

Water Component

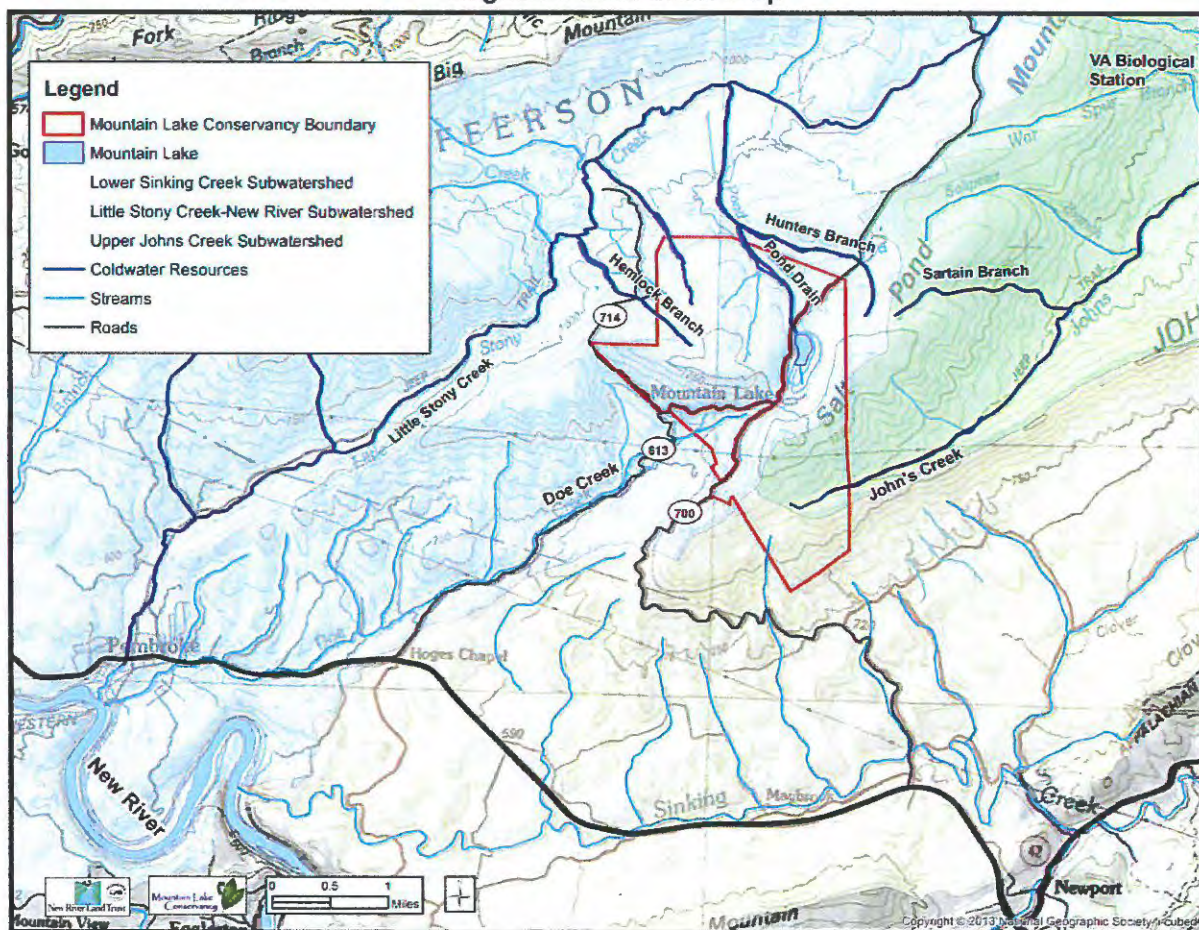
Introduction

Water is a critical conservation resource for the Mountain Lake Conservancy and Lodge property (the property). Water is important both on and off the property. It is critical to the property's ecosystems and character, but also important because water that originates on the property serves a variety of downstream uses. The four primary water conservation resource elements associated with the property are:

- Mountain Lake
- Cold Water Streams
- Headwaters Area
- Ground Water and Wells

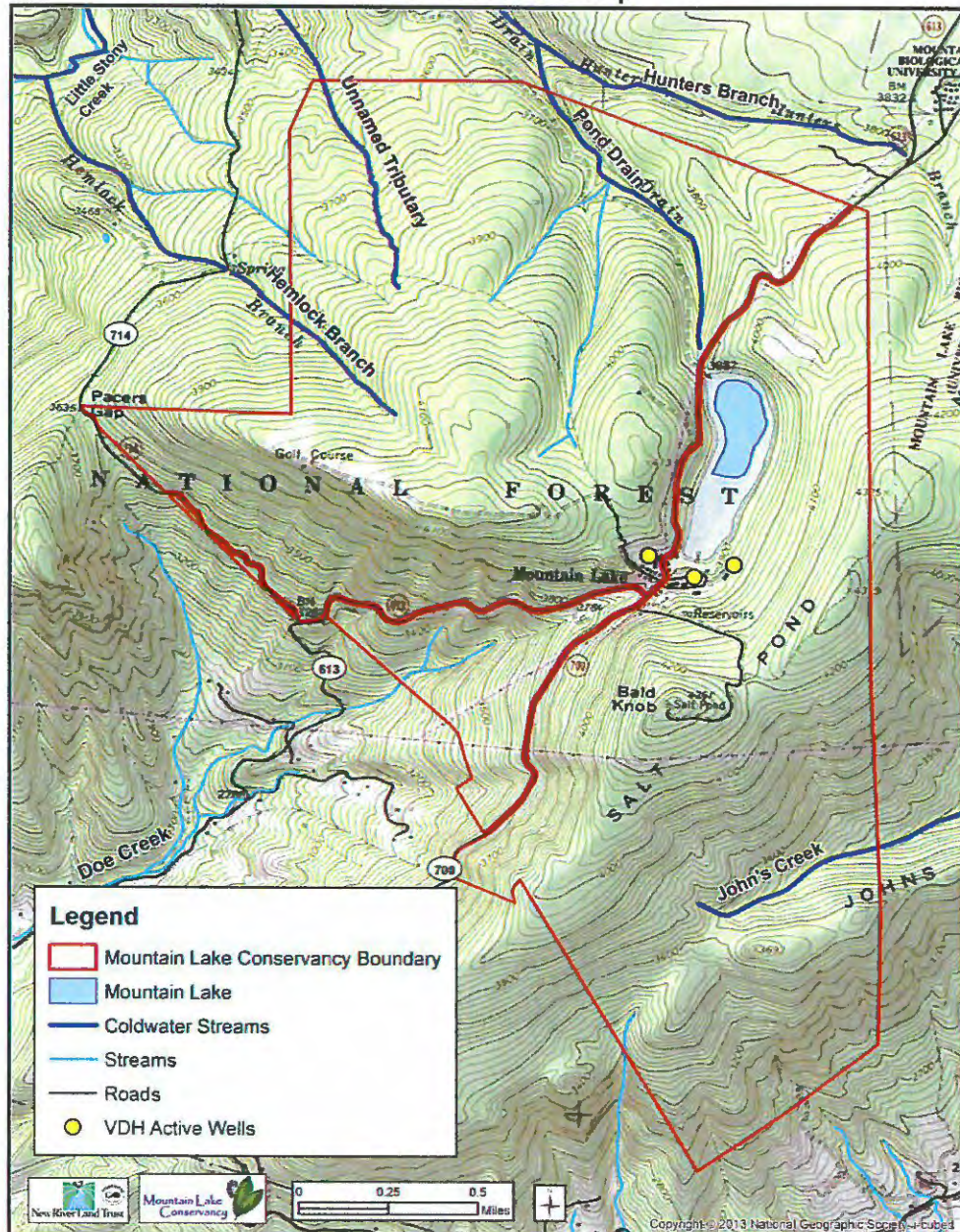
All four of these elements contribute to the property's recreational, aesthetic, and ecological significance. The Regional Watershed Map below shows the main water bodies on the property within the context of the larger subwatersheds to which the property drains. The Water Resources Map on the following page shows all the water resources on the property including the three wells used for drinking water. On both maps the Cold Water Streams are displayed as the darker blue lines.

Regional Watershed Map



(NRLT, 2014)

Water Resources Map



(NRLT, 2014)

Highest Priority Elements

Although this plan highlights several conservation resources that make the property special, **many would say that the defining feature of the property is Mountain Lake.** The Lake was originally known as Salt Pond, as it was where cattle and other livestock were given salt. It is one of only two natural lakes in Virginia and the only natural lake in the unglaciated Southern Appalachian Highlands. The Lake is formed by damming caused primarily by progressive downdrop of overlying rock, an origin which may be unique worldwide (Cawley, 1999). Interestingly, the primary discharge from the Lake is not the surface flow out of Pond Drain, but through a leaky subterranean pathway at a crevice in the deepest part of the Lake (Cawley, 1999).

Mountain Lake typically covers about 50 acres, and its level was largely constant at an elevation of 3875 feet during the 19th and 20th centuries. Since 2002, however, it has been subject to significant dry-season level drops. Historically, the last such level fluctuations occurred between 1751 and 1804, with historical accounts giving widely different estimates of the Lake's size. The difference in lake levels can be seen in the images below.



(VA Tech, Date Unknown)



(NRLT, 2013)

Most recently, several years with no significant refilling of the Lake prompted property management to move forward in 2013 with engineering work to partially plug the drain holes that left the Lake largely dry. Clearly, for property management, there were compelling and practical reasons for the work to be undertaken. Work done in 2013 to limit leakage and promote filling of the Lake has led some stakeholders who contributed to this plan to question its status as a natural lake.

The Lake is highly significant as both a recreational and an aesthetic amenity. Having a lake, especially one at full level, greatly adds to the property's appeal as a destination resort. For example, a higher and stable water level would allow for expanded recreational opportunities such as:

- Paddling sports
- Swimming
- Snorkeling and scuba
- Triathlons
- Fishing

From an ecosystem perspective, the Lake is integrally connected to many of the property's other conservation resources. It is beyond the scope of this plan to scientifically assess this relationship, but there is clearly a close symbiosis between the Lake and the following:

- Forest Stand Type 8 which is characterized by hemlock trees;
- Natural Heritage Resources directly around the Lake and along Pond Drain as well as in the multiple Natural Heritage Resources area surrounding the Lake;
- Habitat for a number of waterfowl species, primarily during migration—when the lake's water level is very low, the mud-flat and small meadows in the basin provide important feeding and nesting habitat for several species of shore birds;
- Pond Drain is a Cold Water Stream which is directly connected to the Lake and is impacted by the lake's condition.

One concern for the Lake was raised by research done in 1994 (Beaty & Parker, 1994). This study found that the Lake displayed changes which may have foretold the onset of eutrophication.

Eutrophication is the process by which a body of water becomes enriched in dissolved nutrients, such as phosphates, that stimulate the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen. Oxygen depletion negatively impacts the aquatic life reducing diversity (basically killing off fish and other species). The study was not conclusive in its findings and calls for monitoring and further investigation.

Cold Water Streams

The property has an exceptional abundance of Cold Water Streams. There are four Cold Water Streams that originate on the property: Pond Drain, Hemlock Branch, an unnamed tributary of Little Stony Creek, and Johns Creek. The Water Resources Map on page 19 shows these streams as the darker blue lines.

Cold Water Streams is a designation of the Virginia Department of Game and Inland Fisheries (VDGIF). The Fisheries Division of VDGIF has identified all of the reaches of these streams as wild (Class I-IV) or stockable (Class V and VI) trout streams or as tributaries to wild trout streams. As a conservation resource element these streams are important from multiple standpoints:

- High water quality
- Such streams are increasingly rare
- Support of native and stocked trout which provide popular recreational opportunities
- Support of other aquatic species and ecosystem dynamics
- Pond Drain, Hemlock Branch and an unnamed tributary drain to Little Stony Creek and the Cascades as seen in the photos below. It is an extremely accessible and popular recreation destination.

Winter and Summer at Cascades



(Both Photos Mtn Lake Website, 2013)

Second Priority Elements

The property is a headwater area for three subwatersheds. This drainage pattern and the three subwatersheds are shown on the Regional Watershed Map. Headwater areas are important for both water quality and quantity. Most of the water from the property flows to the Little Stony Creek Subwatershed and then to the Middle New River Subbasin that is part of the New River Basin which ultimately drains to the Mississippi River and the Gulf of Mexico. **It should be noted that the New River is one of only fourteen American Heritage Rivers in the country and the only river with this designation in the Commonwealth of Virginia.**

The other significant water draining from the property flows to the Upper Johns Creek Subwatershed and then to James River Basin which empties into the Chesapeake Bay. There is also an unnamed tributary of Sinking Creek that flows off the southeast edge of the property.

The property is served by three wells which provide drinking water for the Lodge and cabins. These wells are shown on the Water Resources Map on a previous page of this component. The wells are located within an area close to the Lodge and other resort infrastructure that is actively maintained. **Care should be taken to protect the groundwater recharge area associated with these wells. Use of potential contaminants such as pesticides, fertilizers, vehicle fluids and other toxins should be limited in proximity to the wells.**

Management Recommendations: Lake

Establish a 300 foot riparian buffer around the Lake. The extent of such a buffer can be seen in the Riparian Buffer Map at the end of this component. Mountain Lake is a delicate ecosystem easily affected by human or natural environmental changes. Silt and nutrient runoff from hotel and grounds-keeping activities can quickly affect the Lake's condition. Precipitation is the main source of important nutrients and the major source of acidity (Cawley, 1999).

It is yet to be determined if leakage work caused negative impacts to the delicate hydrologic system of the Lake, Pond Drain, or adjacent forest ecosystems. ***This situation should be researched and monitored, possibly in collaboration with the Mountain Lake Biological Station.***

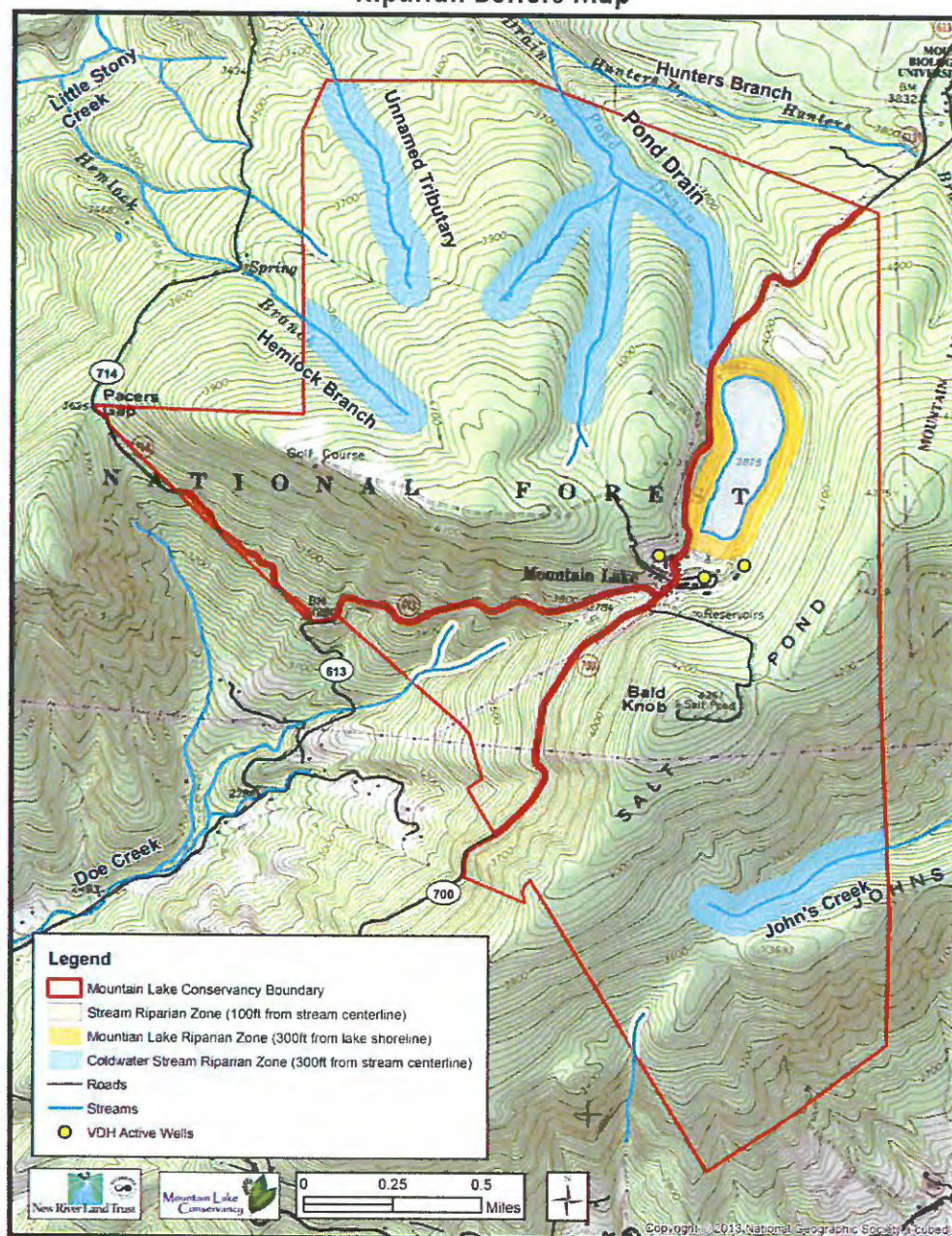
The eutrophication concern highlighted by Beaty & Parker 1994 study should also be further researched and monitored.

Management Recommendation Cold Water Streams and Other Water Bodies

- ***Cold Water Streams present an opportunity for fly fishing, an activity that has grown dramatically in popularity over the past couple of decades.***
- ***Establishment of a 300 foot riparian buffer along the Cold Water Streams and a 100 foot riparian buffer along other streams flowing off the property is recommended (Williams and Pinder, 2014).***
- ***Both property management and recreational activities should be limited to those that do not impair the riparian vegetation and/or adjacent water resources within these buffers.***

These buffer zones cover 337 acres and their extent can be seen in the Riparian Buffer Map on the following page. Detailed information about riparian buffers is available from many state and federal natural resource agencies. Links to relevant information from the VA Department of Environmental Quality, VA Department of Forestry and the USDA Natural Resources Conservation Service are below the Riparian Buffers Map on the following page.

Riparian Buffers Map



(NRLT, 2014)

<http://www.deq.virginia.gov/Portals/0/DEQ/Water/Publications/RiparianBufferManual.pdf>

<http://www.dof.virginia.gov/mgt/riparian/>

<ftp://ftp.wcc.nrcs.usda.gov/wntsc/strmRest/buffers/RiparianForestBufferJobSheet.pdf>