



RED ROCKS PARK

2014 Management Plan

**Prepared by the Red Rocks Master Plan Subcommittee
for the City of South Burlington**



*This document was prepared by the
Red Rocks Master Plan Subcommittee,
as charged by the Red Rocks Advisory Committee,
from January to September 2014.*

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FOREWORD: A call to action

This document presents a list of best management practices, seasonal maintenance needs, and short-term and long-term management actions (summarized on page 40) for maintaining and improving the ecological and recreational features of Red Rocks Park. While this management plan is reflective of the particular time of its writing, it is intended to be an evolving document that will require updates as new strategies are trialled and new information comes to light. However, as this initial writing process comes to a close, two big questions have surfaced:

Who will oversee the implementation of this plan and with what funding?

There is presently no member—or members—of the City staff equipped to handle questions of natural resource management for Red Rocks Park and other natural areas in South Burlington. There is equally a lack of staff time and expertise to build the many possible community partnerships between South Burlington’s parks and open spaces and their stakeholders. Up until now, the City has turned to consultants and student group partnerships for expertise in park management questions, along with volunteer citizens’ advisory committees. This has been a low-cost solution but has led to a lack of continuity in management due to the short-term nature of many student projects and consulting contracts.

Park management and decision-making falls between South Burlington Recreation & Parks and the Department of Public Works, both of which have minimal staff capacity dedicated to management of natural area parks; these same departments oversee the time-intensive maintenance of recreational fields in the City, plus over 15 miles of recreation paths. There have also been instances of uncertain division of duties and decision-making power between the Recreation department and Department of Public Works.

As this management planning process comes to a close, the Recreation & Parks department will be left with a list of actions and projects to undertake, with no staff and minimal capital available to implement them. The subcommittee that informed the writing of this document is also due to dissolve at this same time.

These patterns point to the need for new staff and capital investment, plus a more clear assignment of responsibilities in the departments responsible for the City’s natural area management.

If just three recommendations can be implemented from the management plan, let it be these:

- 1. South Burlington should have a dedicated staff position to (a) inform and coordinate management of the city’s open spaces and (b) build community partnerships and stewardship capacity for South Burlington’s parks.**
- 2. The maintenance and improvement of South Burlington’s parks requires more capital. The City should establish a sustainable funding stream, which would include (a) contributions from the existing Open Space Fund or a similar taxpayer contribution towards park upkeep, and (b) targeted grant applications and fundraising for specific park projects as needed.**
- 3. Existing park regulations must be enforced to ensure compliance.**



SECTION 1: INTRODUCING RED ROCKS

Red Rocks Park is a 100-acre community park and natural area in the City of South Burlington, Vermont. It was purchased by the City in 1970, having formerly served as the Hatch Family Estate since the late 1800s. The roads and lookouts created by the Hatch family now provide walking trails through maple-ash-hickory-oak forest and cedars perched atop red Monkton Quartzite cliffs. A city beach at the southeastern edge of the park provides 200 yards of waterfront access (the only public lake access in the city), and the Champlain Water District operates a pumping station at the western limit of the beach, along with two easements for their transmission lines.

Red Rocks is one of four large natural areas in the South Burlington Parks network (the others are Wheeler Nature Park on Dorset Sreet, the Scott Property on Autumn Hill Road, and the recently acquired Underwood property south of Nowland Farm Road). Red Rocks occupies the westernmost corner of South Burlington (see Map 1). It is bordered by Lake Champlain to the south and west, Burlington to the north, and the Queen City Park neighborhood to the east. The park is accessed from Central Avenue.

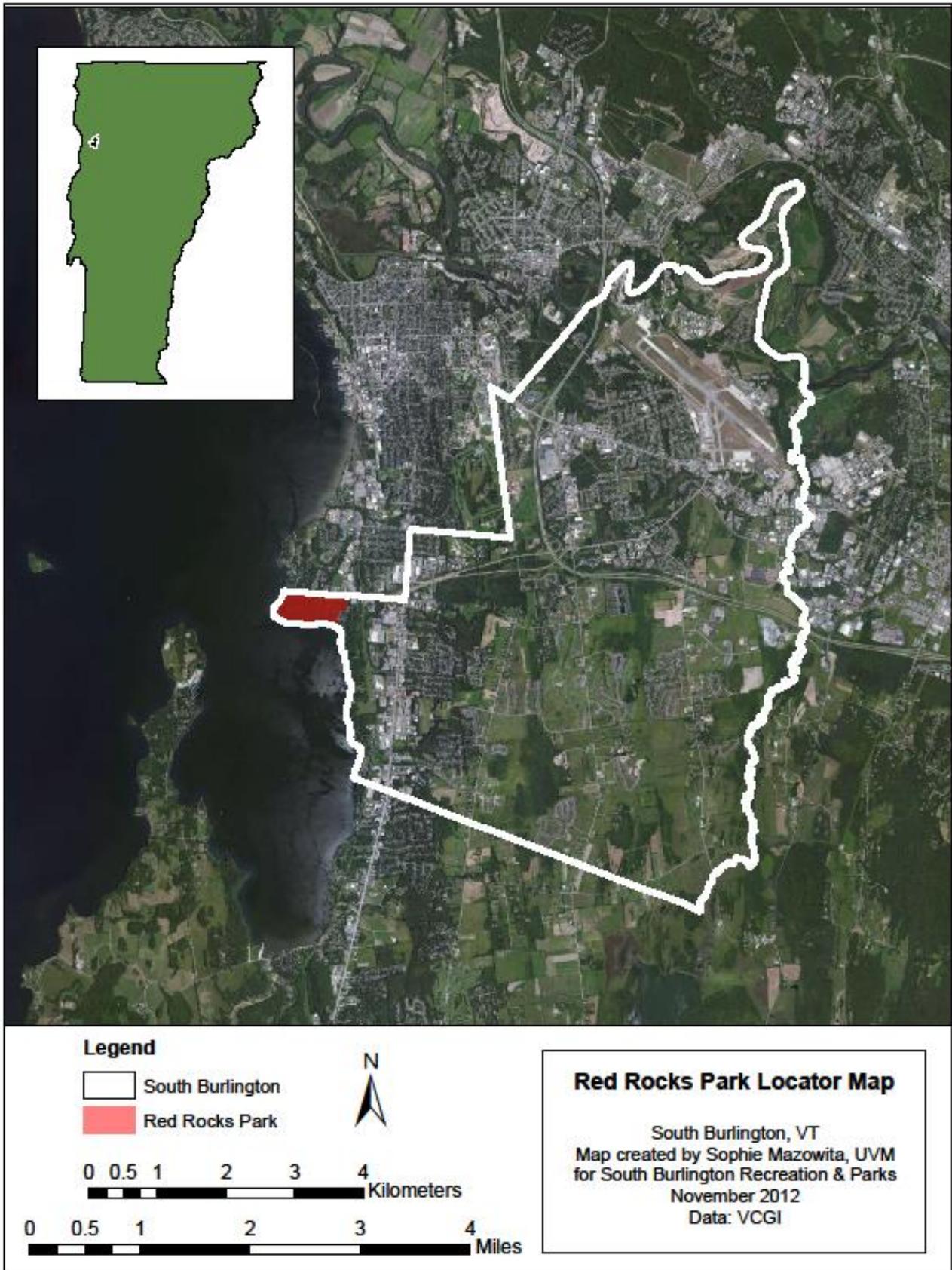
The park is currently operated by the South Burlington Recreation & Parks Department and maintained by the Department of Public Works. Guidance and recommendations are provided by a seven-member committee of appointed city residents, many of whom reside in the Queen City Park neighborhood.

Key management issues and objectives

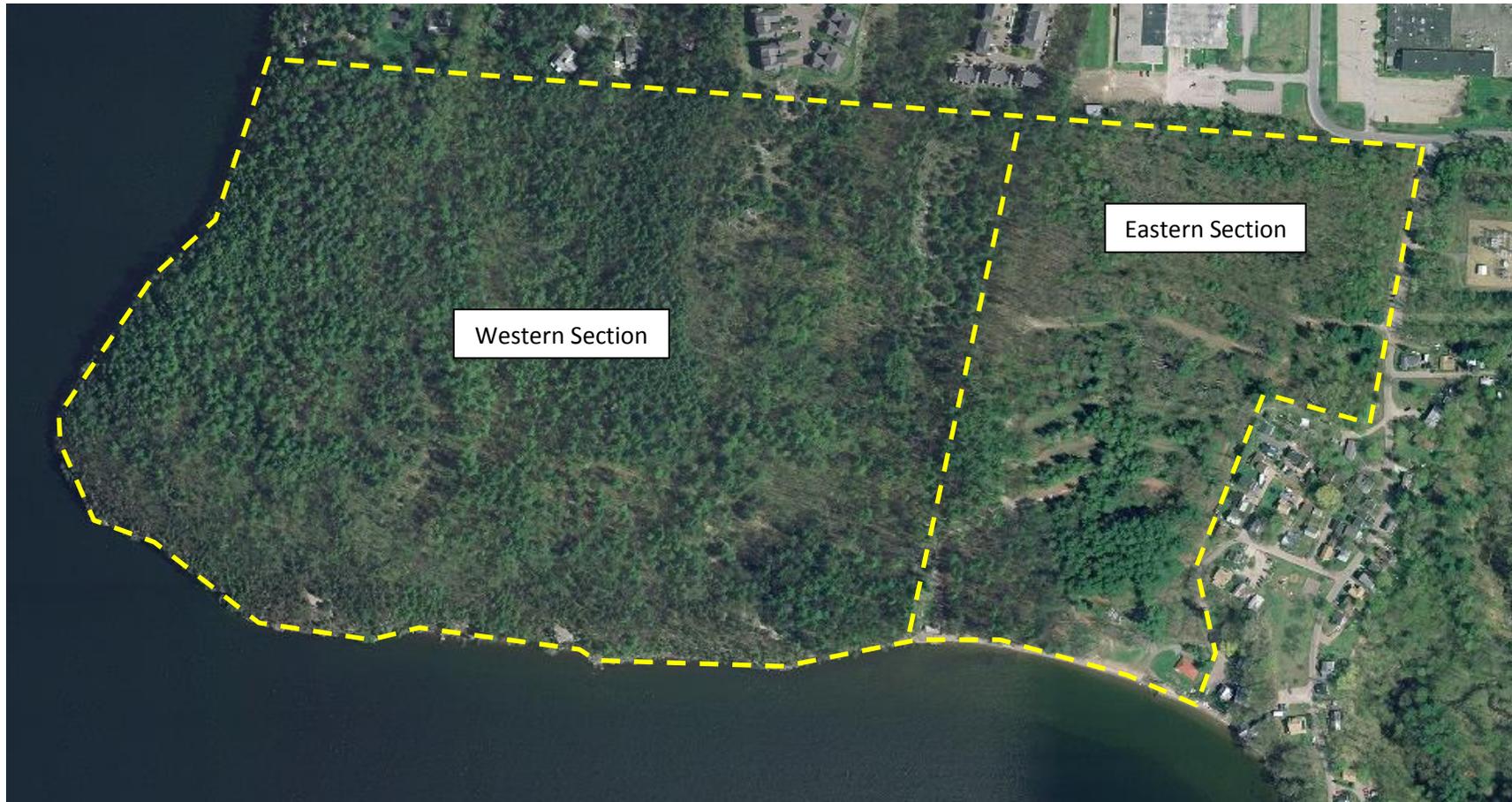
Red Rocks faces challenges posed by heavy recreational use by the public. Aquatic and terrestrial invasive species, off-leash dog impacts, unofficial trail use, forest health, and park signage are among the concerns of the park's management. The City seeks to provide a variety of recreational opportunities in Red Rocks Park while maintaining ecological integrity, minimizing usage impacts, and addressing threats and hazards.

Purpose of this document

This management plan was prepared as a guiding document for City staff and other Red Rocks Park stakeholders. It includes recommendations for park maintenance and natural resource conservation to meet both short-term and long-term goals. The document was prepared by the Red Rocks Master Plan Subcommittee, overseen by the Red Rocks Park Advisory Committee.



Map 1



Map 2. Red Rocks Park can be divided into two major management zones:

- (1) The eastern, “developed” zone, from the Central Ave entrance to the north-south boundary where the hiking trails begin. This section includes the parking lots, picnic area, beach, and CWD easement. It also borders the Queen City park neighborhood. Recreation access is of primary importance in this zone.**
- (2) The western, “natural” zone, stretching from the north-south parking road/hiking trail boundary out to the far western tip of the park. Ecosystem health and wildlife values are a higher priority in this zone.**

SECTION 2: PARK VALUES, ORDINANCES & OPPORTUNITIES

2.1 EVALUATIVE CRITERIA FOR RED ROCKS PARK MANAGEMENT ACTIONS

Management actions should be weighed against the following criteria. “Management action” could refer to a specific policy decision, park maintenance plan, or design of park facilities and grounds.

Ecosystem Health & Wildlife

- Does the management action maintain, restore, or at least minimize impact on ecosystems and ecological processes, including natural communities, wildlife habitat, water, and soils?

Recreation

- Does the management action provide for community members’ physical and spiritual connection to the natural world through public access and recreation?

Community & Neighboring Landowners

- Does the management action respect and build partnerships with neighboring landowners, both public and private?

Education

- Does the management action maintain or enhance opportunities for educational use of the park?

Resource Efficiency

- Does the management action minimize use of energy and other natural resources and the creation of waste?
- Does the management action minimize financial costs?

Aesthetics

- Does the management action maximize the aesthetic quality of the site?

2.2 UNIQUE VALUES OF RED ROCKS

The following features are notable and in many cases unique to Red Rocks, comparing it to other areas within South Burlington and the larger area.

Recreational and Cultural Values

- South Burlington’s only public lake access
- The longest-standing natural area park in the City, providing public access to park land in a “natural” or “wild” state relative to other recreational parks managed for organized sports and playing fields
- Park within walking, biking, and public transit access for a large population

Ecological Values

- Large forested area within a relatively dense urban area
- Significant bird nesting area
- Contains an ecological community of state-level conservation priority: limestone bluff cedar-pine forest
- Important habitat elements for wildlife (e.g., vernal pools, cliff ledges, and mature forest)
- Large populations of spring wildflowers
- A natural buffer helping to protect the source of much of Chittenden County's freshwater
- Part of the shoreline wildlife corridor along Lake Champlain

2.3 MANAGEMENT REGULATIONS AND ORDINANCES

The following management regulations, rights, and ordinances are applicable to Red Rocks and must be kept in mind when considering management actions in the Park. Some could be changed more easily through City process (e.g., the dog leash law), while others fall outside of City control (e.g., changes to the CWD easement) .

US Army Corps of Engineers (USACE) regulations

Work, structures or fill that take place beyond (lakeward of) the 98' elevation are regulated by USACE.

Champlain Water District (CWD) rights

The CWD owns the land immediately surrounding the pumping station at the west end of the beach. They also have access and management rights to two easement that run from this pumping station:

- a 40' easement that runs diagonally from the pumping station towards the park entrance
- a 50' easement that runs along the park entry road, through the northernmost parking area, then southward along the western side of the parking loop road, to the pumping station

Development Review Board regulations

- All land within 150 ft (horizontal distance) of the high water elevation of Lake Champlain (defined as 102 ft above sea level) is subject to surface water buffer standards, which states that "all lands within [the] required stream buffer... shall be left in an undisturbed, naturally vegetated condition." The main concern is maintaining a vegetated buffer for erosion control.
- Wetlands and the 50 ft of land adjacent must also be left undisturbed and naturally vegetated.

South Burlington Dog Ordinance

Dog owners must have their dogs on a leash (max. 6 feet) at all times within Red Rocks Park boundaries. Dogs are entirely prohibited at the public beach and in the water at Red Rocks. Safety is listed as the primary reason for the law, along with protection of "ecologically sensitive areas, including wildlife, rare wildflowers, wetlands, nesting, and other plants, flora, and fauna." Failure to comply can result in a civil penalty charge, up to \$100 per day. Overseen by the Animal Control Officer. Dog owners looking to let their dog off-leash can visit Farrell Park, Overlook Park, Jaycee Park, Szymanski Park, and the Community Dog Park.

South Burlington Park Conduct Ordinance

Park rules include:

- No picking of trees, shrubs, flowers, ferns or other plants within park boundaries.
- No stones, rocks, birds, or animals shall be removed.
- No removal of bark from trees or cutting and removal of firewood.
- Axes, hatchets, shovels, chain saws, picks, handsaws, and all other tools used to dig, cut or build are prohibited.
- No glass containers are permitted within Park boundaries.
- No person shall disturb the peace, endanger the public safety, use obscene or profane language or prevent the use of City parks by others.
- Refuse, rubbish, garbage or other trash of any nature shall not be left in City parks except in receptacles where provided.
- Drinking of alcoholic beverages in City parks is strictly forbidden, except by special permit.
- It is unlawful to post bills, cut, deface, write upon, remove or destroy any tree, shrub, rock, signs, buildings, tables, benches, fireplaces, grills or other structures or equipment, facilities or park property, or appurtenances whatsoever.

(see the City of South Burlington website for the complete document).

2.4 MANAGERS, COMMUNITY PARTNERSHIPS & OPPORTUNITIES

Park managers and recent community partnerships—as well as opportunities for new connections—are summarized below. This list is reflective of the 2012-2014 period of preparation of this management document and is by no means exhaustive.

Current park management

- South Burlington Recreation & Parks (year-round staff of four) oversees park operations.
- The Red Rocks Advisory Committee (seven appointed City residents) provides recommendations and communicates park needs to City Council.
- The Department of Public Works is responsible for park maintenance, responding on an as-needed basis.

Recent project partnerships

- UVM undergraduate classes have researched educational opportunities, hosted a community trail stewardship day, and made landscape design recommendations (NR 206 and PSS 238 classes) during the 2013-2014 academic years.
- UVM Field Naturalist Program collaborated in preparation of the Red Rocks management study in 2012-2013.
- The Nature Conservancy provided support for invasive species management during preparation of the 2012-2013 management study.
- Champlain College 'Foundations of Ecology' class participated in invasive species management in Fall 2013.

Opportunities for partnership and community stewardship

- K-12 and college students; partnerships with specific class groups and teachers; graduate student or senior undergraduate studies
- Local neighborhood stewards (from Queen City Park and the Red Rocks condos along the northern park boundary)
- Individual volunteers from the larger South Burlington & Burlington community who come out to publicly-advertized work days and outreach events
- Corporate groups from South Burlington & Burlington (team-building activities and opportunities to give back to the community)
- Local businesses/companies: Burton, Edlund, Rhino Foods, Dealer.com for trail work days and other stewardship events
- Vermont Youth Conservation Corps to hire for targeted, technical trail work projects
- Local Motion for collaboration on bike and pedestrian accessibility
- Master Gardeners as possible volunteers for landscaping and invasive species
- South Burlington Land Trust
- Yestermorrow Design/Build for Public Interest for a park infrastructure project
- Americorps funding support to hire a stewardship coordinator or other staff position dedicated to park maintenance and/or programming

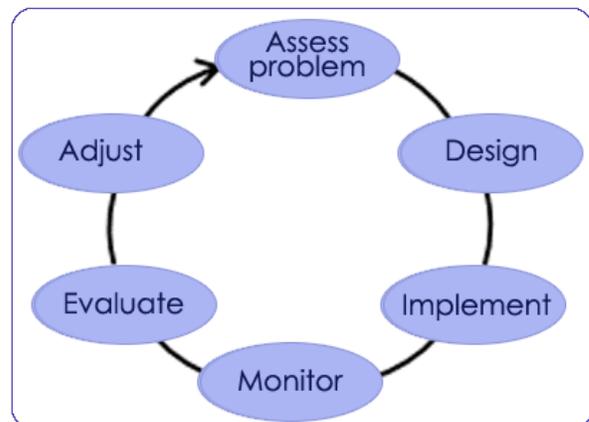
2.5 PARK MANAGEMENT AND PLANNING AS AN ONGOING PROCESS

A park management plan may be a static document, but the park management process is ever-evolving and a constant learning experience for all stakeholders involved.

Management strategies should be adjusted in step with changes in our scientific understanding and with changes in our community values and priorities for the park.

Management in the face of uncertainty

Red Rocks Park faces a host of management questions and concerns that do not have simple answers or solutions. Our knowledge of the natural world and how a natural area like Red Rocks functions will always be incomplete. The best that we can do as park managers and stewards is to implement solutions based on our current understanding of best practices, shaped by our goals for the park. It is important to monitor the results of these management actions, evaluate their success, and continually adjust as our scientific understanding and our own experience at Red rocks indicates. This is an “adaptive management” approach.



The Adaptive Management approach to problem-solving and land management.

Some principles to keep in mind in managing an area like Red Rocks:

- Think of management actions in terms of “small experiments” to test or evaluate possible management strategies.
- Monitor these experiments to assess how they meet goals.
- Consider new information as it emerges and adjust strategies (and goals) accordingly.

2.6 MANAGING PEOPLE & ENCOURAGING COMPLIANCE

Options for restricting use (or encouraging desired use)

There are various means to choose from for limiting park user behavior:

- Time restrictions/seasonal limitations, e.g. off-leash dogs only permitted outside of bird breeding season
- Area/zoning limitations, e.g. no off-leash dogs in sensitive wildlife areas, walk only on designated trails
- Behavior allowances and prohibited activities (e.g. campfires, littering, etc.)
- Group size restrictions
- Suggestions vs. city ordinances

Best Management Practices

- **Explain reasons for regulations** to improve visitor compliance: clearly state the problem, what aggravates it, and how a change in behavior will improve it. Make the suggestion reasonable.
- Be sure visitors understand **how they are expected to behave**.
- **Enforce regulations.** Regulations are there for a reason, and furthermore, it’s not fair to law-abiders if they are not enforced. If enforcement is impossible, better to just *ask* visitors to behave in a certain way rather than have strict but unenforced “empty” regulations; **regulate at the minimum level possible.**
- Punishment-oriented strategies are the most effective in controlling behavior, especially if there’s an enforcement presence, but positive wording of regulations is favored by the majority (e.g. “Please keep your dog on a leash” vs. “No off-leash dogs”)
- Use **positive wording** and messages (and indicate reasons for restrictions) to encourage good behavior, rather than just listing limitations (e.g., “Habitat restoration area” vs. simply “No trespassing” or “Trail closed”)
- **Personal (verbal) contact often facilitates initial receptiveness** to regulations, information, and enforcement, **but written/read guidelines aid retention**
- Simplify messages: having 2 messages vs. 8 on a bulletin board results in the same knowledge gain
- Focus the message: make it personal, tailor it to the audience. It will vary between user groups.

2.7 RECOMMENDED TIMELINE FOR REVISITING THE MANAGEMENT PLAN

An adaptive management approach requires ongoing adjustments and updates to management strategies. At the same time, this management plan would benefit from a **formal written update every 5 years** as new partnerships, outcomes, and issues come to light.

2.8 ISSUES NOT ADDRESSED IN THE MANAGEMENT PLAN

Should any issues arise that are not addressed by this management plan, park operations and maintenance staff should consult with a committee of knowledgeable natural resource specialists or their designated representatives. This would presently be the Red Rocks Park Advisory Committee and its subcommittees; however, the issues are also pertinent to the Natural Resources and Open Space Committee and the Recreation & Leisure Arts Committee.

2.9 IMPLEMENTATION AND OVERSIGHT OF THE MANAGEMENT PLAN

As described in the “Call to Action” in the foreword of this document, the City presently lacks both the staff capacity and funding to implement most of the recommendations outlined in this management plan. Two key, overarching recommendations have thus emerged from this 2014 management planning process:

- 1. South Burlington should have a dedicated staff position to (a) inform and coordinate management of the city’s open spaces and (b) build community partnerships and stewardship capacity for South Burlington’s parks.**
- 2. The maintenance and improvement of South Burlington’s parks requires more capital. The City should establish a sustainable funding stream, which would include (a) contributions from the existing Open Space Fund or a similar taxpayer contribution towards park upkeep, and (b) targeted grant applications and fundraising for specific park projects as needed.**
- 3. Existing park regulations must be enforced to ensure compliance.**

SECTION 3: MANAGEMENT CONCERNS & ACTION PLAN

This section presents some of the central management issues of concern in Red Rocks Park. Each subsection presents the issue, outlines goals, and then outlines management directives divided into several categories:

- **Seasonal maintenance:** regular and ongoing maintenance needs
- **Best management practices:** general guidelines for addressing the management concern
- **Short-term management actions:** priority actions or projects for the next year
- **Long-term management actions:** priority actions or projects requiring a longer time frame

Some management sections also contain directives targeted to the particular issue (e.g., guidelines for management of invasive species by type). Each subsection also lists possible resources and partnerships.

3.1 INVASIVE PLANTS

A) PRESENT CONDITION & PROBLEMS

Much of Red Rocks is occupied by non-native invasive plant species (see Table 1, below), and their management should be a priority for park directors. Many conservation professionals sense a strong threat from invasive species and recommend complete removal as a best practice; however, a growing body of research is pointing to possible negative impacts from such heavy-handed invasive species control. Sound invasive species management should weigh the potential risks and benefits of such management actions on a case-by-case (or species-by-species) basis. First priority should be on preventing establishment of new invasive plants and containing their spread.



The wolf tree area. Notice the yellow-green understory composed entirely of invasive buckthorn, which holds onto its leaves after all the native trees have dropped theirs.

Impacts of Invasives

- Non-native species can quickly replace native vegetation in disturbed areas, leading to dominance of a few species throughout the ecosystem.
- This can lead to loss of a food source for local insects; many moths and butterflies, for example, rely exclusively on a particular species of native plant on which they lay their eggs and their

caterpillars feed. Studies show that non-native species support a lower diversity of insects. This impact can be felt up the food chain, as these insects are a main food source for many birds.

- Other studies show more direct impacts to birds because some fruits of invasive plants have a lower nutritional value compared to native ones, but more research is required to confirm this.
- Some invasive plants cause changes in soil chemistry that can inhibit the growth of other plant species, with long-lasting effects. Garlic mustard is an example of this allelopathic behavior.

Table 1. Invasive species inventory

TYPE 1 – Widespread Species Requiring Long-Term Removal Efforts	Location and Abundance
Common and Glossy Buckthorn <i>Rhamnus cathartica</i> and <i>Frangula alnus</i>	Dominant understory shrub in parts of the limestone bluff cedar-pine community (particularly the cliff jumping area), the parking areas, the northeast corner of the park, and recently disturbed areas (e.g. windthrow gaps). Scattered patches and trees throughout the rest of the forest; absent only from heavily shaded areas, e.g. dense hemlock and cedar growth.
Shrub Honeysuckles <i>Lonicera sp.</i>	Small to large patches of variable density found throughout park, often alongside buckthorns (though less common). Particularly concentrated toward the east side of the park and along the southern lakeside trail to the main overlook points.
Japanese Barberry <i>Berberis thunbergii</i>	Individual plants and small patches found at low density throughout park.
TYPE 2 – Isolated Occurrences and Early Detections	Location and Abundance
Burning Bush or Winged Euonymus <i>Eunonymus alatus</i>	Isolated plants along the entrance road and lakeside trail, with several plants concentrated along the far western (“turnabout”) overlook trail.
Norway Maple <i>Acer platanoides</i>	Scattered trees near the park entrance, along both sides of entry road, and near the high point of the E loop trail. Other scattered undetected infestations likely.
Periwinkle <i>Vinca minor</i>	Isolated dense patches at the top end of the western loop trail, encroaching in from nearby houses. Growing in thick mats.
Asiatic or Oriental Bittersweet <i>Celastrus orbiculatus</i>	Isolated patches and individual plants throughout park, at low density.
Garlic Mustard <i>Alliaria petiolata</i>	Expanding patch near the southeast corner of the parking loop road, towards the beach and Queen City Park (QCP); removed in 2013 but found even more widespread in 2014. There was a robust population found just beyond the eastern border of the park, along the road in QCP, which could be the source. A second, isolated patch growing near the park entrance, to the north of the road just beyond the entry kiosk, was removed in 2013. There was no sign of return in 2014.

Purple Loosestrife <i>Lythrum salicaria</i>	Several isolated plants and patches along the shoreline, including the beach area by CWD and shallows to the west, plus around the point and north of the western loop trails.
Multiflora Rose <i>Rosa multiflora</i>	Isolated occurrences near western loop trail and around parking area.
Goutweed <i>Aegopodium podagraria</i>	Isolated occurrence along northern boundary of park.
Japanese Knotweed <i>Fallopia japonica</i>	One isolated occurrence just beyond the park boundary, near a condo development and adjacent network of side trails leading into the park.

B) DESIRED CONDITION & MANAGEMENT GOALS

Risks of invasives control: proceed with caution

Invasive species do alter the structure and function of ecosystems, but the exact mechanisms and causes are not entirely understood (Didham et al. 2005). Managers should proceed with caution in proceeding with invasives management, as misguided removal efforts can easily lead to further spread. Complete removal often requires an intensive effort, including either repeated physical pulling or chemical treatment. The chemical herbicides are typically applied directly to cut stumps and reportedly break down quickly in the environment, but there are still risks of toxicity inherent in the use of any herbicide. Special care should be taken given Red Rocks' waterfront location and proximity to drinking water sources.

It is also important to keep in mind that invasive plants are a symptom of habitat disturbance rather than the root cause in and of themselves. These plants dominate in openings and areas of bare soil, such as along trails. They were originally introduced and are continually transported by people. The most dense growth of invasive buckthorn in Red Rocks, for example, occurs atop the cliffs where people have created side trails to access lookouts and cliff-jumping locations. Removal of these plants could simply open up the bare soil for regrowth of buckthorn from the seedbank that persists in the soil. Full removal would require a continued effort that could be both expensive and time-intensive.



Most of the green in this picture belongs to the leaves of non-native buckthorn trees which have invaded the cedar forest at the top of the Red Rocks cliffs. What would be the consequence of removing these plants from this sensitive environment?

Even though invasive species have a lower food value for native wildlife, they do still provide some cover and habitat value. Removing all non-native plants would mean removing much of the shrubby growth in Red Rocks, taking away cover from small and medium-sized birds and mammals. Removal efforts should consider what will replace the invasive plants. Such efforts may best be coupled with restoration plantings of native species.

Desired Condition

Given all the uncertainty and risks outlined above, is it wise to pursue any invasive removal in Red Rocks? The City does have the opportunity to limit the spread of certain invasive species that are only present in a small extent at one or two locations right now. This could be done at low risk and low cost and would prevent further loss of native biodiversity.

Management for more widespread and dominant invasives such as buckthorn and honeysuckle would require a much more time- and cost-intensive operation. The pros and cons of this approach should be considered further in consultation with park management and city residents. How important is it to maintain native forest in Red Rocks, in the face of continued introductions of non-native species and disturbance from human use? This is not an easily answered question.

Goals

Park management should, at a minimum, aim to maintain the present level of ecosystem function by:

- 1) Curbing the spread of invasive plant species by containing current populations and
- 2) Preventing further infestations through an early detection-rapid response system

C) INVASIVE PLANT MANAGEMENT

Seasonal Maintenance

- Conduct two annual surveys, one in spring and one in fall, to monitor for new occurrences of invasive plants and to assess success of removal efforts
- Ensure that all park staff—including seasonal staff and Public Works—are familiar with the invasive species present in the park, their native look-alikes, and removal methods
- Continue with management efforts as outlined below in response to occurrences of non-native invasive plants

Best Management Practices

- Use a species-by-species management approach in addressing non-native invasive plant species
- Offer one or more methods for the public to report occurrences of new invasive plants in the park (e.g., a poster with contact information or a log book)
- Produce an educational guide to the non-native invasive plants of Red Rocks to inform the public
- Minimize soil disturbance and stabilize disturbed soil as soon as possible; invasive plants readily colonize these areas
- Monitor recent work sites for the emergence of invasive plants for a minimum of two years

- Invasive plants that have the ability to sprout from stem and root fragments (e.g., purple loosestrife and Japanese knotweed) should never be mowed
- Mechanical removal of invasives should aim to remove all underground parts, to prevent regrowth from the roots; even small root fragments left behind can give rise to many new plants
- Most invasive plants should be removed in late spring and early summer, prior to seed maturation
- Invasives in Red Rocks should be removed by **mechanical means only** (the alternative, to apply an herbicide, is considered too risky given the proximity to the lake and unknown long-term effects)
 - This decision should be revisited within 3 years time based on the success of mechanical removal methods and the assessed priority of invasive species removal, with the following provisions:
 - Any herbicide applications must be done by trained, certified staff (Department of Public Works)
 - No herbicide spraying is permitted within 150 feet of the Queen City water source, which covers a substantial portion of Red Rocks Park
 - Chemical treatment of woody species such as buckthorn should be carried out in the fall, when plants are transporting resources to their root systems
- Plant debris removal options include:
 - Burning
 - Brush piling: Make sure that no cut surfaces or roots are in contact with the soil
 - Bagging and removal: Bag plants in heavy-duty garbage bags and sent to landfill after ensuring that the material is nonviable (wait at least one month, until it is partially decomposed, slimy or brittle)

Management Plan for Widespread Woody Species (Type A)

- Begin targeted removal of all woody invasives from small focus areas (requires trained staff, chainsaw use)
 - Main south-facing lookout designated as a first priority focus area
 - Other areas along the interior of the loop trails (designated “natural areas”) can be targeted next
- Close off focus areas to public, indicating “restoration area” and explaining why
- Replant these areas with native shade-tolerant shrubs and understory species
- Maintain designated “natural areas” as invasive-free
- Target removal of buckthorn and honeysuckle:
 - Release the seedlings of mast trees (oak, hickory, beech) that are important for wildlife
 - Remove larger seed-bearing female buckthorn trees
- All cut woody stumps must be wrapped in a few layers of burlap or thick plastic to prevent regrowth by stump sprouting
- Continue monitoring for new occurrences and move quickly to prevent establishment and spread

Management Plan for Isolated Occurrences and Early Detections (Type B)

- Hold work days to remove isolated populations the less widespread herbaceous invasive species
 - Volunteer and/or Park staff involvement during the early summer
 - Organize training sessions/workshops for regular users and park neighbors
- Mount an “early detection rapid response” to these plants, aiming to remove the populations in their entirety before they can spread aggressively throughout the park
 - Oriental bittersweet sits on this threshold now and could be targeted by repeated hand cuttings throughout the spring and summer:
 - Hand-pull entire plants, including all roots and runners
 - For larger plants, cut climbing or trailing vines close to root collar and repeat every 2 weeks.

D) RESOURCES & PARTNERSHIPS

For more information about invasive plants and their removal:

- The Nature Conservancy has an online identification guide and removal guidelines for Vermont’s invasive plants, available at www.vtinvasives.org

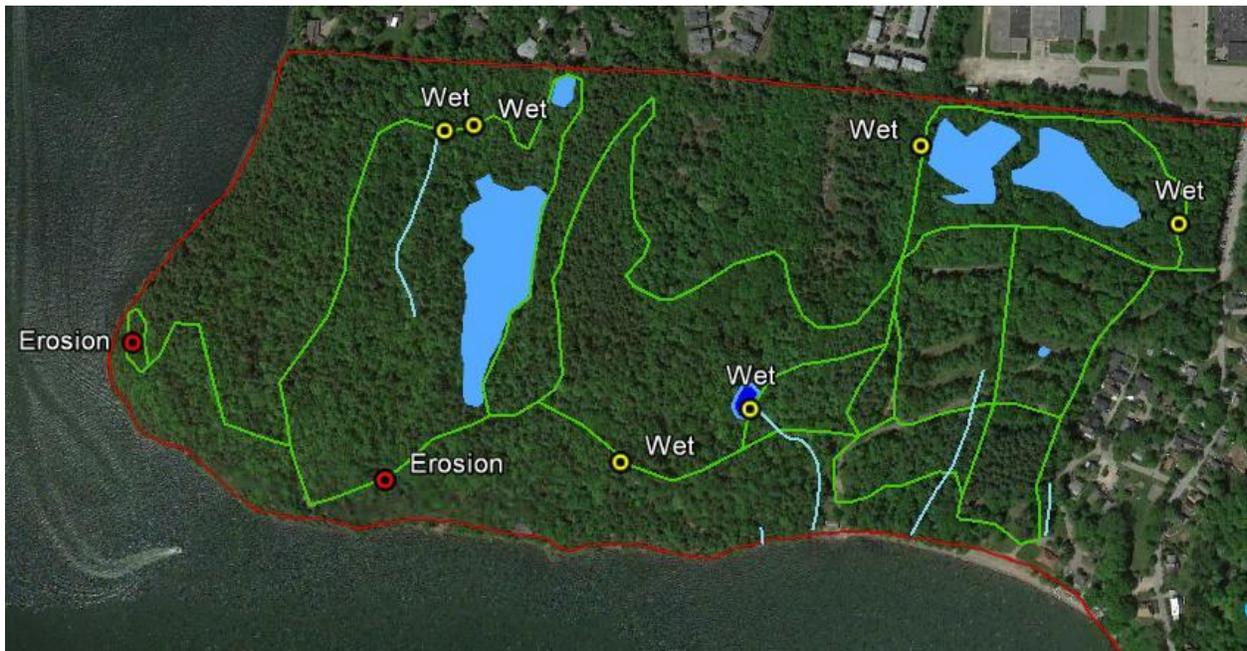
Partnership Opportunities:

- The Nature Conservancy – staff support, mapping, planning
- UVM and Champlain College students, other student groups
- Grants may be available to support removal efforts
- Friends of Red Rocks (community volunteers)
- Corporate volunteer groups
- Master gardeners
- AmeriCorps position

3.2 TRAILS

A) PRESENT CONDITION & PROBLEMS

The Red Rocks trail network includes 3.3 miles of official trails and access roads, based on the original carriage trail network constructed in 1891. These trails have been generally well maintained over the years. Areas in need of maintenance are outlined in Map 3, below. Some volunteers have assisted in maintaining drainage ditches along the areas prone to flooding in 2011-2013.



Map 3. Trail locations with issues of erosion or periodic flooding, requiring management attention.

Unofficial trails account for a further 4.3 miles of pathways through Red Rocks. There is a particularly dense network along the cliffs, especially west of the main southern lookout point and concentrated along the cliff-jumping area (cliff-jumping is not condoned by the City, and the jumping cliffs are considered an attractive nuisance). The creation and use of these ad hoc trails threatens the ecological integrity of Red Rocks.

Map 4 shows the distance from any point in the park to the nearest trail (official or unofficial). It illustrates that the farthest point in Red Rocks from any trail is just over 90 meters (approximately 300 feet), which has a strong implication for park wildlife. Every species has a “flushing distance” at which it will flee when approached by people (or other threats), causing stress and a disruption from regular activities of feeding, breeding, etc. For species like white-tailed deer, this flushing distance may exceed 300 feet, meaning there is no place in Red Rocks where that animal can feel safe from the presence of people.



Map 4. Only a small area of land in Red Rocks Park exceeds 60 m (200 ft) from a trail and one location exceeds 90 m (300 ft), which indicates that the potential disturbance to wildlife is far-reaching.

Trail Impacts

- More trails mean more wildlife disturbance, human-assisted spread of invasive species, vegetation trampling, and erosion.
- For soils, a little use causes most of the impact (trail compaction occurs rapidly with light use). Soil erosion is the most permanent and therefore most serious effect of trail expansion. Soil compaction recovery may take 6-18 years; erosion recovery may take centuries due to the long time it takes for new soil to form.
- Trail erosion risk exists wherever slopes exceed 9 degrees; especially severe above 18 degrees.
- For vegetation, it may take only 20 tramples to lose 50% of the vegetation on a given piece of land.
- Wildlife disturbance is related to the frequency of people passing by, and side trails may bring people closer to critical wildlife areas more often. Negative impacts on some breeding birds occur with forest trails as narrow as 1 to 3 meters; some birds stop nesting near trails and others avoid the trail areas altogether.

B) DESIRED CONDITION & MANAGEMENT GOALS

Trail management should aim to:

- 1) Minimize disturbance to soils, vegetation, and wildlife.
- 2) Provide an enjoyable and safe recreational trail network to suit a variety of park users and purposes, including both active and passive uses of the park.
- 3) Make it clear to park users which trails are open for “official” use and which trails/areas are off-limits for restoration and natural resource protection.

Trail Closures and Openings

Table 2. Guidelines for opening and closing recreational trails

<p><i>Which trails are recommended for opening?</i></p> <ul style="list-style-type: none"> ➤ Heavily trafficked trails that connect to the local community and serve as an alternate park entry ➤ Heavily trafficked trails that lead to particular destinations (e.g., the wolf tree, the 76er lookout) ➤ Trails that are already as wide, well-used and maintained as the “official” ones— indicating popularity and frequency of use ➤ Key shortcut trails between loops 	<p><i>Which trails are recommended for closure?</i></p> <ul style="list-style-type: none"> ➤ Trails going down steep slopes greater than 9 degrees (for erosion issues) ➤ Dense sidetrail networks (close the network with the possibility of centralizing traffic on one path) ➤ Trails going through sensitive habitat ➤ Trails that are minimally used or impacted, with good potential for revegetation and masking of the walked path
<p><i>Why?</i></p> <ul style="list-style-type: none"> ➤ Concentrate use on these official trails to draw use away from other ad hoc trails ➤ The heavily used spur trails are already impacted ➤ Trail closure not a viable option due to heavy use 	<p><i>Why?</i></p> <ul style="list-style-type: none"> ➤ Steep slopes are subject to erosion (soil loss, siltation and pollution of water) ➤ Seldom-used trails stand a good chance of successful closure and restoration
<p><i>How to open trails</i></p> <ul style="list-style-type: none"> ➤ Mark edges of trail ➤ Reroute or reorient the trail as needed to give it a low grade and decrease erosion risk ➤ Add trail signage ➤ Indicate the trail on official park maps 	<p><i>How to close trails/discourage use</i></p> <ul style="list-style-type: none"> ➤ Place logs and other debris across trail ➤ Use tools to scuff up the trail, break up earth to make it look unused ➤ Place notices of “Restoration area. Please stay on trail.” (shown to deter 90% of visitors)



Map 5. Unofficial side trails in Red Rocks created by repeat unauthroized off-trail use. This imapcts park wildlife and ecological health.

C) TRAIL MANAGEMENT

(note: please see Section 3.4 for recommendations for trail directional signage)

Seasonal Maintenance

- Conduct an annual walk-through in the spring to identify trail hazards and assess extent of off-trail use.
- Clear waterbars in the fall, prior to snowfall, and ensure that they remain clear during spring runoff.
- Collect reports of trail maintenance needs (including but not limited to downed trees, washouts, flooding, etc.) from the park users and staff. Respond as needed.
- Host a spring and fall community work trail day.

Short-Term Management Actions – 1 year

- Repair major areas of erosion (Map 3).
- Make modifications to official trail network as outlined in Table 2; reassess yearly
- Prioritize restoration and ad hoc trail closure in the limestone bluff cedar-pine natural community (the cliff-jumping area)
 - Consider designating one or two official access points to these highly-trafficked areas
 - Post signage and install barriers to discourage use of all other side trails
 - Rather than making this the first restoration area closed off to the public, use this designation in another nearby area first, to make park users accustomed to the idea of trail closures and restoration areas
- Designate other restoration areas where natural resource conservation and wildlife use is a priority; in other areas, off-trail exploration for environmental education use would be permitted.
- Establish photographic reference points where seasonal photographs can be taken to document any changes in trail condition, good or bad.

Long-Term Management Actions – 3+ years

- Monitor trail closures to measure success of different techniques
- Complete major trail repairs, installation of new waterbars
 - Possibility of VYCC partnership
- Find solutions to concentrate public access to cliff-jumping areas and minimize creation of further sidetrails along the cliff ledges

Best Management Practices

- Post signs to notify park users of trail closures for rehabilitation purposes.
 - Use positive signage (e.g., with wording about restoration areas and sensitive vegetation) to encourage compliance and raise awareness

- Emphasize the contrast between trail and off-trail zones to avoid expansion of the impact zone (e.g. line the sides of the trail with stones, keep the trail very smooth-surfaced relative to the adjacent land).
- Install barriers to control movement of people—thorny shrubs can be particularly effective. Shrubs and trees are the best options for near houses.
- Plant grass-like plants (grasses and sedges) to revegetate areas where continued trampling is likely, as they are most resistant.
- When closing trails, cover exposed soil with organic mulch.
- Aim for a maximum 9 degree slope on all trails.
 - Where trails exceed this slope, ensure that adequate waterbars are installed

D) RESOURCES & PARTNERSHIPS

- Community volunteers to assist with trail projects
- Corporate volunteer groups
- Vermont Youth Conservation Corps

3.3 OFF-LEASH DOGS

A) PRESENT CONDITION & PROBLEMS



Red Rocks is a popular destination for dog walkers. A “Leash Law” (City Dog Ordinance) is in effect within park boundaries, requiring that all dog owners must keep their pet on a leash (max. 6 ft length) at all times. Dogs are also entirely prohibited at the public beach and in the water at Red Rocks. Failure to comply with the ordinance can result in a civil penalty charge of up to \$100 per day.

Many park users ignore these laws; one survey showed a 12% compliance rate. Some park users abide by an “unofficial understanding” that dogs can be let off-leash during certain times of day, outside of peak hours. Enforcement presence is minimal, so there is little deterrent to anyone breaking the law. The South Burlington Animal Control Officer (ACO) began patrols in 2014 but works only 14 hrs/week across the City. The ACO is

working to encourage compliance and educate dog walkers on the reasons for the leash law but has no jurisdiction over fines.

Off-leash dogs create the potential for negative dog-dog and human-dog interactions as well as impacts to wildlife, vegetation, and water quality.

Impacts on People

- Some park visitors are frightened or threatened when approached by off-leash dogs. These interactions detract from these users' experience and in some cases prevent them from visiting.
- People and pets risk injury from aggressive dogs

Impacts on Wildlife

- Dogs trample vegetation and disturb wildlife off-trail, including ground-nesting birds and animal dens

One study showed that the presence of off-leash dogs affects animals like deer, rabbits, and small mammals (chipmunks, squirrels, and mice); deer activity was lower within 100 m of trails and small mammal activity declined within at least 50 m of trails used by dogs (Lenth et al. 2008). Only a small area of Red Rocks is more than 50 m from a trail, and no place in the park is 100 m away from a trail. Even after dogs have left the park, certain carnivores may avoid areas that have been scent-marked by dogs, while others may increase surveillance along dog-marked trails.

Impacts on Environmental Quality

- Owners may fail to pick up dog poop deposited off-trail; this fecal matter eventually makes its way into Lake Champlain.

Dog-walkers are among the primary and most regular users of Red Rocks; they have been visiting the park as a popular dog-walking destination for over 40 years. It is a high priority to listen to the needs of this user group while exploring solutions that maintain ecosystem health and allow for safe and enjoyable visits for all park users.

B) DESIRED CONDITION & MANAGEMENT GOALS

Different stakeholders express widely varying preferences regarding dog policy in the park, ranging between designating Red Rocks a dog-free zone and allowing off-leash dogs at all times. The City's dog ordinance is in effect in Red Rocks, so any changes to dog regulations would require a modification to this ordinance. As is, the ordinance requires much stronger enforcement.

Desired outcomes surrounding the management of dogs in Red Rocks include:

- 1) Proper enforcement of the City ordinance, to ensure a high compliance rate and minimize any dissatisfaction about rule-breakers vs. followers.
- 2) Safety and satisfaction of all park users, dog-owners and otherwise.
- 3) Minimized disturbance of wildlife, particularly ground-nesting birds; this means keeping dogs on the trails.
- 4) No dog feces left on the ground (either on or off-trail, with or without doggy bags), to ensure clean water and soil and to maintain/improve the park aesthetic.

C) OFF-LEASH DOG MANAGEMENT

Best Management Practices:

- Ensure a high compliance rate with the leash law, through a combination of:
 - Public education including a pamphlet, online materials, and on-the-ground messaging from park staff and the ACO
 - Enforcement of the dog ordinance, including patrols and citations for owners of off-leash dogs
 - Signage, including a detailed sign at the park entry and reminder signs throughout the park
- Educate dog owners so that they are aware of the reasoning for leash restrictions
 - Many pet owners are familiar with the usual complaints of dogs being aggressive to people and other dogs, but relatively few may consider the impacts of off-leash dogs to denning mammals and ground-nesting birds
 - Provide an educational pamphlet or other written and online materials to explain the impacts of off-leash dogs that leave the trails.
 - Maintain clear signage at all park entrance points.
- Provide an incident report form for park users to report negative interactions with dogs in Red Rocks
 - Use this information to assess the need for increased enforcement or other management interventions

D) RESOURCES & PARTNERSHIPS

Red Rocks Park managers could look to examples from similar parks and communities facing this debate about off-leash dogs. The Montpelier Parks Commission (<http://www.montpelier-vt.org/group/66/Parks-Commission.html>) faced similar questions in 2013, though coming from a different direction; Hubbard Park had been an off-leash dog area but faced the question of whether it should remain so.

The Humane Society has collaborated on creation of a pamphlet to encourage keeping dogs on leash in Red Rocks. They have stopped walking their dogs in the park due to negative interactions with offleash dogs.

3.4 SIGNAGE, WAYFINDING & PARK INFORMATION

A) PRESENT CONDITION & PROBLEMS

A separate 2010 report funded by the Lake Champlain Byway outlined recommendations for installation of directional and interpretive signage in Red Rocks Park, and in 2012 a signage subcommittee of the Red Rocks Committee initiated a discussion of future needs. There are currently 25 signs installed in the park: 3 of these indicate no biking, 6 indicate the dog leash law, and 3 warn about cliff jumping. The only publicly visible park map is part of an interpretive panel installed near the park entrance by the Byway. Another interpretive panel is present at the beach house. A new park entrance sign was installed in 2013.



Example of one of the unclear park intersections, at the four-way crossroads junction of the two main loop trails.

Park signage can be divided into the following categories:

- **Regulatory:** lists regulations, ordinances, and fines
- **Informational:** delivers other park information
- **Directional:** wayfinding signage, including maps, arrows, and trail blazes for orienting oneself in the park
- **Interpretive:** provides educational information about the natural and cultural features of the park

The current amount and type of signage presents several issues:

- Many park users—especially but not limited to first-time users—get disoriented in the park
- Lack of signage may lead to noncompliance with park regulations (including dog leash laws, no bikes, staying on official trails, etc.)
- There is no central notice board (outside of the summer operating season when the gate house attendants hand out maps and takes fees) to deliver park announcements and list policies

City emergency staff have also proposed 29 emergency signs (small reflective markers for emergency vehicle directions) to install along all major park trails. These and other signs can detract from the wilderness experience of users, which is why a thoughtful and consistent policy about the type, frequency, and placement of signage is needed.

B) DESIRED CONDITION & MANAGEMENT GOALS

Park signage policy aims to:

- 1) Strike a balance between enough signs to ensure safety and orientation of park users, while still maintaining elements of a wilderness/nature experience

- 2) Ensure effective delivery of park messaging (including city ordinances, park events, park interpretation)
- 3) Establish a coordinated and consistent design in keeping with the natural aesthetic of the park

C) SIGNAGE AND WAYFINDING RECOMMENDATIONS



Map 6. Recommended locations for directional/wayfinding signage (square markers) and a bulletin board at the park entry (star).

Best Management Practices

- Provide easy access to a park map for all users
 - Printed and QR codes
- Employ positive messaging on park signs rather than simply listing restrictions (e.g. “restoration area” rather than “do not enter”)
- Consistent with existing interpretive panels, future panels should be manufactured from digital high pressure laminate and be designed consistent with the template used by the Lake Champlain Byway
- Install the minimum signage necessary to educate and deliver park information without compromising the wilderness feel of Red Rocks Park

Short-Term Management Actions – 1 year

- Install trail markers on the “main” trail that leads from the park entrance to the turnout overlook at the far western point of the park, following the lakeside trail. “In” and “out” directions on this trail will provide simple wayfinding to the main overlook points in the park and identify the quickest exit from the park.
- Install posts with simple directional signs at key park intersections (see Map 6, above).
- Provide access to a digital park map via QR code at the park entrance.
- Install or establish a park bulletin board at the main entrance.

Long-Term Management Actions – 3+ years

- Install additional park interpretive panels and include an inset directional map in each

D) RESOURCES & PARTNERSHIPS

- Lake Champlain Byway – as part of the Byway, Red Rocks interpretive signage follows the standard format used all along this scenic route along Lake Champlain

3.5 FOREST HEALTH & WILDLIFE MANAGEMENT

A) PRESENT CONDITION & PROBLEMS

The Red Rocks forest is primarily a mesic maple-ash-hickory-oak forest, including a mixture of northern woods species with more southerly elements that take advantage of the dry, warm cliffs in these lowlands of the Champlain Valley. Eastern hemlocks occupy some of the wetter, darker, and older growth areas of the forest, and along the cliffs the forest transitions towards a cedar-dominated limestone bluff community.

Red Rocks is largely (if not all) secondary forest; it was managed as a woodlot in the 1800s, and has since been used for pasture and more recent logging operations. There were also several fires of unknown extent and intensity in Red Rocks' past, the largest of which is currently labeled as "The Burn" on park maps. A few stretches of forest may, however, have escaped the axe of European settlers. One hemlock—of only 12" diameter—fell across a trail and was sawed open to reveal over 210 years of growth rings! The tree had been slowly growing on the shallow soils along a rocky ridge, between two sections of trail. There is reason to suspect that other nearby hemlocks could be of similar age, left for their low-quality lumber and because they weren't in the way of pasture land, perched as they were on the steep and rocky terrain.

The Red Rocks forest is presently managed passively; trees are felled if they pose a threat to park users (e.g. snags hanging over a trail), but otherwise the forest is left "as-is." Practices should be taken into consideration to ensure the healthy regeneration of the forest and the optimization of recreation and conservation opportunities.

Recognizing that Red Rocks is a well-loved and well-used public park, the forest management options below do not consider any harvesting or felling of trees beyond the ones that come down on the trails. With public consultation and buy-in, however, park managers might choose to release certain trees that provide valuable wildlife habitat or seed tree values by an individual tree selection. This would mean cutting other trees around the selected valuable trees, with the goal of improving the growth of the selected trees. The County Forester or other natural resource professional should be consulted before proceeding with any such work, which is not recommended as an immediate priority.

Wildlife

Red Rocks includes the following notable wildlife habitat features:

- Rocky and sandy shoreline
- Intact mature forest
- Shrubby undergrowth
- Forest clearings
- Hemlock stands
- Rock crevices and ledges
- Vernal pools
- Woody debris (fallen trees and branches) on the forest floor
- Standing snags with nesting cavities and loose bark
- Large mast-producing trees (oaks and hickories)
- Cliffs

The intact forest of Red Rocks is particularly suited to a variety of birds; it serves as both a nesting location for summer residents and an important staging area for migrating species. The 135 species in the current Red Rocks bird list include 11 of the Vermont “Birder’s Dozen,” a set of species identified by Audubon Vermont as being high priorities for protection in northeastern US forests. It is suspected that Peregrine Falcons (a once-endangered and still threatened species) attempted to nest on the cliffs at Red Rocks in summer 2013 and 2014, but they may have been deterred by the high foot traffic along the cliff edge. No nest sites have been confirmed.

B) DESIRED CONDITION & MANAGEMENT GOALS

- 1) A healthy natural environment that supports a diversity of wildlife species
- 2) Preservation of Red Rocks’ rare flora and fauna and their habitats

C) FOREST MANAGEMENT

Best Management Practices

- Leave both large and small woody debris for provision of wildlife habitat and recycling of forest nutrients.
 - Small mammals rely on the cover provided by coarse and fine woody debris.
 - Fallen trees serve as germination sites for many plants, including tree seedlings.
 - Felled trees cleared off trails could be piled off-trail rather than immediately alongside it.
 - Smaller branches and brush can be piled for wildlife habitat use
- Leave snags and cavity trees standing; these provide habitat for many animals, such as woodpeckers, owls, squirrels, raccoons, and bats.
 - Aim for 4 to 6 large snag or cavity trees per acre; one should exceed 21” diameter at breast height (DBH) and the rest should exceed 15” DBH.
- Maintain important mast trees, such as oaks and hickories, for wildlife.

- Monitor forest for signs of natural regeneration.
 - Manage for non-native invasive species to release native species.
- Maintain forested buffers around sensitive habitats, especially wetlands and vernal pools (a 50-foot buffer is currently regulated around all designated wetlands).

Short-Term Management Actions- 1 year

- Establish a monitoring program for signs of non-native insect pests including Emerald Ash Borer, Asian Longhorned Beetle, and Hemlock Woolly Adelgid.
- Conduct breeding bird surveys in early spring and mammal surveys in winter to determine wildlife occurrences and designate protected areas as needed

D) RESOURCES & PARTNERSHIPS

- The Chittenden County Forester has consulted on park management and is available to meet for forest assessments and recommendations.
- Audubon Vermont monitors nesting of threatened and endangered bird species, including a Peregrine Falcon nest monitoring program.
- New England Wild Flower Society conducts rare plant surveys and has collected seed from populations of native spring wildflowers at Red Rocks. Their nursery could in turn offer a supply of seeds to areas of Red Rocks in need of restoration.
- TREEage conducts forest pest visual surveys and operates a community nursery in South Burlington.

3.6 RECREATION & EDUCATION OPPORTUNITIES

A) PRESENT CONDITION & PROBLEMS

Recreation

Red Rocks attracts both local South Burlington and Burlington residents, plus tourists from farther afield, with its diversity of recreational options. The South Burlington Recreation & Parks Department strives to provide fulfilling leisure time activities for all residents. Increasing recreational use and activities is a laudable goal, but several of these uses can conflict with one another and also with provision of wildlife habitat. The City should consider how to prioritize these conflicting uses in finding the balance between quantity of quantity of recreational use (maximizing the number of citizens served) and preserving the quality of the recreational experience.



Some of the most popular uses of the park are also illegal or considered nuisances due to the destructive behavior that often accompanies them (e.g., the rocky cliffs popular for cliff-jumping suffer from severe erosion, devegetation, and littering). The City does not condone cliff-jumping in Red Rocks but also realizes that access to the cliffs cannot be controlled.

Current Recreational Uses

- Walking, hiking, running, jogging, dog-walking
- Winter cross-country skiing and snowshoeing
- Swimming from beach, rocks, and cliffs
 - Beach house (and bathrooms) open from last weekend in June until mid-August
- Boating
- Bird-watching and nature appreciation
- Nature connection
- Outdoor sketching and painting
- Picnicking
- Relaxation and restorative uses
- Enjoying scenic views
- Special events including festivals and track meets
- Illegal and nuisance uses: camping, campfires, cliff-jumping

Education

Red Rocks has great potential as an outdoor classroom destination for local school groups, and it also offers all visitors a chance to explore and learn about nature in an urban setting. Envisioning Red Rocks as an outdoor classroom and for various education uses has implications for park visitation numbers, sense of crowdedness, trail impacts, and more.

Current & Past Educational Uses

- College class field trips
- College class service learning projects
 - *UVM NR 206 senior capstone project-based class in the Rubenstein School of Natural Resources*
 - *PSS 238 Ecological Landscape Design*
- K-12 use as a nature center is limited/nonexistent; some use for gym classes, cross-country meets
- Week-long “Governor’s Institute” for high school students (based out of UVM) focused on Red Rocks several years ago
- Public guided walks
- Summer nature camps since 2013
- Visits from the City’s summer recreational camps
- Red Rocks Nature Club monthly nature walk in 2012-2013

B) DESIRED CONDITION & MANAGEMENT GOALS

- 1) Offer a variety of recreation and education options in Red Rocks for different user groups but prevent overuse and adverse impacts on park infrastructure, vegetation, water, and wildlife.

C) RECREATION MANAGEMENT

Recreational Opportunities

- Nature play area
- Use of retired parking areas in eastern section
- Moorings and/or boating access
- Improvements to beach and picnic area

Educational Opportunities

- Nature education center for public and for institutions
- Place-based education for school groups: benefit of students accessing a forest within their own city boundaries (learning in their own backyard)
- Stewardship opportunities
- Modeling Red Rocks as a community forest
- More connections with local schools and colleges



One of the abandoned parking pods that provides open, grassy habitat and could serve as a nature play area or picnic area.

Short-Term Management Actions

- Enhance the aesthetics of the park entry
- Restore scenic views from main overlooks across Lake Champlain and through the picnic grove, with the following considerations:
 - The old-growth cedars of the limestone bluff community should be left as-is.
 - Trees should be pruned rather than removed to open views; exposed soil would be an easy target for colonization by invasive species (which could impact native vegetation and very quickly impede the views again).
 - South Burlington's Development Review Board regulates all land within 150 feet of the lakeshore. Land is to be left in an "undisturbed, naturally vegetated condition" unless otherwise approved.
 - Park users should be notified before any such work takes place, especially in such a public location.

Long-Term Management Actions

- 1) Create infrastructure that could facilitate use of the park as an outdoor classroom.
- 2) Improve opportunities for park users to access the water through boat rentals and use.
- 3) Investigate the possibility of public moorings.

- 4) Create more shaded sitting areas on/near the beach.
- 5) Extend the open season of the beach house for visitors looking to access the beach with bathrooms and change rooms.
- 6) Consider improvements to beach infrastructure such as a boat launch or pier and a beach pavilion.

D) RESOURCES & PARTNERSHIPS

Current/past:

- UVM and Champlain College service learning
- Green Mountain Audubon Center guided walks

Potential partnerships:

- Boat/paddleboard rental service through a private partner such as at Oakledge Park and North Beach. This opportunity has been considered in the past but was not considered a viable business option at the time.

3.7 CHAMPLAIN WATER DISTRICT (CWD) EASEMENT

A) PRESENT CONDITON & PROBLEMS

The intake for the Champlain Water District was sited at Red Rocks in 1970, and the system came online in 1971. The CWD is Vermont's largest regional public water supplier, serving 12 municipal systems in Chittenden County, and this is their only intake location. A second intake line was recently added in response to increasing demand; it was located offshore of the far western point of Red Rocks.



The CWD holds a 40-ft wide easement through the eastern (developed) section of Red Rocks, starting just south of the main

park entry and running in a diagonal towards their pump station at the west end of the Red Rocks beach. Another easement lies below the upper parking area and then follows the road down to the pump station. The CWD also owns the land immediately surrounding the pump house.

There have been past conflicts and expressions of concern from park neighbors in response to CWD management actions, such as tree cutting within the easement and installation of signage. CWD staff

walk the easement line and brush-hog/mow every summer. Repairs are mainly done manhole to manhole; mowing is done to maintain access to these. Projects and repairs have increased in frequency in recent years; they used to be more sporadic. The slope down to the water, east of the pumping station, was cleared for machinery access 10 to 15 years ago. It was rip-rapped to hold the soil back, but is currently experiencing erosion (likely compounded by frequent passage of people and dogs).

CWD managers have expressed a willingness to manage their infrastructure with minimal impact to the park. They also must invest a certain portion of their upgrade costs into landscaping, and they are willing to target some of this funding at the discretion of City management. Some of these funds went towards construction of a viewing deck, guardrail and plantings (visible in the picture above) in recent years.

In Spring 2014, a UVM Ecological Landscape Design class studied the pump house area and made several detailed suggestions for plantings and rain gardens to improve the aesthetics of that area.

B) DESIRED CONDITION & MANAGEMENT GOALS

The CWD has full jurisdiction within their property and easements but is open to suggestions, so long as their needs for their transmission lines can be met. Collaboration with the CWD should strive for:

- 1) Maintenance of the CWD right-of-way that maximizes wildlife habitat, aesthetic, and ecological values without compromising the access requirements of the CWD.
- 2) Transparency and understanding between park users and the CWD about work done in the park.

C) RIGHT-OF-WAY MANAGEMENT

Best Management Practices

- Maintain an open and collaborative relationship with the CWD regarding management of their transmission lines and pump station within Red Rocks Park.
- Communicate with a CWD representative at minimum annually about any management concerns.
- Communicate ideas for use of CWD landscaping funds as they are available:
 - Erosion prevention
 - Beach management
 - Improving the aesthetic of the pumphouse and surroundings
- Make recommendations to the CWD:
 - Maintain vegetation to the greatest extent possible, i.e. remove larger trees and shrubs growing into the easement (ones that would delay emergency manhole access) but retain all herbaceous growth for wildlife and aesthetic benefits. Remove only what's directly around manholes for access as needed.
 - Notify local residents and park users (via signage on park notice boards) of any changes—with advance notice—and explain the reasons for any changes (e.g. placement of new pipes and outlets, widening of roads, removal of vegetation, etc.)
 - Manage erosion of the slope next to the pump house with plantings. Install barriers or signs to prevent people from walking on the area as needed.

D) RESOURCES & PARTNERSHIPS

- UVM Ecological Landscape Design Students (PSS 238) re-envisioned the pump station area and made recommendations for erosion control, educational opportunities, and rain gardens. Opportunity for an ongoing partnership.

3.8 BEACH MANAGEMENT

A) PRESENT CONDITION & PROBLEMS

Red Rocks contains South Burlington’s only public beach access, a 200-yard stretch of waterfront at the southeastern corner of the park. The beach at Red Rocks has been closed on several occasions due to high levels of blue-green algae and bacteria from the outlet of Potash Brook, which drains into Lake Champlain just south of Red Rocks beach. Zebra mussels and Eurasian milfoil (both aquatic invasives) also pose problems for beachgoers, and the beach sands are frequently washed away by high water levels, rain events, and wave action.

Many of these factors act from far beyond the boundaries of Red Rocks, including:

- pollution across the Potash Brook watershed
- wind and wave action
- large rain events resulting in stormwater runoff
- spring flooding



Zebra mussels growing in the shallows on the Red Rocks shore (left) and a blue-green algae bloom (right).

B) DESIRED CONDITION & MANAGEMENT GOALS

Management of the beach area aims to:

- 1) Maintain a safe and appealing location for residents and park users to access South Burlington's only public lakeshore.

C) BEACH MANAGEMENT

Seasonal Maintenance

- Rake algae and other material that washes onto swimming area at beach during swim season, daily or as-needed
- Close beach and post signage informing of *E. coli* and blue-green algae blooms

Long-term Management Actions

- Consider extending the open season of the beach and access to the beach house
- Improve shaded seating areas and aesthetics at the beach with plantings

D) RESOURCES & PARTNERSHIPS

- The Lake Champlain Committee monitors blue-green algae across Lake Champlain and trains volunteers to make weekly reports, one of whom monitors the Red Rocks beach weekly during the spring and summer
- The Vermont Department of Health advises on and posts beach closures.

3.9 PARKING & TRAFFIC MANAGEMENT

A) PRESENT CONDITON & PROBLEMS

Red Rocks is officially open for a seven-week period from the end of June through mid-August. At this time, visitors are asked to drive into the park and pay an entrance fee (either a day use fee or season pass) for access during daytime hours. Outside of this seven-week period, visitors can park in the area outside the park gate, free of charge.

Many visitors ignore the 'No Parking' signs installed during the seven-week operating season and enter the park without payment. While some may be confused about the seven-week switch of parking areas, many appear to ignore the "no parking" signage on Central Ave because they do not want to pay a parking fee. Others are frustrated by the need to park within the park gate during daytime hours but then move their vehicle before park staff locks the gate and leaves for the day.

The present parking system poses several challenges:

- There is little incentive to park within park boundaries when a free option exists just outside, with inconsistent enforcement.
- The City loses a potential revenue stream from illegally parked vehicles.
- The present system requires a full-time gate attendant to take park entry fees, which costs more than the revenue from parking permit sales
- Park users are inconvenienced by the switch to Central Ave parking at the end of the work day.
- A substantial amount of park acreage is dedicated to parking, which could otherwise provide wildlife habitat and recreational benefits.
- Vehicle traffic and noise impacts neighbors adjoining the park.

B) DESIRED CONDITION & MANAGEMENT GOALS

The parking system at Red Rocks should strive to:

- 1) Provide a straightforward and fair parking option for park users that encourages compliance
- 2) Minimize the park acreage devoted to cars, as well as the visual, neighborhood, and ecological impact of the parking system
- 3) Encourage the use of alternative forms of transportation to Red Rocks (including but not limited to bike and bus)

C) PARKING MANAGEMENT

Options

- Increase parking enforcement to ensure compliance during summer season
- Remove parking from within park boundaries
- Re-design parking area along Central Ave, to extend it into the Park and accommodate a larger number of vehicles
- Share use of privately-owned company parking lots on Industrial Parkway
- Accept that some users will continue to park without paying. Pursue other sources of revenue
- Install donation boxes or another parking fee collection system in outer lot asking visitors to pay
- Require payment year-round for consistency

Best Management Practices

- Use positive messaging asking people to contribute towards park upkeep or restoration when they are spending money to access Red Rocks, rather than letting them simply view it as a fee to park their car
- Minimize the within-park parking area, which will in turn minimize soil compaction, decrease plant and animal disturbance, and increase the area available for park recreation
- Provide accessible parking according to ADA standards

Short-Term Management Actions

- Encourage biking, walking, and public transit to Red Rocks
 - Consider connections to bike and walking paths
 - Increase bicycle parking

Long-Term Management Actions

- 1) Assess alternatives, then re-design the parking system with the goal of minimizing the park area devoted to vehicle parking as well as minimizing visual, neighborhood, and ecological impacts
- 2) Restore and/or repurpose retired parking areas

D) RESOURCES & PARTNERSHIPS

- City Planning & Zoning Office for parking redesign
- Burton & Edlund Co. – opportunities to use their company lots on weekends

3.10 FUNDING

A) PRESENT CONDITION & PROBLEMS

Currently the only revenue stream for the park comes from summer operating season parking permits, which is supplemented with funding from the City’s operating budget. Several park users have expressed a willingness to donate funds towards park upkeep and programming. The City should explore different options for fundraising and developing a sustainable funding stream for park projects.

In 2014, park users fees were:

Season pass \$10 for residents, \$25 for non-residents **Daily pass** \$5 for residents, \$8 for non-residents

B) DESIRED CONDITION & MANAGEMENT GOALS

- 1) Sustainable revenue stream for the park
- 2) Funds for park improvements

C) FUNDRAISING

Best Management Practices

- Appeal to park users’ love for and connection to Red Rocks in soliciting donations
- Fund regular park maintenance with a reliable and sustainable municipal funding stream

Short-Term Management Actions – 1 year

- Establish a “Friends of Red Rocks” account for donations that could fund park projects, upkeep, and staffing
- Solicit donations from park users at the entrance gate by means of a physical and/or virtual (mobile text) donation box
- Investigate grant opportunities for park projects

Long-Term Management Actions

- Allocate capital for park improvements from the Open Space Fund or a similar taxpayer contribution

D) RESOURCES & PARTNERSHIPS

- Community volunteers

SECTION 4: PARK MAINTENANCE ACTIVITY TIMELINE

Spring:

- Invasive plant monitoring walk-through
- Remove garlic mustard by mid-May (generally, target herbaceous invasives before they go to seed)
- Trail flooding assessment and minor repairs
- Community trail stewardship day(s)
 - May Green-Up Day
 - June National Trails Day

Early Summer:

- Train seasonal staff on identification of invasive species
- Remove herbaceous invasive species, before they go to seed
- Beach opening (ahead of June park “open” season)
- Breeding bird surveys at this time of year indicate species nesting in the park

Summer:

- Major trail repair/construction/rerouting projects
- Regular park walk-throughs
- Rake beach daily
- Monitor water quality for swim safety

Fall:

- Clear waterbars
- Remove woody invasive species, as they go dormant
- Prune/clear view corridors
- Invasive plant monitoring walk-through
- Community trail stewardship day

Winter:

- Tracking surveys allow for assessment of wildlife habitat

SECTION 5: SUMMARY OF MANAGEMENT ACTIONS

INVASIVE PLANT MANAGEMENT

- 1) Begin targeted removal of all woody invasives from small focus areas (requires trained staff, chainsaw use)
 - Main south-facing lookout designated as a first priority focus area
 - Other areas along the interior of the loop trails (designated “natural areas”) can be targeted next
 - Close off focus areas to public, indicating “restoration area” and explaining why
 - Replant these areas with native shade-tolerant shrubs and understory species
- 2) Hold work days to remove isolated populations the less widespread herbaceous invasive species (e.g., Garlic Mustard)
 - Volunteer and/or Park staff involvement during the early summer
 - Organize training sessions/workshops for regular users and park neighbors
- 3) Mount an “early detection rapid response” to these plants, aiming to remove the populations in their entirety before they can spread aggressively throughout the park
 - Oriental bittersweet sits on this threshold now and could be targeted by repeated hand cuttings throughout the spring and summer

TRAIL MANAGEMENT

- 4) Repair major areas of erosion
 - Possibility of VYCC partnership
- 5) Restoration and ad hoc trail closure in the limestone bluff cedar-pine natural community (the cliff-jumping area)
 - Consider designating one or two official access points to these highly-trafficked areas
 - Post signage and install barriers to discourage use of all other side trails
 - Rather than making this the first restoration area closed off to the public, use this designation in another nearby area first, to make park users accustomed to the idea of trail closures and restoration areas
- 6) Close other ad hoc trails
 - Post signs
 - Install natural barriers
 - Cover exposed soil with mulch and revegetate with resistant sedges
- 7) Establish photographic reference points where seasonal photographs can be taken to document any changes in trail condition, good or bad.

OFF-LEASH DOG MANAGEMENT

- 8) Install new informational signage about dog regulations and fines, including a detailed sign at the park entry and reminder signs throughout the park
- 9) Provide an educational pamphlet or other written and online materials to explain the impacts of off-leash dogs that leave the trails.
 - Maintain clear signage at all park entrance points.
- 10) Enforce the dog ordinance, including patrols and citations for owners of off-leash dogs

- 11) Create an easily accessible incident report form for park users to report negative interactions with dogs in Red Rocks
 - Use this information to assess the need for increased enforcement or other management interventions

SIGNAGE & WAYFINDING

- 12) Install trail markers on the “main” trail that leads from the park entrance to the turnabout overlook at the far western point of the park, following the lakeside trail. “In” and “out” directions on this trail will provide simple wayfinding to the main overlook points in the park and identify the quickest exit from the park.
- 13) Install posts with simple directional signs at key park intersections.
- 14) Provide access to a digital park map via QR code at the park entrance.
- 15) Install or establish a park bulletin board at the main entrance.
- 16) Install additional park interpretive panels and include an inset directional map in each

FOREST HEALTH & WILDLIFE

- 17) Establish a monitoring program for signs of non-native insect pests including Emerald Ash Borer, Asian Longhorned Beetle, and Hemlock Woolly Adelgid.
- 18) Conduct breeding bird surveys in early spring and mammal surveys in winter to determine wildlife occurrences and designate protected areas as needed

RECREATION & EDUCATION

- 19) Restore scenic views from main overlooks across Lake Champlain and through the picnic grove, with the following considerations:
 - The old-growth cedars of the limestone bluff community should be left as-is.
 - Trees should be pruned rather than removed to open views; exposed soil would be an easy target for colonization by invasive species.
 - South Burlington’s Development Review Board regulates all land within 150 feet of the lakeshore. Land is to be left in an “undisturbed, naturally vegetated condition” unless otherwise approved.
 - Park users should be notified before any such work takes place.
- 20) Create infrastructure to facilitate use of the park as an outdoor classroom
- 21) Improve opportunities for park users to access the water through boat rentals and use
- 22) Investigate the possibility of public moorings
- 23) Create more shaded sitting areas on/near the beach
- 24) Extend the open season of the beach house for visitors looking to access the beach with bathrooms and change rooms
- 25) Consider improvements to beach infrastructure such as a boat launch or pier and a beach pavilion

CHAMPLAIN WATER DISTRICT RIGHT-OF-WAY

- 26) Make recommendations to the CWD:
 - Maintain vegetation to the greatest extent possible, i.e. remove larger trees and shrubs growing into the easement (ones that would delay emergency manhole access) but retain all herbaceous growth for wildlife and aesthetic benefits. Remove only what's directly around manholes for access as needed.
 - Notify local residents and park users (via signage on park notice boards) of any changes—with advance notice—and explain the reasons for any changes (e.g. placement of new pipes and outlets, widening of roads, removal of vegetation, etc.)
 - Manage erosion of the slope next to the pump house with plantings. Install barriers or signs to prevent people from walking on the area as needed.

BEACH MANAGEMENT

- 27) Consider extending the open season of the beach and access to the beach house
- 28) Improve shaded seating areas and aesthetics at the beach with plantings

PARKING MANAGEMENT

- 29) Assess alternatives, then re-design the parking system with the goal of minimizing the park area devoted to vehicle parking as well as minimizing visual, neighborhood, and ecological impacts
- 30) Restore and/or repurpose retired parking areas
- 31) Encourage biking, walking, and public transit to Red Rocks
 - Consider connections to bike and walking paths
 - Increase bicycle parking

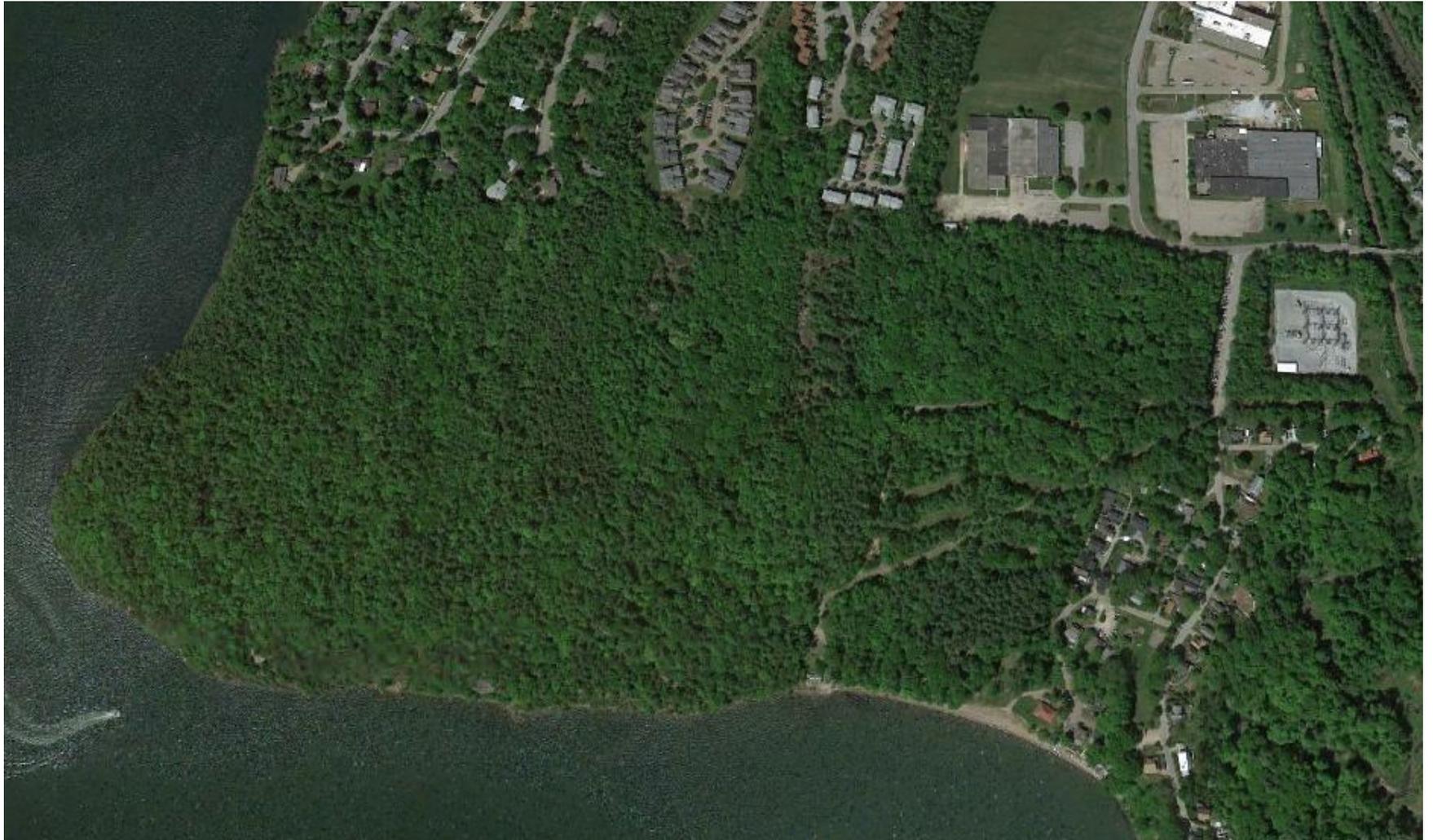
FUNDRAISING

- 32) Establish a “Friends of Red Rocks” account for donations that could fund park projects, upkeep, and staffing
- 33) Solicit donations from park users at the entrance gate by means of a physical and/or virtual (mobile text) donation box
- 34) Allocate capital for park improvements from the Open Space Fund or a similar taxpayer contribution
- 35) Investigate grant opportunities for park projects

STAFFING

- 36) Create a dedicated staff position to (a) inform and coordinate management of the city's open spaces and (b) build community partnerships and stewardship capacity for South Burlington's parks.

APPENDIX 1: Red Rocks from the air



APPENDIX 2: Current Park Trail Map

RED ROCKS PARK

