

A report for the Burlington Conservation Board  
and the Burlington Department of Planning & Zoning  
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# Wildlife Assessment

**Lone Rock Point, the Arms Grant & Burlington College**



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Introduction

Lone Rock Point is a 146-acre peninsula on Lake Champlain located two miles north of the Church Street Marketplace adjacent to North Beach Park, a popular spot along the Burlington waterfront. Lone Rock Point is privately owned by the Episcopal Diocese of Vermont and includes a school, conference center, community gardens, and a solar-power installation. Its hiking trails are open to the general public.

Northwest of this are the Arms Grant property, Burlington High School, and North Avenue Cemetery. The Arms Grant is 30.5 forested acres owned and managed by the City of Burlington’s Parks and Recreation Department. It is designated Urban Wild and includes diverse species, rocky outcrops and small wetlands. The Urban Wilds category, introduced in 2002, applies to City properties that “provide habitat for rare and endangered plant and animal communities, wetlands and other riparian systems” as well as “important wildlife habitat and travel corridors” (Winooski Valley Parks District, 2003: iv). The Burlington College property, a 32-acre parcel currently under discussion for development, is an important connection between the forested Lone Rock Point and Arms Grant properties to the 40-acre Urban Reserve situated just north of the Burlington Waterfront Park and Moran Plant.

The Burlington Department of Planning and Zoning is interested in improving wildlife corridor connectivity in the Lone Rock Point/Arms Grant area, across North Ave and Route 127 to the Winooski River and adjacent undeveloped land. A longer-term effort is now underway to develop North Ave into a “complete street,” with improved support for use by pedestrians and cyclists, and provides a window of opportunity at the same time to enhance to wildlife crossings through this very developed area. Also included is a consideration of the impact of domestic dogs on wildlife in Arms Grant and recommendations for future allowed uses.

Context: Connectivity in the Landscape

The fragmentation of habitat into smaller unconnected patches by residential and commercial development and roads, highways, and power lines creates significant barriers to wildlife movement. In general, the smaller the wildlife habitat area, the fewer species it can support. Lost connectivity results in disturbance and displacement of animals, population fragmentation and increased genetic isolation, direct or indirect mortality, and the loss of ecosystem functions performed by wildlife species (Washington Wildlife Habitat Connectivity Working Group).

It is crucial to connect habitat that can facilitate movement of wildlife between natural areas encompassing a species’ home range (Austin et al 2013: 48-50). This includes daily movement, as well as seasonal movement for breeding, birthing, and summer and winter habitat, as well as dispersal and colonization of new habitat. The concept of a species home range refers to the “area traversed by the individual in its normal activities of food gathering, mating and caring for young” (Burt, 1943). The total land area of Lone Rock Point is roughly 0.25 square



## Habitat Connectivity Across North Ave Assessment, Burlington Vermont



mile and the adjacent Arms Grant parcel is less than 0.05 square mile. The Burlington College property is another 0.05 square mile. Many of the mammal species we detected have home range requirements significantly exceeding these sizes, making connectivity to other suitable habitat critical for conservation efforts. Home range estimates for detected species are included in the wildlife inventory to emphasize the likelihood of and need for movement through these areas.

## Methodology

In conducting this wildlife assessment we first reviewed available baseline data and existing wildlife inventories, including the 2003 "Arms Grant Property: Inventory, Assessment and Management Plan" and 1996 report "Rock Point: Natural Features, Land Use, and Management Options."

During the winter and early spring of 2015 we performed a focused assessment of wildlife presence, habitat features, and road crossings in the area of study. The time equivalent of three field days per team member were made to Lone Rock Point and Arms Grant properties over twelve different days. We recorded wildlife sightings, tracks, and other sign indicating the presence of a particular species. An additional three visits to the study area were undertaken by a fourth student who shared sightings and observations with our project team.

In addition to the primary investigated properties (Lone Rock Point, Arms Grant and Burlington College lands), our team also assessed portions of the Elks Property to the north west of Arms Grant, North Beach, the Sea Caves and Arthur Properties, Killarney Drive, Ethan Allen Park, the railway tracks running underneath North Avenue bordering the Shell gas station and Urban Reserve (North 40). In addition, a rapid field assessment on the Burlington College lands was conducted by Dr. Kolan and his graduate class of twelve students in Applied Wildlife Management and Field Ecology on March 18, 2015.

We also consulted with Teague O'Connor, Director of Crow's Path, an outdoor education and nature-connection program hosted at Lone Rock Point by the Episcopal Diocese of Vermont and Rock Point Center. This consultation allowed us to supplement our list of observed wildlife species and special features, and to gain additional perspective on the impact of possible management options for wildlife management and habitat connectivity in the area.

The remainder of this report is divided into three sections, corresponding to the different scales at which we assessed these questions. Part I describes special features of the many different habitat types found in the study area. Part II provides an overview of the wildlife detected during our 3-month study period, supplemented as needed by additional sources to provide a more comprehensive picture than permitted by this short study window. Part III identifies possible "pinch points" that wildlife may be using to connect to other suitable habitat areas at the landscape scale. Part IV outlines our recommendations for future uses of the properties to support the presence of wildlife in the area and where possible to facilitate their movement to other needed habitat areas in the region.



## Part I: Habitat Types

### Vernal pools & wetlands

According to a 1996 report on Lone Rock Point that included a natural communities inventory, there are several “locally uncommon wetland types” (Carex Consultants), including forested wetlands. Below-freezing temperatures during most of the field season that informed this report prevented an in-depth analysis of the red maple swamp, forested wetlands, and wet old fields scattered throughout the property. However, their proximal nature suggests that they may act as a network of habitat for amphibians and water birds.

Many of the wetlands documented in this report are not visible at the time of this writing (late April 2015). One vernal pool southeast of the Alliance Church hosts wood frogs and spotted salamanders. Of particular note, however, is the Cattail Marsh (a designated Natural Community) located west of North Beach. This wetland is located behind sand dunes adjacent to North Beach. Reportedly maintained by a pair of beavers, the beaver chews are evident and abundant. Muskrat and mink, in addition to beavers, have been reported in this area (UVM PLACE, 2015).



### Sustainable Forest Communities

The large forested area covering parts of Lone Rock Point, the Arms Grant, North Beach Park, Burlington High School, Burlington College and the Urban Reserve make up a Sustainable Forest Community, a city-designated term assigned to areas within Burlington that exhibit exemplary “naturalness” or wildness. Within this area, 35 acres of the Arms Grant Forest and 14 acres of the adjacent Rock Point property comprise one of two high quality forests on the site; the second is a 24-acre parcel on the tip of Lone Rock Point. Few areas in the Burlington area can provide this interior forest habitat for birds and mammals, particularly those sensitive to edge effects.

### Hard Mast Trees

Many parts of Lone Rock Point and Arms Grant provide valuable sustenance for wildlife in the form of tree nuts. Mature white oak, red oak, American beech, and shagbark hickory release hard mass that wild turkeys, squirrels, chipmunks, and white-tail deer will forage for in the fall when the trees drop their acorns and nuts. The location of these hardwood forests are continuously linked throughout the property - from the upland area just up from the floodplain forest at the lakeshore, through most of the Arms Grant parcel behind the Elks Lodge and Alliance Church.



### Hemlock Forests

Areas of dense hemlock and pine offer important refuge from snow and cold temperatures to white-tail deer residing locally. A closed canopy of hemlock behind Burlington High School and continuing into Arms Grant provide this unique habitat. Deer beds have been found through this area by Crow's Path students and staff. The hemlock/pine stand along with nearby shrubby field edges with young hardwood shoots provide a critical food source for the local population of deer through the winter months.

### Lake Bluff Cliffs

The shoreline of Lone Rock Point features limestone cliff faces topped by cedar-pine forest. Cliffs are important raptor nesting habitat. Peregrine falcons were sighted in 2014 mating on the ice off the shores of Lone Rock Point. The understory and herbaceous vegetation can be easily trampled and the soil eroded; previous management recommendations (Carex Consulting, 1996) advised that bikers and walkers be routed away from the cliff edges.





## Donahue Sea Caves

A unique destination for winter hikers or summer kayakers, the Sea Caves are located along the edges of the marsh between North Avenue and Rte 127, east of Burlington High School. The spring-fed caves contain the only access to water when the pond is completely frozen during the coldest winter months. As such, fish congregate in these relatively oxygen-rich waters, and larger fish that cannot obtain enough oxygen die and become food for birds. (A list of bird sightings is included in our inventory.)



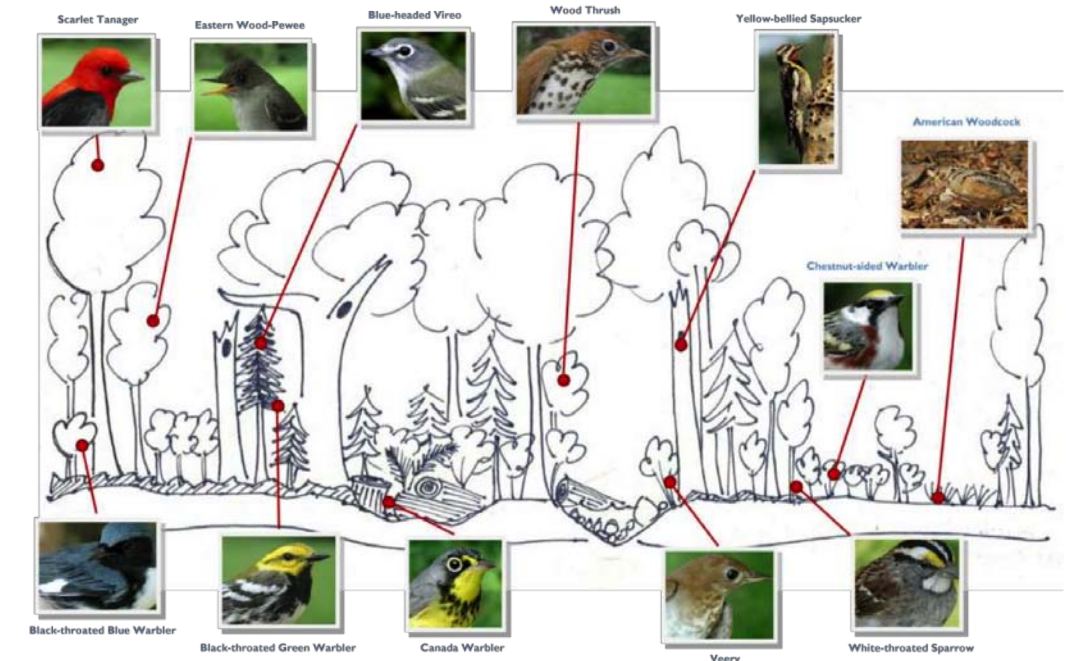
## Coarse Woody Debris

Standing dead wood, or 'snags' and downed wood on the forest floor can provide critical habitat for wildlife. Woodpeckers will create large cavities in snags that can then provide nesting habitat for other cavity-nesting birds and small mammals. The mid-late successional forests around Lone Rock Point and Arms Grant provides significant standing dead wood, and woodpecker-built cavities are abundant. The spring-fed caves contain the only access to water when the pond is completely frozen during the coldest winter months. As such, fish congregate in these relatively oxygen-rich waters, and larger fish that cannot obtain enough oxygen die and become food for birds.



## Bird Habitat

Even though our study period was too early in the year to detect birds using the area for breeding, there are tools we can use to consider the quality of bird habitat found at Arms Grant and Lone Rock Point. Vermont Audubon has compiled an information sheet of birds for land-owners and foresters called "The Birder's Dozen." These birds represent a spectrum of nesting species for Vermont, and prefer a variety of habitat types. The presence of these bird populations can be used as an indicator of the heterogeneity of available habitat. Since we do not have data on population specifics for these birds, we can instead consider what types of habitat these birds use, and consider which of these habitat types Lone Rock Point and Arms Grant might offer.



"The Birder's Dozen" from Audubon VT, 2015

The graphic above illustrates the possibilities of habitat in a structurally complex forest. There are species like the American Woodcock that are most frequently observed in 'edge' habitat, where forests grade into open meadows or yards. Others, like the Canada Warbler, frequent areas with dense underbrush and large amounts of coarse woody debris on the forest floor. Still others, like the Veery and Wood Thrush, are most common in areas with a dense midstory, exhibited in uneven-aged forests.

At Lone Rock Point there are some areas exhibiting midstory growth, possibly due to some old cutting on the property. However, a large majority of the land at Rock Point and Arms Grant is a closed canopy, even-aged forest that has a nearly open forest floor, except for herbaceous plants. Any bird species that relies on midstory structure, albeit dense midstory, is not likely to nest on this land.



The coarse woody debris present on-site is generally standing as snags, not fallen on the forest floor; some speices, like the Canada Warbler; better utilize downed wood for habitat. However, the standing snags do provide ample food availability for other birds like the Pileated Woodpecker, an ecosystem engineer creating cavities in trees that will become nests for a multitude of other creatures. The natural processes of forest development will turn these standing snags into logs on the forest floor which will then possibly attract the attention of Canada Warblers.

For the species that prefer edge habitat, Lone Rock Point and Arms Grant both provide opportunity for nesting. The alder meadow area and abandoned field across from the parking area at Lone Rock Point is a good example of edge habitat for an American Woodcock. The patchwork nature of development surrounding these conserved lands offers additional edge habitat where the forest meets residential backyards and the Alliance Church and Elks Lodge fields.

This land also provides opportunity for species nesting in the canopy, whether they prefer conifer, hardwood, or mixed. Typically these species will be found in closed canopy forests, which is how this forest is best described. For species that are typically found in forest interiors, it is somewhat debatable whether or not Lone Rock Point and Arms Grant might provide suitable habitat. For the urban patchwork landscape of Burlington where forested parcels are smaller than in large block conserved land like the Green Mountains, this area might provide the best option for interior forest. However, with so much development encroaching, this habitat is certainly not ideal for an interior forest nesting bird.

Lone Rock Point and Arms Grant play an important role for migratory birds along the Lake Champlain flyway. Birds looking to rest or birds that might be forced down to land due to weather benefit from greenspace and possible food sources available along the way. Being continuously forested from the edge of the Lake makes this land quite valuable along the flyway.

Part II: Wildlife Detected

The 1996 study of the Rock Point area conducted by Carex Consulting found evidence of 25 mammal species, while the 2003 inventory of the Arms Grant property commissioned by the Winooski Valley Park District lists 21 mammal species (a subset of the species from the 1996 Rock Point report). We were able to either directly detect or confirm with others the presence of many notable species from this list, including river otter, mink, gray fox, red fox, fisher, coyote, white-tailed deer, raccoon and striped skunk. Of these, river otter, gray fox, and mink are classified by Vermont’s Fish and Wildlife Department as Medium Priority Species of Greatest Conservation Need.

The average home range requirements of these key mammal species are given in Table 1. As previously noted, the properties of Lone Rock Point, Arms Grant, and Burlington College together comprise just over one-third square mile. This is significantly less than the average home range size of most of these species and underlines the importance of wildlife corridors to allow for passage to other suitable habitat areas.

Table 1. Home range requirements of mammal species detected in Lone Rock Point, Arms Grant, Burlington College, and adjacent areas from Feb-April 2015.

Species	Home Range Requirements (square miles unless otherwise noted)
*Northern river otter	0.7 to 22 / 15 to 30 linear mi
*Gray fox	1 to 5
*Mink	2 to 3
Red fox	9 to 12
White-tailed deer	0.23 to 2
Fisher	7
Coyote	15
Raccoon	0.15 to 0.4
Striped skunk	.25 to 1.9

\*Vermont Species of Greatest Conservation Need, Medium Priority.

Given the three-month study period between February and April, we were able to observe only two amphibian species directly: the Eastern red-backed salamander and wood frog. Consultation with local naturalists confirmed that American bullfrog, green frog, Northern leopard frog, spring peeper, and spotted salamander are also present in vernal pool and wetland areas during the spring. Of these, the spotted salamander is classified by Vermont's Fish and Wildlife Department as a Medium Priority Species of Greatest Conservation Need.

While a list of bird species we observed can be found in Appendix 1, it should not be considered a full, accurate inventory of birds using the area as seasonal nesting habitat, given that our study took place between February and April. This study period coincided with the migratory season for birds along the Lake Champlain flyway, but was too early to directly detect species using the area for breeding.

A full description of the mammals, amphibians and bird species that we detected or are known to be present in the area is included in Appendix I, along with maps showing the locations of tracks, sign, and direct sightings.

### Part III: Landscape-scale Observations

Lone Rock Point, the Arms Grant and portions of the Burlington College parcels provide unique forest cover among urban development near the lake shore. Their connectivity to surrounding contiguous habitat is interrupted by this development as well as two heavily-used roads. Whether or not these properties act as full-time habitat for some species or as temporary refuge for others, it is important to examine their place within the east-west corridors leading to the Intervale and Green Mountains, and the north-south corridor that extends along the shores of Lake Champlain.

Using aerial photographs and field experience, our team identified three potential "pinch points" that wildlife may be using to connect to other suitable habitat.

#### The train tunnel

Located under North Avenue, the tunnel connects the Urban Reserve/ Burlington College property to the wetlands between North Avenue and Rte. 127. Despite the chain link fence surrounding the tracks to the west of the tunnel, there is ample evidence of both wildlife and human use on the



tracks. Regular snow plowing of the rail tracks made it difficult to determine if wildlife was walking through the tunnel, but gray fox, skunk, raccoon and squirrel tracks were noted near the tunnel entrance. However, many of the tracks extended up hill to North Avenue indicating that wildlife may be crossing the road at this location. However, passage over or under Rte. 127 is challenging. There was no evidence of mammals crossing the frozen wetland adjacent to the Sea Caves, north of the railway tunnels.



#### The residential area bordering Killarney Drive

Killarney Drive and the northern corner of the Arms Grant and Elks Lodge Properties holds potential as a route for wildlife travelling to Ethan Allen Park. Many of the backyards along Killarney Drive are not fenced or are bordered with the relatively permeable split rail fencing. Most mammals could move through backyards in this area; in fact, neighbors have sited foxes, raccoons and skunks on the Elks Property. However, North Avenue is a major barrier to wildlife passage and backyards along Village Green (bordering Ethan Allen Park to the south) are lined with chain-link fence. There is no obvious siting for a wildlife tunnel or bridge in this area.





## The residential properties connecting the Arms Grant to the Sea Caves

This area may be a more direct route connecting forested areas on both sides of North Avenue. Unfenced backyards and cedar hedgerows are permeable borders that mammals could traverse; however, they must still cross North Avenue to reach the ponds and Sea Caves between North Ave. and Rte. 127. The use of game cameras and any available roadkill data on this stretch of road would confirm animal road crossings and inform any potential wildlife bridge construction at or near this location.



## Part IV: Recommendations

### Dogs & dog walkers

Dog tracks were well documented in the Arms Grant property in the vicinity of the trail network. The presence of widely-spaced tracks (up to 5-foot stride length), likely of a bounding dog, suggest that off-leash dogs may threaten wildlife. We recommend that dogs be kept on-leash within these properties, particularly during the winter months when wildlife is conserving energy. Given the large number of stakeholders who use this property (the diocese, Burlington High School, nature-connection programmers such as Crow's Path, bikers, hikers, naturalists, and other members of the general public), there may be ample interest in a "citizen patrol" group who could monitor dog leashing.

### Bike Use

There are a large number of biking trails within the Arms Grant property and the area seems to be popular among the growing group of winter "fat tire" bikers. In many places, the braided paths either directly cross wetland areas or are in such close proximity as to increase the likelihood of domestic dogs disturbing amphibian activity in the vernal pool. The density of trails around Arms Grant provides little buffer area and hardly any 'interior' habitat space. A focused effort on building and maintaining sustainable trails in this park will discourage the creation of social trails and minimize the impact on wildlife either in residence or passing through. Of primary importance is keeping the Arms Grant trails out of the vicinity of wetlands. Increased trail definition and marking will decrease the formation of braided trails throughout the property.

### Fencing

Around the Burlington City Cemetery the fencing is chain-link on the north, west, and south facing sides. This fencing is in somewhat poor condition with holes in the chain link. Keeping these holes may encourage permeability of small mammals across the landscape. A possible improvement might be to replace the chain link fencing with wrought iron fencing as is present on the North Ave side of the cem-



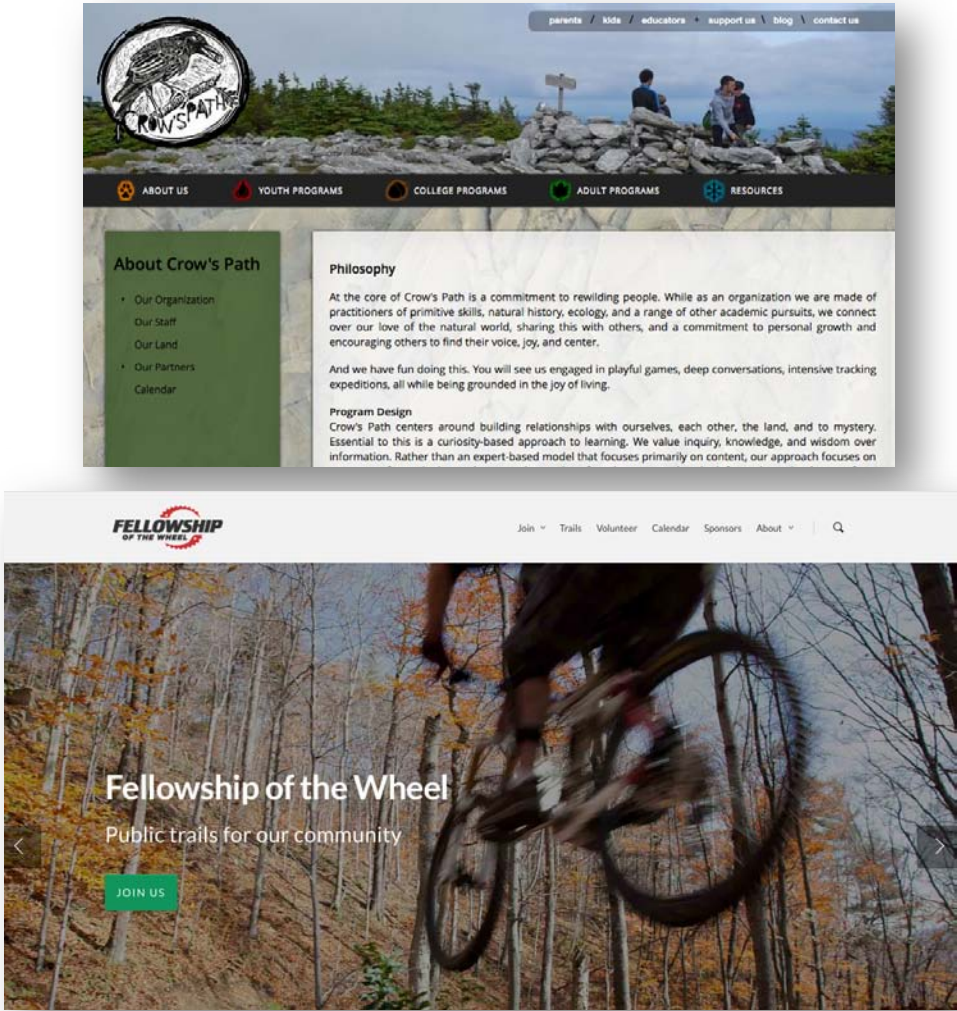
etery. This fencing would allow small mammals to pass through, but restrict the movement of larger animals like white-tailed deer whose presence near North Ave might cause some concern.



# Community Involvement

Crow’s Path, an outdoor education and nature-connection program started in 2009, is hosted at Lone Rock Point by the Episcopal Diocese of Vermont and Rock Point Center. Students (both adults and children) spend their days on the site engaged in hands-on activities in the natural surroundings. Crow’s Path director and UVM Field Naturalist graduate Teage O’Connor spent time with our team to list observed species, identify special places of interest, and discuss the present day ecosystem at Lone Rock Point.

The Fellowship of the Wheel, a non-profit biking association, may play an important role in developing an organized trail system on the property that remains open to public use while minimizing impact to sensitive habitat.



At the time of writing this report, members of the wider Rock Point user community are also convening a process to discuss the long term management and stewardship of their property. A public invitation was extended to users of the Rock Point property to participate in the Rock Point Land Use Implementation Plan.

# Conclusion

The one-third square mile area comprising Lone Rock Point, Arms Grant, and Burlington College provides important habitat for wildlife in Vermont’s biggest city. Because these lands are bordered by busy thoroughfares and developed regions, facilitating the movement of wildlife in and out of these locations to other suitable habitat areas in line with their home range requirements is an important consideration in future planning efforts.

Three likely pinch points for wildlife crossings in the area were identified. These include: 1) the train tunnel located under North Avenue, 2) the residential area bordering Killarney Drive and the northern corner of the Arms Grant and Elks Lodge Properties, and 3) the residential area connecting Arms Grant to the Sea Caves wetland parcel (south of the Route 127 on-ramp from North Ave). The use of game cameras and roadkill data between Arms Grant and the Sea Caves parcel could help inform whether this might be a suitable site for the construction of a possible wildlife bridge in the future.

Recommendations for the management of these lands to better support the presence of wildlife include: 1) keeping dogs on-leash in Arms Grant, particularly during winter months, 2) building more well-defined trails and keeping them out of the vicinity of wetland areas, 3) allowing existing fences to remain permeable, and 4) encouraging community involvement in stewardship of the area.

# Acknowledgements

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We would also like to extend our gratitude to our instructor, Dr. Matt Kolan, of the graduate course in Applied Wildlife Management and Field Ecology at the University of Vermont. His support and feedback on multiple versions of the presentation given to the Burlington Conservation Board on May 4, 2015, as well as this written report, were extremely valuable and much appreciated.



References

- Austin, John M. et al (2013) Conserving Vermont’s Natural Heritage: A Guide to Community-Based Planning for the Conservation of Vermont’s Fish, Wildlife, and Biological Diversity. Montpelier, Vermont: Vermont Fish and Wildlife Department and Agency of Natural Resources.
- Burt, W. H. (1943) “Territoriality and Home Range Concepts as Applied to Mammals.” Journal of Mammalogy. pp 346-352.
- Carex Consulting. (May 1996). Rock Point: Natural Features, Land Use, and Management Options. Prepared for The Rock Point Property Task Force and The Burlington Conservation Board.
- DeGraaf, Richard M. and Mariko Yamasaki. New England Wildlife: Habitat, Natural History, and Distribution. (2001) Hanover: University Press of New England.
- “Eastern Coyote. Vermont Wildlife Fact Sheet.” Accessed at website: <http://www.vtfishandwildlife.com/library/Factsheets/Furbearer/Coyote.pdf> on May 3, 2015.
- Eiseman, Charlie. Dec 2007. Wildlife Habitat and Corridors in the Winooski Valley Park District’s Communities. <http://www.burlingtonvt.gov/sites/default/files/PZ/OpenSpace-ProtectionPlan/Wildlife%20Corridor%20Report.pdf>
- Kelly, Kevin J. March 13, 2013. “Burlington’s Rock Point is Prime Real Estate, but It’s Not for Sale — Yet,” Seven Days: Vermont’s Independent Voice. <http://www.sevendaysvt.com/vermont/burlingtons-rock-point-is-prime-real-estate-but-its-not-for-sale-yet/Content?oid=2243053>
- Staying Connected Initiative. Accessed at website <http://stayingconnectedinitiative.org/our-region/wildlife/> on May 3, 2015.
- University of Vermont. Focal Places in Burlington. Rockpoint: Natural History & Ecology. Accessed at website: <http://www.uvm.edu/place/burlingtongeographic/focalplaces/rp-ecology.php> on April 17, 2015.
- Vermont Fish and Wildlife Department. Vermont’s Species of Greatest Conservation Need. Accessed at website: [http://www.vtfishandwildlife.com/SWG\\_list.cfm](http://www.vtfishandwildlife.com/SWG_list.cfm) on May 2, 2015.
- Washington Wildlife Habitat Connectivity Working Group. Importance of Habitat Connectivity. Accessed at website: <http://waconnected.org/importance-of-habitat-connectivity/> on May 3, 2015.
- Winooski Valley Park District. April 2003. Arms Grant Property: Inventory, Assessment and Management Plan. April 2003. Prepared for the City of Burlington Parks and Recreation Department.

Appendix I: Wildlife Species Detected or Known to be Present in the Study Area

Mammals

\* Denotes Vermont Medium Priority Mammal Species of Greatest Conservation Need (Vermont Fish and Wildlife Department, 2004).

Home range estimates taken from DeGraaf and Yamasaki (2001) and supplemented with information from Vermont Fish and Wildlife factsheets.

\*Northern River Otter (*Lontra canadensis*)

Otters often create runs across peninsulas or from high points connecting water sources. The otter tracks spotted on February 13, 2015 on the Lone Rock Point peninsula followed this common pattern. Tracks have been found by Crow’s Path staff along Lake Champlain and at the sea caves, suggesting that they may be passing between the two areas. Otters are often found in pairs or groups and generally stay in wetland and water habitats.

Estimates of otter home ranges vary from 0.7 to 22 square miles and between 15 to 30 linear miles of stream.

\*Gray fox (*Urocyon cinereoargenteus*)

Gray fox tracks were recorded on February 25, 2015 approaching the northern end of the tunnel under Route 127, adjacent to the Urban Reserve. Gray fox are smaller than red fox and have greater difficulty navigating deep snow. As such, it is not uncommon to find gray fox tracks along trails, or in this case, along the plowed edges of the railroad tracks. Recent plow activity prevented us from tracing the gray fox tracks into the tunnel to confirm its connectivity.

Grey fox tracks were also observed in the Arms Grant parcel along the northeast property boundary. These tracks were difficult to follow because the individual was making use of the cross country ski trail present behind the neighborhood homes.

Estimates of gray fox home range size vary from one to five square miles.

\*Mink (*Mustela vison*)

Mink have been sighted frequently by Crow’s Path staff along the lakeshore in a somewhat protected alcove. Staff members were also able to identify a family of mink denning nearby. Mink survive on both terrestrial and aquatic prey, and thus are commonly found in forested wetlands and lakeshores.

Long distance travel is common along waterways, although their home range is estimated at between two and three square miles.



Red fox (*Vulpes vulpes*)

A red fox was sighted on March 18, 2015 on the steep hillside immediately west of the City snow dump located on the Urban Reserve and scented a short time later by another group of students. Red fox hunt meadow voles, mice, squirrels, cottontail rabbits and woodchucks, and are often found in or near open spaces within fragmented forests where these prey live. Red fox are comfortable in human-influenced landscape and utilize infrequently mowed fields to hunt their prey.

Estimates of red fox home range size studied in Maine vary from nine to 12 square miles.

White-tailed deer (*Odocoileus virginianus*)

Striking presence of white-tailed deer was observed in March when our team found a deer kill-site at the base of limestone cliffs located west of the clearing within Lone Rock Point. According to Teage O'Connor of the Crow's Path program, four white-tailed deer live within Lone Rock Point, Arms Grant and the Elks Property and the kill had happened in December 2014. Although it was clear from abundant types of scat that many scavengers had fed on the carcass, it is likely that a coyote killed the deer.

Estimates of white-tailed deer home range size vary from 0.23 to square miles to two square miles.

Coyote (*Canis latrans*)

The kill site of the white-tail deer is evidence of coyote presence in Lone Rock Point. Coyote scat was abundant in the vicinity of the kill site and meadow area at Long Rock Point. Though no denning or resident coyotes have been observed, this area does see occasional individuals and packs moving through the landscape.

Coyote have an average 15 square mile home range in Vermont, with focused activity taking place in a four to eight mile core area.

Raccoon (*Procyon lotor*)

Raccoons are highly opportunistic and will eat whatever food is readily available. Found almost anywhere with access to water, raccoons are intelligent nocturnal animals comfortable in urban and rural areas. Raccoon tracks were sighted near the train tunnel passing under North Avenue. Crow's Path staff also reported that a rabid raccoon was killed at Lone Rock point two years ago.

Because they are so adaptable, individual raccoon home range size can vary widely, from 7 acres in urban areas to 19 square miles (studied in North Dakota), commonly measuring between 0.15 square mile to 0.4 square mile.

Striped Skunk (*Mephitis mephitis*)

Striped skunk tracks were recorded on March 18, 2015 in the open field behind Burlington College. Striped skunk are omnivores whose diet includes insects, birds, eggs, small mammals, as well as vegetation and garbage, making them common in urban and rural areas.

Estimates of home range sizes vary from .25 square mile in urban areas to 1.9 in rural areas.

Fisher (*Martes pennanti*)

Fisher tracks were observed near the ravine in Arms Grant. The presence of fisher in this area was also noted by Teage O'Connor of the Crow's Path program. Fisher den in hollowed trees, logs or vacant porcupine dens. They are frequently found in coniferous forests during the winter, likely due to snowpack accumulation.

Average home range size for the fisher is estimated to be about 7 square miles averaged over a year. Males range farther than females, up to an estimated 19 miles in a study in Maine.

Woodchuck (*Marmota monax*)

The sandy soils of the Lake Champlain shoreline offer ample burrowing habitat for woodchucks. Home range sizes are variable, with estimates ranging from 0.7 to 55 hectares.

Domestic and feral cat (*Felis catus*)

Game cameras placed by Crow's Path staff within Lone Rock Point and near the Burlington College cemetery captured images of domestic, or now feral, cats. The cats likely impact small rodent and bird population.



# Amphibians

## Observed

Eastern red-backed salamander (*Plethodon cinereus*)

Observed on the edge of a moist area in Arms Grant. This is an entirely terrestrial salamander common in well-drained forested habitats like the sandy soils of the former deltaic-deposited, upland areas around Lake Champlain.

**Consultation with local naturalists** confirmed that the following amphibian species are also known to be present at the Arms Grant and Lone Rock Point sites.

- American bullfrog (*Rana catesbeiana*)
- Green frog (*Rana clamitans*)
- Northern leopard frog (*Rana pipiens*)
- Spring peeper (*Pseudacris crucifer*)
- \*Spotted salamander (*Ambystoma maculatum*)
- Wood frog (*Lithobates sylvaticus*)

\* Denotes Vermont Medium Priority Reptile-Amphibian Species of Greatest Conservation Need

# Birds

Broad-winged hawk (*Buteo platypterus*)

Sighted on 4/24 in Arms Grant. This particular individual was being mobbed by crows at the time. Broad-winged hawks are frequently found in deciduous or mixed deciduous- conifer forests with openings, or near water bodies. Although Lone Rock point and Arms Grant are probably in too developed an area for nesting, these birds are using the land for hunting small mammals, amphibians, and young birds.

Mallard duck (*Anas platyrhynchos*)

Mallards live year-round on Lake Champlain. Most likely interested in the spring-fed open waters with fish at the Donahue Sea Caves, this Mallard was observed in the the pond area of the Intervale near Route 127. They frequently live in wetland areas, though will feed on water and off, surviving on aquatic plants, insect larvae, and earthworms.

Wood duck (*Aix sponsa*)

A common nesting resident in Ethan Allan Park just northeast of Arms Grant, these ducks are frequent in the waters around the Sea Caves. The hardwood forests above Lake Champlain in Lone Rock Point appear to be potential habitat as well. Two pair of wood ducks were observed at the vernal pool behind the Alliance Church.

Pileated Woodpecker (*Drycopus pileatus*)

Pileated woodpecker are easily identifiable forest birds requiring fallen wood and large standing dead trees, which they drill into with distinctive chisel-like bills to search for carpenter ants and other insects. Evidence is seen throughout Arms Grant and Lone Rock Point, as well as individuals observed on the edge of Arms Grant behind the Alliance Church.

\*Great Blue Heron (*Ardea herodias*)

Sighted at the Donahue Sea Caves, this large bird is frequently fishing in the Intervale Area. They hunt slowly, standing very still for long periods of time before a quick recoil of their necks grabs a fish. They also hunt frogs and small mammals. They can be found in both freshwater and saltwater habitats.

## Birds of interest from eBird listing (Lone Rock & Sea Caves)

One-hundred and twenty-four bird species have been recorded at Lone Rock Point/North Beach on Cornell University’s ebird website in the roughly two-year period between April 13, 2013 and April 30, 2015. Notable species include ten of the 12 of the ‘Birder’s Dozen’ identified by Audubon Vermont Forest Bird Initiative (with the number of sightings given in parenthesis).

- Yellow-bellied Sapsucker (1)
- Eastern Wood Pewee (2)
- Blue-headed Vireo (1)
- \*Chestnut-sided Warbler (1)
- \*Black-throated Blue Warbler (1)
- Black-throated Green Warbler (4)
- \*\*Canada Warbler (1)
- White-throated Sparrow (2)
- Scarlet Tanager (2)
- \*American Woodcock (1)

These birds are readily identifiable by either by sight or sound and use forest habitat for breeding. Many of these are declining in numbers; those that are not should ideally remain stable or increase through proper forest management.

Thirty-seven species were recorded at the Donohue Sea Caves on Cornell University’s ebird website in the roughly two-year period between April 13, 2013 and April 30, 2015. Waterfowl and shorebirds were common, including wood duck, Canada goose, and ring-billed gull.

\* Denotes Vermont Medium Priority Bird Species of Greatest Conservation Need

\*\* Denotes Vermont High Priority Bird Species of Greatest Conservation Need

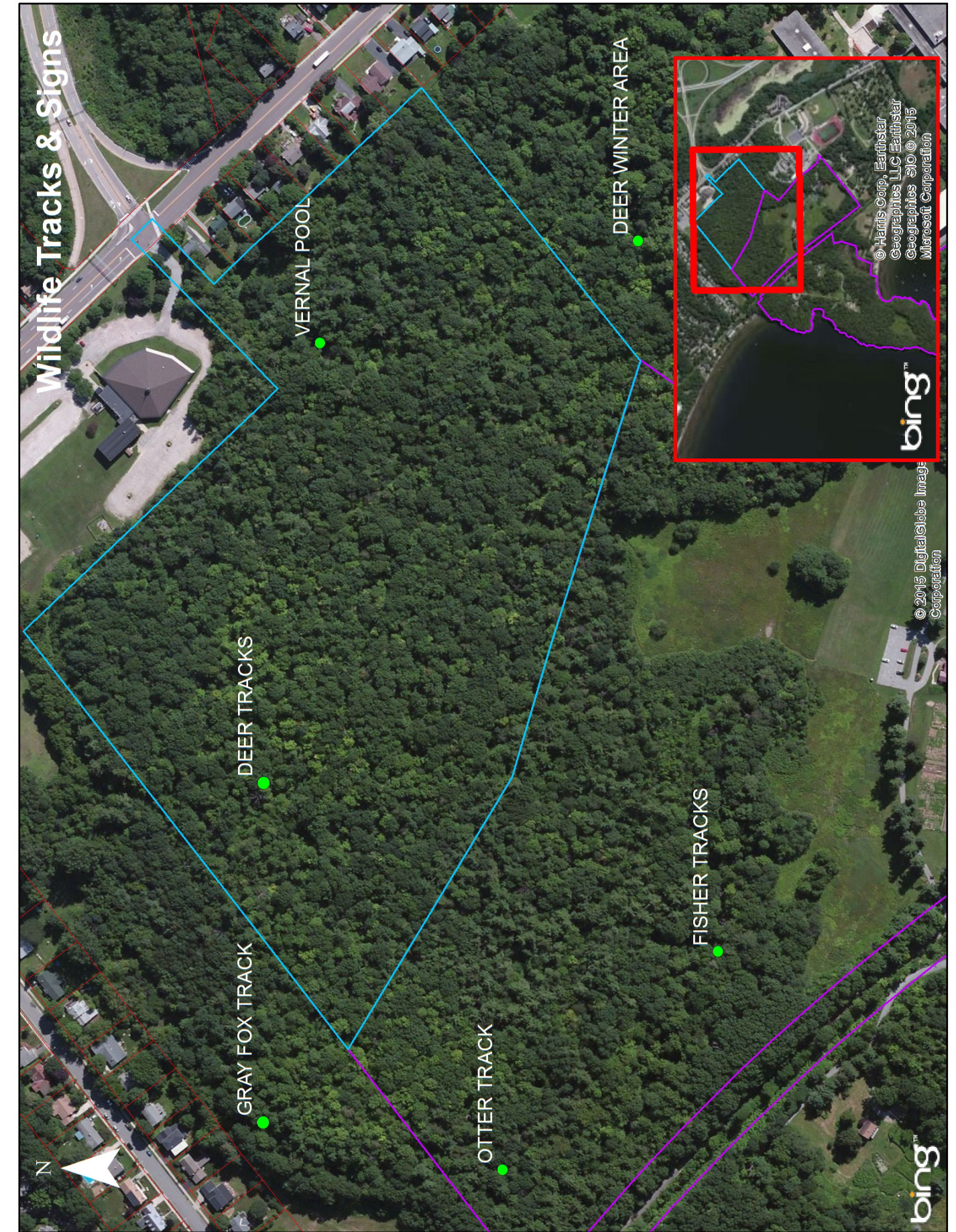


## Appendix II: Wildlife Track and Sign Maps

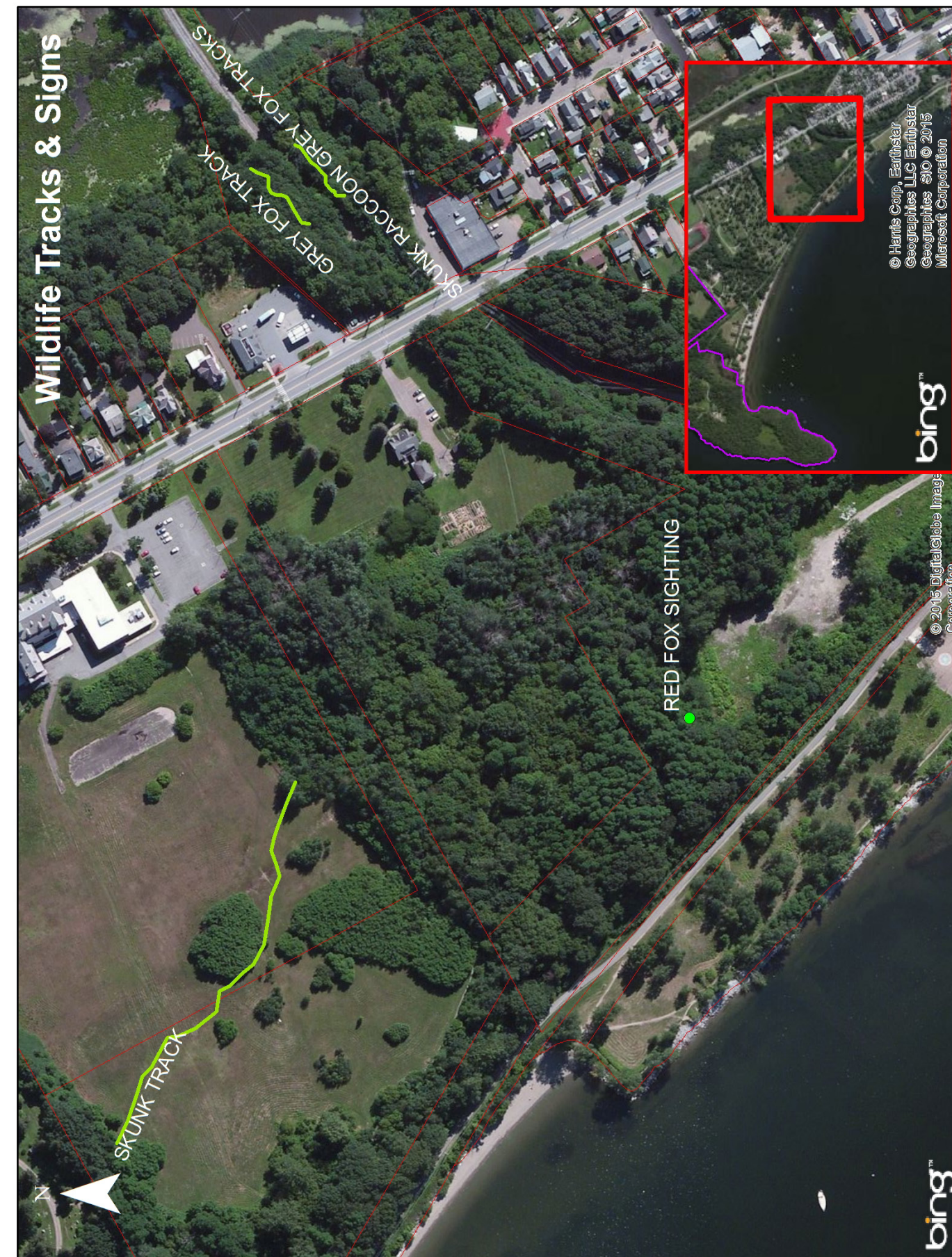
p. 23: the Arms Grant

p. 24: Lone Rock Point

p. 25: Train tunnel under North Avenue









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