

Carvins Cove Natural Reserve

Trail Management Plan July, 2010



**Carvins Cove Natural Reserve
Trail Management Plan**

Approved by:



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Date

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Roanoke Parks and Recreation

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Executive Summary

This *Trail Management Plan* is the result of the Roanoke Parks and Recreation Department's initiative to implement the 2007 *Carvins Cove Natural Reserve Park Management Plan*. The *Park Management Plan* identified multi-use trail activities as the most popular recreational uses at the Cove and recommended development of a trail management plan.

The Parks and Recreation Department coordinated with trail volunteers, trail users, Pathfinders for Greenways, and Roanoke Valley Greenway Commission to develop this trail plan. In 2009 volunteers assessed the physical conditions of all the official trails and evaluated their sustainability. In addition, a task force evaluated the potential of the Carvins Cove trail network to provide a wider array of benefits for all visitors.

The vision for the trail program is to retain all the official trails and to expand the trail network in order to have a trail system that provides trails and loops for users of different skill levels and modes of travel. Many of the official trails will be improved through maintenance and minor rehabilitation. New trails will be developed, reviewed on a case by case basis for sustainable alignment, compliance with easements, benefits to users, long term health of the forests and streams, and resources for construction and maintenance. Shared use trails will be the norm, but single use trails will be available in circumstances where resource protection or safety requires. The quality and sustainability of trails at the Cove will be high, with both easily accessible and very remote opportunities.

Management of the trails system within Carvins Cove has been and will continue to have a resource-driven operational mission. Due to the scarcity of general funds for operations and/or capital development, the collective resources found within our 600+ member volunteer system will assist, support, network, provide labor for, and provide grant support for trail maintenance, management, and construction. Volunteer responsibilities will be expanded to supplement City resources, with volunteer direction from Pathfinders for Greenways, working in cooperation with the Parks and Recreation Department. Specific trail improvements are recommended in this document, and guidelines for implementation and recommended practices for management are included.

"Thousands of tired, nerve-shaken, over-civilized people are beginning to find out that going to the mountains is going home; that wildness is a necessity; that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life."

John Muir

Acknowledgements

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Stakeholder Organizations:

Carvins Cove Trail Care Crew, Mid-Week Trail Crew, Pathfinders for Greenways, Roanoke Appalachian Trail Club, Roanoke County, Roanoke Parks and Recreation, Roanoke Valley Greenway Commission, Roanoke Valley Horsemen's Association, and the Virginia Natural Heritage Division.

Section I. Introduction

1.1 Context for Development of Carvins Cove Trail Management Plan

The lands at Carvins Cove (the Cove) have been owned by the City of Roanoke (the City) for over sixty years. In 2004 the City and Roanoke County established the Western Virginia Water Authority (WVWA) to manage the water and wastewater systems of the region. The WVWA was given ownership of Carvins Cove reservoir and the surrounding lands below the 1200-foot contour. The remaining Cove lands above the 1200-foot contour were retained by the City and are managed as a natural reserve through the Parks and Recreation Department.

The City and the WVWA recognize the need for a scientific-based approach to sustainable natural resource management of the 12,463 acres at the Cove. The Parks and Recreation Department worked with the WVWA and an advisory committee to develop a *Carvins Cove Natural Reserve Park Management Plan*, adopted by City Council in 2007. The *Park Management Plan* established five Resource Management Zones for the Cove, provided management goals and guidelines, and identified the need to plan for programs, facilities, operations, and trails. The trails plan was to include an inventory and assessment of trails and to address sustainability, maintenance, and funding.

Development of this *Trail Management Plan* reflects the Parks and Recreation Department's on-going commitment to manage the Cove as a regionally significant outdoor recreation destination with a network of sustainable trails. The *Trail Management Plan* is set within the context of the overarching planning principles included on page 4 of the *Park Management Plan*:

1. The primary purpose of the Carvins Cove Natural Reserve is protection of the municipal watershed to provide a safe, potable water supply to over 137,000 area residents and businesses.
2. Carvins Cove Natural Reserve contains a high level of biological diversity and will be managed in a manner that protects and enhances the ecosystem benefits and functions.
3. Compatible outdoor recreation and educational uses and activities will be encouraged to promote the health and well being of the area residents and visitors, and these uses and activities will be managed in a manner that supports ecosystem management and water quality objectives.
4. Management recommendations for Carvins Cove will be scientifically based using best available knowledge, proven standards, and advice of natural resource management and planning professionals, and they will be supplemented by additional research and study as outlined within the appendices of the *Park Management Plan*.
5. The City of Roanoke and Western Virginia Water Authority will manage the resources of Carvins Cove using a collaborative process that fosters interjurisdictional cooperation and participation by the public.

1.2 Brief History of Carvins Cove Trails

For many years City Code officially permitted only fishing, boating, and picnicking at the Cove. However, other recreation activities occurred and were accepted, including hiking, horseback riding, and mountain biking. Because Cove property was bought from landowners in a community of farms and homesteads, the roads and trails to those homes have continued to be used as trails.

In 2002 the Parks and Recreation Department, working with Cove trail users, initiated a process to identify and name trails at the Cove. A group including horseback riders, mountain bikers, Appalachian Trail hikers, greenway planners, and Pathfinders for Greenways met to resolve conflicting names developed by the various user groups. The final names were adopted by the City in 2003, and the first official trail map was developed, using the new names, as shown in Figure 1.

Also in 2003 the Parks and Recreation Department coordinated volunteers and professional trail planners to do an initial assessment of some of the trails. The Department hired the International Mountain Bicycling Association’s team to evaluate seven miles of trails and suggest realignments to improve trail sustainability. The 2006

Carvins Cove Trail System

Trail Type:

- Fire Road
- Trails
- - - Appalachian Trail**
- 25 Ft. Contours
- Reservoir
- Cove Boundary

Trail / Fire Road Key

1. Happy Valley
2. Brushy Mountain*
3. Tuck-A-Way
4. Comet
5. Jacob's Drop*
6. Kerncliff*
7. Hemlock Tunnel*
8. Araminta
9. Songbird
10. Arrowhead
11. Enchanted Forest
12. Little Bell
13. The Gauntlet*
14. The Trough*
15. Buck*
16. Hotel
17. Hi-Dee-Hoe
18. Horse Pen
19. Tunnel
21. Schoolhouse
22. Riley's Loop
23. Sawmill Branch**
24. Four Gorge

*Steep Inclines
 ** Hiking Only

Trail Usage Limited To:
 Hiking, Biking, and Horseback riding. No ATV

Park Use Permits are required.
 Acquire at Boat Dock
 or bike shop on Rt. 311.

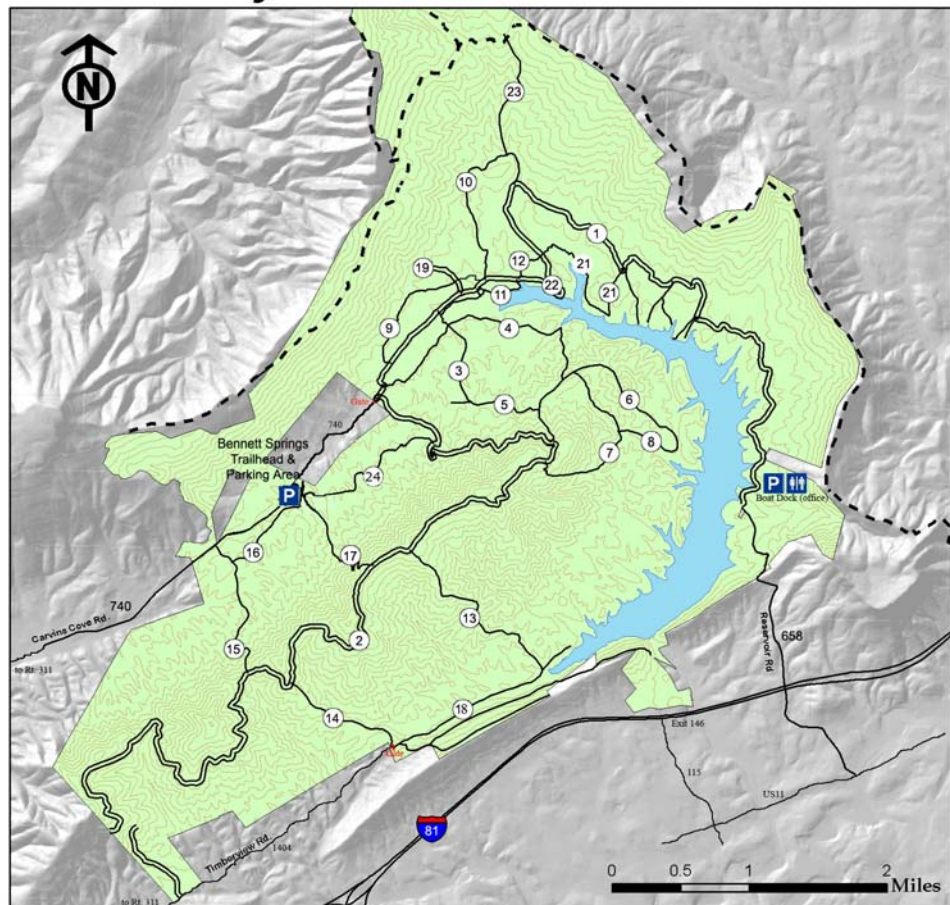


Figure 1. Map of Carvins Cove Official Trails

report titled *Recommendations for Improving Sustainability and Connectivity of the Carvins Cove Trail System* provided excellent information and recommendations for eight trails. Many of those recommendations have been implemented with volunteers working alongside professional trail builders to construct sustainable alignments, rolling grade dips, hardened crossings, and climbing turns.

The Parks and Recreation Department has continued to work with volunteers to address users' needs and to improve the sustainability of the trail network. Working through the Parks and Greenways Planner, volunteers, currently organized by Pathfinders for Greenways, are committed to assisting the Department with trail maintenance and construction at the Cove.

1.3 Management Restrictions and Easements

1.3.1 Appalachian National Scenic Trail

Portions of the Cove lands (Figure 2) are subject to special management restrictions. In 1998 the City granted an easement to the National Park Service to protect the Appalachian National Scenic Trail (AT). The AT runs around the ridge above the Cove for fifteen miles. The easement requires protection of a 500-foot corridor on either side of the Trail. Within that easement, foot travel only is permitted; hunting is prohibited; no mechanized or motorized equipment or vehicles are allowed except in emergencies; no toxic chemicals are allowed; and no camping is allowed except at the existing shelter and designated Lamberts Meadow camping area. The Appalachian Trail is managed as a partnership among landowners, federal agencies, and volunteers. This section of the AT is under Park Service jurisdiction and is maintained by the Roanoke Appalachian Trail Club. There is a policy on side and connecting trails which would have to be followed to make any new trail connections to the AT.

1.3.2 Natural Heritage Areas

In 2008 the Parks and Recreation Department worked through the Virginia Division of Natural Heritage (DNH) to complete a biological inventory and assessment of the Cove. The report recommends protecting three areas by: 1) restricting new trails and removing illegal trails in an area that supports a globally rare Central Appalachian Xeric Chestnut Oak – Virginia Pine Woodland community; 2) consulting with DNH prior to changes in another area that encompasses Sawmill Branch Trail, portions of the AT, the Blue-Line Trail for the AT, and several trails made by all terrain vehicles (ATVs); and 3) consulting with DNH prior to changes in an area on Brushy Mountain that encompasses portions of Brushy Mountain, Buck, Trough, Hi-Dee-Ho, Gauntlet, Hemlock Tunnel, and Jacob's Drop Trails. Wildfire is encouraged in the latter two areas.

1.3.3 Conservation Easements

In 2008 and 2009 the City granted conservation easements to the Virginia Outdoors Foundation and Western Virginia Land Trust. Together these easements encompass the City's 11,363 acres above the 1200-foot contour. The easements' purposes are to protect the land for watershed preservation, outdoor recreation, scenic open space, natural habitat, biological diversity, and forestal use. The easements allow new trails and amenities, but restrict the size and placement of other buildings. They allow public recreation activities and trails, but require approval for new trail construction in the Natural Heritage areas and recommend banning ATVs within the easement areas.

Easements on Carvins Cove Lands

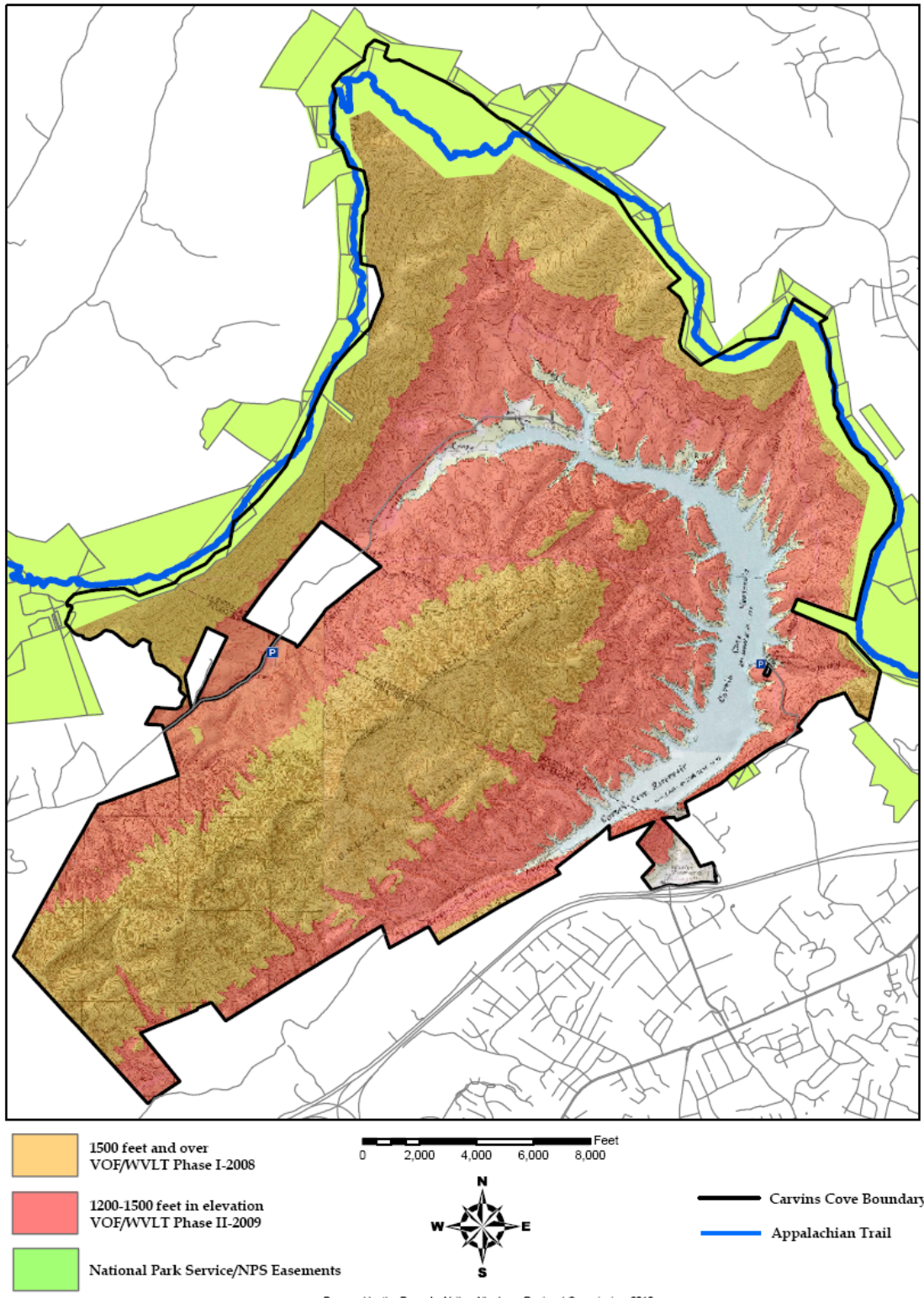


Figure 2. Map of Carvins Cove Easements

1.4 Plan Partners and Scope of Work

In the winter of 2009, the Parks and Recreation Department recruited a team of volunteers and staff from the Roanoke Valley Greenway Commission, Roanoke Valley-Alleghany Regional Commission, and Pathfinders for Greenways to address the growing need for managing Carvins Cove's trails. The team worked with Department staff to develop a format for trail assessment and recruited and trained volunteers to assess existing, official trails. The volunteers included hikers, mountain bikers, and equestrians. In addition to assessing the trails, the group developed a ranking of trail difficulty, recommended changes and improvements, proposed new trail options, and discussed management considerations in order to make recommendations to staff on management of the Cove trails.

The Trail Plan Task Force's objectives were:

1. To assess conditions on the existing trails and roads shown and numbered on the Carvins Cove trail map.
2. To map with a GPS unit other roads and trails.
3. To evaluate the suitability of each existing trail for use by hikers, equestrians, and mountain bikers.
4. To review the official trail network for the Cove and recommend opportunities for additional trails.
5. To identify the issues, challenges, and opportunities for managing the trail system.
6. To recommend improvements to trails and ancillary facilities.
7. To recommend operation and maintenance policies in relation to trail management.
8. To provide input from representative trail users for the planning process.
9. To compile the information cited above into a trail management plan, within the framework of the *Carvins Cove Natural Reserve Park Management Plan*, to guide the City's trail program at the Cove for the next 5-10 years.

1.5 Management Direction

1.5.1 Existing Direction

Carvins Cove is recognized in a variety of state and regional plans as an important natural and recreational resource. On the state level the Cove is included on the Virginia Birding and Wildlife Trail and in the 2007 *Virginia Outdoors Plan*. Regionally, the 2007 *Update to the Roanoke Valley Conceptual Greenway Plan* recognized the entire Cove trail network as a greenway destination.

Direction for the Cove and for trail management is included in several previous City plans. This information is summarized in Table 1.

Table 1. Management Direction for Cove Trails from Previous City Plans

Vision 2001/2020 Roanoke, Virginia Comprehensive Plan (2001)

- EC A7 "Promote trails on City-owned land, where feasible and suitable."
- EC A8 "Promote and increase access to trails and natural areas by providing parking, guide maps, and appropriate marking."

Comprehensive Parks and Recreation Master Plan (2000)

Action Strategies:

- 9. "Develop trails, greenways, and on-road bicycle facilities, doing so in a way to interconnect shopping areas, schools, work sites, parks, other important places in the valley, and future open spaces. Where appropriate, trails should be multi-use trails, accommodating activities such as hiking, bicycling, and horseback riding."

Carvins Cove Land Use Plan (2000)

Section F. Conclusions

- F.5. "Careful design of the proposed enhancements and trail locations should be considered to preserve the existing wilderness environment of Carvins Cove."

Section J. Trails Plan

- J.3. "All known trails should be identified and evaluated as to their condition and technical difficulty. Areas requiring improvement should be noted along with the type of repairs and materials needed and approximate man-hours required to complete the work. This information will serve as the basis for an overall trail assessment plan."
- J.4. "The trail assessment plan will provide the trail manager with suitable information for directing volunteer labor and projecting yearly trail buildups and estimated costs."
- J.5. "In general, trail development is to be kept off the steep slopes and minimized in the preservation areas."
- J.9. "Each trail head should be identified with a sign which displays the appropriate color designating the difficulty of the trail."

Carvins Cove Natural Reserve Park Management Plan (2007)

4.2.1 Protect Water Quality: Guidelines:

- 2. "Use careful site selection procedures and appropriate design standards when locating new recreational facilities so that soil compaction and erosion are minimized."
- 3. "Maintain a minimum 100-foot vegetated buffer around Carvins Cove Reservoir...and along each side of perennial and intermittent streams, spring seeps and any other identified wetlands within the Carvins Cove watershed. Water-dependent structures, such as bridges, may be allowed within the buffers. . ."

4.2.2 Protect the Natural Environment and Biodiversity: Goals:

- 4. "Protect the habitat of fish and wildlife resources to maintain or enhance recreational uses and scientific values."

4.2.3 Provide Compatible Recreational Opportunities: Goals:

- 2. "Enhance and strengthen recreational opportunities at Carvins Cove in a way that does not distract from the relatively pristine, naturalistic character that the park currently projects. New and expanded forms of recreation will be low impact in nature and sensitively sited."
- 3. "Expand access and available recreational opportunities in at least one portion of the park for people with mobility limitations."
- 5. "Activities which utilize trail systems, such as mountain biking, horseback riding, hiking and sightseeing/nature study are growing in popularity at Carvins Cove. These uses should be encouraged and facilities and management guidelines developed to minimize their impact on the watershed."
- 6. "Rationing of public recreational use through a permit system to avoid over-use and degradation of trails, campgrounds, and other public-use sites should be considered if needed to protect the watershed."

- 4.2.3 Provide Compatible Recreational Opportunities: Guidelines:
2. "Manage trail use in a manner that limits conflicts between various user groups: hikers, mountain bikers, and horseback riders."
 3. "ATV use, currently prohibited at the Cove, should continue to be banned in the future."
 8. "Prohibit user-created social trails."
 9. "Inform trail users of erosion hazards and encourage them to observe 'Leave No Trace' guidelines."
 11. "Suspend trail use during wet conditions and during periods of drought."
- 4.2.3 Provide Compatible Recreational Opportunities: Actions:
3. "Engage the user community and seek their preferences for future park amenities, their opinions about problems at the park, and their participation in park maintenance."
 6. "Provide hitching posts and at least one horse-unloading ramp."
 12. "Conduct a trail assessment of all existing trails. For needed trail renovation, use the construction and design guidelines created for Mill Mountain."
 13. "Install a gate at the City of Roanoke property line on the Brushy Mountain fire road to discourage user trespass on adjacent private property."
 16. "Roanoke Parks and Recreation will work to build partnerships . . . and a broad constituency dedicated to the enhancement and protection of this significant regional resource."
- 4.2.4 Provide and Maintain User Amenities and Infrastructure: Guidelines:
1. "Provide bike racks and hitching posts at all parking lots."
 2. "Provide environmentally friendly restroom facilities at all parking areas."
 3. "Establish inspection and maintenance guidelines for roads, parking lots, trails, and other types of infrastructure in the park."
- 4.2.4 Provide and Maintain User Amenities and Infrastructure: Actions:
1. "Parking for cars at Timber View Road and a trailhead facility should be evaluated."
 2. "Evaluate existing toilet facilities at the Bennett Springs picnic area and consider re-opening them for use."
- 4.2.5 Provide Public Education Opportunities: Action:
- "Develop interpretive trails, including displays explaining the history and resources of the park."
- 4.3 Priority Needs
- 4.3.1 Immediate and Short-Term Needs
- Assess current trail system
 - Inventory culverts and address culvert failures
 - Upgrade Bennett Springs entrance
 - Create a single message board and educational message for each entrance.
- 4.3.2 Middle and Long-Term Needs
- Full development of trail system

1.5.2 Goals, Objectives, and Strategies

The Trail Plan Task Force developed the following goals and objectives for the trail system at Carvins Cove Natural Reserve.

Goal:

To provide a sustainable network of trails which provides quality and safe non-motorized trail opportunities year round, allows users to enjoy the natural environment in ways which fulfill their physical, emotional, and spiritual needs, and protects the natural resources and watershed resources while providing these opportunities.

Objectives:

- To provide opportunities for multiple modes of travel, including hiking, mountain biking, and horseback riding.
- To provide sustainable trails.
- To provide trails with a range of difficulties, serving users with varying skills.

- To provide linkages to other trail networks, including Roanoke Valley greenways and the Appalachian Trail.
- To provide a spectrum of opportunities for educators, scientists, artists, naturalists, and teachers.
- To provide trails in front and back-country settings with a wide spectrum of opportunities.

Strategies:

The following strategies are recommended:

- Provide sustainable trails built to standards of USDA Forest Service, International Mountain Bicycling Association (IMBA), National Park Service, and Appalachian Trail Conservancy.
- Provide connectivity among trails and destinations.
- Provide trails with a wide range of difficulty.
- Provide loops.
- Provide for multi-use trails, including hikers, mountain bikers, and equestrians.
- Provide signage and wayfinding.
- Develop a cadre of volunteers to assist with maintenance.
- Provide trail related amenities such as trailheads, parking lots, restrooms, and signage serving a variety of users.

Section 2. Trail Plan Process

2.1 Description of the Area

Carvins Cove Natural Reserve is a 12,463-acre municipal watershed managed by Roanoke Parks and Recreation and the Western Virginia Water Authority. The area is described in detail in Sections 2 and 3 of the 2007 *Carvins Cove Natural Reserve Park Management Plan*. That plan is available on-line at www.roanokeva.gov, click on Departments/ Parks and Recreation/ Administration/ Planning and Development/ Existing Plans.

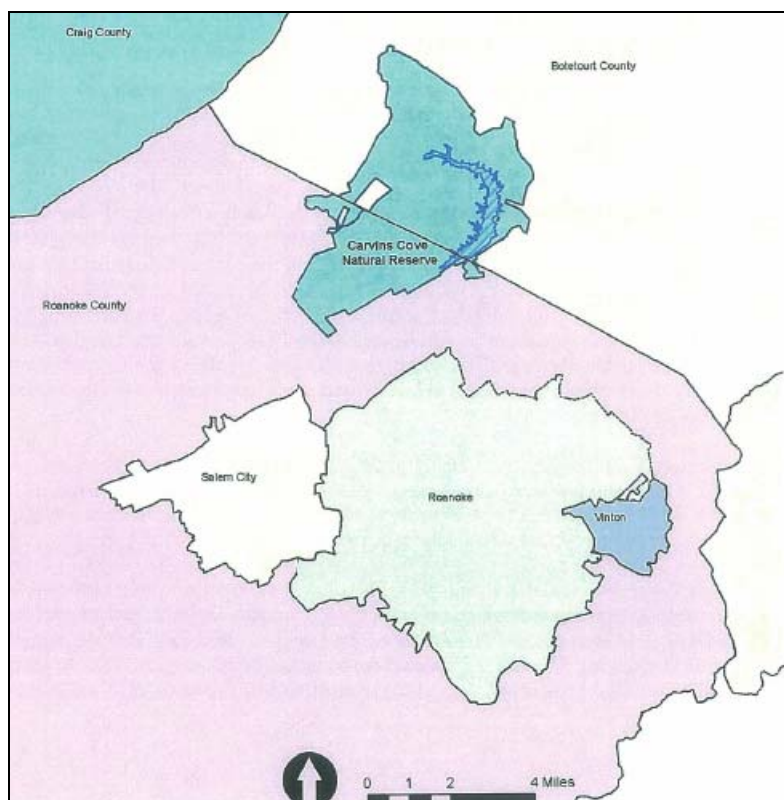


Figure 3. Vicinity Map for Carvins Cove Natural Reserve

The *Park Management Plan* divides the Cove into five management zones based on physical, biological, and cultural resources. A map of the zones - #1 Recreation Development, #2 Natural Resource Protection, #3 Low Impact Recreation, #4 Cultural Resource, and #5 Riparian Protection - is shown in Figure 4. There are existing trails in each of these areas. The Management Zones are based on access, slope, soils, hydrology, and other physical and biological factors. Table 2 shows the Cove's official trails and their management zone.

Table 2. Management Zone Location of Official Trails			
# on Map	Name	Length Miles	Management Zone in Which Located*
1	Happy Valley	6.62	4, 5
2	Brushy Mountain	9.80	2, 3, 4, 5
3	Tuck-a-way	1.02	1, 3, 5
4	Comet	2.28	1, 3, 2, 5
5	Jacob's Drop	1.14	2, 3
6	Kerncliff	1.99	2, 3
7	Hemlock Tunnel	1.95	2, 3, 5
8	Araminta	0.78	3, 5
9	Songbird	2.06	1, 5
10	Arrowhead	1.61	1, 3, 5
11	Enchanted Forest	0.84	1, 5
12	Little Bell	0.30	1
13	Gauntlet	2.54	2, 3
14	Trough	1.25	2, 3
15	Buck	1.59	2, 3, 5
16	Hotel	1.00	3, 5
17	Hi-Dee-Hoe	1.60	3, 2, 5
18	Horse Pen Branch	1.50	3, 5
19	Tunnel	0.41	4, 5
21	Schoolhouse	1.79	1, 5
22	Riley's Loop	0.36	4, 5
23	Sawmill Branch	1.22	2, 3, 5
24	Four Gorge	2.39	3, 5
		46.04	

* For each trail, zones are listed in the order of descending amount of mileage.

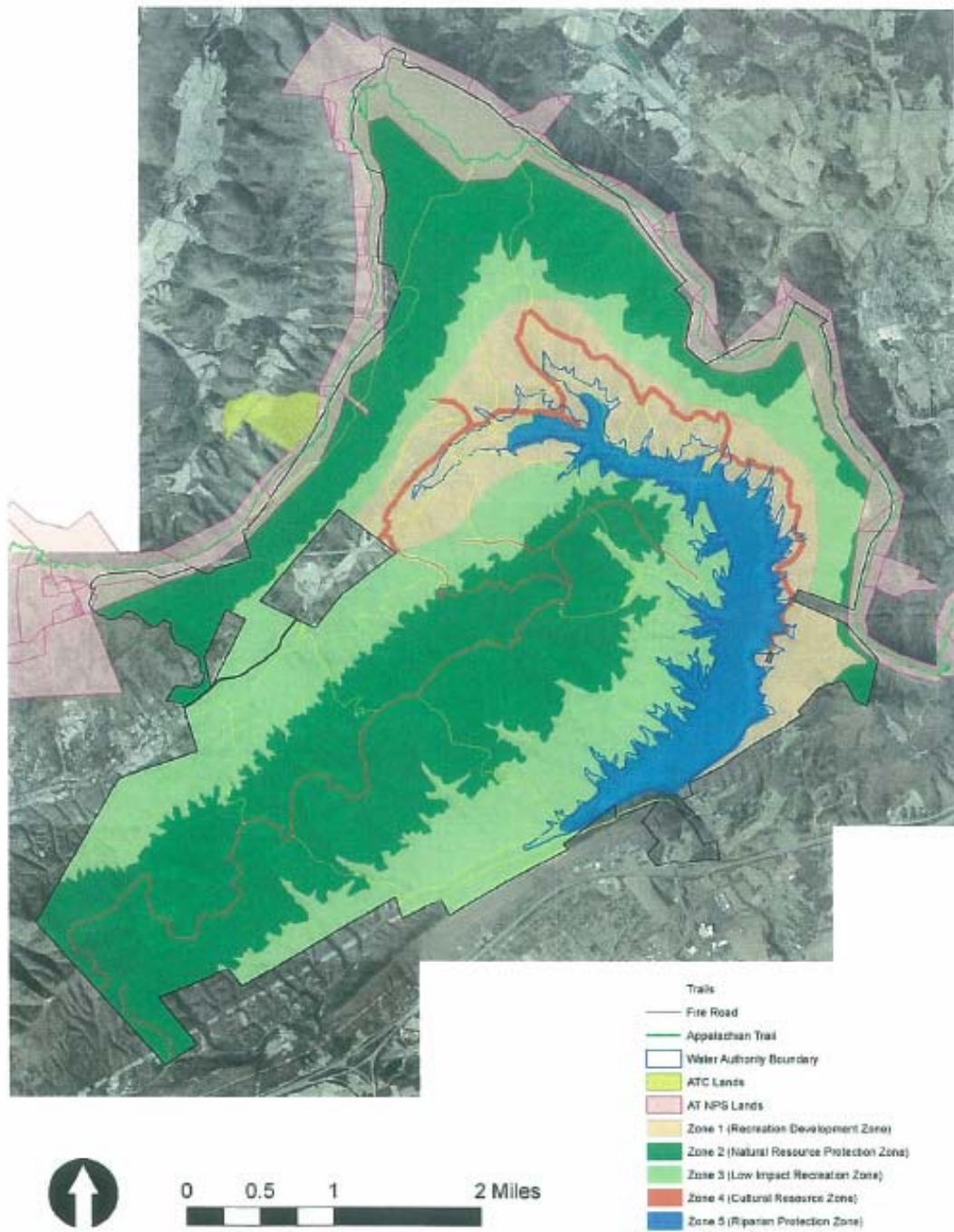


Figure 4. Management Zone Map

The assessment of trails completed in 2009 shows that the trails which have problems with soils and muddiness are most frequently located in Zone 1, Recreation Development. The trails which have problems with erosion are most frequently in Zones 2 or 3, Natural Resource Protection and Low Impact Recreation. For these trails the problem is usually fall-line location. Trails in Zones 1, 2, and 3 can be built on sustainable alignments with careful attention to drainage features, angle of alignment (trail slope vs hillside slope) and creek crossings.

One of the most important factors for trails is the Cove's proximity to a metropolitan area and to Interstate 81. Three hundred thousand people can be at the Cove within thirty minutes of leaving home; forty million people are within a three hour drive and thus could come to the Cove for the day. The *Park Management Plan* calls for protection of the "pristine, naturalistic character" and "rationing ... to avoid over-use." The *Trail Management Plan* provides specific guidelines, data, and recommendations to guide management to meet these objectives.

2.2 Research and Review of Issues

Carvins Cove Natural Reserve's size and trail network make its management needs comparable to those in national forests and national parks. The USDA Forest Service has been the lead federal agency for multi-use trail management, research, and guidance on construction and maintenance, but other organizations like the Appalachian Trail Conservancy (ATC) and International Mountain Bicycling Association (IMBA) have made important contributions on designing sustainable trails. In the last 20 years many new books have been published on trail design, recognizing that users have different experiences, impacts, and needs based on their modality (foot, bike, horse, etc.) Appendix B contains a list of references and design guidelines reviewed during development of this trail plan.

There are several issues important to management of the Cove's trail network. The discussion below is not meant to be all inclusive, but to highlight issues raised by the Assessment Team, staff, and stakeholders.

2.2.1 Sustainable Trail Design

The focus on sustainable trail design is especially important at the Cove because of the focus on protection of the water quality and the increases in recreational use of the trail network. Sustainability has been defined as:

Sustainability is the ability of the travel surface to support current and anticipated appropriate uses with a minimal impact to the adjoining natural systems and cultural resources. Sustainable trails have negligible soil loss or movement and allow the naturally occurring plant systems to inhabit the area, while allowing for the occasional pruning or removal of plants necessary to build and maintain the trail. If well built, a sustainable trail minimizes seasonal muddiness and erosion. It should not normally affect fauna adversely nor require rerouting and major maintenance over long periods of time.

U.S. Department of the Interior, National Park Service, Natural Resource Management Guidelines, 1997

Two key considerations in designing sustainable trails are proper siting and construction to reduce erosion. Trail erosion is caused by a combination of

grade, water, soil type, and trail users. Water damages the trail surface by removing soil when it flows across its surface. The steeper the grade, the more velocity and power the water has to move material downhill. Trail users increase this erosion potential by loosening the surface of the tread, making it easier for water to scour it away. In order to prevent erosion, it is critical to site the trail in a manner that encourages sheet flow (a dispersed flow of water across the trail) rather than channeling the water down the trail, leading to a down-cutting of the trail tread.

Blue Ridge Parkway Trail Plan, 2004 Final Draft

Trail professionals recognize that, in order for trails to be sustainable, they must be designed to reduce erosion caused by water and erosion caused by users. Erosion caused by water is closely correlated with trail alignment, particularly the steepness of the trail grade in comparison to the landscape it traverses. Other factors include the frequency of grade reversals that push water off the trail, the amount and intensity of precipitation, the soil composition and erodibility, the amount of trail use and types of users, the width of the trail and surface available to collect water, the trail surface material and hardening, and the canopy coverage to intercept precipitation.

2.2.2 User Impacts

Erosion is movement of soil caused by precipitation, gravity, or wind. Users' contribution to erosion can be through compaction or displacement of soil and varies depending on whether travel is up or down and on the degree of user effort. The impact of users is related to weight and surface area of contact, hardness of the point of contact (shod hoof, boots, tires), consistency of contact and speed, acceleration and deceleration, and physics of propulsion. In general, horses have more impact on erosion and sedimentation than hikers or mountain bikes. This impact is related to increases in soil roughness and loosening, which detaches soil particles that then can become sediment. Shod horses have more impact than "barefoot" horses. Bicycle tires on moderate grades can actually compact soils, increasing resistance to erosive forces. The trail design standards developed by the Forest Service and other managers attempt to balance user impacts with resource conditions and sustainability. A summary of research on trail user impacts is included in the *Jake and Bull Mountain Trail Assessment and Management Plan* referenced in Appendix B.

In addition to erosive forces, biological impacts are a consideration in the Cove watershed. The amount of excreta of a user is a function of user type and time in the area. Horses produce the most by mass; hikers often have a longer residence time; mountain bikers may have the least impact. Wildlife is abundant in the Cove and probably at this time as significant a source as humans. The impacts of deer and birds in transporting seeds, such as invasive species, are higher than for human users.

2.2.3 User Characteristics and Experiences

Many books have been written on the various user groups and trail standards for accommodating their needs. Many of these are referenced in Appendix B. Less research is available on how trail standards and grades affect how the user feels. Input from stakeholders (Appendix D) revealed a passion for the Cove trails and for the range of experiences available here.

The charts in Figure 5 were developed by Randy Martin of Trailscape, Inc. in California to relate user effort to average grade up and down. While equestrians are not included, because the horse is doing the work not the rider, the charts provide insight on experiences for hikers, mountain bikers, and trail runners.

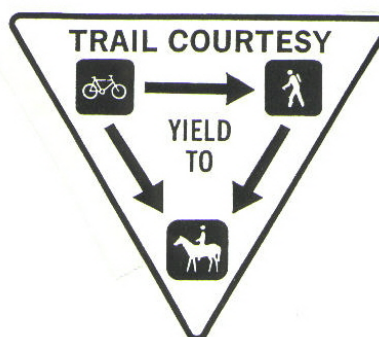
2.2.4 User Conflict

Trail conflicts develop for a variety of reasons, usually related to users expectations and desired experience. Many conflicts occur because of inconsiderate user behavior. Experience shows that such conflicts can be minimized by education on trail etiquette and resource conservation values, provision of information on trail difficulty and mileage, posting of guidelines and regulations, and peer pressure for compliance.

Frequency of contact is an important factor in reducing conflicts. Hikers normally travel at 2 miles per hour, horses at 5-6 mph, and mountain bikers at 3-15 mph. Users traveling 2-3 mph can be startled by others traveling at higher speeds. Interaction among users can be reduced through self selection of more remote areas, design and construction of passing zones, management actions such as restricting the direction of travel or types of users, and development of a trail ethic of etiquette in all users. The trail ethic has improved at the Cove, but should continue to be emphasized through publications and signs. All users should be courteous, speak to others and horses when approaching to pass, restrict noise, carry out trash, and practice the concepts of "leave no trace."

American Trails (www.americantrail.org/resources) recommends three ways to help reduce user-group conflict: involve user groups in the decision making process, use volunteer patrols, and involve user groups in trail maintenance. Roanoke Parks and Recreation has been implementing these recommendations for several years. Trail etiquette guidelines are included in Appendix E.

Trail users should know who has the right-of-way. Bicyclists yield to hikers and horses, with hikers also yielding to horses. The "yield triangle" should be used on Cove literature, kiosks, and access points.



The "yield triangle" is widely used to remind users who has right-of-way.

Average Grade 100 Yards	User Experience: Hiker	
0-3% Up	May not be enough to provide Fitness Demand at full speed	
4-6% Up	Enough grade to get heart going	
7-10% Up	Easier to get heart rate up at walking speed	
10-15% Up	Heavy demand	
15-20% Up	Hard Hiking, not likely talking	
Down		
0-3% Down	Fairly Restful	
4-6% Down	Boosted walking, some braking or foot slap	
7-10% Down	Heavier Pounding	
10-15% Down	Pounding Due to Braking	
15-20% Down	Small Step Pounding	

Average Grade 100 Yards UP	User Experience: Bicycling	
0-3% Up	Fast efficient climbing, fantastic in rolling terrain	Delight
4-6% Up	Middle chain ring climbing	Light work
7-10% Up	Likely shifting to small chain ring, a boring grind	Hard work
10-15% Up	Small Chain ring slow climbing, maybe walking, even 12%	Strain
15-20% Up	Small chain ring, Granny gear. Walking the bike may be	Oppressive
Down		
0-3% Down	Pedaling downhill, without braking, good fitness high delight, can coast, able to use full traction for turning not braking.	Yippee
4-6% Down	Enough grade to coast, some pedalling, exciting and fast	Exciting
7-10% Down	Really fun but using up elevation quickly, intermittent braking	Pay Attention
10-15% Down	Consistent braking, difficult to turn and brake	Hands Hurt
15-20% Down	Heavy continual braking. Can feel like going over bars	Uncomfortable

Average Grade 100 Yards	User Experience: Runner	
0-3% Up	Full Speed light load, able to run full distance speed	
4-6% Up	Starts to feel some demand but can be ascended at 3/4 speed	
7-10% Up	Significant slowing toward 10%	
10-15% Up	Approaches running at a walking pace	
15-20% Up	Walking is just as fast	
Down		
0-3% Down	At 3% a runner can let 'em roll without pounding, turns feel rolly	
4-6% Down	at 5-6% Sustained, some braking with every step	
7-10% Down	Pounding with every step with full stride	
10-15% Down	Shorter step pounding	
15-20% Down	Small step pounding	

Figure 5. User Experiences at Different Grades

2.2.5 Watershed Protection

The 630-acre Carvins Cove Reservoir provides approximately 45% of the drinking water for Roanoke City and County. Watershed protection is of paramount importance and a central focus of the 2007 *Park Management Plan* as well as the 2000 *Land Use Plan*. It was a driving force behind the conservation easement placed on the Cove. Trail-building crews working at the Cove follow the standards of USDA Forest Service and the International Mountain Biking Association (IMBA) to ensure that water quality is not adversely impacted by the construction of trails. The trail assessment process makes note of soil erosion and other potential impacts on water quality so that these conditions can be corrected. While eroding trails are recognized as problematic, for most trails at the Cove there is a substantial buffer zone where sediment is able to settle before reaching streams or the reservoir.

2.3 Data Collection Process and Methods

2.3.1 Process

The Trail Plan Task Force used the following process:

1. Assessment of Trails
 - a. Development of assessment forms and system.
 - b. Training and procedure review with Assessment Team.
 - c. Assessment of official trails and road beds.
 - d. Review of unofficial trails and connections.
2. Mapping of official and other existing trails.
3. Research on issues and standards.
4. Review of trail data by Assessment Team to determine user suitability and difficulty.
5. Input from stakeholders and trail maintainers.
6. Coordination and review with Parks and Recreation staff.
7. Development of recommendations for each trail of actions needed.
8. Development with Assessment Team of recommendations for new trails and connections.
9. Authorization by the City.

2.3.2 Assessment Method

The Trail Plan Task Force reviewed several existing trail assessment systems, including the USDA Forest Service, National Park Service, Appalachian Trail Conservancy, Universal Trail Assessment Process (UTAP), and IMBA. The Task Force used a form similar to the one developed for Mill Mountain Trail Plan, with modifications recommended during that process. The form is shown in Figure 6, with the data for each trail summarized in Section 3 of this plan.

Each trail was assessed by a team of two to five people. Trail Assessment teams attended a training session, with classroom and field instruction on using the tools and forms. For each trail, the assessors recorded the trail width, surface, and features. All trails were measured, using Rolatape-type measuring wheels recording in feet. Grades on the trail and hillside slope were recorded section by section, with two people using clinometers. The inventory data was collected in leaf-off season in the winter of 2009.

- Keep all the official trails open; don't close trails.
- Build new trails to disperse use and provide loops.
- Continue to manage the Cove trails for remote, dispersed use.
- Provide more trails that tie to the parking lots.
- Provide parking at Timberview Road.
- Make it easier to get a permit. Install a donation box at Bennett Springs parking lot.
- Provide changing stall and/or bathroom facilities at Bennett Springs parking lot.
- Continue to improve signage and maps.
- Don't "dumb down" difficult trails. Offer a range of difficulties.
- Designate/build a special use trail for technical mountain bikers, a hiking only trail from the boat landing to the AT, and easy trails at the boat landing.
- Consider ways to protect trails in wet conditions, such as freeze/thaw and rain.
- Provide easy trails near the parking lots.

The team members recognize that accommodating the trail needs of both residents and visitors to the Roanoke Valley, while protecting the resource base, is a challenging task. Carvins Cove provides a back country trail system that is only minutes from Roanoke and from I-81. Long term management will require sustainable trail design, staffing, financial resources, and the continued partnership approach for planning and managing trail resources.



Volunteers conducted the trail assessments, measuring the length, grade, and cross slopes of all roads and trails.

Section 3. Trail Conditions and Recommendations

3.1 Existing Conditions and Recommendations for the Official Trails

3.1.1 Description of Official Trails

As described in the Data Collection process in Section 2.3, each numbered trail showing on the City's Cove map was assessed and conditions recorded. These are referred to in this Trail Management Plan as the official trails. The most recent map is shown in Figure 1 on page 2 with 24 trails; the termini and descriptions of these trails are shown in Tables 3 and 4. As part of development of this plan, a Trail Plan Map was made showing the 24 official trails, plus other existing and proposed trails. The Trail Plan Map is attached to the back of this document as Figure 7.

Map #	Name	Length Miles	Tracks	Termini 1	Termini 2	Trail Intersections
1	Happy Valley	6.62	Multi	Carvins Cove Road	Boat Landing Parking Lot	2,4,9,3,19,11,12,22,21,10
2	Brushy Mountain	9.80	Multi	Happy Valley	Private property at VA Deer Road	24,5,7,13,17,14,15
3	Tuck-a-way	1.02	Single	Happy Valley	Jacob's Drop	11,4
4	Comet	2.28	Single	Happy Valley	Kerncliff	3
5	Jacob's Drop	1.14	Multi	Brushy Mountain	Tuck-a-way	6
6	Kerncliff	1.99	Multi	Jacob's Drop	Reservoir	4,7
7	Hemlock Tunnel	1.95	Single	Brushy Mountain	Kerncliff	8
8	Araminta	0.78	Single	Hemlock Tunnel	Kerncliff	None
9	Songbird	2.06	Single	Happy Valley	Happy Valley	19
10	Arrowhead	1.61	Single	Happy Valley	Happy Valley	23
11	Enchanted Forest	0.84	Single	Happy Valley	Tuck-a-way	1
12	Little Bell	0.30	Single	Happy Valley	Happy Valley	None
13	Gauntlet	2.54	Single	Brushy Mountain	Horse Pen	None
14	Trough	1.13	Single	Brushy Mountain	Horse Pen	14a
14a	Trough Expert	0.13	Single	Trough	Trough	None
15	Buck	1.59	Single	Carvins Cove Road	Brushy Mountain	16
16	Hotel	1.00	Single	Hi-Dee-Hoe	Buck	None
17	Hi-Dee-Hoe	1.60	Single	Bennett Spr. Parking	Brushy Mountain	16,24
18	Horse Pen	1.50	Multi	Timberview Road	Reservoir	14,13
19	Tunnel	0.41	Multi	Happy Valley	The tunnel	9
21	Schoolhouse	1.79	Single	Happy Valley	Happy Valley	None
22	Riley's Loop	0.36	Multi	Happy Valley	Happy Valley	None
23	Sawmill Branch	1.22	Single	Arrowhead	Appalachian Trail	None
24	Four Gorge	2.39	Single	Hi-Dee-Hoe	Brushy Mountain	None
		46.04				

Table 4. Description of Trail Experience on Official Trails		
Map #	Name	Description and Experience
1	Happy Valley	Happy Valley is a gently rolling, one lane, gravel and dirt road which connects many of the other trails and provides loop options. It is usable in most weather conditions, although puddles are common. Because it is surfaced, it feels less remote than other trails, but its length allows users to get away from sounds of civilization. There are many cultural resources along the route, including cemeteries and old home sites. Wildlife watching and birding along the trail are excellent. Views of the reservoir are possible near the picnic area and at Riley's Loop.
2	Brushy Mountain	Brushy Mountain is a steady climb for the first three miles and then a gently rolling, dirt road. It has gravel surfacing only at the very beginning. It ties together multiple trails and serves as the backbone of the upper trails accessed from the Bennett Springs parking lot. This road offers the best views at the Cove, gradually circling the mountain to provide glimpses in all directions with views of Tinker Mountain, Sawmill Branch, the reservoir, and the Roanoke Valley.
3	Tuck-a-way	Tuck-A-Way crosses interesting flood plain environment. Parts of the trail are often muddy, and the 20'+ creek crossing is difficult for hikers. Beyond Comet the trail is steeper, climbing to Jacob's Drop. The trail is an important connection to Happy Valley Trail.
4	Comet	"Lower Comet" from Happy Valley Trail to Tuck-A-Way is gently rolling with minor drainage crossings. It provides a single track experience that roughly parallels Happy Valley. "Upper Comet" is more challenging as it climbs to Kerncliff.
5	Jacob's Drop	Jacob's Drop is a steep road with loose stone and some ruts. Going down requires braking and speed control; going up requires significant stamina and strength. This trail is part of an outer loop of trails for highly skilled riders.
6	Kerncliff	Kerncliff Trail is on a one-lane road maintained for powerline access. While a few sections are very steep, most of the trail has easy, rolling grades. Because of the powerline overhead in multiple areas, this trail provides excellent views of the reservoir.
7	Hemlock Tunnel	At the top, the trail is winding, a little steep, and a lot of fun for experienced riders. The mid-section requires more skill over a section that is very steep, straight, with consistent grade and loose rocks and debris. Beyond that, the trail is tight, twisty, a little rough, and challenging with unpredictable flow.
8	Araminta	This is a narrow, single-track trail in a remote area. Grades are not difficult, but the trail is poorly benched and difficult to follow. Currently there are no signs.
9	Songbird	Songbird was re-aligned by the Trail Solutions team to provide a sustainable alignment on the lower slopes of Tinker Mountain. It is single track, with moderate climbs and good flow. It goes through pine stands and hardwood stands, passes some interesting rocks, and has several excellent views of the creek. Described as "smooth, swoopy, and twisty," this trail is very popular with mountain bikers, but used heavily by equestrians and hikers as well.
10	Arrowhead	Arrowhead is a single track trail, more technical than Songbird, with interesting water features. There are numerous ups and downs, several vernal ponds, and numerous user-built jumps and trail features. Several creek crossings have been improved with rock structures, but there are no bridges and crossings can be difficult, at least wet, in high water. This is one of the few trails that offers a long section paralleling a creek with views of riffles and waterfalls.
11	Enchanted Forest	Enchanted Forest has always been a very popular, very easy trail through a plantation of white pine with numerous log structures. At one end the trail parallels the reservoir shoreline, providing excellent bird watching opportunities. During the 2008 fire and windstorm several sections of pines were blown down, blocking sections of the trail with tangles of trees. When the trail was eventually re-opened, the new alignment followed many of the recommendations of the 2006 Trail Solutions report. The trail now utilizes Happy Valley for creek crossings.

12	Little Bell	This is a short trail connecting Enchanted Forest to Schoolhouse Trail. It is relatively flat through a stand of regenerating white pine.
13	Gauntlet	The Gauntlet has traditionally enticed the most daring mountain bikers and heartier hikers and equestrians because it is the longest downhill at the Cove. During the 2008 fire the upper portions of the trail were bulldozed into fire lines. After the fire this section was rebuilt on a longer alignment to come out to Brushy Mountain Trail across from Hi-Dee-Hoe Trail. The trail is not particularly technical, but rough in spots, long, fairly narrow, with some challenging grades when going up.
14	Trough	This trail is a long downhill, much of it on the fall line. The upper section used to be washed out, thus the name Trough. In 2009 rolling grade dips and water diversions were installed in a way that provided advanced technical features like jumps, banked turns, and hardened landing areas. Upper portions of the trail are now popular with downhill mountain bikers who enjoy the jumps. The lower section of this trail was rerouted in 2005 to avoid private property and is now on a very sustainable alignment.
14a	Trough Expert	This is the upper section of Trough with technical features.
15	Buck	This is the trail about which user views are most divergent. The trail was probably built as a hiking trail; it is narrow and has steady grade, multiple switchbacks, and several entrenched sections. For some users it offers a technical work out; others are bothered by the awkward flow and trenching.
16	Hotel	This trail provides some very easy walking in floodplain areas, but is interspersed with difficult creek crossings and very steep sections. There are several stone "Christmas trees" along the trail.
17	Hi-Dee-Hoe	Hi-Dee-Hoe is a steady climb, with over 10% grade for three quarters of its length. As the only trail out of the Bennett Springs parking lot, it receives a tremendous amount of use. Most of the trail is narrow and climbing; parts are fall line but other parts side hill with switchbacks. Loose stone is common on upper portions of the trail.
18	Horse Pen	Horse Pen Trail was a narrow path on an old road prior to the 2008 fire. In one place a failed culvert has resulted in a trench 10 feet wide and four feet deep. In 2008 fire crews cleared and widened the trail for access. The trail is now a road, but has numerous stopped up culverts.
19	Tunnel	This is a heavily graveled road with an unused gate on the Happy Valley end. It crosses Songbird Trail and the creek, ending at a large open landing at the tunnel. At the end users can see water gushing through the tunnel and the large piles of stone which were blasted out. This is one of the few trails at the Cove which has a destination. The surface is unpleasant for trail purposes because the stone is relatively large and irregular.
21	Schoolhouse	This is one of the trails which was realigned and rebuilt by the Trail Solutions team. It has several creek crossings, some of which are difficult for hikers. There are numerous frog ponds and soils are generally soft. The trail passes a nice view of the reservoir and the site of the old schoolhouse.
22	Riley's Loop	Riley's Loop is the site of the old picnic area, which was accessible for many years by vehicles coming from Carvins Cove Road. When making the loop, users see a white pine stand which once sheltered picnic tables, "beaches" along the reservoir edge, fishing spots, a closed bathroom facility, a stored dock, and lots of old signs. This area has great potential to be improved as an interior destination site.
23	Sawmill Branch	Sawmill Branch Trail is blazed in red and has been managed for hikers only as an access to the Appalachian Trail. Much of the trail is in the trench of an old road, far from the creek itself. About half way up it crosses a large area of Turkey's beard. As it approaches the AT, the trail crosses several springs and creeks. Because of its distance from any vehicular access, the trail receives little use and does not appear to be deteriorating further.
24	Four Gorge	This sidehill trail was built between 2004-07 to provide a connection from the Bennett Springs parking lot to the lower trails closer to the reservoir. It has a 30' bridge at Deep Creek Junction and crosses four other drainages. It has a rolling alignment and great flow. This trail is heavily used and very popular.

3.1.2 Summary of Assessment and Sustainability Data

Collection of the trail assessment data included recording trail length, width, surface, grades, cross slope, hillside slope, features related to sustainability, maintenance needs, and attractions. This large volume of data is being stored by the Department of Parks and Recreation in a separate volume as baseline information for ongoing monitoring and maintenance. After collection and review of the data, the Assessment Team evaluated the sustainability of each trail and the amount of maintenance required to handle existing use levels. The information in Tables 5 and 6 summarizes this data and can be used for monitoring and scheduling maintenance.

Map #	Name	Length Miles	Width (feet)	% Exceeds half rule	Trail 0-5%	Grade 6-10%	11-15%	16-20%	21-30%	>30%
1	Happy Valley	6.62	8-12	Road	28	62	10	0	0	0
2	Brushy Mountain	9.80	8-13	Road	55	45	0	0	0	0
3	Tuck-a-way	1.02	1.5-4	86	43	47	4	4	3	0
4	Comet	2.28	2-4	48	48	17	20	9	5	0
5	Jacob's Drop	1.14	4-8	42	19	15	35	23	7	0
6	Kerncliff	1.99	4-8	62	37	36	13	7	7	0
7	Hemlock Tunnel	1.95	2-4	57	27	24	22	16	10	1
8	Araminta	0.78	1.5-2.5	47	49	40	7	3	1	0
9	Songbird	2.06	2-4	23	68	26	6	0	0	1
10	Arrowhead	1.61	2-4	59	51	34	9	6	0	0
11	Enchanted Forest	0.84	2-4	47	66	22	11	1	0	0
12	Little Bell	0.30	2-4	75	85	15	0	0	0.5	0
13	Gauntlet	2.54	1.5-2	30	22	34	37	4	2	1
14	Trough	1.13	2-4	70	19	27	27	26	0	0
14a	Trough Expert	0.13	2-8	100	0	0	28	66	7	0
15	Buck	1.59	1.5-4	17	25	32	37	4	1	1
16	Hotel	1.00	2-4	78	61	13	7	11	8	0
17	Hi-Dee-Hoe	1.60	1.5-4	30	12	14	54	19	1	0
18	Horse Pen	1.50	9-12	Road	74	26	0	0	0	0
19	Tunnel	0.41	8-12	Road	38	52	10	0	0	0
21	Schoolhouse	1.79	2-4	35	68	29	2	1	1	0
22	Riley's Loop	0.36	8-12	Road	83	17	0	0	0	0
23	Sawmill Branch	1.22	2-4	68	7	26	45	19	3	0
24	Four Gorge	2.39	2-4	22	56	24	18	2	0	0
		46.04								

Table 6. Sustainability and Maintenance Needs for Existing Trails					
Trail Name	Highly Susceptible to Wind Damage	Sustainability with Current Use	Trail Name	Highly Susceptible to Wind Damage	Sustainability with Current Use
Araminta		3-4	Horse Pen		3
Arrowhead	✓	2	Hotel		3-4
Brushy Mountain		1	Jacob's Drop		3
Buck		3	Kerncliff		2
Comet - Lower	✓	3	Little Bell		2
Upper		2	Riley's Loop		1
Enchanted Forest	✓	3	Sawmill Branch		4
Four Gorge		1	Schoolhouse	✓	3
Gauntlet		2	Songbird	✓	1
Happy Valley	✓	1	Trough		2
Hemlock Tunnel		3	Tuck-a-way		4
Hi-Dee-Hoe		2	Tunnel		1
1=Easily sustainable with annual maintenance			3=Needs maintenance quarterly and after rains		
2=Needs bi-annual maintenance of tread			4=Tread is not repairable via routine maintenance		

3.1.1 Trail Difficulty Rating and Recommendations

The Assessment Team discussed each trail, its difficulty and its sustainability. Rating each trail’s difficulty can: 1) help users make informed decisions, 2) encourage visitors to use trails that match their skill level, 3) minimize risk and injuries, and 4) improve visitors’ experiences. Difficulty ratings should be posted on trails, kiosks, and maps.






The difficulty of the trail will vary depending on the user’s experience and mode of travel. Hikers can negotiate most obstacles. Mountain bikers are more affected by trail surface obstacles. Horses are less affected by distances, but restricted by clearances. In general, the factors important in rating trail difficulty are tread width, trail clearance, surface condition, trail grade, natural obstacles, and technical features.

Trail difficulty ratings are assigned under ideal conditions and are based on difficulty compared to other routes in the area. A trail rated intermediate by local standards could possibly be rated easy if located out west. Conditions are always subject to change due to weather conditions. In ranking difficulty, the Team recognized that all trails at the Cove require expertise and physical conditioning. While some trails are easier than others, none are as easy as greenways in town. Users need to have and to develop trail skills.

The Assessment Team also considered whether a trail could be utilized by someone with physical disabilities. None of the trails is currently accessible under guidelines of the Americans with Disabilities Act (ADA). However, there are trails that could be

utilized if special access were provided or moderate improvements made. The ratings for difficulty and ADA potential are shown in Table 7.

Table 7. Degree of Difficulty Rating and Recommendations			
Name	User Skill Level Required		Potential for ADA
	Current Signage	Recommended Rating on Signage	
Araminta	None	■	No
Arrowhead	■	■	No
Brushy Mountain	●	●	Yes
Buck	None	◆	No
Comet			No
Lower	■, ◆	■	No
Upper	None	◆	No
Enchanted Forest	■, ●	●	Yes
Four Gorge	■	■	No
Gauntlet	◆◆	◆◆	No
Happy Valley	●	●	Yes
Hemlock Tunnel	◆◆	◆◆	No
Hi-Dee-Hoe	■	◆	No
Horse Pen	■	●	Yes
Hotel	None	■	Yes
Jacob's Drop	◆	◆	No
Kerncliff	None	●	No
Little Bell	■	●	Yes
Riley's Loop	None	●	Yes
Sawmill Branch	None	■	No
Schoolhouse	■	●	No
Songbird	■	●	No
Trough	◆	◆	No
Tuck-a-way	■	■	Portion
Tunnel	●	●	Yes

	(Easiest) These routes are appropriate for novice through advanced users. They generally follow obvious, well-marked trails and roads. Grades are gentle, and only minor obstacles will be encountered.
	(Intermediate) These routes are appropriate for intermediate through advanced users. Terrain will be steeper, trails narrower, and obstacles such as roots and loose stone will be encountered.
	(Advanced) These routes are recommended for physically fit users with technical skill. Terrain is steep, and difficult obstacles will be encountered.
 	(Most Difficult) These routes are recommended only for physically fit users with technical skill. Users need to control speed, watch for surface hazards, and be familiar with trail location. Terrain is steep, and technical obstacles will be encountered.

3.1.1 Recommendations for Official Trails

Table 8 on the next page shows recommendations developed by the Assessment Team for maintenance and improvements on the official trails at the Cove. These recommendations address issues of connectivity to other trails, accessibility for the recommended users, and sustainability of the tread.

3.2 Conditions and Recommendations for Other Existing Trails

There are many other existing trails and old roads, some of which show on the Carvins Cove Trail map without numbers and some of which do not show. These trails were reviewed, but not assessed. The most significant ones are discussed below with recommendations in Table 9.

3.2.1 Appalachian National Scenic Trail (Trail Plan Map # 25)

Four miles of the Appalachian Trail are located on City-owned land and eleven additional miles are contiguous to the Carvins Cove property. The Appalachian Trail Conservancy (ATC) maintains an inventory and assessment of the AT, and the local Roanoke Appalachian Trail Club (RATC) has overseers assigned to each Trail segment. RATC and hikers value the remoteness of this section of the AT. Occasionally horses and ATVs get on or cross the trail. Parts of the AT are in the Natural Heritage area.

3.2.2 Trail Paralleling the AT (Trail Plan Map #32)

There is a road paralleling the AT above Songbird Trail. Portions of the road show as a dotted line on the USGS maps and sections were part of the AT in the 1950s. This road is receiving ATV use now and was noted in the Natural Heritage Report as receiving motorbike use. The trail is in the AT corridor and in the most significant of the Natural Heritage areas, where the recommendation is no new trails. Closure is recommended.

3.2.3 Blue-Line Trail for the AT (Trail Plan Map #26)

The Blue-Line Trail runs from the AT at Brickey's Gap to the AT at Lambert's Meadow, serving as an alternative AT route in case of severe or icy weather on Tinker Cliffs. The owners of the property at Brickey's Gap have rights to cross the AT to farm their property. They also have a hunting cabin on their property.

There is evidence of frequent ATV use on the Blue-Line Trail and on other old roads connecting to the Blue-Line. ATVs are accessing Cove property, and there are signs of hunting and camping on Cove lands. Much of the Blue-Line Trail and ATV use are in a Natural Heritage area.

3.2.4 Dam Trail (Trail Plan Map #29)

There is a trail from the boat landing parking lot to the dam. Once open and maintained, the trail is still used by fishermen, hikers, and mountain bikers. It has two very hazardous sections near the dam where the trail has collapsed into the reservoir. The dam is a popular observation point among users. The WVWA, which manages the dam and overlook, closed the trail because of the hazards and erosion. While the trail is easy and could be a great addition to recreation opportunities available from the boat landing, it would require some realignment and rock work to make it safe and sustainable.

Table 8. Recommendations for Official Trails	
Name	Recommendations for Maintenance and Improvements
Araminta	<ol style="list-style-type: none"> 1) Install signs. 2) Relocate sections near the creek to side slope. 3) Re-bench existing sections and remove duff. 4) Harden creek crossings. 5) Build a new trail from this area to Horse Pen.
Arrowhead	<ol style="list-style-type: none"> 1) Continue to improve sustainability with rolling grade dips and minor realignments. 2) Improve stream crossings to provide options for all user groups. 3) Improve drainage on Sawmill Branch end of trail. 4) Consider a different name that doesn't imply protected artifacts. 5) Build a mid-slope trail from here to both parking lots.
Brushy Mountain	<ol style="list-style-type: none"> 1) Repair the damaged culvert near Happy Valley. 2) Replace "No Trespassing" signs with Park boundary signs at access points. 3) Develop trail access from here to Timberview Road to provide a connection to Hanging Rock Battlefield Trail and Masons Creek Greenway. 4) Install a gate at the City boundary to restrict ATVs.
Buck	<ol style="list-style-type: none"> 1) Consider using techniques similar to those on the Trough, but keep trail tread narrow and switchbacks tight. 2) Deberm problem areas by hand. 3) Save work on this trail until others have been repaired.
Comet	<ol style="list-style-type: none"> 1) Divide this trail into Lower Comet and Upper Comet. 2) Close in wet weather and freeze/thaw conditions. 3) Improve the creek crossings, including at least one bridge.
Enchanted Forest	<ol style="list-style-type: none"> 1) Close during freeze/thaw and rainy conditions. 2) Continue to harden areas which are often muddy. 3) Utilize Happy Valley Trail for all creek crossings. 4) Maintain for a variety of recreation programs.
Four Gorge	<ol style="list-style-type: none"> 1) Continue to armor creek crossings with stone as needed. 2) Extend both directions to connect to Tuck-a-way and Buck.
Gauntlet	<ol style="list-style-type: none"> 1) Manage for the most skilled users. 2) Evaluate conversion of the top of the old trail into a more challenging route with technical features. 3) Build new trails to connect to Hemlock Tunnel and Araminta/Kerncliff.
Happy Valley	<ol style="list-style-type: none"> 1) Clean and repair culverts regularly. 2) Use crush-r-run sized stone rather than gravel to improve the surface for trail users. 3) Repair railings on the bridge at Sawmill Branch. 4) Provide ADA parking at the gate on Carvins Cove Road. 5) Provide interpretive and historical markers. 6) Improve the signage and gate at Carvins Cove Road. 7) Manage invasive species and maintain old fields for wildlife diversity. 8) Add mileage markers along the trail with zero at the boat landing. 9) Remove spray paint from trees. 10) Combine with Brushy Mountain for a Carvins Cove Greenway, with connections to Tinker Creek Greenway and Hanging Rock Battlefield Trail.
Hemlock Tunnel	<ol style="list-style-type: none"> 1) Maintain for expert riders. 2) Relocate section that is in creek bed.

Hi-Dee-Hoe	<ol style="list-style-type: none"> 1) Mitigate stormwater runoff from the parking lot. 2) Increase frequency of trail maintenance. 3) Install rolling grade dips, outslope, and re-establish full bench where needed. 4) Build a mid-slope connection to Buck.
Horse Pen	<ol style="list-style-type: none"> 1) Provide new parking at Timberview access point. 2) Improve for ADA and family use, but narrow from current 12-foot width to 8-feet. 3) Clean culverts and rehabilitate the trench. 4) Build trail bridges to narrower widths to prevent vehicle loading. 5) Repair the remaining bridge. 6) Remove debris from the road corridor.
Hotel	<ol style="list-style-type: none"> 1) Turnpike some sections and improve to provide an easy interpretive loop. 2) Provide large stepping stones at creek crossings for hikers. 3) Close during wet weather and freeze/thaw conditions. 4) Evaluate a mid-slope connector between Hi-Dee-Hoe and Buck. 5) Consider seasonal use restrictions after a mid-slope connector is built.
Jacob's Drop	<ol style="list-style-type: none"> 1) Coordinate with AEP on maintenance. 2) Regrade sections that are trenched to divert water off the trail.
Kerncliff	<ol style="list-style-type: none"> 1) Coordinate with AEP on maintenance. 2) Build a trail section that goes around the hill instead of up and over it. 3) Install signage. 4) Build connections to Lower Comet and to Horse Pen/Gauntlet.
Little Bell	<ol style="list-style-type: none"> 1) Monitor drainage basins and grade reversals and improve as needed.
Riley's Loop	<ol style="list-style-type: none"> 1) Convert the existing building into a maintenance facility and build a waterless restroom. 2) Provide hitching racks and picnic tables. 3) Remove old signs. 4) Provide managed parking for special Parks and Recreation programs.
Sawmill Branch	<ol style="list-style-type: none"> 1) Install and replace signs, particularly near the AT where use is restricted. 2) Maintain hiker only status.
Schoolhouse	<ol style="list-style-type: none"> 1) Provide better crossings of creeks for hikers. 2) Close during wet weather and freeze/thaw conditions. 3) Provide interpretive signage at the schoolhouse.
Songbird	<ol style="list-style-type: none"> 1) Maintain as is. 2) Continue to harden muddy spots. 3) Build a connection to Bennett Springs Parking lot.
Trough	<ol style="list-style-type: none"> 1) Maintain for skilled users. 2) Monitor for hunting and ATV use.
Trough Expert	<ol style="list-style-type: none"> 1) Maintain for skilled users.
Tuck-a-way	<ol style="list-style-type: none"> 1) Provide interpretative signage at the old swimming pool. 2) Close during wet weather and freeze/thaw conditions. 3) Evaluate building a bridge across the creek (~70') and realigning the trail for better drainage. 4) Harden muddy areas. 5) Connect to Four Gorge.
Tunnel	<ol style="list-style-type: none"> 1) When resurfacing in the future, use crush-r-run stone or limestone fines to improve conditions for trail users. 2) Provide interpretive signage at the tunnel.

3.2.5 Powerline Trail from Timberview (Trail Plan Map #28)

The Powerline Trail from Timberview is a road used by Appalachian Power for utility maintenance. It also is used by a variety of ATVs and motorbikes. Most of the trail is on Cove property, but a portion does cross private lands owned by a church. This trail could be a final link in building a trail loop that circles the reservoir, a frequent request from users. If an easement were acquired, the trail could tie to lands owned by WVWA and then to the proposed Tinker Creek Greenway and the boat landing parking lot.

3.2.6 Timberview Connector (Trail Plan Map #27)

The Cove trail map shows an existing multi-track trail that climbs from Timberview Road up the mountain but does not quite reach Brushy Mountain Trail. The trail is gated at Timberview. This trail was built as a road and generally has a sidehill location and is in good condition. It crosses under the powerline $\frac{1}{4}$ mile from Timberview, and ATVs are accessing the trail from private property at the powerline.

3.2.7 USGS Track (Trail Plan Map #31)

This multi-track trail shows as a dotted line on the USGS quadrangle map from private land on Timberview to Brushy Mountain Trail. It was bulldozed as a fire line in 2008. Restoration crews installed tank traps but did not reseed it. Portions of this trail are receiving significant ATV use. Closure of this trail is recommended.

Table 9 shows recommendations for improvement or closure of these existing trails.

3.3 Recommendations for New Trails

While the 12,463-acre Cove has 24.2 miles of single track trails and 21.8 miles of trails on roads, there could be many improvements to the system and to the recreation opportunities that system provides. The Assessment Team noted the following issues:

- There are few opportunities for beginners from accessible points. Most of the trails suitable for beginners are either on service roads or miles away from parking lots. For example, Enchanted Forest is a great beginner hike or mountain bike ride, but it is three miles from the closest parking. New trails that give beginners opportunity for easier, shorter loops are needed at both parking lots.
- There are too few trails from the parking lots. The existing trails receive a disproportionate amount of use and need more frequent maintenance. Additional trails and loops close to the parking lots are needed.
- There are many old roads which once provided access to homes or which were used for extracting timber. With little environmental impact some of these roads could be opened as new trail opportunities with historic, interpretive, and natural resource value.
- Most users enjoy opportunities for loop trails and enjoy riding/hiking different trails. New connections to form loops and to connect trails would expand these options and disperse use, thus preserving the feeling of remoteness so valued at the Cove. Loops of different lengths would help meet the varying needs of the different users, who typically travel different distances in a day.

- Happy Valley and Brushy Mountain Trails provide connectivity at the Cove and provide the longest, easiest trails. A smoother, aggregate surface on these trails would better serve less experienced users, those with “cruiser” bikes, and those wanting to travel in groups or with children.
- The Cove trail network is not currently connected to other trails. Connections to the valley greenways, the Jefferson National Forest and Havens Wildlife Management Area trails would improve connectivity.

Recommendations for the official trails have addressed many of these issues for connectivity, accessibility, and suitable trail surface. The new trails shown in Table 10 are suggested to more fully develop the Cove trail network, providing a range of opportunities for a variety of skill levels and users. Development of these trails would help fulfill the goals and objectives of the trail plan. Section 4.5 of this plan describes the process that would be followed to develop specific trail construction proposals and outlines conditions, such as funding and support for maintenance, that the Parks and Recreation Department would want fulfilled prior to trail development.

Name	Recommendations for Maintenance and Improvements
Appalachian Trail	<ol style="list-style-type: none"> 1) Ask ATC and RATC to install regulatory signs at points where illegal use may be entering the AT, such as the gas-line, Brickey’s Gap, and other trails. 2) Work with ATC and RATC to protect the AT experience. 3) Mark the AT on all Cove maps as “hiking only”. 4) Work with ATC to evaluate a connecting trail to the boat landing.
Trail Paralleling the AT	<ol style="list-style-type: none"> 1) Close and revegetate. 2) Post Park boundaries and regulations. 3) Work with ATC and DGIF to curtail illegal, motorized access.
Blue-Line Trail	<ol style="list-style-type: none"> 1) Post Park boundaries and regulations. 2) Coordinate with ATC to contact AT neighbors and remind them that ATVs are not allowed on City lands. 3) Ask RATC members to photograph and report violations. 4) Coordinate with RATC to manage use of the Blue-Line Trail and protect the AT experience.
Dam Trail	<ol style="list-style-type: none"> 1) Coordinate with WVWA on whether the trail will be open, on creation of a viewing platform at the dam, and on repair of hazardous sections. 2) If open, improve drainage crossings, reroute and repair eroding sections, and blaze. 3) If closed, naturalize, revegetate, and block the trail .
Powerline Trail	<ol style="list-style-type: none"> 1) Post Park boundaries and regulations. 2) Contact the church to assess its willingness to negotiate an easement for the trail.
Timberview Connector	<ol style="list-style-type: none"> 1) Extend this trail to connect to Brushy Mountain (#2) near #30 and provide a connection from the Cove trails to the valley greenway network. 2) Post Park boundaries and regulations.
USGS Track	<ol style="list-style-type: none"> 1) Close/obliterate the trail, particularly the upper section connecting to Brushy Mountain Trail. 2) Post Park boundaries and regulations.

Table 10. Recommendations for New Trails	
Map #/ Name	Rationale for Recommendation
#34 - Mid-Slope Connection - Buck to Arrowhead	A new sidehill trail is needed to disperse use from the Bennett Springs Parking Lot. This new trail would be located outside the Natural Heritage Area, generally paralleling the 1500' contour. A small easy loop could be developed on the flat directly across from the parking lot. Connections to Buck, Songbird, Tunnel and Arrowhead would greatly improve connectivity of trails.
#35 - Mid-Slope Connection - Arrowhead to the Boat Landing	This trail would be a continuation of #34 from Arrowhead and would parallel Happy Valley, providing a mid-slope sidehill trail at approximately the 1500' contour. It would have connections to Happy Valley near Schoolhouse. Co-location with the gas line should be explored as an option from Angell Branch to the boat landing.
#36 - AT Connector from Boat Landing	There is an old trail from the boat landing area to the AT at the powerline. Explorations in this area with ATC show a route that would avoid private land, but still provide a connection to the AT. This would be a hiking only trail. Coordination with ATC and NEPA compliance would be required.
#37 - Easy Trails at Boat Landing	Easy trails need to be built at the boat landing for beginner mountain bikers and casual hikers.
#38 - Brushy East Mid-slope - Timberview Connector to Hemlock Tunnel	This trail would provide a mid-slope connection from Timberview Connector to the Trough, the Gauntlet, and Hemlock Tunnel. This would provide a continuous mid-slope trail on the east side of Brushy Mountain, utilizing some existing old roads. It would provide part of an intermediate network from Timberview to the lower trails along Happy Valley.
#39 - Connection to Tinker Creek Greenway	This trail would be a connection from the boat landing to Tinker Creek Greenway along Carvins Creek, providing a linkage to the valley greenway system. Parts of this are outside the Cove and would be completed by the Greenway Commission.
# 40a - Four Gorge extension to Tuck-a-way	This is one of the most requested additions to the trail system. It would provide a link from the popular Four Gorge Trail to the lower trails of the Cove, eliminating a long road ride.
#40b - Four Gorge Extension to Buck	This would provide a mid-slope connection near Bennett Springs parking lot, extending Four Gorge to the west to Buck. This would relieve pressure on Hotel Trail and provide a shorter loop close to this parking lot.
#41a - Lake Wrap: Horse Pen to Araminta	This would be a new trail from the end of Horse Pen (#18) at Gauntlet (#13) to Araminta (#8). It would parallel the lake, but would be substantially back from the lake shore in order to get around the many inlets and coves. It would provide an intermediate level trail that starts at the end of Horse Pen, a beginner trail, and connects to Araminta, another intermediate trail that connects to difficult trails. Thus it would provide a longer option with increasing difficulty.
#41b - Lake Wrap: Araminta to Comet	This would be a new trail from the end of Araminta (#8) to the lower Comet (#4). It would parallel the lake and avoid the difficult hill climb on Comet. In conjunction with 41a, it would provide a longer intermediate trail connecting Timberview to Happy Valley.
#42 - Hanging Rock Connector	This trail would be an extension of Brushy Mountain along Virginia Deer private road to connect to Timberview Road and Hanging Rock Battlefield Trail. This would be a major connector to the valley greenway network. Right-of-way would need to be acquired. This is outside the Cove boundary, but would service the Cove if developed by the Greenway Commission.

3.4 Conditions and Recommendations for Trail Related Issues

Assessment of the official trails and development of the *Trail Management Plan* involved discussion of many issues and conditions which affect trail use. A summary of issues that affect trail use and recommendations are presented in 3.4.1-3.4.4.

3.4.1 Access and Parking

Parking for access to the Cove trails is limited. Some parking areas are official, public trailheads, but some users may access the trails from private land. Table 11 summarizes the public parking options and the trails users access from those parking lots.

The boat landing parking lot on Reservoir Road is the largest parking area for the Cove. This area is managed by the WVWA and currently is staffed seven days a week. In 2010 the office hours are: *April 1 - September 30: 6:30 a.m. to 8:30 p.m.; October 1 - March 31: 8:30 a.m. to 6:30 p.m.* The area offers boat trailer parking, car parking, fishing, picnicking, boat rentals, and private boat launching. Horse trailers may park here, but not on the asphalt, and thus only four or five trailers can be accommodated.

Parking Lot Name	Surface	Ownership	Size	Existing Facilities	Trails Accessed
Boat Landing on Reservoir Road	Paved	Western VA Water Authority	20 boat trailers, 50 cars, 4 horse trailers	Bathrooms, administrative office, boat rental, permits, picnic area, fishing pier	Happy Valley
Bennett Springs on Carvins Cove Road	Gravel	City of Roanoke	6 horse trailers, 40 cars	Kiosk	All
Timberview Road	Paved/gravel	VDOT/City of Roanoke	3-4 cars beyond turnaround	School bus turnaround is posted No Parking; some spaces beyond that near gate	Horse Pen, Trough, Gauntlet
Park 'n Ride, Daleville, on US 220	Paved	VDOT	~ 30 cars	Access to Appalachian Trail; foot travel only; 2-1/2 mile hike to ridge above the Cove	Appalachian Trail
AT Parking, Route 779	Dirt	VDOT	~ 12 cars	Access to AT via 3 mile hike on Andy Layne Trail; foot travel only	Appalachian Trail
AT Parking, Route 311	Gravel	VDOT	~60 cars	Access to AT; foot travel only; 6 mile hike to AT above the Cove	Appalachian Trail

One official trail, Happy Valley, is accessible from this end of the Cove. Trail users will travel three miles before they reach a single track trail. While Happy Valley is an easy trail, it is a road and the distance from the boat launch to the network of trails is a deterrent for many users.

The Bennett Springs parking lot provides access to the Brushy Mountain end of the Cove. The parking lot is large enough for horse trailers, but the lot is also extensively used by mountain bikers. From this parking lot there is one trail – Hi-Dee-Hoe. Hi-Dee-Hoe intersects within a ¼ mile with Hotel Trail and within ½ mile with Four Gorge Trail. These three trails get a tremendous amount of use. While Hotel is rated Easy/Intermediate, Hi-Dee-Hoe is rated Difficult and Four Gorge is rated Intermediate. Users who are less fit or less skilled often find these trails too difficult. Many bicyclists, some with children, opt to ride the paved road for one mile to the gate at the end of Carvins Cove Road where they can access easier trails, such as Happy Valley and Brushy Mountain.

Timberview Road dead ends at Horse Pen Trail. The parking spaces are posted No Parking because school buses turn around there. Trail users often park in the limited space beyond the turnaround on the shoulders of the road in front of the gate. This access provides connections to Horse Pen, Trough, and Gauntlet Trails.

The Appalachian Trail parking lots are not currently serving Cove trail users, although they provide access for hikers utilizing the AT above the Cove.

In the past a private landowner at the end of Carvins Cove Road has allowed horse trailers to park at his barn. This private parking provides the horses direct access to Happy Valley and Brushy Mountain Trails and thus to a broader network of trails. This property is currently for sale and cannot be relied on for public parking. Loss of this shared private parking will lead to substantially more horse parking and trail impacts at Bennett Springs.

In addition to these access points there are many landowners along Carvins Cove, Reservoir, and Timberview Roads who have bought their property specifically for its proximity to the Cove and its recreation opportunities. These neighbors look for legitimate ways to access the Cove trails without driving to a parking lot.

Table 12 presents parking recommendations to address the needs of trail users.



Bennett Springs parking lot serves many types of users, as well as being a staging area for trail work days.

Table 12. Parking Recommendations		
Parking Lot Name	Recommended Additions to Facilities	Recommended Trail Additions
Boat Landing	Additional horse trailer parking; kiosk with trail information; changing stalls; equestrian hitching rails and mounting blocks; bike racks; environmental education and natural resource mgt information	Easy trails for all users; access to AT; interpretive trail
Bennett Springs	Changing stalls; sanitary facilities; pay station; horse mounting block; drainage improvements; Share-the-Road signs from there to the gate; curb stops and markings to accommodate more vehicles; expansion for more horse trailer spaces	Loop trails; off-road connection to Songbird; ADA trail; easy trails; interpretive trail
Timberview Road	Parking lot or additional parking spaces beyond bus turnaround; ADA parking	Trails outside riparian buffer connecting Trough and Gauntlet to Lower Comet and connecting Horse Pen to Plantation Road
Park 'n Ride, Daleville	None	None
AT Parking, Route 779	None	None
AT Parking, Route 311	None	None
Carvins Cove Road (New Parking Area)	Additional parking lot, including ADA spaces, near Carvins Cove Road gate	None
Other Access without Parking	Legitimate access to trails for adjacent landowners and neighbors	None

3.4.2 Cost Recovery

The Western Virginia Water Authority charges a fee for recreational use of the Cove. This Land Use fee in 2010 is \$2.00 per person per day or \$20.00 per person per year. Permits may be purchased at the Boat Landing, East Coasters bike shop on Electric Road, or Just the Right Gear bike shop on Route 311. When permits are purchased, users are issued a hanger for their vehicle window. Permits are checked by viewing the hangers. Permits cannot be purchased on-line or after hours, and thus it may be inconvenient, particularly for out of town users, to purchase a permit.

The Parks and Recreation Department manages programs at the Cove, as well as special events. Fees for these programs return revenue to the City. Users believe commercial outfitters are leading trips at the Cove; special use permits from these outfitters could be a source of revenue.

Table 13 shows recommended improvements to the fee system.

Table 13. Recommendations for Improvements to Cost Recovery System
1. Develop a method for buying a permit on-line or at offices of Parks and Recreation Department.
2. Install a self service pay station at parking lots.
3. Establish a trail fund, e.g. an enterprise fund, for Parks and Recreation to receive permit fees from trail users and dedicate funds to management of the trail network.
4. Establish rates for special use permits for trail concessionaires.

3.4.3 Prohibited Uses

The 2007 *Park Management Plan* documents concern about illegal motorized vehicles and unauthorized hunting. While assessing trails and exploring unofficial trails, the Trail Assessment Team found multiple locations where there is substantial ATV use of old roads and multiple hunting stands. Trail users also reported encounters with ATV users. This use appears most concentrated in three areas:

- Brushy Mountain to Timberview Road – There are multiple private tracts bordering the Cove property on Timberview Road and many ATVs parked in driveways. The aerial photos reveal roads from many of these properties onto City land. Field work, with GPS units to show boundary lines, confirmed that there are many instances of trespass, dumping of debris, hunting stands, road construction, structures, and motorized trail use on City land in this area.
- Brushy Mountain to Carvins Cove Road, west of Buck Trail – In this area adjacent landowners have a network of trails for both legal and illegal uses. Some trails are used for horse access to Brushy Mountain and Buck Trails. Other trails are receiving ATV and motorbike use.
- The Blue-Line AT Trail and Brickey's Gap Area – In this area there is legal motorized vehicular access across the AT to service private property. There is a hunting cabin on this property and signs of ATVs from there onto the Blue-Line AT Trail and Cove lands. Many parts of the Blue-Line Trail are on woods roads, and most of these are receiving vehicular use. In addition to that trail, there are numerous old roads in the area that are being used by ATVs, and there are signs of camping and hunting. Much of this use is in a Natural Heritage area.

While it would be difficult to patrol all these areas, legitimate trail use can be part of a multi-faceted approach for addressing trespass and undesirable uses.

Table 14. Recommendations for Addressing Prohibited Uses
1. Install Park boundary markers on existing trails and show permitted uses.
2. Work with neighbors and user groups to encourage respect for and legal use of the Cove.
3. Encourage the Virginia Department of Game and Inland Fisheries (DGIF) Conservation Officers to patrol within the Cove, particularly during hunting season.
4. Alert DGIF to hunting infractions.

3.4.4 Damage Prevention

During the fire of 2008 several trails were damaged irreparably by motorized equipment, and several fire lines are now receiving prohibited use by ATVs. While hand lines can be built on existing trails without significant trail damage, fire dozers can be very destructive. Fires are emergency situations, but planning and coordination with the Virginia Department of Forestry (DOF) prior to another incident could prevent damage to existing trails. The Task Force recommends that DOF be asked to keep fire plows and dozers off single track recreational trails.

3.5 Summary of Recommendations with Priorities

Priorities for the Carvins Cove Trail Network fall into several categories. There are construction priorities, priorities for ancillary facilities, and maintenance priorities. Tables 15-17 are current recommendations, but other items may come up that Parks and Recreation Department staff needs to pursue, using the process outlined in Section 4.4 and 4.5. The Task Force recommends that the priority items in each category be pursued concurrently, rather than all items in the maintenance category being completed before the construction category. Volunteers have different interests and new trails inspire new interest and support. Also, financial resources via grants or donations may be available for construction of some types of facilities prior to others.

Map #	Trail Description	Priority
40a	Four Gorge East: Brushy Mtn to Jacobs Drop	1
18	Horse Pen bridge repair	1
16	Improve Hotel Trail to have an easy, interpretive loop	1
37	Easy Trail at Boat Landing	1
34c	Mid-Slope Trail: Bennett Springs Parking to Songbird	1
4	Comet creek crossings	2
27	Timberview Connector to Brushy Mtn	2
39	Tinker Creek Greenway Connector	2
34d	Mid-Slope Trail: Songbird to Arrowhead	2
41a	Lake Wrap: Horse Pen/Gauntlet to Araminta	2
3	Tuck-a-way bridge, if feasible	3
29	Dam Trail	3
28, 42	Right-of-way for Powerline Trail and Hanging Rock connector	3
34a	Mid-Slope Trail: Buck to Bennett Springs Trailhead	3
35b	Mid-Slope: Schoolhouse to Boat Landing	3
38a	Brushy East Mid-Slope: Gauntlet to Hemlock	3
41b	Lake Wrap: Kerncliff to Comet	3
7	Hemlock Tunnel: Relocate sections.	4
28	Powerline Trail	4
30, 38c	Brushy East Mid-Slope: Timberview Connector to Trough	4
35a	Mid-Slope Trail: Arrowhead to Happy Valley at Schoolhouse	4
38b	Brushy East Mid-Slope: Trough to Gauntlet	4
40b	Four Gorge West: Buck to Hi-Dee-Hoe	4
33	Connector from Mid-Slope (#34) to Tunnel Trail	5
36	AT Connector from Boat Landing	5
42	Hanging Rock Connector	5

Table 16. Priorities for Supporting Facilities and Equipment		
Trails Served	Task/Item	Priority
All	Develop on-line method to purchase a pass	1
1	Install City/WVWA entrance and rules signs	1
1, 17	Reduce runoff from parking lots	1
1, 17, 18	Provide updated maps in kiosks at parking lots	1
1, 2, 18, 19, 22	Remove obsolete metal signs	1
13, 14, 18	Provide parking at Timberview Road, including ADA	1
2, 14, 18, 23, 25, 26, 27, 28, 31, 32, 33	Post Park boundaries and ATV prohibitions at unofficial access points	1
6, 8, 23	Install identification signs at all trail intersections	1
All	Purchase Ditch Witch mini skid steer for trail building	1
All	Purchase chain saws and personal protective equipment for use by trained volunteers	1
22	Convert existing building at Riley's Loop into maintenance facility and build a waterless restroom.	1
1	Add more horse parking at Boat Landing	2
1	Replace gate at Carvins Cove Road	2
16, 17, 24	Install changing stalls and waterless sanitary facilities at Bennett Springs lot	2
16, 17, 24	Install self-service pay station at Bennett Springs lot	2
16, 17, 24	Delineate spaces to accommodate more vehicles	2
All	Establish tool storage facility	2
All	Provide hand tools for volunteers	2
1, 2, 18	Provide new parking, including ADA, at Carvins Cove Road	3
1, 2, 22	Provide horse hitching racks and mounting blocks	3
All	Provide trail technical features with avoidance routes	3
7,13	Repair damaged trail signs	3
All	Purchase motorized wheelbarrow	3
1, 2, 3, 19, 21	Provide interpretive, historical, and environmental signs	4
1, 3, 9	Manage invasive species and maintain wildlife openings	4

Table 18 lists the existing and proposed trails in the Cove network and the allowable uses of each. The map at the back of this document shows the entire network.

Map #	Trail Name	Work Needed	Priority
1	Happy Valley	Add mileage signs; remove spray paint	1
1	Happy Valley	Clean culverts, repair and replace	1
1	Happy Valley	Remove old signs	1
1	Happy Valley	Repair rails on bridge at Sawmill Branch	2
1	Happy Valley	Manage invasive species and maintain wildlife openings	3
2	Brushy Mountain	Post boundary and No Motorized Vehicle signs at critical access points	1
2	Brushy Mountain	Repair first culvert and wing walls	1
2	Brushy Mountain	Clean culverts	2
2	Brushy Mountain	Install gate at boundary on Virginia Deer end	3
3	Tuck-a-way	Harden/Fix wet spots; assess creek crossing	1
4	Lower Comet	Fix creek crossings - armour, culvert or bridge	1
4	Lower Comet	Harden/Fix wet spots	1
4	Upper Comet	Add water diverters	2
5	Jacob's Drop	Add water diverters and regrade trenches	2
6	Kerncliff	Add water diverters; install signs	2
7	Hemlock Tunnel	Add water diverters	2
8	Araminta	Install signs	2
8	Araminta	Reroute out of creek; harden crossings	2
9	Songbird	Finish back slope; harden muddy spots	1
10	Arrowhead	Add water diverters and drainage structures	2
10	Arrowhead	Install bridge or rock creek crossing	3
11	Enchanted Forest	Harden/Fix wet spots	1
12	Little Bell	Monitor drainage basins	3
13	Gauntlet	Add water diverters	2
13	Gauntlet	Rework top of old trail with water diverters and advanced technical features similar to Trough	2
14	Trough	Routine maintenance	3
14a	Trough Expert	Replace paper signs with wooden	3
15	Buck	Deberm and add water diverters	2
16	Hotel	Harden/Fix wet spots; turnpike sections	1
16	Hotel	Reroute steep climbs	3
17	Hi-Dee-Hoe	Add rolling grade dips and water diverters; regularly remove berm, outslope	2
17	Hi-Dee-Hoe	Re-align fall section	2
18	Horse Pen	Clean culverts, correct flow at trench; remove debris	1
18	Horse Pen	Repair bridge	1
19	Tunnel	Clean culverts; use finer stone for resurfacing	3
21	Schoolhouse	Harden/Fix wet spots; improve hiker crossings	1
22	Riley's Loop	Remove old signs	1
23	Sawmill Branch	Divert water off trail at the spring	3
23	Sawmill Branch	Replace signs	3
24	Four Gorge	Widen tread on steepest sidehills; armour all crossings	2

Table 18. Summary of Proposed Trail Network and Uses			
Map #	Name	Recommended Uses	Rationale
1	Happy Valley	Mtn. bikes, horses, pedestrians, administrative vehicles	Sustainable road
2	Brushy Mountain	Mtn. bikes, horses, pedestrians, administrative vehicles	Sustainable road
3	Tuck-a-way	Multi-use, no vehicles	Retain
4	Comet	Multi-use, no vehicles	Retain
5	Jacob's Drop	Mtn. bikes, horses, pedestrians, AEP maintenance vehicles	Retain
6	Kerncliff	Mtn. bikes, horses, pedestrians, AEP maintenance vehicles	Retain
7	Hemlock Tunnel	Multi-use, no vehicles	Retain
8	Araminta	Multi-use, no vehicles	Retain
9	Songbird	Multi-use, no vehicles	Retain
10	Arrowhead	Multi-use, no vehicles	Retain
11	Enchanted Forest	Multi-use, no vehicles	Retain but restrict use in wet weather
12	Little Bell	Multi-use, no vehicles	Retain
13	Gauntlet	Multi-use, no vehicles	Retain
14	Trough	Multi-use, no vehicles	Retain
14a	Trough Expert	Mountain bikes	Retain
15	Buck	Multi-use, no vehicles	Retain
16	Hotel	Multi-use, no vehicles	Retain but restrict use in wet weather
17	Hi-Dee-Hoe	Multi-use, no vehicles	Retain
18	Horse Pen	Mtn. bikes, horses, pedestrians, administrative vehicles	Sustainable road
19	Tunnel	Mtn. bikes, horses, pedestrians, administrative vehicles	Sustainable road
21	Schoolhouse	Multi-use, no vehicles	Retain
22	Riley's Loop	Mtn. bikes, horses, pedestrians, administrative vehicles	Sustainable road
23	Sawmill Branch	Hikers only	Access to AT
24	Four Gorge	Multi-use, no vehicles	Retain
25	Appalachian Trail	Hikers only	National Scenic Trail
26	Blue-Line Trail	Hikers only	Access to AT
27	Timberview Connector	Multi-use, no vehicles	Develop into connection from Brushy Mtn. to Timberview Road
28	Powerline Trail	Mtn. bikes, horses, pedestrians, AEP maintenance vehicles	Connect Timberview area to Boat Landing and to greenway network
29	Dam Trail	Pedestrians, mountain bikes	Evaluate with WVWA for safety and easy trail near Boat Landing
30	Brushy East Mid-Slope Connection	Multi-use, no vehicles	Existing sidehill trail; incorporate into 38
31	USGS Track	Close	Too steep; not sustainable
32	Trail Paralleling AT	Close	Natural Heritage area and AT corridor
33	Tunnel Road to Mid-slope Connector	Multi-use, no vehicles	Develop old road into sustainable trail after Mid-slope is built.
34	Mid-slope Connector: Buck to Arrowhead	Multi-use, no vehicles	Expand network from Bennett Springs parking lot
35	Mid-slope Connector: Arrowhead to Boat Landing	Multi-use, no vehicles	Expand connections from Boat Landing to single track trails
36	AT Connector from Boat Landing	Hikers only	Provide connection to AT that is day-use length
37	Easy Trails at Boat Landing	Pedestrians, mountain bikes	Expand trails at largest parking lot
38	Brushy East Mid-Slope Connection	Multi-use, no vehicles	Develop legal trail from Timberview Connector to Hemlock Tunnel
39	Connection to Tinker Creek Greenway	Multi-use, no vehicles	Connect Cove to valley greenways
40	Four Gorge Extensions	Multi-use, no vehicles	Expand network from Bennett Springs parking lot
41	Lake Wrap	Multi-use, no vehicles	Expand network from Timberview Rd
42	Hanging Rock Connector	Multi-use, private vehicles	Connect Cove to valley greenways

Section 4. Trail Management Policies and Practices

4.1 Authority

Carvins Cove Natural Reserve is under the joint authority of the Western Virginia Water Authority (WVWA) and the City of Roanoke, through its Parks and Recreation Department. The day-to-day operations at the Cove are a joint effort of the two agencies. In general, the WVWA manages the land and water below the 1200-foot contour, and the Parks and Recreation Department manages the land and resources above 1200 feet. Currently, the WVWA maintains the lower service road which is Happy Valley Trail. The Parks and Recreation Department takes the lead on other trail management. Within the Department, programmatic and special events are addressed through the Superintendent of Recreation, while planning, design, land use, trails, capital development, and construction activities are administered through the Parks and Greenways Planner.

4.2 Standards and Specifications

The Parks and Recreation Department uses national standards and best management practices for planning and development of the City's natural surface trails. Trails at the Cove are constructed and maintained using the standards and guidelines in:

- Birchard, William Jr., Robert Proudman, and Michael Dawson, (2000), *Appalachian Trail Design, Construction, and Maintenance*, Harpers Ferry, WV, Appalachian Trail Conference, 237p.
- Hancock, Jan, Kim Jones Vander Hoek, Sunni Bradshaw, James D. Coffman, and Jeffrey Engelmann, (2007), *Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds*, Missoula, MT, USDA Forest Service – Technology and Development Program, 312p.
- Hesselbarth, Woody, Brian Vachowski, and Mary Ann Davies, (2007), *Trail Construction and Maintenance Notebook*, Missoula, MT, USDA Forest Service – Technology and Development Program, 166p.
- International Mountain Bicycling Association, (2004), *Trail Solutions: IMBA's Guide to Building Sweet Singletrack*, Boulder, CO, International Mountain Bicycling Association, 272p.

These references and other guidelines applicable to development of trails at the Cove are cited in Appendix B.

4.3 Volunteer Trail Management Partners

When the Parks and Recreation Department became responsible for management of the trails at the Cove in 2004, it began working with local trail volunteers and users to assess and manage the trail network. Because of its existing relationship with Pathfinders for Greenways (Pathfinders), Parks and Recreation has selected this organization to be the official volunteer management partner to work with the Department to implement this plan. Pathfinders is a non-profit 501(c)3, which was established in 1997 to organize volunteers for greenway and trail projects in the valley.

There are many trail users at the Cove willing to invest time and resources into improvement of the trails they use. Management of these volunteers, training, and channelization of volunteer energy into priority projects is an important role for the volunteer managing entity. Additionally, the administration of the volunteer organization must be an efficient and cooperative effort between the volunteer entity and Parks and Recreation.

Recommended Practices:

1. The primary contacts for volunteer management and implementation of this plan shall be the Roanoke Parks and Greenways Planner and the Roanoke Valley Greenway Coordinator or their designee.
2. Pathfinders will work through Parks and Recreation to establish and help fund a program that recognizes volunteers and their service with incentives and annual recognition.
3. Pathfinders will coordinate through Parks and Recreation to provide training for volunteers on trail construction, machinery operation, first aid, trail maintenance, crew leadership, and other skills as needed.
4. Volunteers will sign City waiver/risk forms prior to working on trail projects at the Cove, and Pathfinders will keep these on file.
5. As funds are available, Parks and Recreation will purchase equipment and materials needed by volunteers.
6. Pathfinders will explore ways for users to report problems and document issues.
7. User groups interested in providing services, such as mountain bike patrol, ridge runner, and adopt-a-trail, will be encouraged to provide support and assistance and will be coordinated through Pathfinders.

4.4 Maintenance and Monitoring

The Parks and Recreation Department and Pathfinders for Greenways will use the trail assessments completed for this plan as the basis for setting up maintenance and monitoring schedules.

Recommended Practices:

1. Trails will be maintained by volunteers, local clubs, staff, and specialized trail crews as resources are available. Roads will be maintained by the managing agencies.
 - Routine trail maintenance will include clearing blowdowns, brushing, cleaning drainage structures, installing or refurbishing markers and signs, spot trail or creek hardening, and litter removal.
 - Heavy maintenance will include items involving the trail tread such as installing or reshaping drainage structures, re-establishing trail tread, or realigning the trail. Equipment such as the Ditch Witch SK500 or SK650 may be needed.

2. Each trail will have an assigned volunteer for routine maintenance. Heavy maintenance will be supervised by approved crew leaders using trained machine operators.
3. All chainsaw operators will be certified by the USDA Forest Service or trained under other programs approved by the Department. Pathfinders shall maintain records of sawyer certifications and Assumption of Risk Waivers.
4. Volunteer coordinators and leaders will meet with Parks and Recreation staff at least once annually to review assignments, priorities, reports, and issues.
5. Maintenance volunteers will record hours, monitoring reports, and other paperwork, as required by Parks and Recreation.
6. As resources are available, Parks and Recreation will work with Pathfinders for Greenways to help fund material and equipment purchases such as a Ditch Witch 650, chainsaws, and personal protective equipment dedicated for trail work at the Cove.
7. Parks and Recreation will evaluate the feasibility of repurposing the building at Riley's Loop to be a centralized maintenance facility for secure storage of materials, equipment, and tools for the volunteers.
8. The Department as well as Pathfinders will continue to participate in continuing education efforts regarding sustainable natural resource and stewardship education for the continuing enhancement and care of Carvins Cove.

4.5 Construction

This plan recommends the addition of new trails plus the realignment of sections of existing trails. Any new trails will be implemented in accordance with the Parks and Recreation Department's Planning and Development Procedures. Each proposed new trail will be evaluated to ensure that sufficient resources are available to complete construction and maintenance, that the trail is sustainable and in compliance with any easements or restrictions, and that the trail adds logically to the trail network.

Recommended Practices:

1. Appendix F illustrates a page to be added to the Project Proposal application for new trail construction, when submitted to Parks and Recreation under the Planning and Development Procedures. The form will document inclusion in this plan, location, termini, stream crossings, resources for construction, resources for maintenance, features, anticipated user groups, and any possible restrictions, such as Heritage areas.
2. Each new trail constructed will be sponsored by an approved group or trail crew leader.
3. The sponsoring construction group/leader will flag the trail alignment, take GPS readings for mapping purposes, and supply necessary submittals for Parks and Recreation review.

4. If construction of the new trail is approved, the sponsoring construction group/leader will be responsible for coordinating work days and equipment and for posting work hours on the database.
5. New trails will be built using the standards referenced in this plan.
6. New trails will only be constructed after review and approval of the Planning and Development application and authorization by Parks and Recreation.

4.6 Signage and Marking

Trail identification signage has been greatly improved by the installation of new wayfinding signs at intersections. Roanoke's Parks and Greenways Signage Workbook provides design guidelines for general informational kiosks, educational/interpretive kiosks, maps, and regulatory information. Existing, older signage should be removed when feasible.

Recommended Practices:

1. Remove all obsolete signs.
2. Mark property lines at official and unofficial access points, listing uses allowed and not allowed.
3. Implement the Carvins Cove signage plan as resources allow.
4. For consistency on trails:
 - Use kiosks and/or "you are here" maps at trailheads and entrance gates.
 - Use trail names and mileage information on maps and signs.
 - Utilize suitability symbols on all trail wayfinding.
 - Use the international yield courtesy sign at trailheads and major access points.
 - Use stenciled blazes on trees as reassurance markers for obscure trails.
 - For trails that are not multi-use, clearly post use restrictions at all intersections – e.g. "Hikers Only".
 - Post boundaries and access points to restrict ATVs, other motorized vehicles, and prohibited activities.
 - Mark affected trails during seasons when wet weather closures may be applicable.

4.7 Special Events and Group Use

As the trail opportunities at the Cove become increasingly recognized, there is more demand for special events such as races and more organization of group rides by private and commercial interests. Because these uses are often organized well before the date of occurrence, the organizers want to hold the event rain or shine. The Cove's single track trails were not built for group use, and trail widening, shortcuts, sloughed shoulders and damaged features are common with such usage. Also, most trails at the Cove cannot handle heavy, wet weather use, and some cannot handle heavy use at all. Group use poses a social impact in addition to physical impacts on the trail in that

groups reduce privacy and the feeling of remoteness, as well as arousing conflict because of prolonged or repeated stoppage for passing other users. When applications for special events or group use are reviewed by both the Department with the Pathfinders, a performance bond should be considered along with a special events permit. This documentation should address how the program and/or event promoter guarantees the trails will be in as good or better condition after the event than they were before; typical conditions should be mitigated and repaired after an event within 5 business days.

Recommended Practices for Special Events Use:

1. Establish criteria for selecting the limited number of special events that can occur on Cove trails in a year.
2. Subscribe to and endorse a "Leave No Trace" policy.
3. Give priority to special events that help build the trail system, rather than just using and consuming trail resources.
4. Establish a series of policies and fees designed to ensure that special events and group use are "no net impact" to the trail network at the Cove. These policies may include:
 - A fee schedule for special events that recoups costs for preparations for the event/group and management of trail repairs after the event.
 - Posting of a bond that covers costs of assessment of trail damage after an event and contracted repair to the trails when the event causes trail degradation.
 - Conditions for cancellation/postponement of events, including changing the event location shall be made in accordance with the lead management staff previously identified herein.
 - Restrictions on which trails can be used.
 - Restrictions on trail use in wet weather conditions. Only Happy Valley, Tunnel, and Brushy Mountain should be used for special events when there has been significant rain. No trail events should be scheduled during spring thaw season; generally from March – April.
 - Conditions for notification prior to events to other users who may be impacted.
 - Prohibition of marking paint and requirement that all flagging and signage be removed within 24 hours of the event.

Recommended Practices for Group Events

1. All groups should educate their members on reducing trail impacts and leaving no trace.
2. Leaders of large groups shall be responsible for knowing trail conditions, dispersing use if necessary to reduce impacts, and selecting trails that can be used without damage under the current conditions.
3. Groups should make every effort to reduce inconvenience to other users who must stop for their passing.

4. Commercial groups (guides, outfitters, etc) charging a fee/accepting donations to lead trips must have an outfitter/guide permit and will be charged a special use fee per trip.
5. Groups found to be conducting unauthorized business within Cove property shall be required to immediately leave the premises.

4.8 Marketing, Programming, Information, and Education

The Parks and Recreation Department's Outdoor Recreation Division is responsible for all outdoor programming, special events, and educational information at the Cove within areas managed by the City. It coordinates with the Western Virginia Water Authority in creating an interpretive, educational, and programmatic approach for the Cove. Collaboratively, the Office of the Parks and Greenways Planner, Pathfinders, and the Roanoke-Alleghany Regional Commission will develop waterproof, high color, shaded relief maps of the Cove to be sold at local and regional venues, both public and private. All proceeds of such sales should be appropriated into the Cove's operational marking line items for the continuation of this service.

Recommended Practices:

1. Produce a waterproof map that could be sold, with proceeds going into the Department's trail operating funds. The map will include topographic information, suitability, trail alignments, rules, and descriptions of routes.
2. The ethics of Leave No Trace will be emphasized on all Cove trail publications.
3. Cove publications will include trail etiquette and education on sharing trails with horses, mountain bikes, and hikers.
4. A telephone or web-based hot-line for users to report issues and safety concerns and learn about special trail conditions, such as wet weather closures or upcoming events, is recommended.
5. Trail publications will include information on how to volunteer to help with trail activities in the Park.

4.9 Amendments to This Plan

While this plan's Task Force and Assessment Team have reviewed existing conditions and development options, it is impossible to anticipate all the conditions that might come up or to know all the opportunities. The Cove is a large preserve that is dynamic and subject to many changing natural conditions such as fires, storms, and insect infestations. In addition the human factors such as budgets, politics, recreational equipment development (e.g. mountain bikes), outdoor recreation trends, and demographics make management of the Cove a dynamic process.

The Parks and Greenways Planner or his/her designee shall be responsible for making operational management decisions as the environment changes and for evaluating the many management activities with potential to affect the trail network. For amendments to this plan, he or she shall make recommendations to the Director of Roanoke Parks and Recreation for review, comment, and referral to the City Manager for approval.

Recommended Practices:

1. The Parks and Recreation Department has the authority to add new trails or retire trails within this trail plan. New trails added to the plan will be reviewed for compliance with the objectives and guidelines in this plan and in the 2007 Park Management Plan.
2. When trails are added or retired from this plan, a new map will be produced and the trail description and priority will be added to the plan as an addendum.
3. Approval for construction of the added trail will follow the procedures in Section 4.5.
4. The entire plan will be reviewed and updated every 10 years.
5. Any proposed amendments to this plan will be discussed with the Pathfinders for Greenways organization.

Section 5. Operations

5.1 Overview

Since Carvins Cove's inception as a public park, Roanoke Parks and Recreation has relied heavily upon both volunteer assistance and public/private funding opportunities to manage the trails within the Reserve. The Office of the Parks and Greenways Planner has been the central decision-making and implementation clearinghouse on matters regarding land use, natural trail management, maintenance, and capital development; as usage has increased in recent years, additional assistance and maintenance coordination has been provided through the Department's Outdoor Recreation Division. While the pattern of enhanced usage continues to grow, the City does not presently have regular staff presence devoted to Cove duties. Aside from the functionality of the trails system for human access into this pristine natural resource, trail management at the Cove also falls into routine operational areas of interpretation, programming, special events, dead fall/forestry, storm management, public safety, and volunteer workday oversight.

5.2 Fiscal and Physical Operations

The majority of the land-based recreation opportunities that Parks and Recreation is responsible for are found above the 1200-foot elevation contour line. There are over 46 miles of single track trails and maintained public safety/fire roads that are used primarily by hikers, mountain bikers and horseback riders. These trails and roads must be sustainable and maintained according to this Trail Management Plan. Active trail maintenance, signage and re-routes are critical issues that need consistent and professional attention to ensure sustainability.

Currently, the Western Virginia Water Authority collects all land-based recreation fees and provides minimal maintenance to the fire roads that surround the Reserve. The Parks and Recreation Department coordinates volunteer trail building encompassing over 9,000 volunteer hours and 230+ project workdays since 2008, yielding a direct volunteer labor force contribution exceeding \$187,650 ($\$20.85 \times 9,000$). While most of this work is the result of human sweat-equity, there is an ongoing need for supplies and materials related to trails management that requires purchases of stone, concrete, chainsaws, oil, fuel, maps, and heavy equipment purchase and/or lease.

5.2.1 Staffing and Fee Policy Justification

Customer service, safety, trail/site maintenance, deadfall management, culvert repair, invasive species management, and tracking user trends are commonplace and expected routine functions of a public outdoor recreational trail system. Since City Council decided to establish Carvins Cove as a public park in 2004, there have not been any operating appropriations for the daily care and stewardship of the Cove. While user fees are collected at approximately \$60,000 per annum, these fees are managed per the discretion of the Western Virginia Water Authority. This plan recommends a policy change that would allow Parks and Recreation to collect future usage fees so that there shall be a direct relationship between the user fee revenue and continued trail and natural resource stewardship. Such funds could be used to establish an operating line-item budget under the Department's Administrative Division. If authorized through the Department's Strategic Business Plan, it is

recommended that a part-time position be created and partially subsidized through user fees to continue to provide services currently offered at the Cove to include: a) on-the-ground oversight of both maintenance projects and programs, b) provide a public safety and public relations presence, and c) help maintain and foster relationships with other local agencies, landowners and user groups. This position will also focus on daily core trail related needs such as customer service, user safety, hazard identification/maintenance challenges, maintain trail priorities and inventories of needed repair and replacement, plus assist as the Department's on-site logistics for recreational programming and special events where appropriate.

5.2.2 Capital Improvements

Developing trail related capital improvements has been ongoing since 2001. Most improvements to date of this nature have been timber bridge development, trail reroutes, trailhead parking facilities, and primary gateway/entrance signage and gating elements. As trail usage continues to increase, it is obvious that such usage in such a diverse topography has a direct impact on major park infrastructure needs. There are several capital needs addressed in this plan that fall into the following categories: a) trailhead parking improvements and expansion, b) bridge/crossing enhancements, c) stormwater and erosion management, d) trail construction features, and e) volunteer equipment needs. Parks and Recreation will annually review the prioritized trail and related auxiliary facility needs in concert with Pathfinders for Greenways and create an annual action plan for maintenance and/or improvements. Should the need arise for capital funding; the Department shall submit such funding requests on an annual basis as per the direction of City Council for their consideration. Selected capital items are identified in this plan from tables 8 through 17.

5.2.3 Visitor Passes

With Parks and Recreation's new recreational software system, ActiveNet, the Department can now easily implement a user friendly registration system with point of contact and credit card, web based transactions for usage fees. Using this registration system, the Department has the ability to administer:

- On-line payments with an instant identification pass/receipt that can be downloaded and printed with an individual identification number,
- Pay and go options at any recreation center or the main office, and
- A mail-in option to receive a pass.

ActiveNet will provide trail users with a user friendly interface in purchasing either day or annual use passes. The traditional locations for pass purchase will remain in place; however, it is recommended that the Department consider having two separate use passes hereafter: one for water-based recreation and usage collected by the WVWA and one for land-based recreation and trail usage collected and managed by Parks and Recreation.

Appendix A Acronyms

AT	Appalachian Trail, a National Scenic Trail open to hikers only
ATC	Appalachian Trail Conservancy, an organization that works with the National Park Service on AT management and coordinates with local trail clubs
ATV	All terrain, motorized vehicle
City	City of Roanoke, the owner and manager of Carvins Cove lands above the 1200' contour
DGIF	Virginia Department of Game and Inland Fisheries, responsible for enforcing hunting regulations
DNH	Division of Natural Heritage, Virginia Department of Conservation and Recreation, responsible for protection of endangered species
DOF	Virginia Department of Forestry, responsible for fighting wild fires
IMBA	International Mountain Bicycling Association, an organization that promotes mountain biking and provides resources and training on sustainable trail design
LNT	Leave No Trace, an ethic of responsibly enjoying the outdoors and leaving no sign of your presence
RATC	Roanoke Appalachian Trail Club, the local club that maintains the AT near Carvins Cove
WVWA	Western Virginia Water Authority, the owner and manager of Carvins Cove reservoir and lands below the 1200' contour

Appendix B

List of Resources and Design Guidelines

American Association of State Highway and Transportation Officials (AASHTO) (1991), *Guide for the Development of Bicycle Facilities*, Washington DC, 44p.

Beckley, Bob, (2000) *Accessible Loading Platform for Boaters*, USDA Forest Service, Missoula, MT.

Birchard, William Jr., Robert Proudman, and Michael Dawson, (2000), *Appalachian Trail Design, Construction and Maintenance*, Appalachian Trail Conference, Harpers Ferry, WV, 237p.

Birkby, Robert (1996), *Lightly on the Land: The SCA Trail-Building and Maintenance Manual*, Student Conservation Corps Inc., The Mountaineers, Seattle, WA, 271p.

Code of Federal Regulations, Title 36, Volume 1, Part 4, Vehicles and Traffic Safety, Sec 4.3 Bicycles, Revised as of July 1, 1998.

Community Trails Handbook (1997), The Brandywine Conservancy, Inc., Chadds Ford, PA, 97p.

Daly, Judi, "Sharing the Trail with Horses: Understanding Their Instincts," article published by American Trails, in Trail Tracks, Stuart MacDonald, editor, Volume 32, Number 2, Summer 2003, 22p.

Duffy, Hugh (1991, June), *Developing Sustainable Mountain Trail Corridors*, National Park Service, Rivers & Trails Program, Denver, CO.

Edwards, Rich (2003 January), "A Report and Recommendations for the Blue Ridge Parkway Trails in the Roanoke Area" (2003, January), Unpublished report, International Mountain Bicycling Association, 10p.

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Flink, Charles, and R. Searns (1993), *Greenways: A Guide to Planning, Design, and Development*, Washington DC, Island Press, 351p.

Graefe, A.R, Kuss, and Vaske (1990), *Visitor Impact Management: The Planning Framework*, National Parks and Conservation Association, Washington DC, 106p.

Groenier, James Scott, Steve Monlux, Brian Vachowski, (2008), *Geosynthetics for Trails in Wet Areas*, USDA Forest Service, Technology and Development Program, in cooperation with U.S. Dept. of Transportation, 0823-2813-MTDC, Missoula, MT, 26p.

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Kelley, Michael (1998, October), "Bikes and Horses: A Case for Sharing," presented at the National Symposium on Horse Trails in Forest Ecosystems, Clemson University.

LaPorta, Liz and Woody Keen, (2008), *Jake and Bull Mountain Trail Assessment and Management Plan: Promoting Recreation and Environmental Protection through Assessment, Collaboration and Education*, USDA Forest Service, R8, Southern Region, Chattahoochee-Oconee National Forest, Blue Ridge Ranger District, 94p.

Lopes, Brian and Lee McCormack (2005), *Mastering Mountain Bike Skills*, Human Kinetics, Champaign, IL, 196p.

Marion, Jeffery, Joseph Roggenbuck, and William Manning (1993), *Problems and Practices in Backcountry Recreation Management: A Survey of National Park Service Managers*, National Park Service, Natural Resources Publication Office, Denver, CO, 65p.

McCoy, M. and M. Stoner (1992) *Mountain Bike Trails: Techniques for Design, Construction, and Maintenance*, Missoula, MT, Bikecentennial, 19p.

Miller, Jay S., (1983) *Construction & Maintenance of Horse Trails*, prepared in cooperation with Arkansas Trails Council, U.S. Forest Service, Arkansas Trail Ride Association, and the Northwest Arkansas Horse Trail construction volunteers, 32p.

Moore, Roger, (1994) *Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice*, sponsored by The Federal Highway Administration and the National Recreational Trails Advisory Committee, (Report #FHWA-PD-94-031), Washington DC, 70p.

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- Ritter, Mike, Jan Ritter, Joey Klein, Rich Edwards, and Jen Edwards, (2001), *Building Better Trails: Designing, Constructing, and Maintaining Outstanding Trails*, International Bicycling Association, Boulder, CO, 64p.
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- Ryan, Karen-Lee, editor (1993), *Trails for the Twenty-First Century: Planning, Design, and Management Manual for Multi-Use Trails*, Rails-To-Trails Conservancy, Island Press, Washington DC, 214p.
- Standard Specifications for the Construction of Trails* (1984, June), USDA Forest Service, Engineering Staff, Washington DC, EM-7720-102, 140p.
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Appendix C

Design Elements

1. Design Philosophy
2. Exhibits
3. Signage
4. Bridges
5. Trails
6. Roads
7. Crossings
8. Gates & Guardrails
9. Culverts & Drains
10. Trailhead Restrooms



1. Design Philosophy

The purpose of this appendix to the Carvins Cove Natural Reserve Trail Management Plan is to set the visual and functional context for the trails and their various support and adjunct facilities. The following concepts and design guidelines are meant to set the character and mirror the natural landscape of the Cove and establish a uniform feel for the enjoyment of our park visitors.

Our philosophy is to create amenities and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. These concepts were established to guide a wide range of design disciplines including environments, products, and communications.

While this section does not address all specifications necessary to develop these amenities, it does depict the visual and sustainable character necessary to compliment the natural beauty of Carvins Cove. Specific typical sections and specifications that are recommended for use with the Cove may be found primarily within the *National Park Service's Denver Service Center* as well as the *USDA Forest Service Design Specifications*. Specific design specifications and construction details shall be rendered by a registered Landscape Architect or a Professional Engineer.

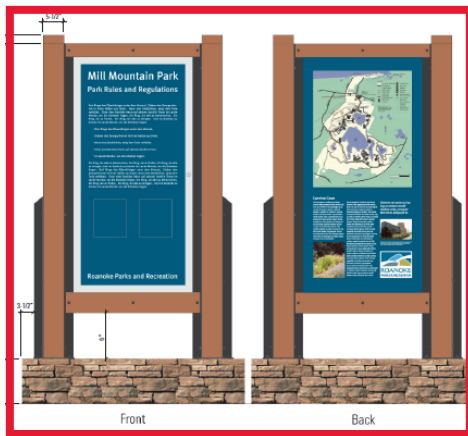


2. Interpretive, Educational, Informational Exhibits



Exhibits may be offered in a variety of styles and sizes. Most are of two types: low profile and upright; both are compliant with the Americans with Disabilities Act.

Low profile exhibits are low, angled panels that provide an interpretive message related to a specific place or feature.



Upright kiosks typically provide orientation information, rather than site-specific interpretation. These exhibits are often located near a visitor center or trailhead, to provide information about park facilities, programs, and management policies.



3. Signage

Signage within Carvins Cove should adhere to the Department of Parks and Recreation signage guidelines such that the visual integrity of the park is not disrupted.



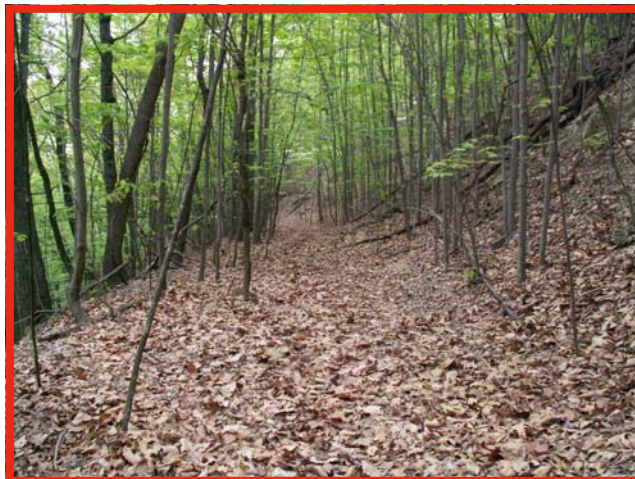
4. Bridges

It is anticipated that the Cove may require different levels of bridge functionality over time. For the purpose of this section we shall focus upon two central concepts: structures for official motorized vehicles and those for biking, hiking, and horseback riding. The USDA Forest Service defines bridges as structures exceeding 20' in length and higher than 5' off the ground. Trail bridges may be narrow to restrict vehicular access.



5. Trails

The trails within the Cove have been previously specified as to their form, design, and function within the body of this plan. The following concepts visually illustrate the “best management practices” that we shall strive for. Specifications and standards recommended through the International Mountain Bicycling Association, National Hiking Association, Appalachian Trail Conference, and the USDA Forest Service will be used.



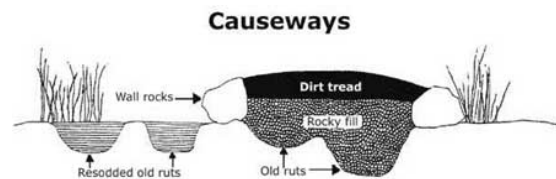
6. Roads

Use of roadways within the Cove shall be limited to administrative use, utility maintenance, public safety, and general public access to the developable management zones. At this time no public motorized access is allowed within the Cove. New aggregate and asphalt typical sections and specifications shall conform to either USDA Forest Service and/or National Park Service standards, as shown in the photos below.



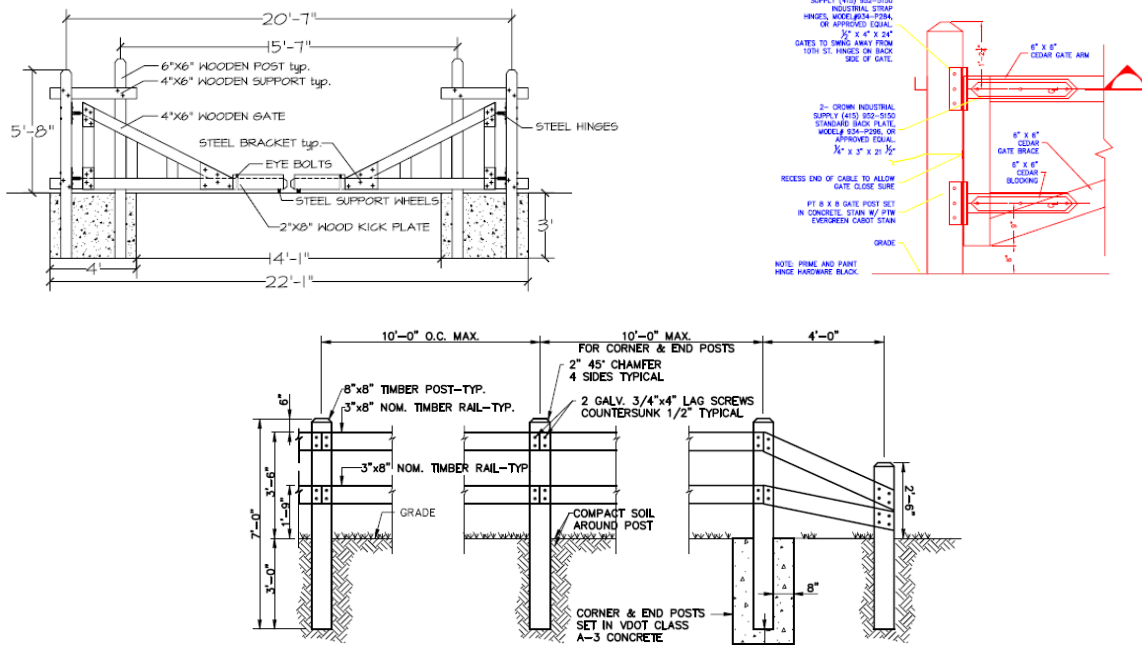
7. Crossings

Crossings are where designated human travel is deemed necessary within sensitive natural environments. This plan refers to features smaller than a bridge (smaller than 20' long and 5' high) as "crossings". These areas may or may not be defined as "wet." Refer to the *USDA's Wetland Trail Design and Construction Guide*, as well as the *International Mountain Bicycle Association Trail Solutions*. Examples of crossings are shown below.



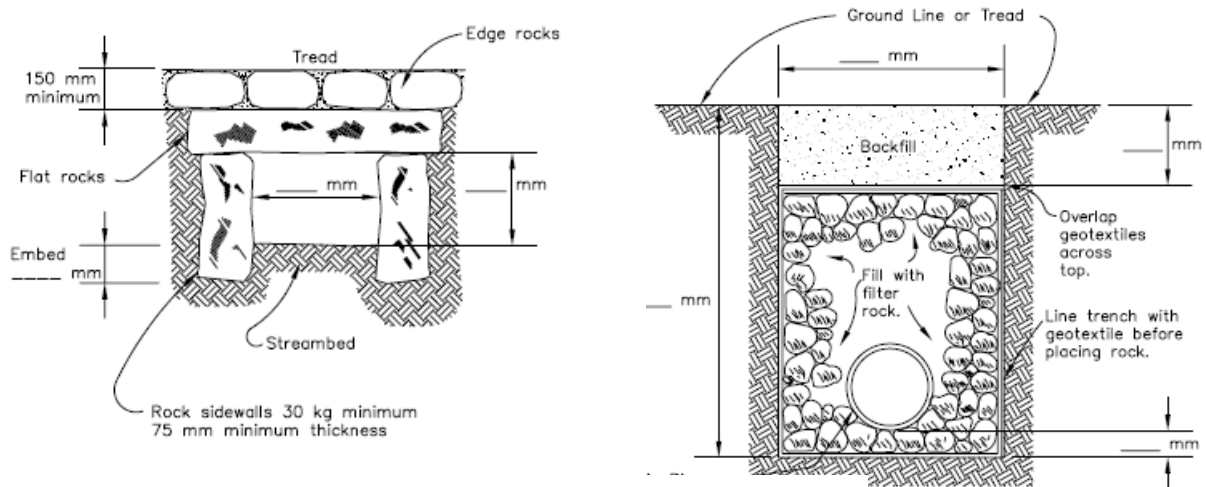
8. Gates & Guardrails

Gates and guardrails should be utilized where public safety is of a concern as well as to create aesthetic barriers to areas where human access is prohibited. Essentially, there shall be two basic specifications of timber guardrails, one that is used for motorized traffic and another that is used for aesthetics, and/or bicycle and hiker control/safety.

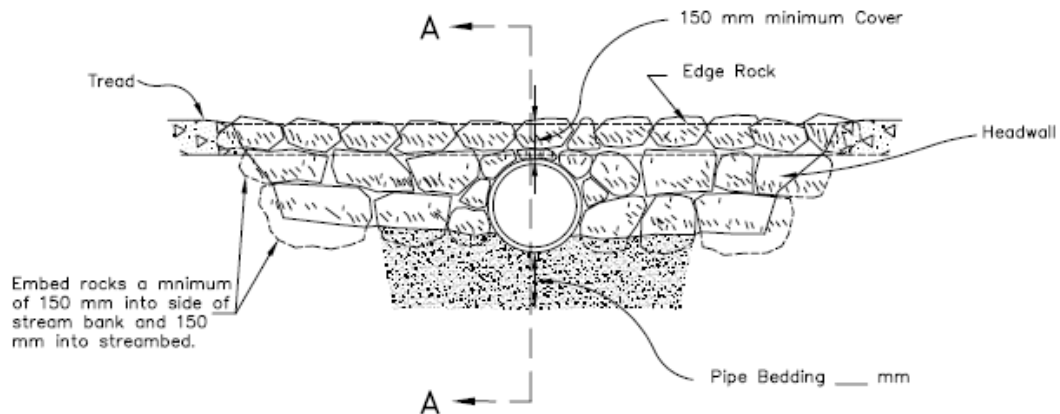
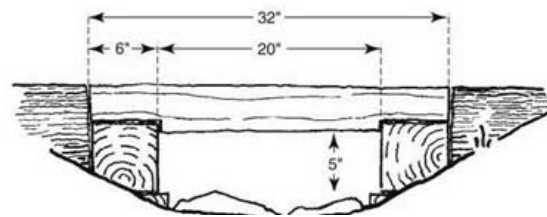


9. Culverts & Drains

These structures should be developed in such a way that they fit into the natural character of the Cove. It is recommended that, when feasible, culverts be made from field stone, other natural rock, or timber elements, rather than hardscape, plastic, or urban materials. Recommended specifications shall include the National Park Service, the USDA Forest Service, and the International Mountain Bicycle Association.



Wood culvert component sizes



10. Trailhead Restrooms

Restrooms and comfort facilities should be located at primary trailhead and parking facilities. These facilities should encompass a design that complements the natural character of the Cove and possess a functionality and operation that is sustainable. Facilities should be dependent primarily on natural lighting and be self contained and/or biodegradable pump-out systems.



Appendix D

Input from Volunteers and Stakeholders

Compiled Comments re Carvins Cove Trails - April 14, 2009

1. Where would you like to see additional trails built?

I would like to see connectors between existing trails which would make longer single track loops without having to hop on the fire road. For instance a trail from the top end of Arrowhead to the far end of Schoolhouse. Also from the end of Four Gorges trail at the fire road to the top Tuck-A-Way, terrain permitting.

A trail to the top of the mountain that isn't as steep as Hi-Dee-Hoe would be on my wish list, too.

A lot of trail systems around lakes and reservoirs use the contour of the body of water to lay out their trails. This makes for great scenery and countless miles of trail going in and out of inlets and coves.

The ability to ride ALL the way around the cove legally once again would be OUTSTANDING. It would mean building a trail from somewhere near the bottom of The Gauntlet to somewhere near the dam, dropping the ridiculous and counter-productive "security" ban on being near the dam (who actually believes the dam is safer from international terrorists with fewer local citizens' eyes on it??) and re-opening the trail from the dam to the boat launch with some reroutes.

Extend the Four Gorges Trail across the fire road and connect up with Comet.

Connect the tunnel trail to the Sawmill Branch trail with a section paralleling the AT for multi users.

Extend 4 gorges with same type of trail.

More trails accessible from the boat docks. Many of existing trails can be connected.

A dedicated downhill only trail would be spectacular. Does not necessarily need to be on a steep part of the mountain either.

Trail from Four Gorges to girl scout would be neat. I think you already had this in mind though. A trail from the bottom of Gauntlet to the lower trails would be nice also (not super important to me though.)

Buck is in pretty bad shape in my opinion. I hiked it the other day after the rain while I was collected some data for school. Badly eroded in many areas, Im sure you were already aware of this.

I would like to see more trails on top of the mountain maybe one beside the fireroad. Maybe use Douthat as a example. Nice campground and great trails. I'm thankful for all the trails that are there but there is plenty of room for more. More trails like songbird would be great.

Connecting the bottom of the Gauntlet and Hemlock Tunnel would allow for a greater variety of loops involving the more difficult trails at the Cove.

Connect the main parking lot to songbird via a western route. Connect the end of Buck (at the road) to a loop around the private parcels on the west and back to the parking lot. This would make a nice beginner loop (but would have two road crossings). The freeride area could be made "official" if the trail impact is low and the site is well designed. Possibly connect Gauntlet to Araminta/Hemlock Tunnel. Connect Buck to Hi-dee-hoe halfway up. Connect The Trough to the Gauntlet halfway up. Make a "hiking only" trail from the parking lot up to the AT.

from Schoolhouse back to Boat Dock

The Cove has a great opportunity in building additional trails; I believe the 13,000 can support it. The location of the these trails would of course need to be closely looked at as far as sustainability but both sides of the mountain and the lower area have huge potential that needs to be tapped.

It would be good to get some trails on the east side of the cove. This would allow quicker access to trails from the boat launch parking lot. I would suggest intermediate trails that are low to rolling with some short climbs.

2. How many miles of trail should the Cove have?

As much of the "newer" sustainable trail that the land allows and keeps user conflict at a minimum.

Hmm...I'm not sure how many miles there are now, but I think total trail miles would have to be tempered with volunteer\maintenance hours available.

Planning for new trails which reflects a theme of preserving the isolated feeling one gets when on the trails, rather than using some arbitrary total number of miles of trails.

I think we will have sufficient mileage.

The more the merrier. It spreads the users out and avoids congestion at peak use times.

"unlimited" - I doubt that that word could ever be over applied.

Don't really know, but a little more would be nice. There is a danger of getting more trails than can be effectively maintained (especially those that are hard to get to the cut out deadfalls)

50 (about 10 more than now)

enough for some dedicated equine trails so I won't have to ride in horse poop and mud

I would like to see another trail off the top of the mountain, either side is fine. There is lots of room between hideho and bucks, as well between trough and gauntlet. I would like this trail to be multi-use, however built with bicycles in mind. We currently have a section (trough expert) built with bicycles in mind and it's been a huge hit! Anyone could have access to this trail, but I'd like to have something that is built for bicycle use. We need a trail where people in this area and specifically up and coming youngsters can really tune their skills to help compete at the race level and get the youth excited about riding bicycles. Childhood obesity is a huge problem for our society and we need to help fight it anyway we can. Having exciting riding spots and riding community is something that will bring kids in as well as adults.

I don't think there is a magic number and it already has an excellent layout as far as mileage is concerned. I believe that most everyone will agree, they don't want it over littered with

intertwining trails, however a few more could be put in. If you hang a right onto the fireroad from 4 gorges, on the fireroad climb there is a large piece of woods in this area (on left going up at first) that could be used to put in another "connector" trail that could be used coming down or up, but I would propose to make it "climbable" (mostly a "up" trail) so that people could hang a right off of 4 gorges onto the fireroad and shortly be back on singletrack going up the mountain.

I believe we could double the miles of trails with low impact in an environmentally sound way.

30% more would be sufficient.

3. Should any trails be closed?

With some work, all existing trails should continue to remain open.

None come to mind for complete trail closure.

No trail closures--we need more, not less.

No!

NO

only on during first 24 hours after a good rain or other precipitation.

Not permanently, but temporary closures of specific trails when conditions are bad makes sense (e.g. Enchanted Forest has been very muddy for several weeks. Closing this trail during extended wet periods would prolong its life and make it more enjoyable for all.

perhaps enchanted forest. It has too many wet sections and downed trees. Perhaps there could be a small loop down to the water and back. The other trails seem ok but some eroded sections could be re-routed.

no

I don't necessarily think, any of the current trails should be closed, however if there was a candidate for a re-route it would be bucks rut.. I hesitate in saying that because people seem to love it so much. I personally think the descent is over too quickly, but that's just me.

I do not see the need to close any of the existing trails although some need minor repairs...remember these are nature trails and not a paved pathway, nor should they be.

No

4. What trails should be repaired and where? (just some examples would be fine)

Hiddie Ho and Bucks Rutt definitely need to have the trail tread outsloped in some places.

The Comet creek crossing has become a quagmire on the end between the fire road and the intersection with Tuck-A-Way.

The new section of Enchanted Forest which is always wet could use some attention or bypass and bring trail out to fire road before that mess.

The trail from the dam to the boat launch needs repair. Yes, I know it's closed, but it gets ridden anyway, so it might as well be made safe where it currently has some severe erosion with a high drop-off to the water.

On the Comet, the ditch with the switchback (sharp descent with sharp curve coming out and up steep bank)

Rerouting around mud-bogs on Hotel and at the bottom of Hemlock would help those trails. I know that many will likely suggest a major overhaul of the some of the steeper trails (I suspect Buck and Hemlock will be commonly identified), but I can't state strongly enough how much I am opposed to this! Buck is probably my favorite trail at the Cove. It is one of the few trails that is just as much fun to climb as it is to DH. I genuinely love that trail and find it in the vast majority of my rides at the Cove. The entire trail is rideable by those w/ appropriate skills. There are many features that require advanced skills (and I don't clean it every time), but removing difficult features on trails doesn't serve the MTB community well as it prohibits the development of these advanced skills. Steep rocky switchbacks, exposed roots, narrow trails and loose rocks demand full concentration even from advanced riders. This focus leads to a "Zen-like" experience that cannot be accomplished on wide, non-technical trails like Songbird. This "Zen" is one of the main reasons why many of us ride. Removing these features equates to penalizing those of us who have worked and pushed ourselves to develop advanced skills. Just yesterday, I was very disappointed that roots in the really tight switchback on Hi-Dee-Ho had been removed. I knew they would eventually have to go, but I had just recently been cleaning that feature with regularity which generated a great sense of joy/pride/accomplishment for me. Now, I don't have that challenge to look forward to in the long climb up the mountain. One of the great features of the Cove is that trails for all skill-levels can be found. For those lacking the skills to navigate the roots and rocks of the difficult trails, they can either push their bikes past these features, attempt them repeatedly until they acquire the skills to successfully ride them, or ride the easier trails. However, once these difficult trails are smoothed over, advanced riders are left out in the cold. Man-made "technical trail features" are a poor substitute for natural features like roots/rock as these "TTFs" generally are too few and far between, don't really "fit" the trail, and lack the organic nature to deliver the biking "zen."

The steep section of Comet (closest to the cove) could use a re-route. There are also three stream crossings that could be reduced to one in that same area of The Comet. Generally, any severely eroded areas near drainage crossings.

The Drop - erosion is a problem there. The Comet - ditto. Enchanted Forest intersection to the Comet (creek is a problem with access to Comet)

I believe all the trails could use work here and there, specifically rock armoring, we are seeing a increase in traffic and this would greatly increase the ability to use them without harm during the wet seasons and thawing months. This would also help with the holes that horse hooves leave during these wet times. There are a number of water bars, that need to be replaced on hideho.

I like the variety of the trails that the Cove has to offer, some are flowy and meander others are steep and rough. I do like the addition of the "expert" section of the Trough and would like to see more of this type of riding. In other words the Cove has something for everyone and is worth driving distance for. I really do not have any dislikes at the Cove except would like to see more trails.

5. What do you like and dislike about the trails?

Many of the new trails are not difficult. The trails leading to the ridge tend to be more technical but also have erosion issues. We need some sustainable technical trails.

What's not to like?

I like the rugged, technical, single-track trails. Don't care much for the double-track.

The variety of the terrain is a positive.

The log ramps with no go around is a negative for equestrians.

I like the variety.

Having to interrupt a ride, stop, dismount, greet, smile, to many groups of horses who just don't get it! It seems the groups are getting larger - recently the previously 8 to 15 grouped riders are now 15-25 riders - just too many.

I love the trails at Carvins Cove! Their strength is the variety that exists at the Cove. There are lots of easy trails for beginners/intermediates (Songbird, Schoolhouse, Little Bell), but there are also trails that challenge advanced riders (Buck, Hemlock, Hi-Dee-Ho).

Nice variety of trails. Parking area not great in terms of central location/variety for beginners/families..but maybe reduces overuse.

Trails are great, other than maintenance, leave them be!

I really like the directions that the trails have been taken in. There is a lot of discussion around what's been done to the trail system in the passed few years, about smoothing it out too much and how wide it has gotten due to traffic and the new trail cuts. Overall, I really enjoy the updated sustainable work that is being done, the trails' flow have greatly increased. I would like to see some rougher/rockier more technical stuff available; not only for myself, but for the naysayers who think we are dumbing the place down, making it too easy.

Like rolling with short climbs. Don't like anything that is too technical and rocky (for example, trails along the top of North Mountain). I like to ride my bike, not carry it.

6. What other needs do you have? (rest rooms, bike wash, changing rooms, parking, water, camping...)

Any of the above would be fine but all are bonuses. If some of the yearly permit money could be used for the above, even better. And if camping or another means of generating income for the reservoir can be achieved I think the money should be kept for "Cove" improvements and maintenance.

Rest rooms and a bike wash would be great additions. I'm not sure if you have ever been to the Tsali recreation area in North Carolina, but they have bathrooms and a bike wash which are very convenient.

It would be nice to have changing/restrooms at the Bennett Springs parking lot, along with potable water to refill camelbacks and a bike wash, and the same camping policies as the National Forests (primitive camping allowed anywhere except specifically-prohibited areas) but if I could have only one thing, it would be re-opening the dam trail and building a connection to it from The Gauntlet.

All nice ideas, if the funding is available, start small.

Rest room facilities at the Bennett Spring parking lot and at the former restroom building near the cove would be nice. A few picnic tables scattered around would be nice. Suggested areas would be the former picnic area at the upper end of the cove (Bennett Springs side), on the School House trail near the water, on the Arrowhead near the intersection of Sawmill Branch where the large rocks and the stream are located. Additional mileage signs on Happy Valley Rd, measured from the boat dock side. Suggest every 1/2 mile. I think they go to about 4 miles now.

Awesome idea - let's copy Tsali - Swimming, some camping, restrooms/showers, bike wash, access to potable water.

Permits/Pay posts at Bennett Springs - almost every time I go there, local as well as those from out of town pull in to enjoy the trails -Sorry, they will have to back track or go across town to purchase a permit - Right - we never see them around again.

No bathroom. Keep it rustic!

Restrooms/changing rooms wouldn't be bad. A brew-pub across the street that serves good pizza would also be great, but that is probably asking too much :)

An easier pass/permit system. Remove all out-of-date and conflicting signs. Update kiosk. Maybe a parking area at the end of Carvins Cove Road.

I think having a standard pay Kiosk would be great at trail heads where folk's would put say \$2-3 in an envelope drop box and tear off a tag & put in their windshield for the park ranger.

Bike wash as Bennett Springs would be great but probably abused by locals (washing cars, tractors, etc.)

Rest Rooms would be great, but hard to maintain and keep clean. Maybe a latrine fashioned after one I've seen on the AT. Skylight, concrete floor, minimal maintenance.

I'd love to say yes to having a changing area and bathrooms but out there I believe it's asking for negative behavior, especially after dark. Some sort of drinkable water source out there would be nice, but I know that won't be easy considering the water in that area isn't the best. A small designated camping area could be nice. I also would like to see a grill at the parking lot, so that people could have get togethers and cook out.

I do not support the idea of restrooms, changing stations or bike washes. The setting is rustic and that has always been part of the appeal.

Restrooms at the Bennett Springs trail head and additional parking at the end of Timberview Road.

7. Any suggestions on trail management?

Signage with distances would be a great help with new users. Even have mileage on the official Cove map.

Other than your emails, there's really no communication that I am aware of that gives trail users an idea of what's going on concerning trail management. Also, how could users communicate

to the powers that be trail maintenance needs (downed trees, etc.)? Maybe a website with a forum or at least an email contact could increase communication.

Trail management: Not sure exactly what you mean. I would advocate getting input from a wide variety of sources, which the city seems to be doing now, rather than making decisions within silos and then wondering why people think they're bad decisions, as the city used to do.

Continue as present.

It is time to apply alternate days/alternate trails for horses & mt. bikers -seriously -At Tsali this allows everyone to enjoy the trail without disruption to their ride.

Amazing work has been done.

No, you're doing a great job Brian!

From the little bit I know the trails are being managed excellently currently, with only room for small improvements. I would love to see more events being held, cookouts, parties, bike demos.

I believe the trails should be managed by the users under the guidance of the Parks and Recreation Department. There are many motivated users that are now maintaining trails, I think that additional people would be willing help in the effort if presented in the right way.

8. Should the trails be closed for weather conditions where use would damage the trails?

Education about using trails in different weather conditions would be a help. To have a trail conditions page of a website. Most of the trail issues are occurring on the newer trail that hasn't had adequate time to "break in." Users need to know that they can ruin or erode newly constructed trail very easily in wet weather. There are some trails at the Cove that are not effected by weather. These should be highlighted in some way.

Different trails drain\dry at different rates, so how would weather closures be communicated and managed? The areas on the lower trails that seem to get damaged the most are perpetually wet areas that I don't think closures would help. All in all, I don't think weather closures would have any real benefits other than frustrate users.

I am not as familiar with the Cove and the trail system as many others are but in just my short time out there helping to assess the trails it is obvious to me that some if not all the trails need to be closed when the ground is wet. The damage I saw from bicycles and horses on wet trails was significant. I don't know how this would be enforced but hopefully, over time, the culture would change so that users were in the mind set of protecting this resource rather than using/abusing it.

I wouldn't bother trying to close trails due to weather consitions--less government is better on this issue, and bad weather already has a dampening effect (pun intended) on the amount of trail use. Any damage done is negligible compared to the bureaucratic nightmare of trying closures.

I think this should be handled by suggestion, rather than strict ruling.

Yes, no riding the single tracks within 24 hours of precipitation.

I think the trails should be closed after excessive rain and freeze/thaw periods. This would have to be a case by case scenario. After the recently heavy rains the trough was perfectly fine. Hard as a rock!

It might not be a bad idea to close the trails in bad weather conditions.

YES!!!!!! Trails in metro areas w/ high traffic are normally closed during bad conditions. A few people on the trails soon after big rains or freeze/thaw can do more damage than hundreds of users on dry days (this is especially true for horses). Due to the variety of trails at the Cove, a "sliding scale" closure may be possible. On really bad days, all trails should be closed. Some trails dry out faster than others, therefore, we could have several layers of closures from completely closed to completely open (with trails like the fire-roads opening first, non-boggy/rocky trails like Buck and Arrowhead opening next, Enchanted Forest opening last, etc.).

No. Perhaps some guidelines to avoid use in wet conditions.

I do often wonder if trails should be closed due to conditions, for instance during the thawing months, the trails are really soft in spots and people continue to ride them, I believe the rock armoring could be the real answer to this, making the trails stronger!

I do think that the trails that drain slower "lower trails" should be closed to all users when it has rained heavily or during times of snow and thaw. The upper trails do not seem to be much of an issue although horses do a lot of damage during these times.

Definitely!

9. Is user conflict an issue that needs more attention? If so, what are the issues and possible fixes?

User conflict is always mentioned between bikers and equestrians. Everyone I know who rides horses at the cove has mentioned no problems. But education on how to approach & and pass a 1000lb animal should be offered in some way.

I have had very little user conflict. I have had many encounters with horse users, most of which have been pleasant. But then again I yield to horses, too. The only "conflict" I have had has been a few snotty remarks from other mountain bikers, but I attest that to their lack of proper upbringing.

User conflicts: It would be worthwhile to try to educate trail users more--perhaps put up more yield triangles, more prominent info in kiosks, etc.

I haven't had any conflicts, everybody is generally very accommodating to others it seems.

Very little user conflicts but occasionally some bikers do not know how to pass horses. Suggest educational materials be placed on the kiosks at the parking lots. Also, include the trail users "Yield" logo on park signs, maps and kiosks.

Again, alternate days/alternate uses for horses/mt.bikers - Before the current conflicts become magnified.

Riders need to be more aware of equestrians though.. perhaps a large sign at the kiosk?

Yes. Horses destroy trails! Empirical studies repeatedly show that horses are comparable to motorized vehicles in their contribution to trail erosion. Mountainbikes and hikers generate an

order of magnitude less erosion on trails than either horses or ATVs. Adding the copious amounts of manure left on the trails by horses (don't forget the Cove is a drinking water supply), makes this the 500 lb. gorilla in the room that isn't being acknowledged. Banning horses entirely is justifiable, but limiting the number of horse permits, limiting the number of days they can ride, restricting them to certain trails, restricting them to days when the trails are really dry, or other options will greatly extend the life of those trails and increase enjoyment for other users. I'm sure horse riders will suggest that MTBs are a problem, but I doubt they can point to anything more than "personal annoyance" as MTBs cause minimal erosion, leave behind no fecal waste, and are a minimal threat to the wildlife and the safety of others. The arguments made by horse riders against MTBs are usually comparable to a grumpy old man screaming "You kids get off my lawn!"

Here is a summary of recent empirical studies on trail erosion and impacts of trail users on the surrounding ecosystems: In a study commissioned by the National Park Service, Marion (2006) found that mountain bikers cause less erosion than hikers. In the Big South Fork National River and Recreation Area, bike trails had fewer problems with erosion than hiking trails as mean trail width was 24" and 32" respectively and mean cross sectional areas (CSA) of soil loss were 6 in² and 19 in² respectively. The total amount of soil lost from bike trails per mile was 30% of that from hiking trails. Hikers were also found to be more likely to create highly eroded informal trails to campsites. No difference in the proportion of trail that was muddy was found among hiking and bike trails. Most importantly, this study indicated that horses (mean trail width 81", CSA = 150), and ATVs (mean trail width 104", CSA = 246) were much more damaging to trails and caused much greater soil erosion than any human powered activity. A comparative study by White et al. (2006) also concluded that across multiple ecological regions, mountain bikes cause slightly less erosion than hikers and much less than horses and ATVs. Mountainbikers also do not appear to have any greater impact on plants and animals than hikers. Thurston and Reader (2001) found no statistical difference in the plant density, plant diversity, and soil exposure after equal use by hikers and mountain bikers. Spahr (1990) found that mountain bikers (15% flush rate) were less likely to disturb Bald Eagles than hikers (46% flush rate) and fishermen (34% flush rate). Gander and Ingold (1997) also found no statistical difference in the rate or distance of fleeing by large ungulates startled by hikers and mountain bikers.

Gander, H. and P. Ingold. 1997. Reactions of Male Alpine Chamois /*Rupicapra r. rupicapra*/ to Hikers, Joggers and Mountainbikers. *Biological Conservation* 79: 3.

Marion, J. L. 2006. Assessing and Understanding Trail Degradation: Results from Big South Fork National River and Recreational Area. USDI, National Park Service.

Spahr, R. 1990. Factors Affecting The Distribution Of Bald Eagles And Effects Of Human Activity On Bald Eagles Wintering Along The Boise River, 1990. Boise State University, Thesis.

White, D. D., M. T. Waskey, G. P. Brodehl, and P. E. Foti. 2006. A comparative study of impacts to mountain bike trails in five common ecological regions of the Southwestern U.S. *Journal of Park and Recreation Administration* 24(2): 20.

Perhaps an educational poster in the kiosk.

I don't believe user conflict is an issue at all, I find nothing but great people at the cove, that's just my experience. There are bound to be issues from here and there, with the influx of people we are having; however I have not witnessed any and none come to mind. I believe a bell box (top/bottom) may be a great addition for our trails that are capable of holding speed and may have blind corners.

All users in my experience respect one another and does not seem to be an issue.

Not that I have noticed.

10. Any other input welcome

I think there needs to be a more inclusive approach to trail building. It seems that there are some trail builders that sometimes (all the time) need help, rather than a formalized plan that everyone can get behind and focus on. There are localities that are doing more with less people because they can see the "prize."

I would like to see easier access. The permit process is a little difficult especially if you want to enter on the Bennett Springs side. The small fee accessed could not provide any significant revenue and I would suggest it be eliminated. We also need a parking lot at the "Gate" at the end of Bennett Springs Road.

I'd like to see a restroom facility (of some sort) in the Bennett Springs parking area. And several friends have asked about more trails at the skill level of songbird.

I would like to see some trails developed on the east side of the cove to the east of the trail that is accessed at Timberview.

I spotted another missing trail on your CC trail map. There is a nice water-level trail along the shore from the dam to the boat dock parking area. It is narrow and somewhat rocky in places, so may not be a suitable bike or horse trail, but it is a pretty hiking trail. Lots of nice ferns and galax, and pretty views out across the water.

Three things I would like to see at the Cove are:

1. More beginner trails on the boat dock end of the fire road. There are some large areas that are relatively flat that could accommodate trails easily (I think). I think that would pull some of the beginner bikers from the Bennett Springs end where I often see families with children using the road instead of the connector trail to enter the cove.
2. A parking area at the end of Timberview.
3. Opening of the fire road for public use all the way to hanging rock. This would offer the potential for some great connections to the city trail system. I have stopped riding that section because of the postings. I would assume that this would require some negotiations between the city and private land owners.

I would love to see a parking kiosk/machine at the parking lot (like what is at pay parking lots) where someone could pay for a day use pass (or longer) without having to go to the boat dock/ or just right gear (nothing against Steve). This is especially important as these two venues are not always open and it would be much more user friendly to have a system similar to that. (But with an automated kiosk) Molly and I used one in Arizona at a trailhead last month...very simple and user friendly. I think this would be a step forward for the city...as they are becoming more proactive about promoting our outdoor resources. Also, another trail to connect gauntlet/trough if feasible would be great (about half way up the mountain). Thanks for all your work!

The Cove needs more trails on the back side near hemlock, araminta, gauntlet, etc. Connecting trails would be very nice between these and maybe farther out past Bucks Rutt. Another potential area for trails are near the tunnel road and around arrowhead.

More technical trails with logs and harder things to ride. So anyone can improve or just take it easy at the cove

The Cove should have enough trails so it will be a premier riding destination with enough room for one to not see others on a crowded day

Special recognition at the kiosk for those to contribute their time to give back to the trail system - designate those who contribute hard dollars and those who contribute hard labor, etc.*

I can only think of a few things I'd like to see.

1. Singletrack trail from boatdock to Schoolhouse... I live on that side of things so this would bring me and many others to the Cove more often. Could also add mileage to the trail system!
2. Skills area???? You know with logs, skinnys, etc. Maybe off of the fireroad near the bridge at the base of Arrowhead. I think putting it "deeper" into the property would help it's longevity.
3. Flatter singletrack from the Bennett Springs Parking lot in... One lady mentioned one time the possibility of building one from the area directly opposite the parking lot and running it to Songbird.
4. Comet - the downhill was horrible the last time I rode it with a huge rut. Also at the base of the big hill used to be a big mud hole - not sure if it was ever fixed. The "V-ravine" near the parking lot end of Comet isn't very user friendly.
5. Parking closer to the Bennett Springs gate (a few of the older folks I know who like to hike/walk asked about this one time).
6. Bathrooms at BS Parking Lot would be a dream, but I'd just settle for a place to change clothes.
7. As for trail maintenance, I think they should really look at a "Adopt-a-Trail" type program where riders could adopt a trail and be responsible for low maintenance problems and if the see bigger issues report back to you or whoever to arrange a work party. This would go alot smoother if we had a more organize mountain bike club in the Valley, but of course I think it would be nice to get some folks from the horseback community involved as well.

We are incredibly fortunate to have the trails at Carvins Cove. Those trails have been integral in establishing and maintaining a great mountainbike community which is good for Roanoke and the surrounding area. Recently, local officials have become committed to promoting outdoor recreation as a way to attract bright, young, ambitious people to the Roanoke Valley. The trails at the Cove can play a major role in this. To the contrary, the lack of "focal point" for the rock-climbing and whitewater communities hinder connections among these groups. I am very grateful to all those who have worked to make the trails at Carvins Cove not only available to ride, but such a high quality riding experience. I have been riding for about 10 years and have ridden several great trails in NM, CO, and CA. I have also ridden the vast majority of the great trails in GA, AL, TN, and NC (not bragging, just trying to provide perspective). Despite this, I firmly believe that Carvins Cove is one of the best trail systems I've ever ridden. The most striking feature of the Cove is the genuine variety of trail. There are many miles of "flowy" IMBA-style trail for beginners/intermediates as well as a few gnarly "old school" trails w/ technical features and long sustained climbs that challenge advanced riders. PLEASE DON'T CHANGE THIS! After living near Atlanta for about 5 years, I am especially sensitive to this situation. A cabal of mediocre riders converted what were once great trails in the metro-Atlanta area to boring, unchallenging trails that were little more than dirt side-walks. This was done in the name of sustainability and access for more riders. However, these actions crippled the entire Atlanta MTB community by prohibiting the development of advanced skills necessary to ride trails outside the metro area. I had many experiences w/ supposedly accomplished Atlanta riders getting destroyed by trails in the North Georgia mountains. Sustainable doesn't have to mean "easy." It can be accomplished w/ armoring problematic slopes and diverting water from steep sections of trail requiring less effort than reroutes around these steep sections.

Generally, I want to see the variety of difficulty levels maintained.

I put a new map online at <http://www.rvarc.org/mpo/maps/cove.pdf> (I think this is also linked off the Greenway site.) Let me know if you see any changes that need to be made. Eventually I would like to have a handout-map this size that has written trail descriptions on the back. You will also see some faint yellow trails on the map (I will eventually remove these) that are trails Liz has GPSed. The printed version is clearer.

In no particular order of importance.....

1. Wash stations at both ends of the Cove. Probably much cheaper to do at the boat dock, though.
2. Changing rooms at both ends.
3. Public access at the Brushy Mtn Fire Road at the Hanging Rock end of Timberview. This would be a great leap forward as it would provide the first physical connection between Cove trails and the Greenway (Hanging Rock Rails to Trails) Parking is already there. Is this end ENTIRELY private property now from the Dynamite end down to the Civil War monument?
4. If #3 is not do-able or even if it is There is a little finger of Cove property that touches Timberview along where the back of Lock Haven is. The topo maps show it as a derelict road going almost up to the BM FRoad. There is or used to be a gate there with a City sign. How about a single track connector trail there?
5. Connector trail from the bottom of the Gauntlet to the bottom of the Lower Clownhead. I have walked this several times and it could be a great trail. Like Four Gorges but four times longer.
6. Relocating the Flume section on Clownhead.
7. I am not in favor of camping within the watershed. The fire risks are too high. Also I am not in favor of encouraging any development there that caters to any more on the the land user groups in addition to hiker, biker, horses that we have now.
8. I have not been on Buck Rut for years. Has it been re-habbed?
9. Schmizzi told me once that he walked from the woods opposite the BS parking area over to Arrowhead and that it would make a great trail route. This would be along the base of Catawba Mtn. and behind the private property. Apparently there are slickrock opportunities there.
10. A single track in the woods running from the boat dock to Arrowhead. This would be a single track alternative to the Happy valley.
11. Special maps that tell the historical story of the Cove with locations of ruins, graveyards, hotel, amusement park etc.
12. I would like to see the RoVa MBP in the short term adopt the two cemeteries on Happy Valley and in the long term would like to see the Patrol including all 13,000 acres into it's patrol responsibility. Adoption would give the Patrol a toe hold in the Cove...something they might be able to parlay into larger responsibilities later.

Thanks asking for my input. Here are my comments.

- 1- I feel strongly that we should leave some of the trails difficult. I am particularly thinking about Buck, but also trails like the upper half of Comet, Arrowhead (except the long gradual slope on the south end), and Hemlock Tunnel (OK, the long, steep, always-washed-out part could go). In addition to the variety and challenge many of us appreciate, these are the trails that hold up the best when it gets muddy out there. I feel we should try to do as little as possible to these trails. I really love the IMBAish feel to the new trails, but it would be a shame to loose the old-school feel of the old trails. It is the VARIETY at CC that I hear people praise so often.
- 2- I would be very excited about working on a trail that would connect the end of 4 Georges (or near it off of Brushy Mountain Trail) to the top of tuck a way (or somewhere along that forest road that it runs into)
- 3- Closing the trails when things are really bad sounds like a good idea in theory, but in practice it sounds problematic. The problem is that often times some of the trails (mostly the lower trails and anything new) will be a mess, but other trails (older ones and ones coming off the ridge) will be OK. Plus, there would need to be some way to find out if they were closed before you drive out there. I think selective trail closings might work. Maybe just a sign in the

parking lot indicating which trails are vulnerable to damage. Sure some people would ignore it, but it would reduce traffic where/when we don't want it.

4- How about a drop box for parking \$ as an option instead of a pass? I don't think people are as annoyed about having to pay as they are about what a hassle it can be to do so. VERY unwelcoming and inconvenient to people from out of town.

I believe one of our biggest and best things we can do with the cove is promote the fun outdoor activities in Roanoke, Va. It will bother some people that it's becoming so public and not their private little get-a-way but we need a good, positive, outdoor recreation area for people to stay fit and healthy both physically and mentally in our valley, it's long overdue. We have excellent surroundings and we need to take advantage of these and promote our area, to help grow. Especially in these bad times as far as job market and economy.

I am excited that Roanoke City Parks and Recreation has taken the steps to further understand, develop and protect the 13,000 acres at Carvins Cove. I have been participating in outdoor recreation sports over the last 25 years and hold a degree in Outdoor Recreation. I have also worked for Roanoke County Parks and Recreation for a 10 year period. I do understand what is at stake and the huge potential that the City Recreation Department has for further developing and maintaining some of the best trails in the state. I only started mountain biking 3 years ago but use the trails at Carvins Cove 3-4 times a week. Without a doubt mountain bikers are the main users of these trails and the ones who do most of the maintenance. Therefore I believe we should have a strong say in the "plan".

In conclusion I want to reiterate that the City has a great opportunity to expand and promote the trails at the Cove with very little impact to the environment. I think the area can become somewhat of a Mecca for mountain bikers due to the terrain and diverse trail possibilities.

RATC March meeting . . . stated that Liz had asked if the Sawmill Branch Trail and a trail from the boat dock at Carvin's Cove to the AT should be included in the trail plan for the cove. There was a general consensus to have both trails included as together with the AT and the road they created a loop hike.

Appendix E

Guidelines and Etiquette for Trail Users

In order for a multi-use trail system to work well, all users must exhibit high standards of behavior and protect the resource they use. The following guidelines for trail etiquette are accepted standards for each user group. The Carvins Cove Trail Management Plan encourages posting these guidelines and utilizing brochures and other techniques to educate users on trail etiquette and practices.

Etiquette and Safety for Hikers

The following guidelines are taken from the Leave No Trace Center for Outdoor Ethics. Leave No Trace is a national non-profit organization dedicated to promoting and inspiring responsible outdoor recreation through education, research and partnerships. These principles can be applied for bicyclists and horseback riders as well hikers.

1. Plan Ahead and Prepare

- Know the regulations and special concerns for the area you'll visit.
- Prepare for extreme weather, hazards, and emergencies.
- Schedule your trip to avoid times of high use.
- Visit in small groups. Split larger parties into groups of 4-6.
- Repackage food to minimize waste.
- Use a map and compass to eliminate the use of marking paint, rock cairns or flagging.

2. Travel on Durable Surfaces

- Concentrate use on existing trails.
- Walk single file in the middle of the trail, even when wet or muddy.

3. Dispose of Waste Properly

- Pack it in, pack it out. Inspect your rest areas for trash or spilled foods. Pack out all trash, leftover food, and litter.
- Deposit solid human waste in catholes dug 6 to 8 inches deep at least 200 feet from water, camp, and trails. Cover and disguise the cathole when finished.
- Pack out toilet paper and hygiene products.

4. Leave What You Find

- Preserve the past: examine, but do not touch, cultural or historic structures and artifacts.
- Leave rocks, plants and other natural objects as you find them.
- Avoid introducing or transporting non-native species.
- Do not build structures, furniture, or dig trenches.

5. Respect Wildlife

- Observe wildlife from a distance. Do not follow or approach them.
- Never feed animals. Feeding wildlife damages their health, alters natural behaviors, and exposes them to predators and other dangers.
- Protect wildlife and your food by storing rations and trash securely.
- Control pets at all times, or leave them at home.
- Avoid wildlife during sensitive times: mating, nesting, raising young, or winter.

6. Be Considerate of Other Visitors

- Respect other visitors and protect the quality of their experience.
 - Be courteous. Yield to other users on the trail.
 - Step to the downhill side of the trail when encountering pack stock.
 - Take breaks away from trails and other visitors.
 - Let nature's sounds prevail. Avoid loud voices and noises
- <http://www.lnt.org/programs/lnt7/#lnt1>

Etiquette and Safety for Equestrians

These guidelines are posted by Equestrian Trails, Inc., a nonprofit corporation established in 1944 with the charter to be "Dedicated to the Acquisition and Preservation of Trails, Good Horsemanship, and Equine Legislation."

- Make sure your horse has the temperament and training for riding on congested public trails. Busy multi-use trails are not the proper place for schooling green horses.
- Advise other trail users of your horse's temperament, e.g. a horse with a tendency to kick should always wear a red ribbon on the tail or a stallion should wear a yellow ribbon. Assume that not everyone will know what these ribbons mean, so be prepared to explain or take the necessary precautions to avoid trouble.
- Obey posted speed/gait limits and use common sense in crowded areas. Canter/galloping on crowded trails endangers everyone.
- Move to the right to allow faster trail users to pass.
- Announce your intentions to pass other trail users and reduce speed in order to pass safely. Pass on the left only.
- Remove your horse from the trail if you begin experiencing behavior problems.
- Stay on equestrian approved trails.
- As a courtesy to others in your group, use appropriate hand signals for turning, slowing, etc., and give verbal warning for dangers on the trail (e.g. holes, low branches).
- Remember that other trail users may not be familiar with horses or their reactions to new experiences. Your horse may be another trail users introduction to horses, what you do is a reflection of the local horse community. Cheerfully answer questions about your horse. You are an ambassador for the entire equestrian community.
- Do not clean out your trailer in the parking area.
- On multiple use trails, step off the trail (if possible) if your horse needs to relieve himself or kick the droppings off the trail.

<http://www.etinational.com/trailetiquette.html>

Etiquette and Safety for Mountain Bikers

The International Mountain Bicycling Association guidelines are recognized around the world as the standard code of conduct for mountain bikers.

1. Ride on Open Trails Only.

Respect trail and road closures (ask if uncertain); avoid trespassing on private land; obtain permits or other authorization as may be required. Federal and state Wilderness

areas are closed to cycling. The way you ride will influence trail management decisions and policies.

2. Leave No Trace

Be sensitive to the dirt beneath you. Recognize different types of soils and trail construction; practice low-impact cycling. Wet and muddy trails are more vulnerable to damage. When the trailbed is soft, consider other riding options. This also means staying on existing trails and not creating new ones. Don't cut switchbacks. Be sure to pack out at least as much as you pack in.

3. Control Your Bicycle!

Inattention for even a second can cause problems. Obey all bicycle speed regulations and recommendations.

4. Always Yield Trail

Let your fellow trail users know you're coming. A friendly greeting or bell is considerate and works well; don't startle others. Show your respect when passing by slowing to a walking pace or even stopping. Anticipate other trail users around corners or in blind spots. Yielding means slow down, establish communication, be prepared to stop if necessary and pass safely.

5. Never Scare Animals

All animals are startled by an unannounced approach, a sudden movement, or a loud noise. This can be dangerous for you, others, and the animals. Give animals extra room and time to adjust to you. When passing horses use special care and follow directions from the horseback riders (ask if uncertain). Running cattle and disturbing wildlife is a serious offense. Leave gates as you found them, or as marked.

6. Plan Ahead

Know your equipment, your ability, and the area in which you are riding -- and prepare accordingly. Be self-sufficient at all times, keep your equipment in good repair, and carry necessary supplies for changes in weather or other conditions. A well-executed trip is a satisfaction to you and not a burden to others. Always wear a helmet and appropriate safety gear.

http://www.imba.com/about/trail_rules.html

Addendum for Trail Construction at Carvins Cove

1. Trail Construction Sponsor: _____
(Name and Contact Information) _____

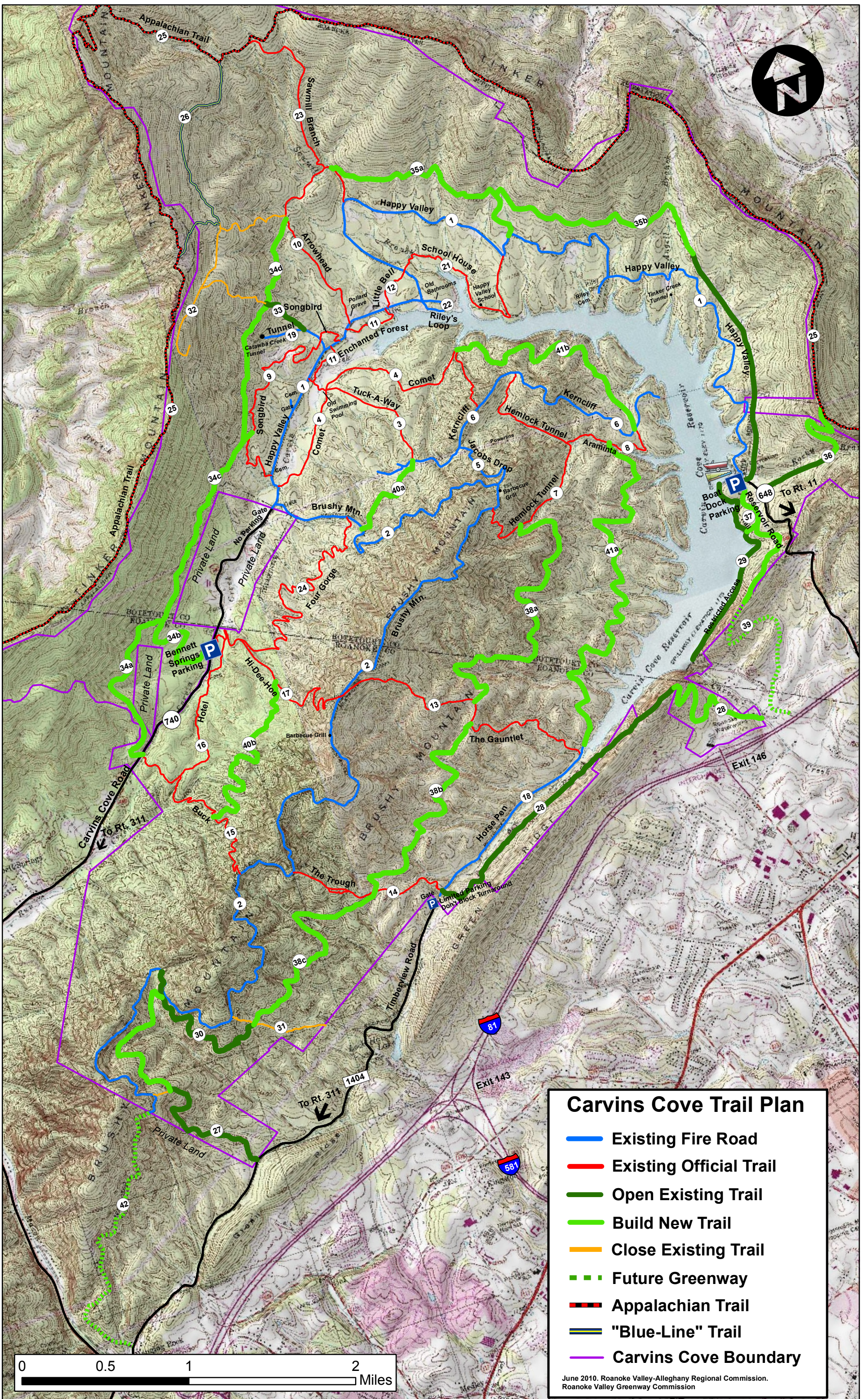
2. Trail Location:
Termini and Length: _____
Trail Intersections: _____
Access: _____
Is the trail in the Trail Management Plan ____ If so, give Plan #: _____
Is the trail within a Heritage area? _____ If so, which one? _____

3. List Features along Proposed Trail

4. Users and Benefits of Proposed Trail

5. Estimate of Construction Needs, Costs, and Source/Funding:
Materials: _____
Equipment: _____
Labor: _____
Time: _____
Other: _____
Source of Funding or Donations: _____
Crew Leaders to Help: _____

6. Development Planning:
Has route been flagged? _____
Has flagging been reviewed by Pathfinders or Parks and Recreation? _____
Has route been mapped? _____



Carvins Cove Trail Plan

- Existing Fire Road
- Existing Official Trail
- Open Existing Trail
- Build New Trail
- Close Existing Trail
- - - Future Greenway
- Appalachian Trail
- "Blue-Line" Trail
- Carvins Cove Boundary

June 2010. Roanoke Valley-Alleghany Regional Commission.
 Roanoke Valley Greenway Commission