

Scientific Research Component

Introduction

The Mountain Lake Conservancy and Lodge property (the property) has historically been and is currently the site of a lot of scientific research. A significant factor to this research being sited on the property is the wealth of natural and conservation resources described throughout this plan.

- The bulk of the property ranks as having outstanding and very high ecological integrity.
- The property ranks as a highest conservation priority in the New River region
- Portions of the property rank highest and high for resiliency to climate change.
- There are thirteen ecological and aesthetically diverse forest stand types.
- Four Cold Water Streams are found on the property.
- Forty-six rare or special status bird species are documented on the property.
- There are nineteen Natural Heritage Resources documented on the property.
- The twenty mile trail system provides access to much of the property.
- The property was the original location of the University of Virginia's Mountain Lake Biological Station (MLBS) which is now located on an adjacent property.

Having the universities of Virginia Tech and Radford nearby has also contributed to the history of scientific research on the property. This is evidenced by the Bird Component which was drafted by a scientist from VA Tech and the 1994 VA Tech lake study described in the Water Component. Also the lake stabilization and monitoring work involves Skip Watts, a professor of Geology at Radford University. However, the majority of both the historical and current scientific research is associated with MLBS. Because of this fact, MLBS associated research and the relationship between the property and MLBS is the focus on this component. The text below is quoted from the MLBS website and provides a broad brush of the relationship between the property and MLBS.

"The private Wilderness Conservancy at Mountain Lake (WCML) owns another 1,012ha bordering MLBS, and welcomes our use for teaching and research. Mountain Lake itself, which is in walking distance from the station, is the only natural lake in the unglaciated Appalachians and is of great biological and geological interest. The variety of rich and diverse habitats near MLBS have provided excellent opportunities for studies in terrestrial and aquatic field biology. Mixed deciduous forests, mountain streams, successional meadows, a large natural lake, ponds, rocky ridges, sphagnum bogs, stands of red spruce, Canadian hemlock, white pine, and both disturbed and virgin habitats are all within walking distance of the station. Because the station is located on the eastern continental divide and is surrounded by strong elevational and environmental gradients, it is uniquely situated to provide abundant opportunities for observational and experimental studies on scales relevant to the ecology and evolution of many plant and animal populations.

Mountain Lake Biological Station (MLBS), a facility of the University of Virginia (UVA), was founded in 1930 and used Mountain Lake Hotel's Thompson Cottage as our laboratory and other hotel facilities for housing and dining until we moved to our current station leased from Little Stony Fish and Game in 1934. Station summer classes and research have continued to use Wilderness Conservancy at Mountain Lake (WCML) land for many projects throughout the last 84 years. Many of these research projects have resulted in publication in scientific journals or unpublished research reports held in the MLBS or UVA's Alderman Libraries. Certain areas of WCML land are of special interest to MLBS, and several of these are of unique biological value. Our highest priority interests, as well as a review of current impacts and recommendations for future use, are summarized below." (Henry & Becky Wilbur, 2013)

Example of Scientific Research

As this plan highlights, the property's forested ecosystem supports a wide range of flora and fauna. Salamander studies are one type of research occurring on the property. There are numerous salamander species documented on the property. Below is some basic information about one species studied on the property.

White-Spotted Slimy Salamander



Physical Description: *Plethodon cylindraceus*, like most salamanders, feature slender bodies, short noses, and long tails. Most individuals have large dorsal and lateral white spots. Adults may reach 11.4 to 20.6 cm in length. This species is typically shiny black with a dark throat and slate belly color. *Plethodon cylindraceus* also has 15 to 17 costal grooves. Its limbs are set at right angles to the trunk, and the forelimbs and hind limbs are of equal size, typical of most salamanders in general. (Bruce, et al., 2000; Hickman Jr., et al., 2009; "Northern Slimy Salamander", 2007) Bruce, R., R. Jaeger, L. Houck. 2000. The Biology of Plethodontid Salamanders. New York, New York: Kluwer Academic/Plenum Publishers.

Hickman Jr., R., L. Roberts, S. Keen, A. Larson, D. Eisenhour. 2009. Animal Diversity 5th Edition. New York, New York: The McGraw-Hill Companies, Inc.

Range Description:	This species is found in the eastern USA, in the Piedmont and Blue Ridge physiographic provinces of Virginia and North Carolina west to the French Broad River and south to the northern Piedmont of South Carolina, and parts of the Valley and Ridge physiographic province in western Virginia and extreme eastern West Virginia and in a small area of the Coastal Plain of eastern Virginia (Highton et al. 1989); also probably the Blue Ridge Mountains and Valley and Ridge provinces in northeastern Tennessee (Redmond and Scott 1996).
Habitat and Ecology:	It is presumed to be the same as <i>Plethodon glutinosus</i> : Wooded slopes, ravines, floodplains, shalebanks, and cave entrances, most often in hardwood forest, sometimes in pinelands. It is generally under or in rotting logs, stumps, or leaf-litter, or under rocks, during the day. Goes underground during dry or freezing weather. Eggs are laid in rotting logs, underground, or in rock crevices, where they develop directly without a larval stage

Major Threat(s):	Intensive harvest of mature forest greatly reduces salamander density in the logged area; population recovery occurs slowly (Herbeck and Larsen 1999). However, logging does not constitute a major threat to the security of the global population.
Conservation Actions:	Maintenance of mature hardwood forest habitat is key to the long-term persistence of viable populations of this species (Petranka 1998). Taxonomic study needed to clarify systematic status.

Blackburn, L., Nanjappa, P. and Lannoo, M.J. 2001. *An Atlas of the Distribution of U.S. Amphibians*. Ball State University, Muncie, IN, USA.
Carr, D.E. 1996. Morphological variation among species and populations of salamanders in the *Plethodon glutinosus* complex. *Herpetologica*: 56-65.
Frost, D.R. 1985. *Amphibian Species of the World: A Taxonomic and Geographic Reference*. Allen Press and the Association of Systematic Collections, Lawrence, Kansas.
Highton, R., Maha, G.C. and Maxson, L.R. 1989. Biochemical evolution in the slimy salamanders of the *Plethodon glutinosus* complex in the eastern United States *Illinois Biological Monographs*: 1-153
IUCN. 2004. *2004 IUCN Red List of Threatened Species*. www.iucnredlist.org. Downloaded on 23 November 2004.
Mahoney, M.J. 2001. Molecular systematics of *Plethodon* and *Aneides* (Caudata: Plethodontidae): phylogenetic analysis of an old and rapid radiation. *Molecular Phylogenetics and Evolution*: 174-188.
Petranka, J.W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press, Washington, D.C.
Redmond, W.H. and Scott, A.F. 1996. *Atlas of Amphibians in Tennessee (Miscellaneous Publication Number 12)*. The Center for Field Biology, Austin Peay State University. Miscellaneous Publication Number 12, Clarksville, TN, USA.

(Hammerson, 2004)

MLBS Interests in WCML Property (Henry & Becky Wilbur, 2013)

Pond Drain Old-Growth Forest

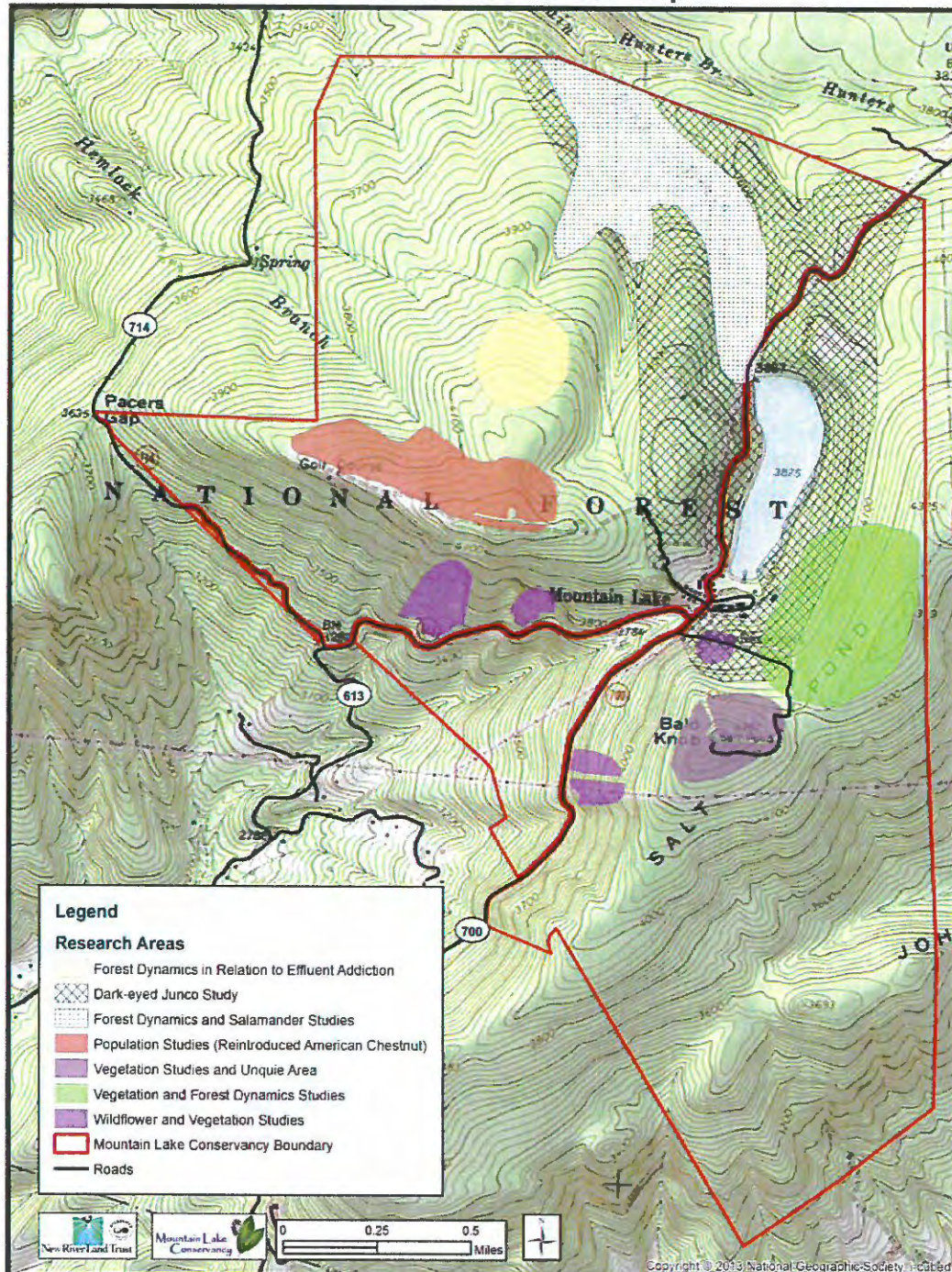
The riparian zone between St Rd 613 and the WCML boundary with Little Stony Fish and Game is a magnificent example of an old-growth Hemlock-Yellow Birch forest with trees exceeding a meter in diameter and 300 years in age. This is an unusual forest type in Virginia and provides habitat for a number of rare plants and northern birds. Winter Wren, Black-throated Green Warbler, Black Throated Blue Warbler, and Veeries nest in the forest, and Northern Goshawks and Golden Eagles have been seen there in the winter. Rare plants include several orchids (Appalachian Tway-blade, Lesser Rattlesnake Orchid), Rock Skullcap, and Golden Saxifrage.

Tim King (Oxford, UK) established a permanent plot in the area between the pump-house and the bridge of the Jungle Trail in 1982 in which he sampled the herb layer plants and mapped all trees. He re-sampled these plots three or four times until ca. 2004. Becky and Henry Wilbur have had three projects on the flora of pond drain (2006 – 2011) that focused on potential impacts of the thinning of hemlocks due to Hemlock Woolly Adelgid induced mortality. They have a continuing interest in the vegetation dynamics of this forest and in completing their draft flora of this area.

Current impacts- The Jungle Trail and White Pine Road provides hikers with a view of this forest.

Future Uses- This is probably the single surviving area of WCML in greatest need of protection as a natural area. Any off-trail travel or other recreational activities should be discouraged. The forest is on an old debris flow (natural landslide) and is very rocky, wet, and fragile. There should be no further trail development, logging, or discharges into Pond Drain. The upslope hardwood forest should also be protected with the White Pine Road as the eastern boundary of the natural area with an extension up Hogskin Branch where very large and old hemlocks remain.

Scientific Research Areas Map



(NRLT, 2013)

Bald Knob

Bald Knob supports an unusual stand of Mountain Laurel, Minnie Bush, and Bear Oak. Red Oak is slowly growing up through the Bear Oak scrub in the absence of fire. This is also the area with American Chestnuts that grow large enough to flower and produce viable fruits. The top of Bald Knob is home to the only known population of a leaf-hopper in the genus *Thatusa* recently discovered and described by researchers at MLBS (Stephen Marshall and Steve Piera). The rock outcrops provide habitat for the Allegheny Woodrat, an attractive and interesting rodent that is threatened in our region. The rocks also support Michaux's Saxifrage, a Southern Appalachian endemic wildflower.

Current impacts- This is a popular hiking destination with excellent access by the Bald Knob Trail, the Homestead Trail, and the Bear Cliff Trail as well as the gravel road that provides access to the communication towers.

Future Uses- The scenic importance of this area should be maintained by high standards of trail and road maintenance to preserve the land and insure the safety of users. There should be no additional construction, especially of structures that spoil the character of the ridgeline. The area to be protected could be defined by the current limits of the Bear Oak stand. Recreation in the designated area should be confined to low impact activities with no off-trail travel.

Salt Pond Ridge

The ridge from Bald Knob to the WCML/MLBS boundary along the Bear Cliff Trail includes a good example of high elevation hardwood forest reclaiming an area that was probably summer pasture less than a century ago.

Current Impacts- The Bear Cliff Trail runs from the Bald Knob Road along the top of the ridge to the WCML/MLBS boundary. This trail provides the only trail access between the two properties and is heavily used by both station and hotel people.

Future Uses- We would like to see the forest stand along this ridge maintained as a natural area with the current trails retained and maintained well, but with no off-trail recreational activities.

Old Golf Course

This area was used heavily from the mid 1980s to recently by a research group that needed an old-field for experimental populations to study pollen flow and disease dynamics in White Campion, a roadside flower. The area in itself is not biologically unique, but is valuable as a site for continued study on this population of flowers.

Mountain Lake

Mountain Lake was recognized as a unique landform by G. Evelyn Hutchinson in his *Treatise on Limnology*, the bible for freshwater ecologists, after visiting the area. There have been additional published studies by Edward Deevey (Yale) and Bruce Parker (VPI) as well as class reports by limnology classes at the station. The Lake was widely recognized as the only natural lake in the unglaciated Appalachian highlands, although this status was destroyed by the civil engineering of last winter. This work also impacted the Pond Drain area as abnormally high volumes of water and sediment loads were discharged into Pond Drain from the lake.

General Management Recommendations

- *Educate about research and make property visitors aware of the sensitivity of research areas*
- *Foster open line of communication between the property management and the MLBS*
- *Develop research concise application, pass & database system*
- *Explore opportunities to collaborate with MLBS, other educational institutions & other scientists*
- *Explore potential youth education programming especially with local and regional schools*
- *Manage property with research in mind including protecting sensitive areas from potential negative impacts from visitors and/or management actions*