salamander (*Plethodon kentucki*) from Powell Mountain Karst Preserve, Wise County, Virginia (photo Chris Hobson)

Three species of frogs were reported previously, including spring peeper (*Pseudacris crucifer*), green frog (*Lithobates clamitans*), and gray treefrog (*Hyla chrysocelis*).with two new additions, the wood frog (*Lithobates sylvatica*), and the mountain chorus frog (*Pseudacris brachyphona*), during this report period.

The Mountain chorus frog (*Pseudacris brachyphona*) from
Powell Mountain Karst Preserve, Wise County, Virginia (Photo Steve Roble)

Reptiles documented in the previous interim report included the northern fence lizard (*Sceloporus undulatus hyacinthinus*), eastern box turtle (*Terrapene carolina*), eastern milk snake (*Lampropeltis triangulum triangulum*), eastern garter snake (*Thamnophis sirtalis*), and northern black racer (*Coluber constrictor*). Two additional snake species, the eastern ring-necked snake (*Diadophis punctatus*), and the black rat snake (*Elaphe alleghaniensis*) were documented during this report period. Although local residents have reported seeing both copperhead, and rattlesnake in the area, neither has been observed at PMKP during our surveys.

Collections of the terrestrial millipede fauna have provided some interesting survey results. Along with previously reported millipede species of interest is a find of particular significance, a new, undescribed species of *Brachoria*. This species is known from a single individual collected at PMKP. Dr. Hoffman is examining additional collections from PMKP in hopes of finding additional specimens of this new species, and other species of interest.

A common millipede (*Pseudopolydesmus canadensis*) at the
Powell Mountain Karst Preserve, Wise County, Virginia (photo Steve Roble)

The butterfly fauna of the preserve includes a list of species that will likely grow as a result of our continued examination of specimens collected at PMKP. To date, at least 27 species have been verified, including the Diana fritillary (*Speyeria diana*), Great spangled fritillary (*Speyeria cybele*), Gemmed satyr (*Cyllopsis gemma*), Cloudless sulphur (*Phoebis sennae*) and the Eastern Comma (*Polygonia comma*), all of which were documented during the July-October report period. Additional butterfly specimens will be examined, and any new species verified will be included in the final report.

A newly emerged Henry's Elfin (s) from Powell Mountain Karst Preserve,
Wise County, Virginia (photo Anne Chazal)

In addition to the aforementioned species groups, a list of mammals encountered on the property will be presented in the final report. Many of these will need to be verified by examining skull, pelage, and other characters to verify the species, therefore a full list of species captured to date is not included in this interim report. .

General invertebrate trapping

Various techniques including pitfall traps, sweep netting, black light bucket traps, yellow bowl traps, Malaise trap, and Lingeren funnels (baited with 50% terpentine and 50% ethanol) have been utilized during our surveys. These methods have resulted in the capture of hundreds of specimens of beetles, moths, and other invertebrate taxa. Preliminary examination of the moth captures has resulted in the identification of one watchlisted species (*Psaphida thaxterianus*; G4 S2S4).

Ultraviolet light trap used for invertebrate sampling at
Powell Mountain Karst Preserve, Wise County, Virginia

Although there are no permanent pond habitats, and no major streams on the property, there are several dragonflies and damselflies utilizing roads and trails on the property. The Common whitetail (*Libellula lydia*), Ashy clubtail (*Gomphus lividus*), Common baskettail (*Epitheca cynosura*), Powdered dancer (*Argia moesta*), Common green darner (*Anax junius*), Blue dasher (*Pachydiplax longipennis*), Azure bluet (*Enallagma aspersum*), and an undetermined damselfly have all been recorded on the property. A list of all Odonata documented at PMKP will be provided in the final report.

Roads and trails also provide habitat for several species of predatory tiger beetles, including the common and widespread Six-spotted tiger beetle (*Cicindela sexguttata*), and the nearly flightless One-spotted tiger beetle (*Cicindela unipunctata*) both reported during the previous survey period. One additional species was documented during June-October surveys, the Red-bellied tiger beetle (*Cicindela rufiventris*). Additional tiger beetles may be encountered during examination of specimens collected in pitfall traps. A list of all beetle species captured that can be identified will be provided in the final report..

The invertebrate portion of the inventory is by far the most time consuming non-field part of the inventory, and will require many hours in the laboratory where specimens will be sorted, prepared, and identified in the coming months. Appendix 1 contains a list of invertebrate species identified to date from PMKP by Dr. Richard Hoffman of the

Virginia Museum of Natural History. A full list of identified invertebrate species will be provided in the final report. Some specimens may require additional taxonomic study, and may not be available in time for final report submission.

Acknowledgements

Many thanks to all of the Natural Heritage staff, CCV staff, and volunteers who have helped in setting up, and accomplishing field work conducted so far. Dr. Richard Hoffman and Art Evans have been particularly helpful in processing and identifying the many specimens of invertebrates collected to date. Thanks to the staff at Natural Tunnel State Park for providing accommodations at the Stock Creek Interpretive Center during our surveys. Thanks to Shane Hanlon of USFWS for his assistance with the inventory of Franklin Pit. Thanks to Rocky Parsons for his assistance in Parson's Cave.

Appendix 1. Preliminary list of identified invertebrate taxa, prepared by Dr. Richard Hoffman, Virginia Museum of Natural History

INSECTA

MECOPTERA:

BITTACIDAE:

Bittacus strigosus

Nr Omega Cave, 29-30 2009, Chazal (1)

Hylobittacus apicalis

Nr Omega Cave, 29-30 July 2009, Chazal (1)

Cedar Ridge malaise trap, 10 June-1 July 2009, Hobson et al. (1)

MEROPEIIDAE:

Merope tuber

Franklin Cave pitfall traps, 29-30 July 2009, Chazal

UV trap 2, NW of campground, 29-30 July 2009, Chazal (3)

PLECOPTERA

CHLOROPERLIDAE:

Sweltsa lateralis

UV trap 4, vic. Solomons Seal cave, 29 June-2 July 2009, Hobson et al. (1)

NEUROPTERA

CHRYSOPIDAE:

Chrysopa oculata

UV trap 4, nr Solomons Seal Cave, 26-29 May 2009, Hobson & Townsend (1)

Chrysoperla rufilabris

Cedar Ridge malaise trap, 6-28 April 2009, Hobson & Evans (3)

HEMEROBIIDAE:

Hemerobius stigmaterus Fitch

Cedar Ridge malaise trap, 6-26 April 2009, Evans & Hobson (2)

COLEOPTERA

CARABIDAE:

Scaphinotus (Steniridia) andrewsii germari Chaudoir

Campground site, 22 Sept 2009, S. M. Roble (0/1)

HETEROPTERA

PENTATOMIDAE:

Menecles insertus (Say)

Campground site, 22 Sept 2009, S. M. Roble (0/1)

TRICHOPTERA

HYDROPSYCHIDAE:

Hydropsyche cheilonis

Uv trap 4, nr Solomons Seal Cave, 29 June-2 July 2009, Hobson & Townsend (2) -- 26-29 May 2009, H & T (1)

Hydropsyche slossonae

UV trap 4, nr Solomon's Seal Cave, 26-29 May 2009, Hobson & Townsend (3)

Hydropsyche sparna

UV trap 4, nr Solomons Seal cave, 26-29 May 2009, H & T (7)

RHYACOPHILIDAE:

Rhyacophila carolina

UV trap 4, nr Solomon's Seal Cave, 29 June-2 July 2009, H & T (5)

Rhyacophila glaberrima

UV trap 4, nr Solomon's Sea; Cave, 29 June-2 July 2009, Hobson & Townsend (1)

LIMNEPHILIDAE:

Pseudostenophylax uniformis

Uv trap 1, Cedar Ridge Cave, 26-29 May 2009, H & T (2)

DIPLOPODA

PLATYDESMIDA

ANDROGNATHIDAE

Brachycybe lecontii Wood

Cedar Ridge pitfalls, 28 April-13 May 2009, Hobson & Chazal (1)

CALLIPODIDA

ABACIONIDAE

Abacion magnum (Loomis)

Locality? Pitfalls 6-28-2009, Hobson (1)

Abacion tesselatum Rafinesque

POLYDESMIDA

XYSTOMDESMIDAE

Apheloria montana flavissima Hffm.

Locality? 12 May 2009, Hobson & Chazal (0/1)

Brachoria cedra Keeton

Locality? 11 May 2009 Hobson & Chazal (1/0)

Brachoria sp. nov.

POLYDESMIDAE

Pseudopolydesmus canadensis (Newport)

Scytonotus granulatus (Say)

JULIDA

PARAJULIDAE

Ptyoiulus impressus (Say)

Outcrop above Parsons Cave, 23 September 2009, S. M. Roble (1/5)

SPIROSTREPTIDA

CAMBALIDAE

Cambala annulata (Say)

Solomon's Seal Cave pitfalls, 27 May--10 June 2009, Hobson & Chazal (2)

CHILOPODA

SCOLOPENDROMORPHA

SCOLOPENDRIDAE

Hemiscolopendra marginata (Say)

Outcrop above Parsons Cave, 23 Sept. 2009, S. M. Roble (1)

CRYPTOPIDAE

Scolopocryptops nigridius (McNeill)

Outcrop above Parsons Cave, 23 Sept 2009, S. M. Roble (1)

Theatops posticus (Say)

Solomons Seal Cave pitfalls, 13-27 May 2009, Hobson & Townsend (1)

LITHOBIOMORPHA

LITHOBIIDAE

Bothropolys multidentatus (Newport)

Outcrop above Parsons Cave, 23 Sept 2009, S. M. Roble (1)

HENICOPIDAE

Zygethobius pontis Chamberlin

Cedar Ridge pitfalls. 29 June-2 Jul;y 2009, Hobson & Townsend (1)

Solomons Seal Cave pitfalls, 13-27 May 2009, Hobson & Townsend (4)

ARACHNIDA

ARANEAE

HYPOCHILIDAE

Hypochilus pococki Platnick

Outcrop above Parsons Cave, 23 Sept 2009, Roble (2/1)

LYCOSIDAE:

Schizocosa ?ochreata Walck.

Cedar Ridge pitfalls, 13-29 May 2009,Hobson & Townsend (8/0)
" , 29-30 July 2009, Chazal (1/0)
Solomons Seal cave pitfalls, 27 May-10 June 2009 Hobson & Chazal (many males)

Schizocosa sp.?

Cedar Ridge pitfalls, 28 Apr.- 13 May 2009, Hobson & Chazal (5/0)
" , 6-28 April 2009, Hobson & Evans (4/1)

Gladicosa gulosa (Walck.)

Cedar Ridge pitfalls,6-28 April 2009, Hobson & Evans (0/1)
Solomons Seal cave pitfalls, 27 May-10 June 2009, Hobson & Chazal (0/1)

Allocosa sublata (Hentz)

Solomons Seal Cave pitfalls, 27 May-10 June 2009, Hobson & Chazal (1/0)

Pirata sp. indet.

PISAURIDAE

Pisaurina mira

Cedar Ridge Malaise trap. 13-27 May 2009, Hobson & Townsend (1/0)

GNAPHOSIDAE:

Cesonia bilineata (Hentz)

Cedar Ridge pitfalls, 13-29 May 2009 Hobson & Townsend (0/1)

Drassyllus covensis Exline

Cedar Ridge pitfalls, 13-29 May 2009 Hobson & Townsend (1/0)

Drassyllus aprilinus Banks

Cedar Ridge pitfalls, 13-29 May 2009, Hobson & Townsend (6/0)
" 28 Apr.-13 May 2009, Hobson & Chazal (2/0)

Drassyllus novus Banks

Solomon's Seal Cave pitfalls, 27 May-10 June 2009, Hobson & Chazal (1/2)

Gnaphosa fontinalis Hentz

Cedar Ridge pitfalls, 29-30 July 2009, A. C. Chazal (1/0)

Sergiolus capulatus (Walck.)

Solomon's Seal Cave pitfalls, 27 May-10 June 2009, Hobson & Chazal (2/0)

Zelotes duplex Banks

Solomon's Seal cave pitfalls, 27 May-10 June 2009, Hobson & Chazal (1/0)

ANYPHAENIDAE

Anyphaena fraterna Banks

Cedar Ridge malaise trap, 13-27 May 2009. Hobson & Townsend 1/0)

CORINNIDAE:

Castianeira variata Gertsch

Solomon's Seal Cave pitfalls, 27 May-10 June 2009, Hobson & Chazal (3/0)

AGELENIDAE:

Agelenopsis kastoni Chamb. & Ivie

Cedar Ridge pitfalls, 13-29 May 2009 Hobson & Townsend (1/0)

" Malaise trap, 13-27 May 2009, H & T (2/0)

Agelenopsis ?

Outcrop above Parsons Cave, 23 Sept. 2009 Roble (0/1)

AMAUROBIIDAE:

Watodes calcaratus (Keyserling)

Cedar Ridge pitfalls, 6-28 April 2009, Hobson & Evans (2/0)

Callobius bennetti (Blackwall)

Cedar Ridge pitfalls, 6-28 April 2009, Hobson & Evans (1/0)

CTENIDAE:

Anahita punctulata (Hentz)

Cedar Ridge pitfalls, 13-29 May 2009, Hobson & Townsend (0/1)

Solomons Seal cave ptfalls, 27 May-10 June 2009, Hobson & Chazal (0/2)

SEGESTRIIDAE:

Ariadna bicolor (Hentz)

Cedar Ridge pitfalls, 6-28 April 2009, Hobson & Evans (1/0)

THOMISIDAE:

Xysticus fraternus Banks

Cedar Ridge pitfalls, 13-29 May 2009 Hobson & Townsend (4/0)

" 28 Apr.-13 May 2009, Hobson & Chazal (1/0)

Xysticus elegans

Cedar Ridge pitfalls, 27 May-10 June 2009, Hobson & Chazal (1/0)

DICTYNIDAE:

Unidentified

Cedar Ridge pitfalls, 6-28 April 2009, Hobson & Evans (1/0)

LINYPHIIDAE:

Neriene variabilis (Banks)

Cedar Ridge Malaise trap, 13-27 May 2009, Hobson & Townsend (1/0)