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Understanding Urban Wilds: Nature, Culture, and Management.

Ted Randich

May 2017

A Master's Paper

Submitted to the faculty of Clark University, Worcester,  
Massachusetts, in partial fulfillment of the requirements for the  
degree of Master of Arts in the department of Community  
Development and Planning

And accepted on the recommendation of

Kathryn Madden, M.C.P., S.M.Arch.S., Chief Instructor

## ABSTRACT

### Understanding Urban Wilds: Nature, Culture, and Management

Ted Randich

Undeveloped natural areas in cities, or urban wilds, are an invaluable resource to urban populations. They provide space for physical activity, mental recovery and relaxation, and nature interaction and learning, among other benefits. Through observation, intercept survey, and interviews, this study explores three urban wilds sites in Worcester, Massachusetts. Current literature covers definitions of what makes nature “natural,” contemporary practices in conservation, and evidence of the benefits listed above. This paper builds on the literature, shedding light on what urban wilds are made up of (nature), how they are used (culture), and how they are sustained through management. A conceptual model frames these three forces, and can be used to inform future management practices and decisions.

Kathryn Madden, M.C.P., S.M.Arch.S., Chief Instructor

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## ACKNOWLEDGEMENTS

Thank you to my adviser Kathryn Madden for spending so much time making sure that this paper was completed. Thank you to Colin Novick for all you have done to enrich my education over the last few years. Finally, thank you to the folks at the Greater Worcester Land Trust, Friends of Newton Hill, and Massachusetts Audubon Society for their willingness to take part in my research and give me some insight into urban conservation practice.

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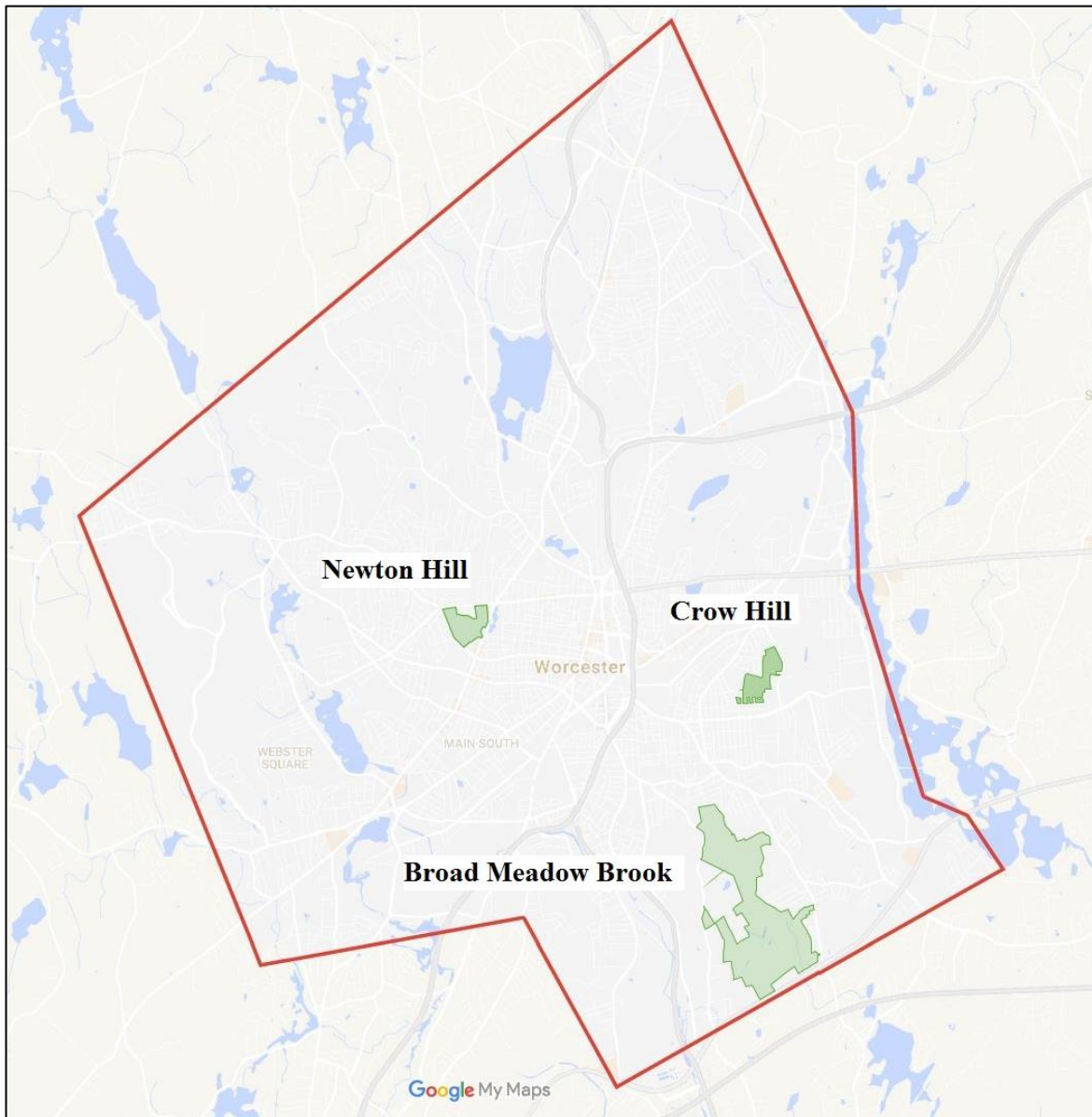
## INTRODUCTION

One of the most unique resources within cities are their urban wilds. Urban wilds are areas of cities that maintain a substantial amount of natural character despite being located in densely developed environments. These areas uniquely provide critical social benefits to the people in the area. The effectiveness of an urban wild is largely dependent on its location, nature, use, and management. This paper studies the interaction of these forces and how they impact the success of an urban woods in providing a public good. The conceptual framework of urban wilds includes interpretations of the term “urban wilds,” background of the policy context, and the benefits that urban woods provide to people.

These benefits include active living, mental health, and education benefits to their users. Active living benefits refer to urban wilds’ potential use as a space for physical activity. Mental health benefits focus on the use of urban wilds as therapeutic landscapes, or landscapes that provide spiritual relief from the busy urban world. Urban wilds are also spaces that introduce urban populations to nature. This provides a type of education that can foster appreciation for the natural world and stimulate environmental stewardship.

While all natural areas can serve these functions, urban wilds are especially important in that they are located close to large populations and people that are most in need of them.

To examine this literature, the paper conducts a case study of three urban wilds sites in Worcester, Massachusetts (see map next page). The sites chosen are Crow Hill, managed by the Greater Worcester Land Trust (GWLTL), Newton Hill, managed by the Friends of Newton Hill (FONH), and Broad Meadow Brook (BMB), managed by the Massachusetts Audubon Society (MassAudubon). At each site, a mix of methods was used,



*1: Site locations in Worcester, Massachusetts.*

using direct observation, intercept survey, and interviews with management entities. Direct observation meant studying the characteristics of the site as well as its users and their activities. The intercept survey attempts to dig deeper into understanding who was using the sites, for what, and why they do it. The interviews with management entities shed light on various strategies employed in the urban woods sites.

The research done in this study provides useful data in beginning to understand the various moving parts of urban wilds and how they impact the overall effectiveness of the sites in providing the benefits described. For an urban wilds site to achieve its full potential, the site manager must strike a balance between wildlife conservation (natural) needs and the needs of the urban populations who use the site (cultural). If a site's balance tips toward the cultural side, the effectiveness of the benefits will not be as strong, not sustainable, or perhaps not even present for the urban population. The end of this side of the spectrum is an urban park. If the balance tips towards the natural side, the urban wilds benefits will still be there, but the population will not be able to realize them if kept out by overreaching management.

Urban wilds only exist and provide their unique benefits to urban populations if management entities can reach an effective balance between natural use and cultural use. At the end of the paper, a model of understanding urban wilds based on nature, culture, and management is presented. Best practices are listed for future urban wilds creation and management. These best practices include defining natural character, creating a sense of ownership, and ensuring usufructory rights. Taken together, themes discovered in this research can be used to inform future urban wilds development and management.

## CONCEPTUAL FRAMEWORK

### **Definitions of Urban Wilds**

Urban wilds are a unique type of open space in cities. For the purposes of this paper, they are defined as *areas of a city with substantial natural character despite being located in proximity to human population*. These urban wilds provide benefits to the public

because of two variables. One is the “natural character” of the site, an ambiguous term based in ecology and aesthetics. The other variable is their proximity to urban populations who would otherwise have no access to natural resources. These variables provide a framework for understanding the “urban-ness” and “wild-ness” of an urban wilds site.

The most difficult aspect of describing urban wilds is defining what is “wild.” Our definition suggests that a potential urban wild can indeed be considered wild if it has “substantial natural character.” Natural character, however, is an ambiguous term. One of the earliest uses of the term “urban wilds” comes from a Boston Redevelopment Authority document in 1976. The document includes natural and cultural characteristics in its definition of “natural character,” identifying flora, fauna, and geology, as well as scenic, recreational, and educational value as components (Boston Redevelopment Authority [BRA] 1976, 18).

Natural character operates on a spectrum, with some sites having more natural character than others. One common conceptualization of what gives a site natural character is its wildness, or its freedom from human contact. New Zealand has a legal policy to preserve the “natural character” of its coastline (Froude 2015). An analysis of legal findings shows that New Zealand courts consistently identify natural elements and systems as a basis for determining natural character, and use deviation from environmental baselines or benchmarks to gauge the level of natural character (Froude 2015, 54). Equating nature with the absence of humans is not without its flaws. Hunter (1996) addressed the issue in the American context, asking whether the benchmark for a landscape’s natural state should be 500 years ago, when Europeans first came to the New

World, or 12,000 years ago, when humans first arrived on the continent (695). Ultimately, the author mirrors the New Zealand court findings, arguing that the degree of human influence is the simplest, most objective measure of natural character (696).

Other definitions attempt to bring humankind into the picture. Gobster et. al. (2007) states that human perceptions of natural character are based on interactions with nature, which take place at the experiential level or “perceptible realm” (959). For that reason, our ideas of naturalness are inherently tied to non-objective aesthetic experiences (963). Ruiz-Ballesteros et. al. (2009) corroborates this theory with an empirical study of perceptions of nature and natural character across different social and occupational groups. The research found that a subject’s background had significant impact on what they deemed of natural character. It should be no surprise that a farmer or miner will have a different perspective of nature than a tourist or government official (161). Simonic (2003) conducted an empirical study of responses to variable natural scenes, scoring subjects’ preferences and perceptions of naturalness. The researchers found that perceived naturalness varied among the respondents, indicating a subjective foundation to natural character (386).

The division between these two groups of thought originates at the theorist’s placement of humanity in nature. Newton et. al. (2002) describes two conceptualizations of nature: nature is something “lived with” or something “lived in,” (27). The “lived with” conceptualization regards nature as something separate from humans. This conceptualization caters to the objective, absence-of-humans definition of natural character. The “lived in” conceptualization brings humans into nature as part of it. This conceptualization agrees more with natural character being a subjective aesthetic

experience. Froude et. al. (2010) is able to succinctly combine these conceptualizations, stating that a site's natural character depends on how much it: a) is of an indigenous nature; b) is free from non-indigenous artefacts; c) has a stable structure geomorphically, hydrologically, and compositionally; and d) exhibits healthy natural ecological and biological processes (339). This dynamic definition allows for human influence in a) and b) while assuring environmental health in c) and d). When looking at the arguments presented here, the urban context of this paper must be considered. A definition of natural character that values environmental health while allowing for human influence plays well into this paper's definition of urban wilds, which are *areas of land with substantial natural character despite being located in proximity to highly developed urban areas*.

### **Policy and Management Context**

Conservation land in cities is created and managed through a legacy of public and private initiatives and partnerships. At the environmental level, the Commonwealth of Massachusetts has long encouraged land conservation. A 1972 amendment to the state constitution codified the right of citizens to “clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment” (Mass. Const. art. XCVII). This article codifies Massachusetts' public trust doctrine, which Wilson (1984) describes as the “public's right to use publicly owned land for socially valuable activities” (84).

The state has continued to support conservation projects for environmental and human benefit. In 1991, 2001, and again in 2008 the state released guidelines for municipalities to create Open Space and Recreation Plans (OSRP). The OSRP is a tool for

local governments in the state to plan and manage the use of their open space and ultimately make their towns more sustainable and attractive (Cryan & Curtis 2008, 1). The OSRP is also a tool for attaining open space and recreation-related funding. Massachusetts offers LAND (Self-help) grants, PARC (Urban Self-help) grants, and Land and Water Conservation Fund (LWCF) grants to communities who create an OSRP (3). To put this in perspective, the LWCF was budgeted 450 million dollars nationally to be distributed to municipalities for conservation efforts in fiscal year 2016 (Cryan 2016). Worcester's most recent OSRP (City of Worcester 2013) serves as an invaluable tool for managing the city's open space. The plan includes references to the sites studied in this paper (12, 18, 19).

Much of the state-level support in Massachusetts has come in the wake of municipal budget cuts, especially in cities such as Worcester. Freeman (2000) explains an extreme case of budget cuts in 1970s New York, where public services such as schools, parks, and transportation were underfunded, or in some cases, abandoned (270). This abandonment can lead to power vacuums with potentially unsafe results. With parks and recreational facilities, Svendsen (2010) outlines how private stewardship groups are often the most constructive entities to step into these power vacuums. These organizations effectively privatize the management of a public good (152). Cranz & Boland (2004) terms this phenomenon the "sustainable park," in the sense that parks often need an active group of concerned citizens and volunteers to sustain themselves today (118).

The concept of public-private partnerships to manage city parkland extends to the management of environmental conservation land as well. This has primarily been achieved through conservation restrictions (or conservation easements as they are known outside of

Massachusetts). Conservation restrictions (CRs) are restrictions placed on the development rights of land that limit what development and what activities are allowed on the land in perpetuity. These restrictions allow the landowner to retain ownership of the property, and often times allow the owner to continue using the land in a way agreed upon in the document. Gattuso (2008) highlights a strength of the CR as its non-involvement with the government. A land owner can conserve their property by donating or selling a CR to a private non-profit land trust. The familiarity of local land trusts can make conservation more personal and comfortable for potential land stewards (5). While conservation on private lands has its benefits, Kamal et. al. (2015) notes that private conservation opportunities do not always line up with needs (1290).

### **Benefits of Urban Wilds: Active Living**

The physical health benefits of urban proximity to green space are wide, and include higher levels of longevity (Takano et. al. 2002), higher levels of self-perceived health (de Vries et. al. 2003), and lower rates of diseases including diabetes and heart disease (Maas et. al. 2009). Additionally, green space has been shown to mitigate the negative health effects of water and air pollution in cities (Escobedo et. al. 2010, Nowak et. al. 2006). This paper, however, focuses specifically on the proximity to exercise space that urban wilds offer.

Urban parkland and recreational space has long been associated with healthier populations. Simple proximity to physical activity resources such as parks or urban wilds is a positive predictor of physical activity levels and overall health (Diez-Roux et. al. 2007, 498). An Australian study found that levels of walking exercise were higher in



neighborhoods that were closer to public open space (Giles-Corti et. al. 2005, 175). Size, attractiveness, and flexibility for dynamic uses were indicators of how strongly an open space would stimulate walking (174). Children have some of the highest health risks, and have more need for physical activity (Wolch et. al. 2011, 8). Despite this, at-risk groups have some of the poorest access to physical activity space (Gordon-Larsen et. al. 2006, 422).

### **Benefits of Urban Wilds: Therapeutic Landscapes**

In addition to the physical health benefits of urban open space and parkland, there has been ample science supporting its role in mental health. Empirical studies have shown the positive effects of nature on stress levels (Ward-Thompson et. al. 2012), mood (Hull 1992), anxiety (Nutsford et. al. 2013), and mental recovery time (Ulrich et. al. 1991). This review focuses on the experience of nature (as opposed to mere proximity) as therapeutic landscapes to improve overall mental, spiritual, and social health.

In 1921, Benton MacKaye envisioned a network of open space along the Atlantic coast for the use of citizens in an increasingly urbanized America. In “An Appalachian Trail: a Project in Regional Planning, he wrote:

*“Next there would be perspective. Life for two weeks on the mountain top would show up many things about life down below. The latter could be viewed as a whole—away from its heat, and sweat, and irritations. There would be a chance to catch a breath, to study the dynamic forces of nature and the possibilities of shifting to them the burdens now carried on the backs of men.” (MacKaye 1921, 8)*

MacKaye's vision was of what are considered today "therapeutic landscapes," or landscapes that improve mental and spiritual health. An experience in this landscape is described by Heintzman (1999), who found through qualitative methods that interactions with nature, especially in solitude, helps people reflect on life and attain a higher level of spiritual wellbeing (3). Interactions with nature through activities such as yoga or retreats are particularly effective for this end (Lea 2008, 96). Frederickson & Anderson (1999) find that immersion in wilderness promotes creative and spiritual inspiration (34). First Nations peoples have long held that interactions with "Mother Earth" are critical for spiritual and emotional health (Wilson 2003, 90). Experience in natural space also heightens relationship health and provides a sense of community (Volker & Kistemann 2013, 120). These therapeutic qualities have been corroborated in studies from Canada (Finlay et. al. 2015) and England (Milligan et. al. 2004).

### **Benefits of Urban Wilds: Appreciation for Nature**

Education is also a benefit of urban wilds. Education in an urban wild space includes early childhood education, where educators use the natural world to introduce children to basic knowledge and learning approaches (Plevyak & Mayfield 2010). It also includes biological and ecological science at the primary and secondary level (Phillipson-Mower & Adams 2010), as well as outdoor experiential learning (Adkins & Simmons 2002), where outdoor team-centric activities are used to foster camaraderie and create moral growth. Our use of education, however, is focused on how urban wilds can foster a greater sense of environmental stewardship and appreciation.

E.O. Wilson's landmark book *Biophilia* posits that humans' have a natural affinity for nature and an innate interest in its ability to thrive (Wilson 1984). He also asserts that developing and nurturing this affinity is critical, especially at the early stages of life. This nurturing is not sufficient, especially in cities. Kahn (2002) terms the weakening connection that we have with nature "environmental generational amnesia" (105). This theory states that, as generations pass the Earth to new generations, the planet becomes more and more developed and degraded. As a result, each succeeding generation measures nature against a lower standard than the previous one. This is especially so among people in cities, whose surroundings are less natural. Miller (2005) argues that reconnecting people with nature, especially in otherwise low biodiversity areas such as cities, is critical to engendering an attitude of preservation and conservation necessary for sustainable stewardship of the Earth (433). An analysis of the relationship between childhood interactions with nature and future stewardship activities revealed that childhood experiences in "wild" settings (camping, hiking, fishing, etc.) were associated with life trajectories toward environmental awareness (Wells 2006, 13). Kellert (2006) argues that the therapeutic benefits discussed in the previous section are instilled as an "ethic of sustainability," which must be taught in the formative years (11).

## RESEARCH DESIGN

Research in this paper is designed to assess the community value of urban wilds using examples in Worcester, Massachusetts as a case study, and to make recommendations for land management to caretakers. Direct observation, intercept survey, and interviews with management entities are the methods used to accomplish this goal.

## Site Selection

Based on the definition of urban wilds and the researcher's prior knowledge of Worcester, 14 sites (Figure 1) were initially identified for consideration in this study. Three aspects of the sites were explored further: natural character, human proximity, and management partners. Using Esri's ArcGIS software, an analysis was conducted of protected urban wilds and United States census blocks. Area was used as an objective measure to approximate the natural character of an urban wilds site. To measure proximity to humans, a population from census blocks was summed within a buffer zone of a half mile around each of the sites (approximately a 10-minute walk). Finally, ownership and/or management for each parcel was evaluated using the Assessor's Property Values search engine on the City of Worcester's website, as well as consultation with a key informant.

Sites varied from 23 to 510 acres. While the area of the urban wilds site was an important consideration, the amount of natural character (a subjective measure) was also taken into account. For example, while Green Hill Park is the largest of the urban wilds sites, it contains a golf course, petting zoo, athletic fields, radio towers, a National Guard Armory, and other man-made structures, all of which erode the natural character. Degree of natural character was measured by outlining the undeveloped area of each site, and comparing this to the total area. This analysis resulted in three measurements: total area, undeveloped area, and a ratio between the two (Figure 1).

Proximity to population ranged from 5,297 to 20,993 people within the ½ mile buffer zones. Sites were evaluated based on the number of people living in blocks within a half mile (roughly walking distance) of the urban wilds site. Some caution must be taken in

assuming “walking distance.” Sites such as Bovenzi Park, East Park, and Green Hill Park are adjacent or at least in close proximity to major obstacles such as highways or railroads. Management entities on the sites include the City of Worcester, local civic activist groups, the Greater Worcester Land Trust, Clark University, and MassAudubon. In order to explore different management strategies, it was preferential to select sites managed by different groups with different missions. Newton Hill, Crow Hill, and Broad Meadow Brook were the best sites based on these criteria. All three have high levels of natural character, are in proximity to high population, and have a unique management strategy.

### **Sampling Design**

Sampling design was set up to try and reach as many diverse users as possible. Each property was visited six times during the month of November, 2016 (Figure 2). The first visit was used to become familiar with the surroundings. Each site was then visited five more times to collect data and make observations. Site visits happened at pre-determined times and dates, and lasted two hours. In order to reach as many diverse users as possible, a variety of morning, evening, weekend, and weekday times were chosen. The times were Monday at 10:00 AM, Thursday at 12:00 PM, Saturday at 10:00 AM, Saturday at 12:00 PM, and Sunday at 12:00 PM. Visits were spread out throughout the month to avoid being grouped into a single week. Most of the month was fair weather, and visits on days that were rainy or cold were postponed.

### **Observation**

Observations during research visits concerned the users of the site and the site itself. General observations of user activities were made, and the number of users present

was tallied. Some of the aspects studied were trails, features, and surroundings. The analysis of trails assessed their natural character, ease of use, and markings (blazes, signs, etc.). Features of the sites include natural features such as the wildlife, vegetation, slope, and water sources, as well as human creations such as structures, fences, litter, and equipment. Finally road signage, parking, bicycle racks, and entrances were considered to assess the interface with the neighborhood.

### **Intercept Survey**

To better understand how people use the sites and what value they get from them, an intercept survey of park users was conducted during the research visits. The survey was made up of a one-page, anonymous questionnaire (Appendix B). The questionnaire takes between 1 and 5 minutes to fill out, depending on the user's level of detail. Necessary Institutional Review Board (IRB) approval was acquired through Clark University's Anonymous Survey Form. Subjects were asked if they would like to participate and given the option to decline or remove themselves at any time. Upon completing the questionnaire, the paper was stored in a folder until the researcher returned to Clark. Completed questionnaires were stored in a locked cabinet until they were collected at the end of November. Questionnaires indicate which site they were taken at, but do not specify the day. At each site, a route was developed to put the researcher in contact with the most individuals in the given time frame (Figures 4, 5, 6). The intercept survey is limited by time constraints. With only five site visits, there is no guarantee of a certain number of responses. Additionally, the November weather limits the range of responses to that season.

## **Interviews**

Interviews with management representatives from each site were conducted to find information about management strategies. Three interviews were held between January and March 2017. Appropriate IRB approval was sought and received for the interviews. Participants signed consent forms before their interview, and the conversations were recorded. Each interview lasted approximately 40 minutes, and covered topics pertinent to the urban wilds site and land conservation in general. The interviews were conducted in a structured dialogue format, with room for follow-up questions. After completing an interview, the recording was digitally saved and stored on a password-protected computer. At the conclusion of the study, recordings and transcriptions were destroyed.

## **CASE STUDIES**

Data about urban wilds in Worcester were collected in case studies of three urban wilds sites in Worcester. Data was gathered through: a) observations of the natural conditions and location in the urban setting; (b) intercept survey responses from the users at the sites; and (c) interviews with key management organizations for each site. Each of the three case studies is summarized based on this organization.

### **Crow Hill**

Crow Hill is a 58-acre conservation property bounded by Franklin Street to the north, Harrington Way to the east, Hamilton Street to the south, and Plantation Street to the West (Figure 6). Crow Hill is made up of land owned by the City of Worcester and the Worcester Ecotarium. The land is collectively protected by four conservation restrictions owned by the Greater Worcester Land Trust, who is the primary land manager. There is an

adjacent 15-acre parcel owned by Green Landscapes, which is not similarly protected and not open to the public<sup>1</sup>. Crow Hill's conservation status began in the 1990s. Using 2010



*2: Crow Hill*

Census data, there are an estimated 13,820 people who live within a half-mile of the site. In the initial analysis, Crow Hill was 10th out of 14 in acreage, 5th out of 14 in nearby population (Figure 1).

### *Observations*

Crow Hill is a diverse property with a mix of slope, wetlands, open area, and forests. The hill itself is at the southern end of the property, and is maintained as an early

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<sup>1</sup> As of May 2017, this parcel has been acquired by the City of Worcester, reportedly for conservation purposes (Moulton\_2017)



successional black oak savannah. Most of the forest is young birches, with some impressive maple and oak overstory. To the northwest, the forest becomes wetland and culminates in two seasonal ponds in the middle of the property. Much of the area is thickly populated by invasive species. The northeastern part of the property is old farmland that has become forested. There is another open area here, with wild grasses and flowers. The eastern edge of the property slopes steeply down open-faced rock to Harrington Way. A single old-growth pasture tree stands among the mostly-young saplings. At the very northern edge of the property is a maintained grass field and a repository of woodchips. Squirrels, chipmunks, songbirds, aquatic wildlife, frogs and turtles are present on the property.

There are about 1.5 miles of trail throughout Crow Hill (Figure 3). Three of the trails are blazed: a blue, red, and yellow trail. The most passable and used trail is the blue trail, which goes from an entrance at Harrington Way to the top of the hill and down the other side to Clarendon Street. The portion of the red trail that circles the southern slope of the hill is also in decent condition. Other trails, however, are in poorer shape. Some trails are unmarked, some are confusing to navigate, and some end at inconspicuous locations. In the wetland section of Crow Hill, many trails become saturated with water fairly easily. The worst trail by far was the northern stretch of the red blazed trail, which is impossible to use. The vegetation is so thick that one is only able to get about halfway between the ponds before they have to turn back.

There are no permanent man-made structures on Crow Hill. Due to its location among a neighborhood and with many residential abutters, however, litter and refuse was

common at the site. A former brick quarry site has debris ranging from old bricks to iron pipes to sections of chain link fence. Most of the neighbors, especially those along Ebenezer Street and Amanola Avenue, have dumped yard clippings and other compost onto the site. Most of the rest of the litter was limited to the top of the hill. Also present throughout the site is evidence of dirt bike or ATV use, including tire tracks and some deep ruts. The deep ruts form an unmistakable loop around the top of the hill.

Crow Hill is not adjacent to any major roads, and there are no directional signs on the nearby thoroughfares. Besides the frontage with Harrington Way, the rest of Crow Hill abuts backyards of residential properties and dead end streets. There are four points of entry to Crow Hill. Two are along Harrington Way, one is at the end of Clarendon Street, and one is at the end of Montgomery Street. The southern entrance at Harrington Way and Clarendon Street entrances were the most accessible.

The busiest street that the site abuts is Harrington Way, which has a City of Worcester sign indicating Crow Hill is there. There is a small parking area and bicycle rack off of the street at the trailhead for the yellow trail. There are no signs specifying this, however, and the parking area is difficult to identify. Shortly after site visits were completed, the City of Worcester constructed a parking lot at a site north of here on Harrington Way, which will be accompanied by additional signage in the future. The other two entrances have no signage whatsoever, besides the “No Motorized Vehicles” signs. They are located at the end of two dead-end streets. An entrance on Clarendon Street has a sizeable dirt pull-off that has room for about 4 to 5 cars. The entrance, while not marked, is pretty clearly a trailhead with blue blazes and a wooden vehicle barrier. An entrance on

Montgomery Street is similar to Clarendon Street, with a “No Vehicles” sign and wooden barrier. The difference is that this point of entrance is at the back of what the adjacent house has turned into part of their yard. This makes it nearly invisible from the road.

Nine people were encountered at Crow Hill over the six visits. Most of these encounters were on weekends, and nearly everyone I came across was in the southern portion of the site, on the hill itself or the trail that loops around it. I never saw any cars parked along Harrington Way, in the lot off of that road, or along Clarendon Street. Each time I returned there was new evidence of use at the top of the hill. I came across new pieces of trash, and fresh dirt bike tracks. However, I never encountered any dirt bikers.

#### *Survey Data*

Crow Hill had the smallest number of responses to my survey, with only three (Figure 9). Respondents were in strong agreement with all of the value statements (See survey, Appendix B) except for one. The first four statements all received perfect scores of 5, while the final statement about access only scored a 4.67. Respondents indicated a variety of activities at the site, including hiking (3), relaxing, enjoying scenery, getting fresh air (2 each), running, spending time with friends, nature watching, picnicking, and playing hide and seek with their children (1 each). The question about what the user liked best about the site yielded responses including the peace, quiet, undisturbed nature, and the proximity to home.

Two of the respondents knew about the site through a friend or family member, while one found it on their own. The Hamilton Street neighborhood was the only one listed as the users’ home. When asked about similar places the users went to, answers included

the Trout Brook Recreation Area in Holden, MA, Boynton Park in Paxton, as well as the Cascades and Lake Park in Worcester.

### *Management Strategy*

Crow Hill is owned by the City of Worcester Conservation Commission and the Ecotarium. Management is overseen by the Greater Worcester Land Trust (GWLT). Infrastructural improvements, such as the recent installation of a parking lot at the northern end of Harrington Way, is done by the City of Worcester. The vast majority of management, however, is conducted by the GWLT.

The GWLT is a non-profit organization whose mission is to preserve and advocate for open space in Worcester. They are headed by a Board of Directors, with a full-time Executive Director and a part-time office worker. The GWLT relies on a network of contributing members for financial support. Additionally, interns and hundreds of volunteers help the day-to-day management of the organization and its lands. The GWLT's methods of conservation include fee ownership of land, with a conservation restriction held by another organization or government, conservation restrictions placed on private- or publicly-held land, and some trail easements. Crow Hill consists of four separate conservation restrictions; three are on land owned by the Conservation Commission, and one is on property owned by the Ecotarium (a children's science museum across Harrington Way).

The GWLT manages the trails, trailheads, and landscapes on Crow Hill. Trail maintenance consists of keeping trails clear and well-marked. Trailheads are maintained to increase the accessibility of the site. While there was no well-marked entrance in my visits,

recent development of a parking lot by the City of Worcester and an information kiosk will serve this purpose in the future. The overall landscapes are also managed, with periodic cleanups and trash collections. In terms of outreach, the GWLT conducts mailings and door-drops every few years in the neighborhood to keep people informed and aware of the local conservation area.

### **Newton Hill**

Newton Hill is a city-owned parcel of land in the Newton Square neighborhood of Worcester's West Side (Figure 7). Based on the 2010 Census, there are 17,889 people



*3: Newton Hill*

living within a half mile of the site. While it is owned by the City of Worcester, both the city and a local activism group (Friends of Newton Hill) manage it. In my preliminary

assessment of urban wilds sites in Worcester, Newton Hill was 12th out of 14 in terms of acreage, and 2nd out of 14 for nearby population, and retains a significant amount of natural beauty (Figure 1). Newton Hill sits on 42 acres bounded by Highland Street to the north, Park Ave to the east, and Pleasant Street to the south and west. The urban wilds area defined as Newton Hill is actually part of two tax parcels. Besides the 42-acre parcel encompassing most of the park, an additional area from the Doherty High School property are included as wilds. Since it was purchased by the City of Worcester in 1888, Newton Hill has remained a forested park.

### *Observations*

Most of Newton Hill is steep and forested, with the exception being the summit, which is maintained as a field and is relatively flat. Trees vary from large pine and oak overstory to birch, oak, beech and maple saplings. Some invasive species, notably honeysuckle, are present near the summit. Wildlife at the site includes squirrels, chipmunks, and a variety of bird species. There is also a red-tailed hawk that frequents the site.

There are more than two miles of trail within Newton Hill (Figure 4). This includes the Newton Trail, Highlander Loop, Lincoln Stroll, East-West Trail, and Old Cart Path, among others. Each trail has a unique name and is marked with diamond-shaped signs. Most of the trails are well-traveled and wide. Trails are also maintained regularly, with mowing and leaf removal. The trails coalesce at several nodes, most notable being the summit of the hill, where the Newton Trail and East-West Trail converge at an iron flagpole.

Human influence is strongly present at Newton Hill. At the Newton Square corner of the site, a section of the park is used for more traditional urban park use; there is a World War I memorial, a basketball court, four tennis courts, and several benches. The disc golf course, while opening up the forest floor, also brings with it 18 man-made tees and 18 man-made holes. Additionally, the disc golf course has benches and trashcans along it every now and again. There is also a workout equipment cycle that with stations around the park. There is a scant amount of litter, much of which is clustered near roads and the Doherty High School parking lot. Finally, there appear to be a few unoccupied homeless camps in the denser parts of the vegetation on the hill.

Newton Hill is extremely visible. It is located across the street from Elm Park, a heavily-used greenspace in the city. Just to the south of the Elm Park boundary is the corner of Park Avenue and Pleasant Street, a major intersection with commercial activity. At the western edge of the site is Newton Square, a focal point of the neighborhood. The surrounding area is relatively walkable, as Newton Hill is completely bounded by sidewalks. Parking is available on the east side of Pleasant Street, as well as the publicly-accessible Spencer Bank and Doherty High School parking lots. Newton Hill has points of entry at Newton Square, the Blessed Sacrament Church on Pleasant Street, the Spencer Bank on Park Avenue, the Rogers Kennedy Memorial at the corner of Highland and Park Avenue and the parking lot of Doherty High School. All but one of these entry points offer nearby parking, bicycle racks, and trail signage.

Sixty-two people were observed in visits to Newton Hill. The Highlander Loop and Newton Trail were especially popular, and weekends were busier. Few people were

encountered at the summit. There were usually a half-dozen people or so at the lower reach of the park, near Newton Square. This is the more city park-like section, so these people were not included in the count of urban wilds users.

### *Survey Data*

A total of 24 people filled out the survey (Figure 11). Based on the value statement section of the survey (Appendix B), respondents agreed the strongest with the first three statements (scores of 4.74, 4.83, and 4.78 out of 5 respectively), indicating a strong appreciation for conservation land, as well as its physical and mental health benefits. Respondents gave lower scores to the ease of access statement, which had only 4.26 out of 5.

Activities Newton Hill users mentioned enjoying in the survey include relaxing (12), getting fresh air (12), hiking (11), enjoying scenery (10), nature watching (8), disc golf (8), spending time with friends (7), walking pets (3), biking (2), running (2), using the exercise course (2), and picnicking (1). When asked what it was they liked best about Newton Hill, answers ranged included nature, the woods, birdwatching, relaxing, walking area, designated trails, place to walk dogs, place to run, workout cycle, convenient location, close to home, not crowded, good people, and the disc golf course.

Most site users (14) discovered the site on their own, while 8 knew about it from a friend or family, one knew about it from a map, one from a program or organization, one from the PDGA (Pro Disc Golf Association) website, and one from general publicity. Fourteen site visitors drove to Newton Hill, a significant portion (10) walked or ran, and one biked. While one participant listed their home location as Marlboro, the rest of the



responses were from Worcester residents. Of these, the highest number (8) were right in the Newton Square neighborhood. Other responses included two from nearby Beaver Brook, and one each from Salisbury Street, Brittan Square, Burncoat, and Grafton Hill.

Participants varied in their response to what places they find similar to Newton Hill. Answers ranged from other city parks such as Coes Pond, Green Hill Park, Elm Park, Bancroft Tower, Institute Park, Boynton Park, and Belmont Hill; to larger nature preserves and state parks including Broad Meadow Brook, Wachusett Mountain, and Leominster State Forest; and other local disc golf courses including ones in Franklin, Easton, and Devens.

### *Management Strategy*

Newton Hill is owned by the City of Worcester and managed by the Friends of Newton Hill, a community activism group that is technically a subgroup of the non-profit Park Spirit Worcester. Friends of Newton Hill's mission is to promote the restoration, maintenance, and use of Newton Hill. The organization has an advisory board with a secretary, treasurer, and president. Day-to-day operations and projects are carried out by a handful of interns and hundreds of volunteers throughout the year. Management practices are done in conjunction with the City of Worcester, who has the final say on what is and is not allowed on the property.

Friends of Newton Hill is responsible for recreation maintenance and community outreach of the site. Since its formation in 2001, the organization has widened the hiking trails, blazed trails with unique markings, added comprehensive informational signage, installed a disc-golf and exercise course, and hosted a multitude of events, including

annual Earth Day cleanups and weekly summer 5K races. The organization uses the local social network of its members, most of which live nearby, to maintain a relationship with the neighborhood. They also have monthly meetings which are open to the public.

### **Broad Meadow Brook**

Broad Meadow Brook is a large series of parcels located off of Massasoit Road in Worcester's Grafton Hill neighborhood (Figure 8). All together, the urban wilds area of



*4: Broad Meadow Brook*

Broad Meadow Brook is over 500 acres, but some of this area is not conserved in perpetuity. Based on the 2010 Census, there are 15,892 people living within a half mile of the site. The land that Broad Meadow Brook sits on is primarily owned by three organizations: the City of Worcester Conservation Commission, New England Power

Company, and MassAudubon. Management of the site is directed by MassAudubon, a state-wide environmental group. Broad Meadow Brook is a significantly natural area, with much of its 500+ acres undisturbed. Of the potential sites considered for the study, it ranked second in total acreage and third in nearby population (Figure 1). Broad Meadow Brook sits within the mega-block of Heywood Street, Massasoit Road, Southwest Cutoff/Route 20, and Granite Street. Ownership of the site is extremely complicated, with over 50 parcels constituting hundreds of acres of protected or semi-protected woodland. These parcels have various levels of protection, from outright conservation ownership, to conservation restrictions, to management agreements.

### *Observations*

The terrain and landscape of Broad Meadow Brook is different depending on where one is in the site. Running through the site from north to south is Broad Meadow Brook itself, a tributary of the Blackstone River. Along this brook are a substantial amount of wetlands. The only non-wetland part of the site east of the Broad Meadow Brook is the area around the visitor center and parking lot. In the northern section of the site west of the brook, there is a meadow made up primarily of grasses and occasional tree saplings. A similar landscape is replicated by a right-of-way for the power lines on the site. The majority of the western portion of the site, however, is forest. Much of the site is particularly rocky, especially along a ridge which runs east of Granite Street. While most of the trees are young, there are a few old overstory oak trees, as well as some maples near some old stone walls in the southern section. Squirrels, chipmunks, deer, coyotes, and bird species including hawks live on the site.

About seven miles of trail crisscross Broad Meadow Brook (Figure 5). Trails all have unique markings and names. Trail markings are clear and consistent. Signage along the trails directs users to certain destination points, including the Visitors' Center. Some trails demonstrate substantial work, especially the Frog Pond Trail, which almost exclusively uses a boardwalk, and the eastern edge of the Sagatabscot Ridge Trail, which is gradually sloped and topped with cinders to make it handicapped-accessible. The convergence of the Sagatabscot Ridge Trail, Frog Pond Trail, and Holdredge Trail forms a node with an information kiosk.

Despite neighborhoods and industrial facilities abutting directly to the site along the eastern and western edges, the site is large enough to maintain its natural character. The most notable human influence on the site is the power lines and their right of way, which is approximately 200 feet across. This opening runs the entire north-south length of the property. The main entrance to Broad Meadow Brook has the most development, with a parking lot, three administrative and educational buildings, a small picnic pavilion, various gardens, and a natural play area for children with outdoor-themed obstacles such as overturned logs. Additionally, the trail from the visitors' center is maintained so as to be ADA compliant with roped-off borders and a gently sloping cinder topping. There are also educational placards spaced along this trail. Litter was very minimal throughout the site.

Broad Meadow Brook is not in a densely populated part of the city, but the greater surrounding area includes the busy Rice Square and Southwest Cutoff, a 4-lane highway. Broad Meadow Brook's main entrance off of Massasoit Road is very well marked. Much of the surrounding area is not walkable—Granite Street and the Southwest Cutoff are not

densely populated and do not have sidewalks. However, the surrounding neighborhoods are connected via the Piggery Trail and the Troiano Brook Trail to the north and east, and an unmarked trail to the west. The main entrance at Massasoit Road is the primary entry point. It has a 42-space parking lot, a visitors' center with bathrooms, educational displays and information, as well as additional administrative and educational facilities. The visitors' center is open six days a week, and is accessible from the Route 22 WRTA bus. A second smaller entrance is located at the western end of Hampton Street. There is limited parking available on the street. There are also trailheads but no designated parking at St. Agnes Church, Granite Street, and Otto Avenue.

Over six visits to Broad Meadow Brook, 45 people were observed. The majority were seen on the weekend visits. Research intercepts were held at the same spot each week; the corner of the Sagatabscot Ridge Trail, Frog Pond Trail, and Holdredge Trail. All of the people seen on the research visits were either leaving or returning to the Visitors' Center.

### *Survey Data*

Twenty-five people filled out the survey at Broad Meadow Brook (Figure 11). Users were in strong agreement with the first four value statements (Appendix B), scoring five or close to it for all of them. Respondents averaged a score of only 3.88 for the final question about access. Users mentioned a variety of activities that they enjoyed at Broad Meadow Brook. The top responses were hiking (22), getting fresh air (21), enjoying scenery, nature watching (20 each), relaxing (12), spending time with friends (10), picnicking, walking the pet cat, and walking with their baby (1 each). When asked what

they liked best about Broad Meadow Brook, users responded with answers including the peace and quiet, the natural beauty, the diverse habitat and nature, the maintained trails, the rocks to walk and play on, the education value, the proximity to home, and the visitors' center.

Twelve of the users knew about the site on their own before coming, while seven had learned about it from a friend or family member, six had found it on a website, three had found out through a local program or organization, and one had read about it in the newspaper. Of the six people who found out through a website, four used the MassAudubon website and two used AllTrails.com. MassAudubon was the organization who introduced three people to the site, and one of those people indicated that they were a member. Nearly everyone who filled out the survey drove to the site, possibly due to the survey location near the main parking lot. Twenty-two drove, three walked or ran, and nobody took public transportation or biked. Visitors were from all over the city, state, and even the country. One visitor was from California, seven were from elsewhere in Massachusetts, and seven were from Worcester. In Massachusetts, visitors were from Southboro, Ashland, Natick, Malden, Hampden, Chelmsford, and Merrimac. In Worcester, visitors were from the Grafton Hill neighborhood (3), Elm Park (2), Hamilton Street, and Webster Square (1 each).

When asked if there were any places that the users considered similar to Broad Meadow Brook, responses included everything from less natural recreation areas such as the Blackstone and Wachusett Rail Trails and the Tower Hill Botanical Gardens to Worcester city parks and conservation areas including Crow Hill, Perkins Farm, Green Hill

Park, Lake Park, and Elm Park. Additionally, several other MassAudubon preserves were listed, as well as more wild state parks and forests. These included Wachusett Meadow, Broadmoor, Drumlin Farm, and Laughing Brook MassAudubon sanctuaries and Walden Pond, Wachusett Mountain, Purgatory Chasm, and Middlesex Fells State Reservations, and Moore, Rutland, and Great Brook State Parks. One respondent answered the far away locations of the New Hampshire mountains and Cape Cod beaches.

### *Management Strategy*

Broad Meadow Brook is made up by an amalgamation of properties owned by a variety of organizations. Ownership is split between the City of Worcester Conservation Commission, the MassAudubon, and New England Power. MassAudubon is the primary manager of the land, however. Properties owned by MassAudubon and the City of Worcester are protected via conservation restriction, and properties owned by New England Power are protected with a management agreement between the company and MassAudubon.

MassAudubon is a statewide non-profit organization whose mission is to protect the nature of Massachusetts for people and for wildlife. This mission is carried out through diverse programming that includes ecological management, wildlife research, education, and conservation. The organization manages over 100 properties across the state, 57 of which are open to the public for recreational and educational use.

At Broad Meadow Brook, MassAudubon runs a Conservation Center that serves as an outdoor education hub for local youth. The Center offers weekly and daily programming, as well as partnerships with school groups and summer camp programs.

Children’s programming is supplemented with informational placards located along the trails near the Conservation Center and a natural play area. In addition to its activities and events for children, MassAudubon also offers nature programming for adults.

Besides the education focus, MassAudubon practices a strong environmental stewardship ethic. The 7+ miles of trail in Broad Meadow Brook exist with the environment in mind, with minimal intrusion and amenities. MassAudubon workers and volunteers complete tasks such as maintaining trails and signage, documenting wildlife, and filling birdfeeders. Much of the maintenance done in the sanctuary is volunteer-based, with oversight from MassAudubon employees.

## DISCUSSION

Three forces—nature, culture, and management—create what we call “urban wilds.” The reasons why some urban wilds are successful and how new successful urban wilds can be created hinges on understanding the interactions between these forces. The relationship between management and culture is the accessibility of the urban wilds site. Management and nature interact through definitions of natural character and the act of conservation. Finally, nature and culture are related through the benefits offered to humans by interactions with nature. Thus, urban wilds exist through the successful interaction of natural and cultural forces mediated by a management entity. In this section, a conceptual model is described in detail and applied to the three case studies in Worcester, Massachusetts (Figure 10).



## **Conceptual Model**

The conceptual model combines the forces of nature, culture, and management with their interactions to create a basis for imagining and creating urban wilds. The three circles in the corners represent the three entities that make up an urban wilds site. Culture refers to the human influence exerted on urban wilds sites. This includes man-made characteristics of the site, such as trails or signs. It also includes the people who use the site, for a variety of purposes. This includes hikers, stewards, and even folks who use a site for an illicit activity like dumping. Management refers to the entity that takes responsibility for the management of the site. This could be a municipal government, community group, non-profit organization, or any other group who assumes a sense of ownership. Any group with any level of effectiveness can assume this role. It should be noted, however, that a certain level of effectiveness is usually required for a site to become an effective urban wilds. Nature refers to the force that the natural world exerts on the site. To what extent are natural flora and fauna allowed to thrive? Nature includes the biodiversity of the site, the flora and fauna, as well as the health of its hydrological, geomorphological, and ecological systems.

On the connecting lines between these three entities are the interactions between them. Loosely, these interactions mirror the topics covered in the literature review. Natural Character refers to the definition used by the management entity to maintain the site. This maintenance can include ecological restoration and landscape maintenance, and largely depends on what the management entity deems “natural”. Accessibility refers to management efforts aimed at making human use of the urban wilds site easier. This

includes community outreach, trail work, and trailhead visibility. Benefits of Interaction refers to the three primary benefits outlined in the conceptual framework: active living, therapeutic landscapes, and appreciation of nature.

### **Managing Natural Character**

How a management entity maintains an urban wilds site is largely dependent on that entity's definition of natural character. As evidenced in the literature, this definition operates on a spectrum. Definitions will fall somewhere between "naturalness as the absence of human impact" and "naturalness as an aesthetic ideal." In order to successfully maintain an urban wilds site, the management entity must reach a clear definition of what is natural.

### *Case Studies*

The case studies in Worcester revealed a variety of management strategies and definitions of natural character. Broadly, the sites varied between an "absence of humans" approach at Broad Meadow Brook and a more "aesthetic" approach at Newton Hill. Crow Hill fell between these on the spectrum. By looking at the values of the users and managers of these sites, conclusions can be drawn about the management strategies. Using Broad Meadow Brook and Newton Hill as a comparison, it is interesting to look at the background of the sites' users to reveal the differences in definitions of natural character.

Broad Meadow Brook and Newton Hill are used by people with very different backgrounds and expectations of nature. Much of Broad Meadow Brook's usership was from around the state, while Newton Hill primarily pulled users from the City of Worcester (and many from the immediate neighborhood). Nearly all of Broad Meadow Brook's users

drove to the site, while at Newton Hill drivers and walkers were split about 50/50. Despite Newton Hill containing far more human infrastructure than Broad Meadow Brook and seemingly being less “natural,” users at Newton Hill answered more positively when asked about how accessible nature was in the city. This geographic context reveals that, at Newton Hill, more users come from an urban setting and have different definitions of nature than the users at Broad Meadow Brook.

These differences in background and values have translated to different management strategies between the two sites. The Friends of Newton Hill (FONH) has engaged in several projects intended to stimulate diverse human use on the site, sometimes with a cost to nature. For example, while trees had to be cut down to allow for the installation of a disc golf course, FONH considers the cutting a positive impact on the site’s natural character, as it allows people to “go into other areas of the park that they never would have gone into before.” This practice exemplifies management which FONH describes as “user-focused,” with a critical eye on “maintaining the natural aspect” of the site. MassAudubon on the other hand, tries to remain as unintrusive as possible when managing Broad Meadow Brook. While MassAudubon does not by any means eliminate human presence at the site, many activities usually associated with open space are off-limits, including running, biking, and pets. These restrictions stem from the organization’s primary goal to preserve habitat for wildlife.

### *Conclusion*

As evidenced by the comparison of Newton Hill and Broad Meadow Brook, natural character and the resulting management varies among urban wilds sites. Despite their

differences, the process by which a definition is created and management implemented remains fairly consistent. At the foundational level are the users and managers of the site. Using their geographic and cultural background, these folks develop experiences and values that shape their outlook on nature and what is “natural”. When they coalesce into a management entity for an urban wilds site, these experiences and values become that site’s definition of natural character, which in turn dictates management practices.

### **Increasing Awareness and Sense of Ownership**

For an urban wilds site to provide the most benefit to the greatest number of people, people have to know about the site and invest time in using it. The literature lists several management frameworks for creating green space, including public protection, conservation restrictions, and non-profit management. Conservation is rarely completed in a top-down manner, and these frameworks constantly find themselves having to collaborate and create partnerships. Through this collaboration, sites can establish themselves as integral parts of the community, which magnifies awareness, use, and a strong *sense* of ownership.

### *Case Studies*

All three sites in Worcester are good examples of using collaboration to create a sense of ownership. They are best looked at in two categories. Newton Hill and Broad Meadow Brook are urban wilds sites that have become established over time. Their higher level of use reflects this. Crow Hill has not become established yet, as evidenced by a lower level of use. All of the sites, however, have relied on collaboration to overcome a fractured or weak legal ownership structure.

Comparing Crow Hill to Newton Hill and Broad Meadow Brook elucidates the importance of establishment. Parts of Crow Hill were first conserved in the late 1990s by the GWLT (founded in the late 1980s). The final portion of Crow Hill to be conserved was not done so until 2017. Relatively speaking, this is a young urban wilds site conserved by a young management entity. Compare this lack of establishment to Newton Hill and Broad Meadow Brook. Newton Hill was conserved in 1888, over a hundred years before Crow Hill. Generations of neighbors to Newton Hill have known the site as an urban wild. Broad Meadow Brook, while it was only conserved in 1991, is managed by MassAudubon, an organization that has been around since the 19<sup>th</sup> century.

Through geography and organization, Newton Hill and Broad Meadow Brook are better known sites. This is reflected by users' responses to what places they go that are similar. At Newton Hill, other established urban park sites were often listed, and at Broad Meadow Brook, several other MassAudubon sanctuaries were listed. One subject simply wrote "other MassAudubon places." It is no wonder that Broad Meadow Brook has more visitors from around the state—some folks visit the site simply because it is a MassAudubon site!

This pattern reveals that, through establishment, different communities find a sense of ownership at different sites. An interview with the Friends of Newton Hill revealed that some people appreciate the site more because they remember it from their childhood, and are happy that it has been restored from its state of disrepair in the 1990s. At Broad Meadow Brook, the community is less local (although many people from the neighborhood use the site) and more focused on folks who are involved with MassAudubon. Crow Hill

has not reached these levels of recognition and sense of ownership yet. In an interview, however, the Greater Worcester Land Trust asked that we “give it four or five generations,” and then see where it is.

### *Conclusion*

Based on evidence in the three case studies, establishment appears to be the key factor in creating use at an urban wilds site. The longer a site or its management entity has been around, the more successful it is in reaching users. Through establishment over time, a site develops a community that is invested in its care. These communities, whether based in geography or an organization, create a sense of ownership that can transcend an otherwise weak legal ownership framework. Newton Hill and Broad Meadow Brook have achieved this community—through geography and organization, respectively—and Crow Hill is still developing.

### **Ensuring Usufructory Rights**

In the literature, three primary benefits of urban wilds were identified. They were: a) use as a physical activity space; b) use as a therapeutic landscape; and c) use as an educational space. Urban wilds sites fulfill these uses to varying degrees of success. Consistent across all sites, however, is the idea of usufructory rights. Usufructory rights are assurances that any activity done on a site is sustainable—in other words, the activity can be replicated over time without degrading the site. Deciding what activities are allowed or not is dependent on what the management entity is trying to preserve and what it deems as degrading the site. Ideally, an urban wilds site will provide the benefits outlined in the literature while ensuring usufructory rights and sustainability.

### *Case Studies*

Usufructory rights are an important consideration at all of the urban wilds sites in the case studies. The term came up specifically in an interview with the Greater Worcester Land Trust (GWLT). The GWLT explained that usufructory rights are a helpful concept to use when deciding what to allow on Crow Hill. Ultimately, if an activity is done in a sustainable manner, it will be allowed. The GWLT listed foraging for plants and even small-scale trapping as activities that would be allowed, in addition to the usual activities of hiking, running, and dog walking. Generally, these activities (when done sustainably) are replicable over time without degrading the site. Foraged plants will grow back, trapped animals will repopulate the area, and foot use by humans will not permanently degrade the area. Other activities, such as mineral extraction and motorized vehicle use, are in violation of these usufructory rights. Crow Hill clay cannot be repopulated, and vehicle use creates damage that cannot be fixed naturally. Specifically with the example of vehicle use, the GWLT explained that there is a problem when it takes “a couple hundred hours trying to repair something that somebody did in about an hour.”

Generally, it seems that the time it takes for an activity to happen should be equal or less than the time it takes for the site to recover from that activity. Broad Meadow Brook presents an interesting case, where seemingly harmless activities such as dog-walking, running, and biking are not allowed. At the surface, these activities may not seem to harm the site in such an extreme way as motorized vehicle use. Looking deeper into Broad Meadow Brook’s mission to provide habitat for wildlife, however, reveals the conflict. In an interview, MassAudubon explained that barking dogs and fast runners and

bikers negatively impact the bird habitat on the site. Those activities are disruptive to nesting birds, and can cause birds to look elsewhere for habitat. Usufructory rights come into play here, as an hour-long dog walk (or a few dog walks every day) can ruin a bird habitat that has taken years to create. Ultimately, decisions made to preserve usufructory rights are dependent on what the management entity wants to protect. At Crow Hill, the GWLT is mainly concerned with the basic ecological health of the site while at Broad Meadow Brook, MassAudubon wants to protect a habitat in a much more comprehensive way.

### *Conclusion*

At the sites explored in the case study, management entities work to provide benefits of urban wilds sites outlined in the literature—physical activity space, therapeutic landscapes, and space for environmental education and appreciation. Due to their unique missions and values, these management entities set different limits on what is allowed and not allowed to ensure usufructory rights. Some sites have stricter definitions on what benefits they provide, and therefore set stricter limits. Usufructory rights guarantee that the sites can continue to function normally and provide benefits to future users.

### CONCLUSION

The three urban wilds of Worcester studied in this paper all have different dynamics in our conceptual model. Using the model, we can assess the strong and weak points of each urban woods. It is important to note that no result is better or worse than the others. Rather, the outcomes are a result of the management entity projecting its values on the particular site. Crow Hill demonstrates strong natural character and is able to



effectively provide benefits to its users. Accessibility to the site is weak due to poor alignment between the site's users and the management entity. At Newton Hill, the site is extremely accessible and provides benefits to its users. This is possible due to a loose definition of natural character that is based in aesthetic values. Broad Meadow Brook maintains a high standard of natural character, and is also very accessible for users. Because of its high standard of natural protection, it is not as effective in providing certain benefits to its users. Once again, these are strong and weak points relative to the conceptual model. Each site is successful in what it aims to achieve.

In the terms of our conceptual model, it is helpful to think of the triangular plane as balancing on a fulcrum. If any of the three corners is particularly strong, that corner will detract from the effectiveness of the interaction between the other two. At Crow Hill, the relative roughness of the terrain and setting of the site away from well-traveled areas adds weight to the natural force and weakens accessibility. At Newton Hill, the intense use by people for everything from running to Frisbee-golf adds weight to the cultural corner, and weakens the definition of natural character. At Broad Meadow Brook, the strict management of the land as a wildlife sanctuary weakens the potential for human benefit (specifically as a physical activity space). Future urban wilds plans should consider this model when identifying and managing space.

APPENDIX A: LIST OF FIGURES

**Figure 1: Analysis of potential sites.**

The “Forest ac.” Field refers to all forest within the site and contiguous to the site, including forest that is not accessible or protected. The “Forest %” field compares forest ac. to the size of the protected area. Sites selected are outlined in red. Overall forest area and forest percentage are assumed to be indicators of “natural character”

<b>Site Name</b>	<b>Acreage</b>	<b>1/2 mi. pop</b>	<b>Forest ac.</b>	<b>Forest %</b>	<b>Nature</b>	<b>Management</b>
Broad Meadow Brook	437.8	15,892	535.2	122%	5	Environmental Group
Crow Hill	57.5	13,820	79.7	139%	4	Land Trust
Newton Hill	42.0	17,889	48.3	115%	3	Activist Group
Green Hill Park	509.5	20,933	183.5	36%	1	City
Cascades System	342.0	5,297	410.6	120%	5	Land Trust
Tetasset Ridge	172.6	8,224	276.4	160%	5	Land Trust
Bovenzi Park	120.7	7,127	143.3	119%	4	Land Trust
Lake Park	97.3	8,150	63.5	65%	1	City
Perkins Farm	73.7	7,391	69.2	94%	4	City
Cider Mill	71.3	8,763	58.5	82%	2	Land Trust
East Park	58.1	13,249	32.0	55%	1	City
Hadwen Park	50.1	7,953	41.2	82%	3	City
Hadwen Arboretum	27.2	15,350	24.0	88%	3	Private
Cookson Field	23.1	7,180	27.8	120%	2	Activist Group

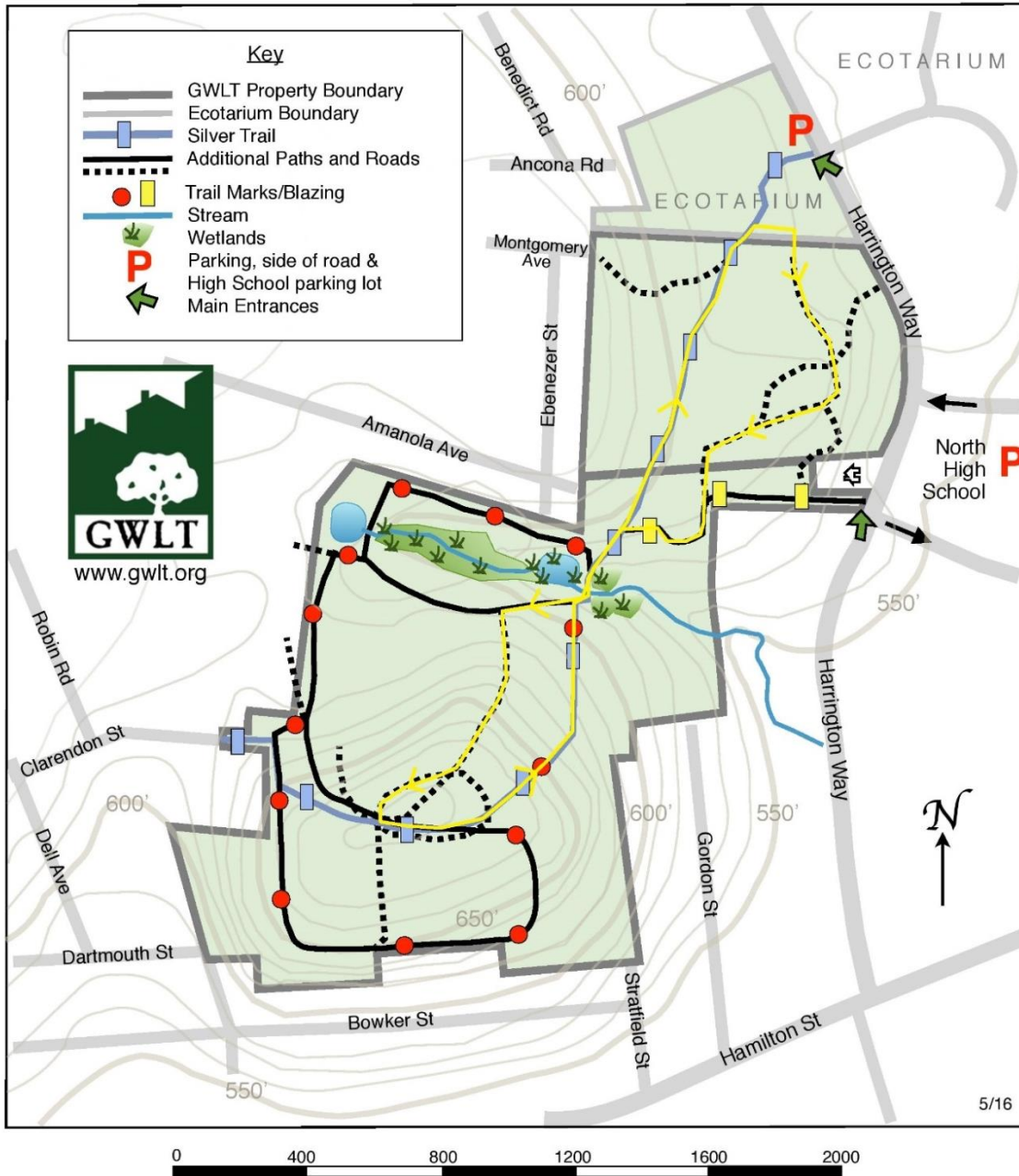
**Figure 2: Site visits.**

<b>Date</b>		<b>Time</b>	<b>Site</b>	<b>Visit Type</b>
Thu	11/3	12:00-2:00	Crow Hill	Preliminary
Fri	11/4	12:00-2:00	Newton Hill	Preliminary
Sat	11/5	10:00-12:00	Crow Hill	Research
Sat	11/5	12:00-2:00	Newton Hill	Research
Sun	11/6	12:00-2:00	Newton Hill	Research
Thu	11/10	12:00-2:00	Crow Hill	Research
Fri	11/11	12:00-2:00	Broad Meadow Brook	Preliminary
Sat	11/12	10:00-12:00	Newton Hill	Research
Sat	11/12	12:00-2:00	Broad Meadow Brook	Research
Sun	11/13	12:00-2:00	Crow Hill	Research
Mon	11/14	10:00-12:00	Broad Meadow Brook	Research
Thu	11/17	12:00-2:00	Newton Hill	Research
Mon	11/21	10:00-12:00	Crow Hill	Research
Sat	11/26	10:00-12:00	Broad Meadow Brook	Research
Sat	11/26	12:00-2:00	Crow Hill	Research
Sun	11/27	12:00-2:00	Broad Meadow Brook	Research
Mon	11/28	10:00-12:00	Newton Hill	Research
Thu	12/1	12:00-2:00	Broad Meadow Brook	Research

**Figure 3: Crow Hill trails and survey route.**

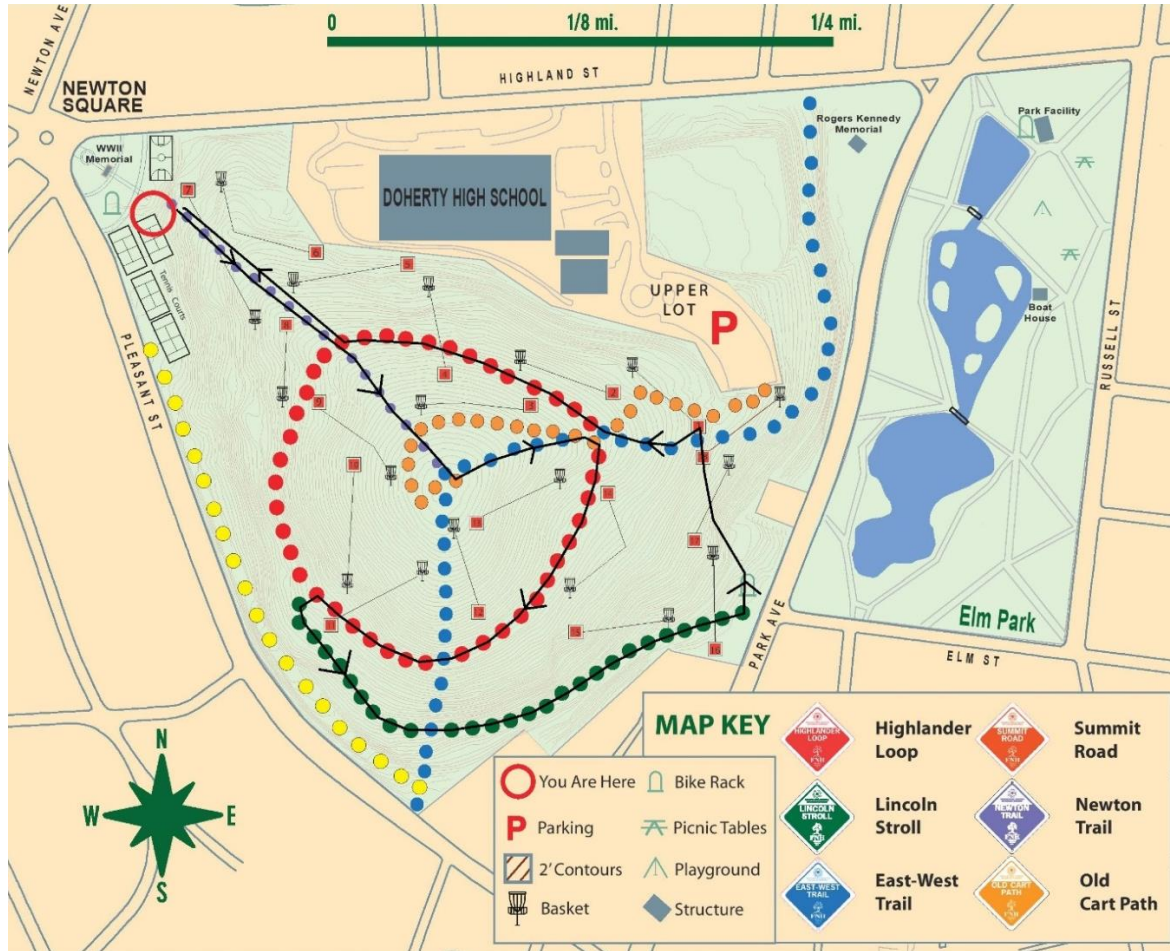
The yellow line represents the route taken for Crow Hill.

## Crow Hill Worcester



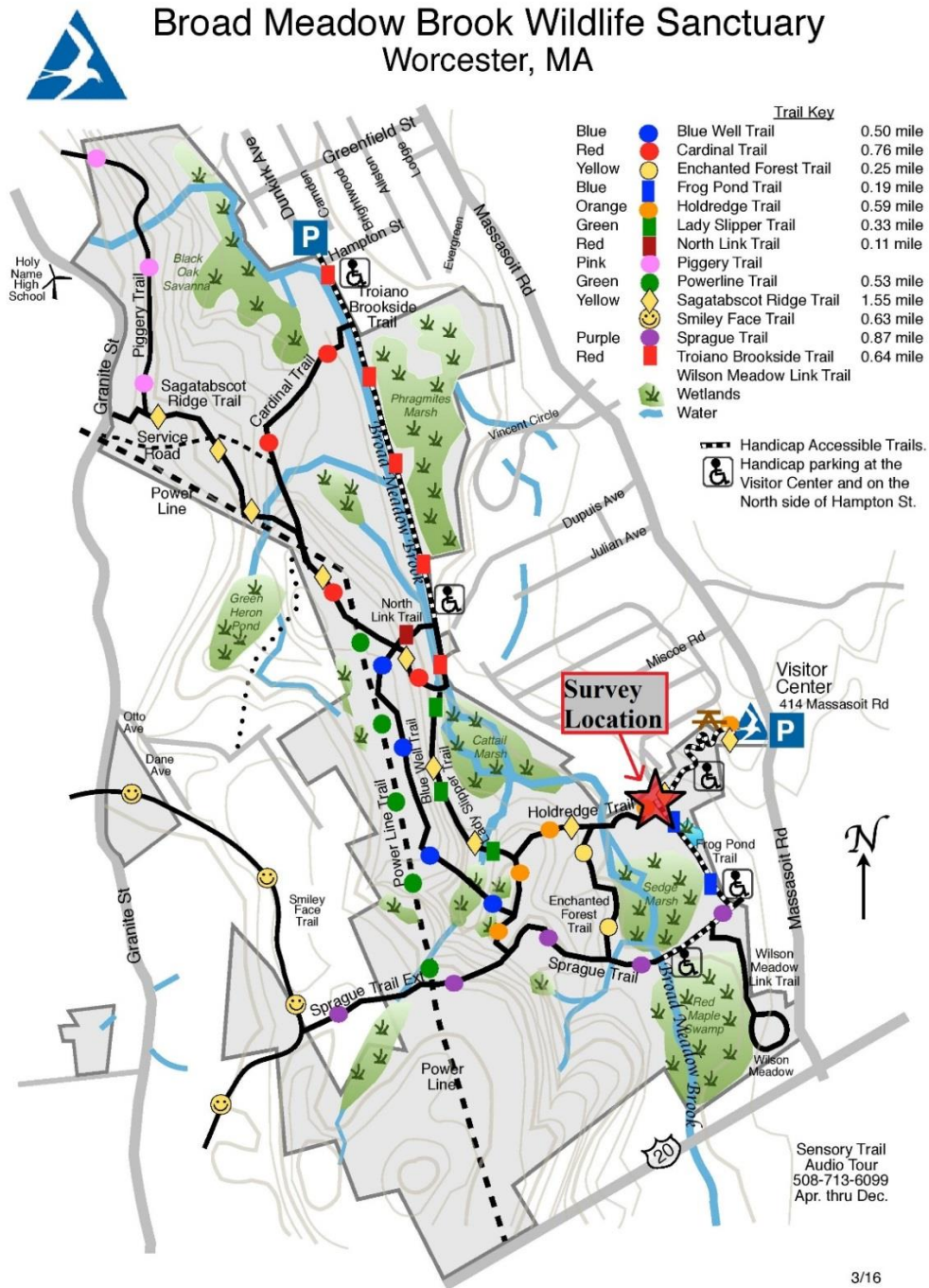
**Figure 4: Newton Hill trails and survey route.**

The black line represents the route taken for Newton Hill.



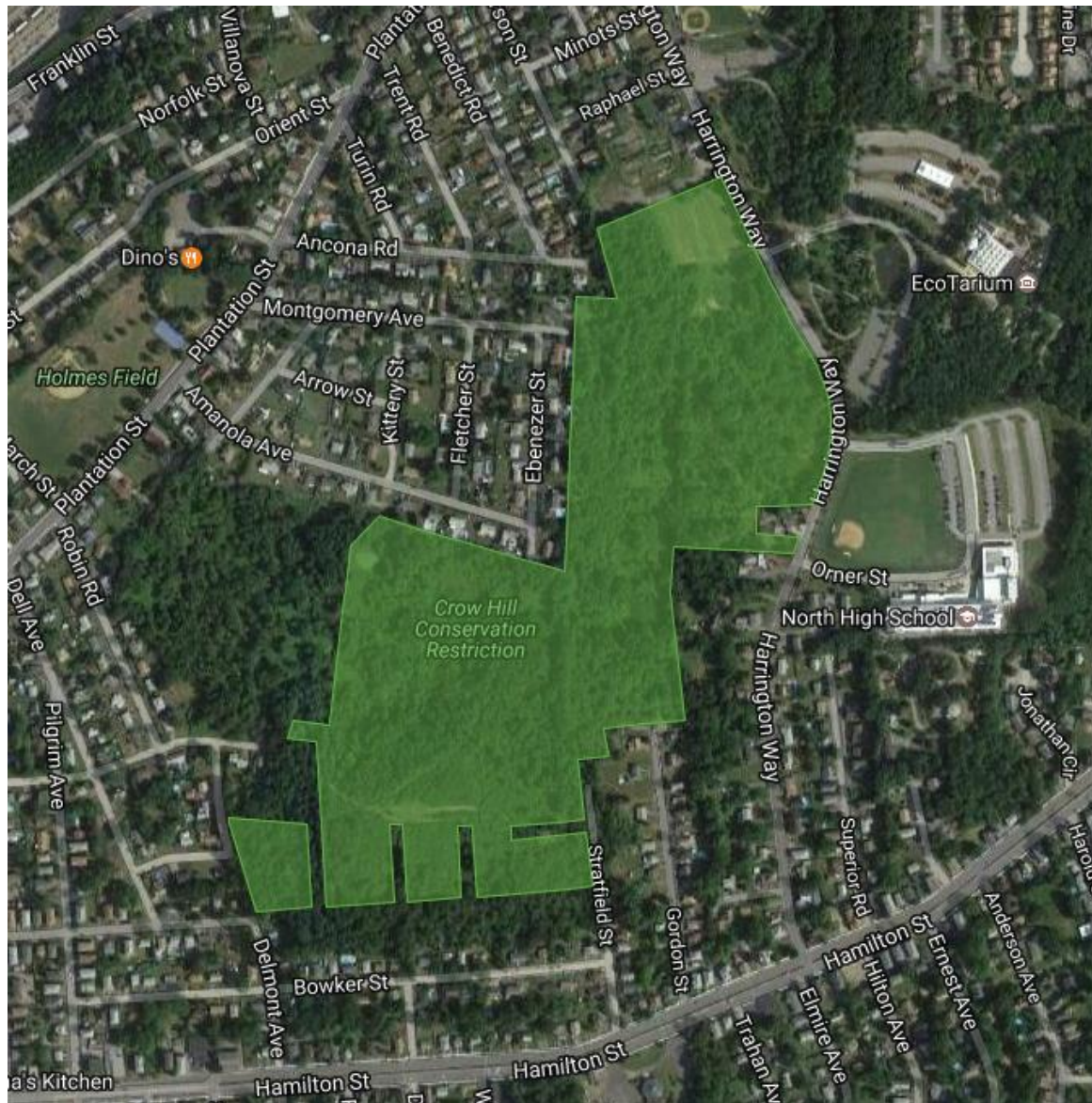
**Figure 5: Broad Meadow Brook and survey location.**

Survey location is represented by the red star.



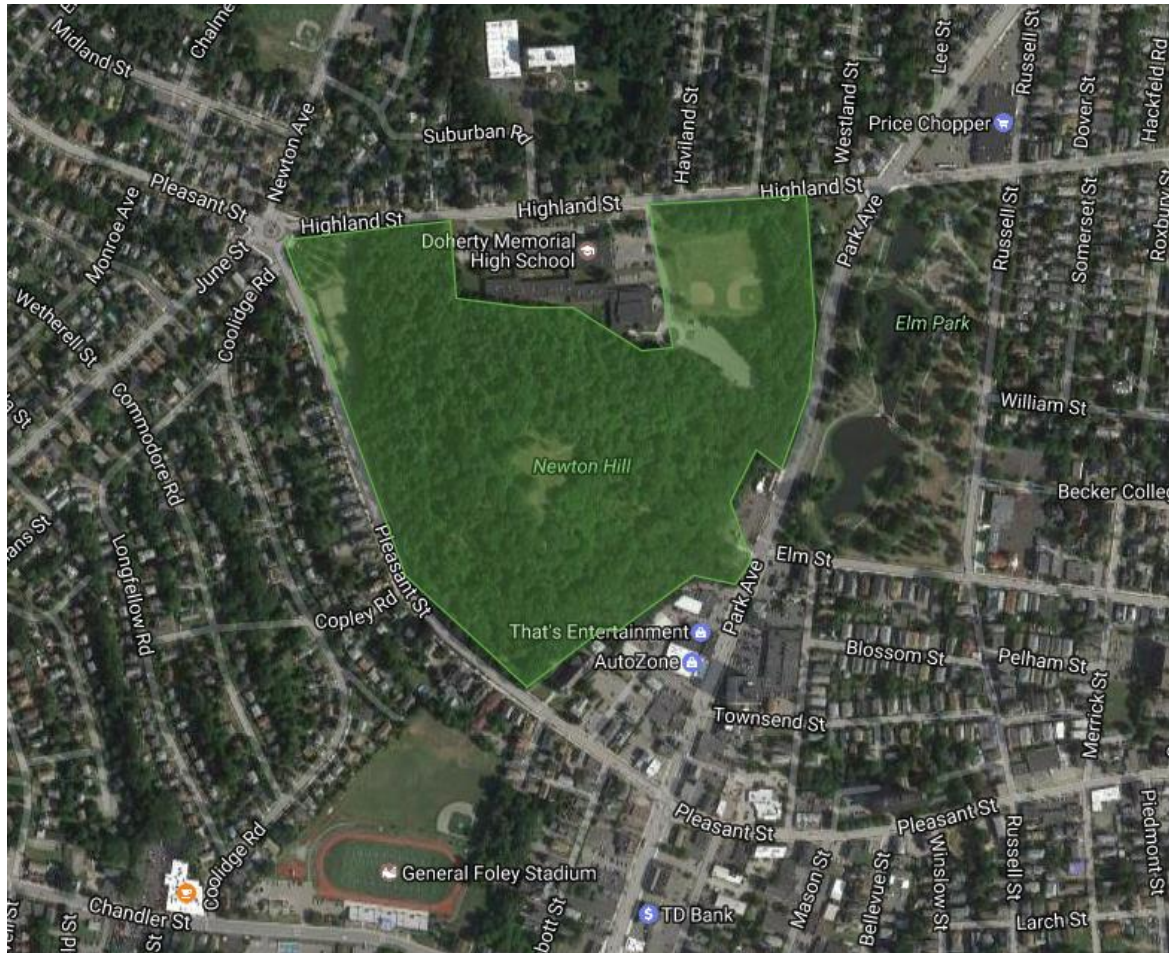
**Figure 6: Map of Crow Hill and vicinity.**

The Crow Hill urban wilds area is shaded in green.



**Figure 7: Map of Newton Hill and vicinity.**

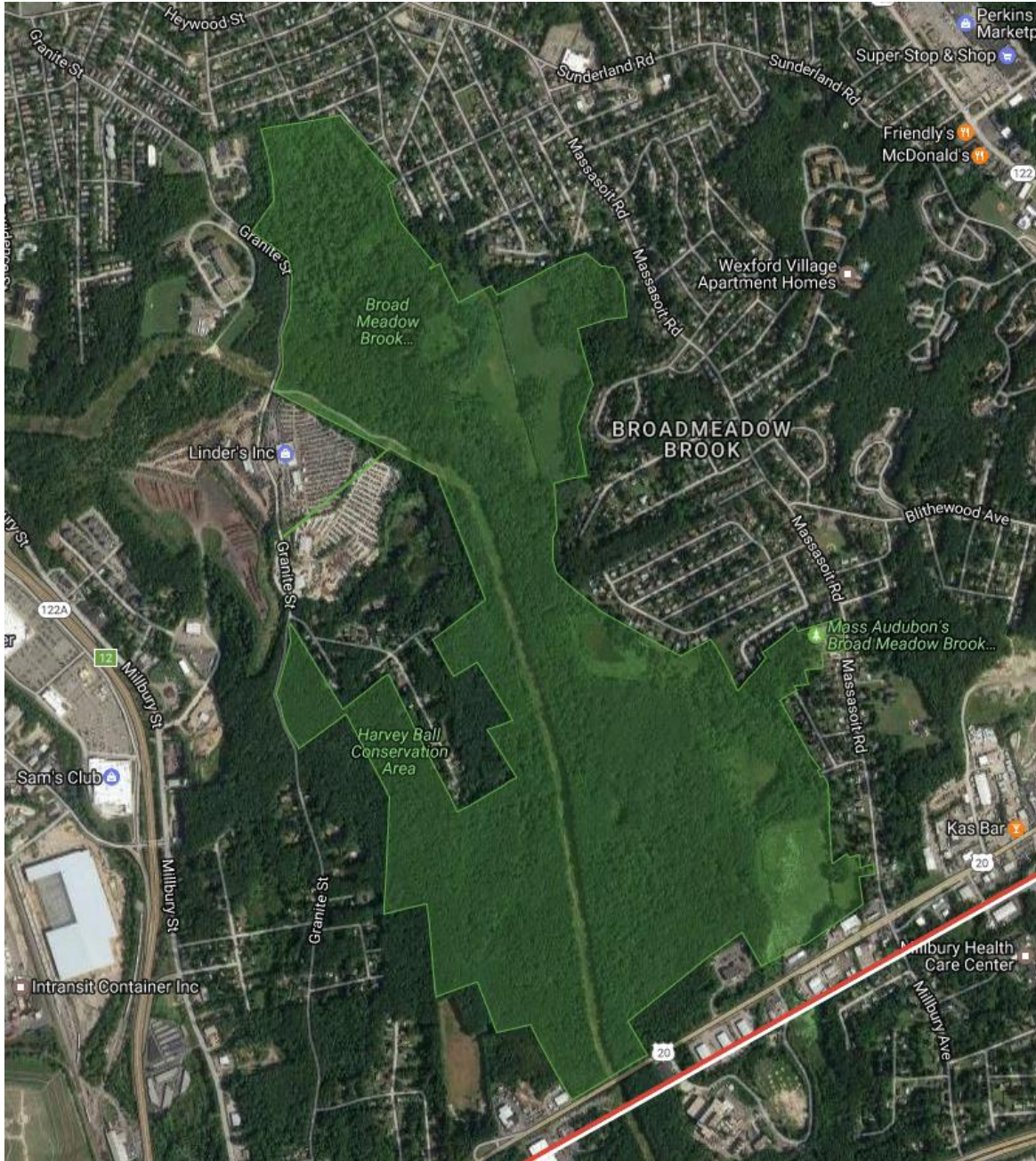
The Newton Hill urban wild area is shaded in green.





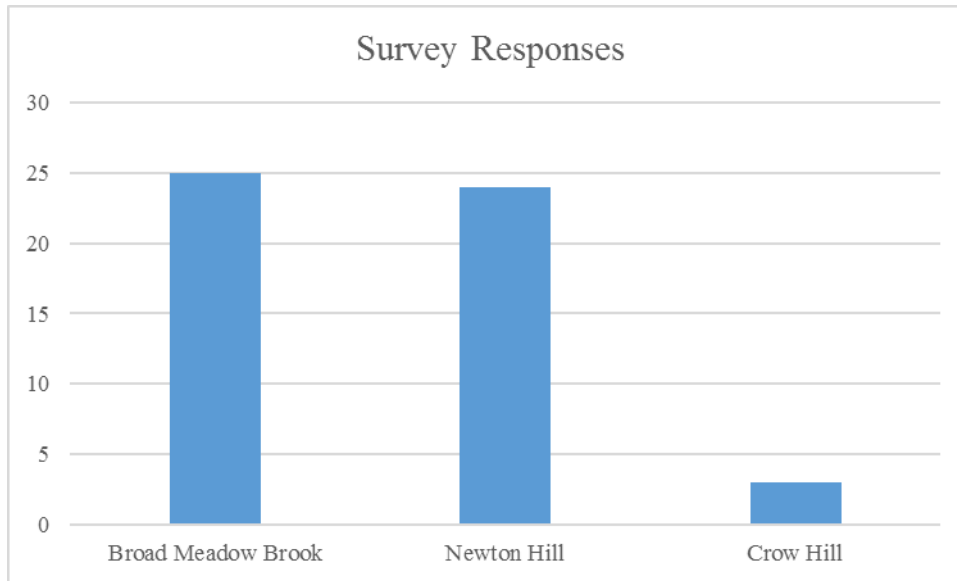
**Figure 8: Map of Broad Meadow Brook and vicinity.**

The Broad Meadow Brook urban wilds area is shaded in green.

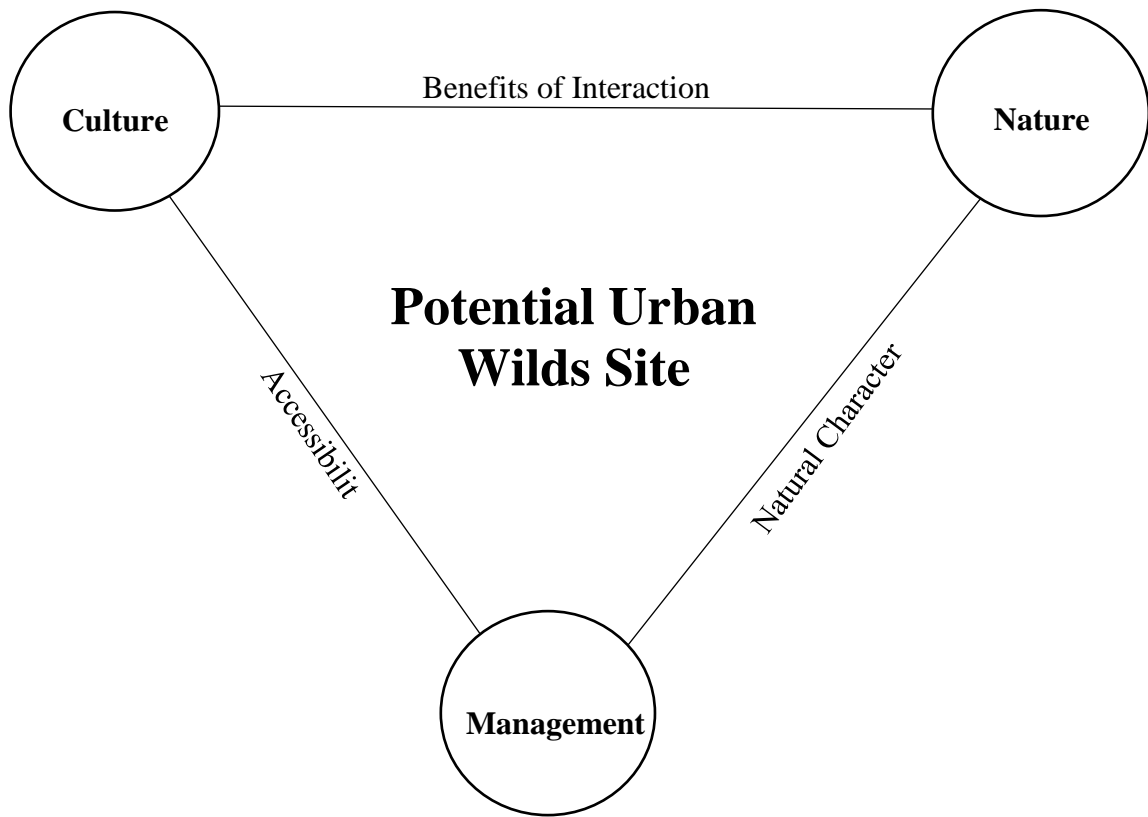


**Figure 9: Survey Responses.**

	Survey Responses
<b>Crow Hill</b>	3
<b>Newton Hill</b>	24
<b>Broad Meadow Brook</b>	25

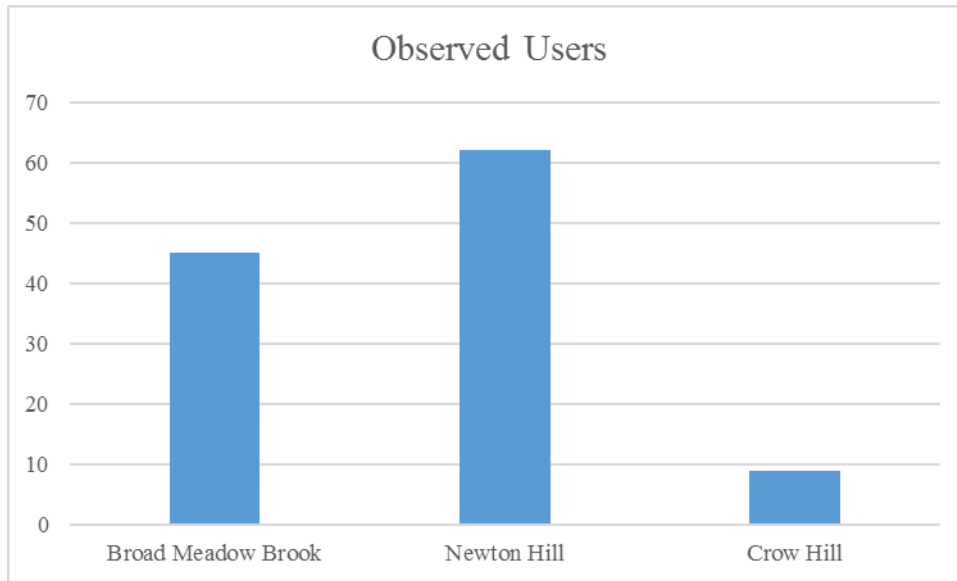


**Figure 10: Conceptual model.**



**Figure 11: Site observations.**

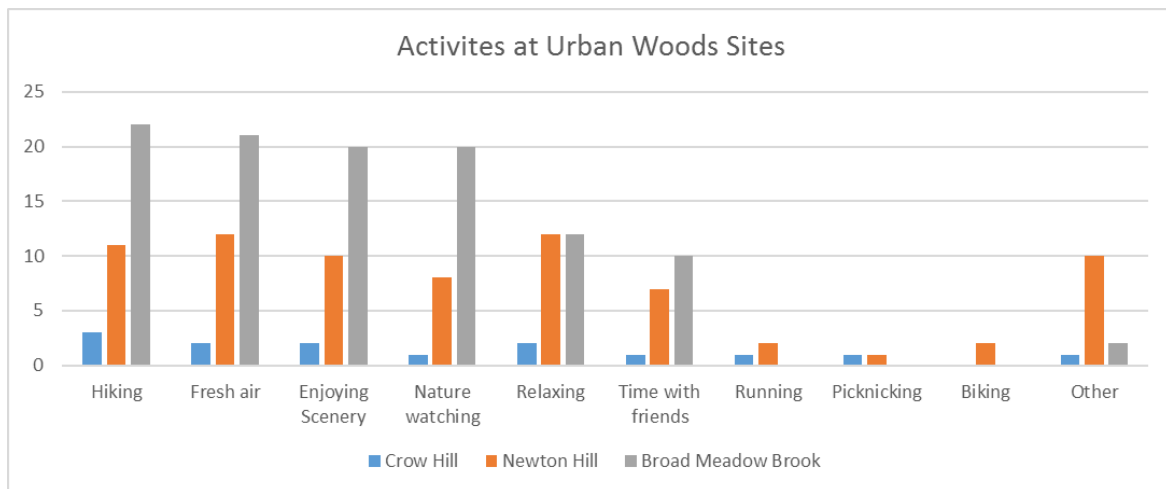
	Site users
<b>Crow Hill</b>	9
<b>Newton Hill</b>	62
<b>Broad Meadow Brook</b>	45



**Figure 12: Activities at all urban wilds sites.**

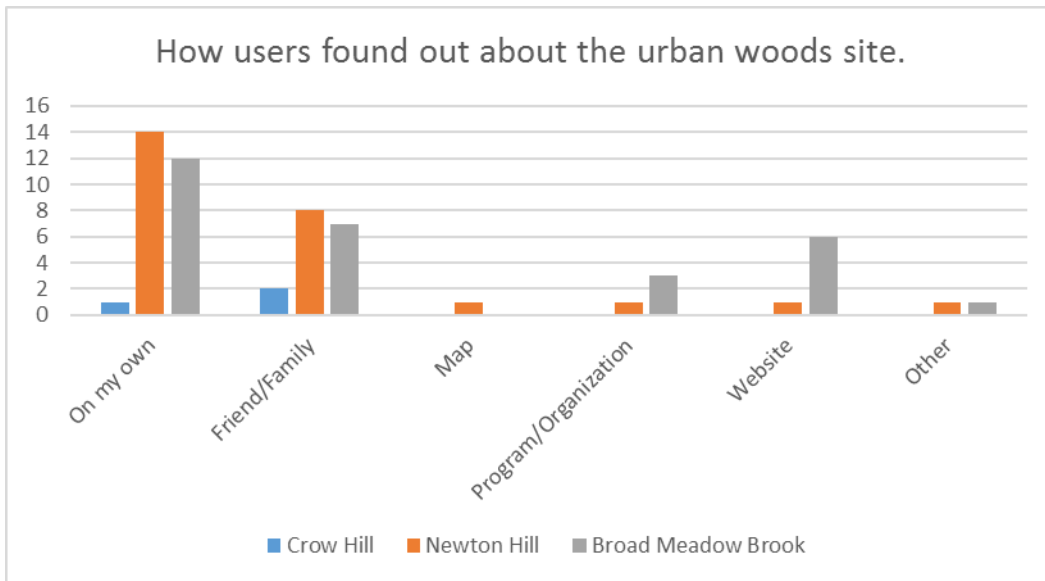
“Other” activities at Newton Hill consist primarily of disc golf (8).

	Broad Meadow Brook	Newton Hill	Crow Hill	Total
<b>Hiking</b>	22	11	3	36
<b>Fresh air</b>	21	12	2	35
<b>Enjoying Scenery</b>	20	10	2	32
<b>Nature watching</b>	20	8	1	29
<b>Relaxing</b>	12	12	2	26
<b>Time with friends</b>	10	7	1	18
<b>Running</b>	0	2	1	5
<b>Picknicking</b>	1	1	1	3
<b>Biking</b>	0	2	0	2
<b>Other</b>	2	10	1	13



**Figure 13: Responses to question “How do you know about the urban wilds site?”**

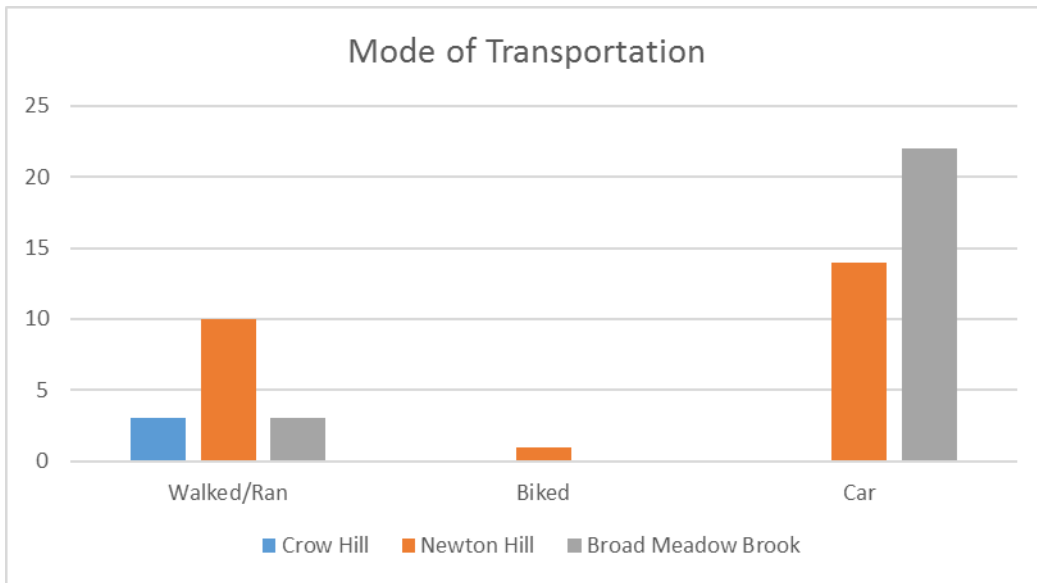
	Crow Hill	Newton Hill	Broad Meadow Brook	Total
<b>On my own</b>	1	14	12	27
<b>Friend/Family</b>	2	8	7	17
<b>Map</b>	0	1	0	1
<b>Program/Organization</b>	0	1	3	4
<b>Website</b>	0	1	6	7
<b>Other</b>	0	1	1	2



**Figure 14: Modes of transportation.**

“Public Transportation” was also an option, but it received no positive responses.

	Crow Hill	Newton Hill	Broad Meadow Brook	Total
<b>Walked/Ran</b>	3	10	3	16
<b>Biked</b>	0	1	0	1
<b>Car</b>	0	14	22	36



**Figure 15: Responses to statements.**

Value: “I value conservation lands and open space in Worcester.”

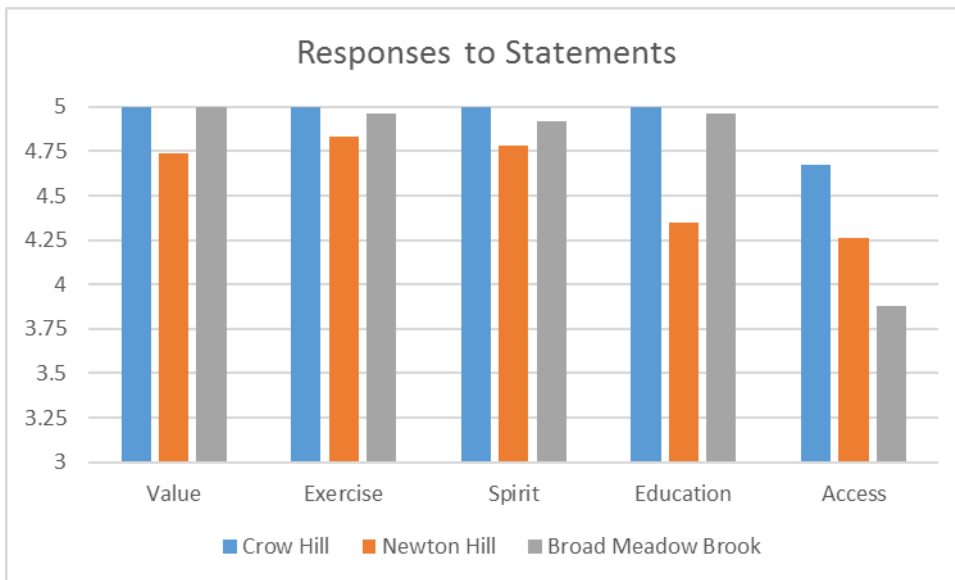
Exercise: “Open space in Worcester is a good place to exercise and get fresh air.”

Spirit: “Being in the woods is spiritually refreshing for me.”

Education: “Natural areas in Worcester provide effective educational spaces.”

Access: “It is easy to access nature in Worcester.”

	Crow Hill	Newton Hill	Broad Meadow Brook	Total
<b>Value</b>	5	4.74	5	4.88
<b>Exercise</b>	5	4.83	4.96	4.9
<b>Spirit</b>	5	4.78	4.92	4.86
<b>Education</b>	5	4.35	4.96	4.69
<b>Access</b>	4.67	4.26	3.88	4.1





## APPENDIX B: ANONYMOUS QUESTIONNAIRE

Location: [Insert site name here]

Date: [Insert date here]

**What are your favorite activities in this place? (Select all that apply)**

- Hiking |  Running |  Biking |  Relaxing |  Enjoying scenery |  Spending time with friends |  Getting fresh air  
 Nature-watching |  Picnicking |  Other (describe below)

**How do you know about this place? (Select all that apply)**

- Found on my own |  Friend or family |  Map |  Program/ social group/organization (identify below)  
 Website (identify below) |  Other (describe below)

**What was your means of transportation getting here? (Select any that apply)**

- Walked/Ran |  Biked |  Car |  Public Transit |  Other (describe below)

**Where else do you go that is similar to this place?**

**What do you like best about this place?**

**How do you feel about the following statements?**

*I value conservation lands and open space in Worcester.*

- Strongly Agree |  Agree |  Unsure |  Disagree |  Strongly Disagree

*Open space in Worcester is a good place to exercise and get fresh air.*

- Strongly Agree |  Agree |  Unsure |  Disagree |  Strongly Disagree

*Being in the woods is spiritually refreshing for me.*

- Strongly Agree |  Agree |  Unsure |  Disagree |  Strongly Disagree

*Natural areas in Worcester provide effective educational spaces.*

- Strongly Agree |  Agree |  Unsure |  Disagree |  Strongly Disagree

*It is easy to access nature in Worcester*

- Strongly Agree |  Agree |  Unsure |  Disagree |  Strongly Disagree

**(Optional) Please name a street intersection near to your home. Ex: May and June St.**

Additional comments (use other side):

APPENDIX C: INTERVIEW CONSENT FORM

**Interview Consent Form**

Title of Research Study: Community Value of the Urban Wilds

Person in charge of study: Theodore Randich, Graduate student in IDCE Department  
(860) 817-9697  
TRandich@Clarku.edu

Researcher supervisor: Kathryn Madden, Professor in IDCE Department  
617-312-4543  
KMadden@Clarku.edu

The signing of this form constitutes consent to participate in a 45 minute interview being conducted by Theodore Randich, a graduate student in the International Development, Community & Environment department at Clark University. The purpose of this study is to better understand the dynamics and benefits of urban wilds and your participation in this interview may aid in making management decisions more beneficial for both humans and the environment. For the purpose of this research, “urban wilds” are defined as undeveloped areas that contain substantial natural character despite being located in proximity to highly developed parcels of land. The interview will be audio-recorded and transcribed with permission.

Your participation in this study is entirely voluntary. You are free to terminate your participation in this research at any time, or to refuse to answer any questions to which you don’t want to respond. Your participation in this study is confidential. Neither recordings nor interview transcripts will contain names or any other information allowing identification of individual participants; participants will be identified by code number only.

Signed consent forms will be locked in Kathryn Madden’s office at Clark University’s IDCE House for storage. The forms will only be accessible to the researcher and the research supervisor, and kept separate from audio recordings and transcripts. Transcripts will be stored in electronic form only, on Theodore Randich’s password-protected computer. Recordings will be stored on a password protected computer and destroyed upon completion of the research project. If you have questions or concerns about the confidentiality of this study, you may contact Theodore Randich.

By signing below, I verify that I have read this consent form and agree to participate in this interview. I have been given a copy of this consent form.

\_\_\_\_\_ (Signature)                      \_\_\_\_\_ (Date)

\_\_\_\_\_ (Printed Name)

*This study has been approved by the Clark Committee for the Rights of Human Participants in Research and Training Programs (IRB). Any questions about human rights issues should be directed to the IRB Chair, Dr. James P. Elliott (508) 793-7152.*

## APPENDIX D: FURTHER SITE-BY-SITE DETAIL

### **Crow Hill**

#### *Natural Character*

The interaction between the management and nature of Crow Hill is embodied by the management entity's definition and conservation of "natural character" on the site. As a member-driven organization, the land-management actions of the GWLT largely stem from sentiments felt by the users of the site, many of which are bound to be GWLT members. Site users referenced a combination of the two major definitions of natural character defined in the literature review when answering what they liked best about the site. Responses included "peace," and "quiet," descriptions that align with the aesthetic definition of urban nature. Another response indicated an appreciation for the "undisturbed nature" of the site. This aligns better with the "absence of humans" definition. Additionally, respondents listed both nature sanctuaries (Trout Brook, Cascades) and city parks (Lake Park) when asked what places were similar.

The GWLT appears to manage Crow Hill with both of these definitions in mind. Since the site was conserved, removal of human influence through cleanups has been a major project. Litter on the site is still removed regularly. There is a limit to this definition, however, as old stone walls have been allowed to remain, and trails have become more and more well-traveled over time. A manager for the site referenced "usufructory rights" as a guiding principal when making decisions. The term means that, as a public space, people should have the right to do what they want on a site provided that they don't "degrade the property," or create a situation where recovery takes longer than the time spent. The

manager mentioned a situation such as dirt bike use, where it takes “a couple hundred hours trying to repair something that somebody did in about an hour,” as a breach of these rights. The GWLT has found itself managing these rights to maintain a certain natural character.

In addition to restorative management, the organization participates in active management, actually changing the landscape to fit an aesthetic. This is noticeable at the summit of the hill, where a black oak savannah is maintained through semi-annual cutting, mowing, and burning. The technique is rooted in Native American practices and persists today through intentional actions by the GWLT (cutting and mowing) and incidental fires. Both the active management practices and the adherence to usufructory rights indicates that the GWLT is trying to return Crow Hill to having a certain amount of natural character, which is loosely based in both ecological and aesthetic qualities.

### *Accessibility*

Crow Hill currently struggles with accessibility to the site, indicating a poor relationship between the GWLT and the users (or potential users) of the site. In five visits to the site, I only encountered 9 people and only had 3 surveys filled out. This is partly due the fact that Crow Hill has very little direct road frontage. Additionally, until November, there was not plentiful or obvious parking at the site. The biggest obstacle for accessibility at Crow Hill is time. Crow Hill has been a public conservation area for less than 20 years, and the GWLT representative interviewed argues that, as the site becomes more established, visibility of the site “will increase in terms of the number of people who know about it.” In the meantime, people who do use the site are predominantly locals; all

respondents to the survey walked there, and the only home neighborhood mentioned was the immediately local Hamilton/Plantation Street neighborhood. The construction of the parking lot will likely bring more car visitors.

The GWLT tackles accessibility with a variety of strategies. On the site, trail maintenance is a priority. Many trails on the site were in poor shape, and the site manager described Crow Hill's trails as needing work. The parking situation is being addressed by the new lot, which will be accompanied by an informational kiosk and bike rack. The hope is to "make it feel more welcoming," and to "send an invitation: please come here." Off the site, the GWLT uses outreach methods such as door-drops and mailings in the immediate neighborhood to increase the local awareness, and keeps Crow Hill maps available on their website and HikeWorcester.com. Most survey respondents indicated that they found out about Crow Hill from a friend or family member, indicating the importance of word-of-mouth information spread.

### *Benefits of Urban Wilds*

Crow Hill effectively provides all three of the benefits this paper identifies. Physical activity such as hiking and running were identified as primary activities on the site. Therapeutic interactions such as relaxing, enjoying scenery, and spending time with friends were cited as well. Finally, nature-watching and playing hide-and-seek with kids show the educative values of Crow Hill. Activity in the urban wilds, whether it is identifying bird species, finding differently shaped leaves, or just playing a game of hide-and-seek can be formative for young children. Respondents to the survey indicated very high levels of appreciation for Crow Hill, with high scores on four of the five value

statements. With this said, the poor connection between the management organization and the users of the site create a situation where the benefits of its use are not translated to a wide diverse population. It remains to be seen whether these benefits can expand to a broader audience as the site establishes itself through time.

## **Newton Hill**

### *Natural Character*

The management practices employed at Newton Hill maintain a unique definition of “natural character.” Folks who filled out the survey indicated a variety of natural factors in their enjoyment of the park. Responses such as “quiet,” “not crowded,” and “outdoor place in the city,” indicated an appreciation of the absence of humans. Other responses, such as “birds,” “beautiful,” and “love the woods,” drifted more in the direction of natural character as an aesthetic value. Similar sites listed by respondents included sites that were more aesthetically centered such as city parks, as well as more ecologically diverse areas such as state forests and wildlife sanctuaries. While these responses straddle the definitions of natural character outlined in the literature, there is a bent toward the aesthetic definition.

The actual management practices used at the site are much more directed toward the aesthetic approach of natural character. In an interview, a land manager explained how the site was very overgrown when FONH began in 2001. Since then, trails have been cut back to their original status as carriage paths, creating a more aesthetically pleasing landscape. The organization actively manages the site by mowing and clearing leaves off trails, maintaining a memorial orchard of fruit trees at the top, and, in recent years installing equipment for recreational activity. These actions were described by FONH as

“non-intrusive,” with many projects going through with a consensus among users. One project, the disc-golf course, received pushback due to the necessary cutting of some trees. However, FONH calls the cutting a positive impact on the site’s natural character, as it allows people to “go into other areas of the park that they never would have gone into before.” This practice exemplifies management which FONH described as “user-focused,” with a critical eye on “maintaining the natural aspect” of the site. FONH ascribes the presence of red-tailed hawks, deer and foxes as evidence of natural character. At Newton Hill, natural character is clearly still the crux of the urban wilds definition. That definition, however, is based on aesthetic value and not a lack of human influence.

### *Accessibility*

Newton Hill is very accessible to the surrounding neighborhood and the greater area, owing in large part to the well-established relationship between the site management and the users of the site. The site has been in conservation since 1888, and FONH has connected users directly into its management since 2001. The organization’s board is full of people who are neighbors to the park, many of them having lived there for a long time. Since FONH is made up of local people who are passionate and not politicians, it is easy for neighbors to get on board and support Newton Hill. Interestingly, many people in the area value the space and use it having known about the struggles it faced with abandonment and crime in the late 20<sup>th</sup> century. Now, FONH describes it as a “family environment” where people can go with their kids and feel safe. These factors are reflected in the survey, where 11 out of 24 respondents walked, ran, or biked to the park.

Additionally, 10 of the 24 respondents were from walkable neighborhoods nearby, and 8 were from Newton Square itself.

Newton Hill is also located and managed in a way that makes it accessible. In terms of location, the presence of three major road frontages makes visibility easier. A top response to what the site user liked best was the proximity to their home. Parking also is plentiful and easy to find at the major entrances to the site. The management of Newton Hill has also facilitated accessibility by creating a dynamic space available for multiple uses. Favorite features of the site listed in the survey included “well-marked, designated trails,” “disc-golf,” and “able to walking dogs,” as well as other activities. FONH calls “passive recreation” a key driver of increasing use, citing the Frisbee course, exercise course, and summer 5K race series as ways to bring people out. FONH hopes that Newton Hill becomes even more of a destination as the organization becomes more established with events and grants and makes more improvements at the site.

### *Benefits of Urban Wilds*

Newton Hill is effective as a space for the three major benefits of natural contact. Physical activity such as hiking, running, biking, and general exercising were mentioned in the survey. Relaxing, enjoying scenery, and spending time with friends were activities mentioned that fit into the mental health aspect of urban wild use. In visits to the site, there were many more site users who were too busy running, biking, or doing another form of exercise to fill out the survey. Families with children ranging from babies to teenagers were also observed spending time together. FONH encourages use of Newton Hill by families and consider it a family environment. According to FONH, school groups



including Doherty High School's Envirothon Club regularly use the site. All of these uses indicate the site's effectiveness in bringing benefits to people. Newton Hill operates with a loose definition of natural character, but this allows them to bring the benefits of urban woods to the greatest number of people.

### **Broad Meadow Brook**

#### *Natural Character*

Natural character at Broad Meadow Brook is strong, due to its size of 400+ acres with no human development besides a power line. This sentiment was shared by the site users. Some listed attributes such as "quiet," "untouched," and "diverse habitat," as reasons why they enjoyed the site. Others mentioned "natural beauty" and "clean" as qualities they enjoyed. These descriptions match with definitions of natural character in the literature. More responses at Broad Meadow Brook tended toward the natural character definition that values human absence over aesthetic appeal. This sentiment is further backed up by subjects' answers to what places were similar. Responses included many other MassAudubon sanctuaries, state reservations in Massachusetts, and even New Hampshire and Cape Cod!

Management practices at BMB are in line with the "human absence" definition. MassAudubon has two primary missions: to preserve habitat for wildlife and to bring people into nature. While MassAudubon does not by any means eliminate human presence at the site, many human activities usually associated with open space are off-limits, including running, biking, and pets. The idea goes back to usufructory rights. A MassAudubon representative explained that it can take years to create certain bird habitats,

and oblivious runners or barking dogs threaten that habitat. Other human uses, especially educational ones, are seen as more sustainable and constructive in this setting.

In addition to restricting certain uses, MassAudubon also manages BMB to increase biodiversity, ecological health, and natural character. Deviation from the trail is strongly discouraged by creating linear trails with few opportunities for stopping. The site has no trash cans, encouraging guests to eat at the visitor center before and after their visit. Invasive vegetation is managed to maintain the indigenous character of the site. Other forms of vegetation control, including poison ivy removal, are restricted to spaces frequented by humans including trails and the area around the visitor center. The organization runs weekly volunteer outings where they monitor ecological health and maintain equipment such as bird feeders and houses. All of these activities are meant to minimize the impact of humans on an environment dedicated to wildlife.

### *Accessibility*

Broad Meadow Brook is a very accessible site for users. Much of this is due to the organizational strength of MassAudubon, which has dozens of other sanctuaries around the state and is well established. Because of this, BMB was able to become a popular destination despite not being conserved until the 1990s. The sanctuary is featured on the organization's website, with information about the sanctuary and the nature center. 45 people were encountered in 5 visits to BMB. Of the 25 to fill out the survey, 22 came by car and parked at the parking lot. Visitors were from all over the city, the state, and even all over the country. Answers to the similar places question on the survey included several other MassAudubon properties and one answer that simply stated "Other MassAudubon

places.” This data is indicative of the state-wide presence of MassAudubon and the subsequent impact this has on use. There were several folks who came to BMB simply because it is managed by a familiar organization.

BMB is managed in a way that prioritizes habitat, but still allows for human use. The section of the site closest to the nature center is the most accessible. The nature center, which is accessible from the WRTA Route 22 bus, provides a welcoming home base for folks to begin hikes and get information about the site. The natural play area allows families and small children a place to use as their own. Additionally, the beginnings of the Sabatabscot Ridge Trail, the Frog Pond Trail, and part of the Sprague Trail is handicapped-accessible, with gradual slopes and a rope railing. The rest of the trails are designed to have minimal encroachment on the surrounding environment. Despite this, the trails remained marked very well, and it is difficult to get lost on the site. In the interview, MassAudubon said that one of their responsibilities working in the city is to maintain relationships with the neighbors. To accomplish this, the organization maintains several neighborhood link trails to allow neighbors easy access. Additionally, they regularly keep neighbors informed of news at BMB through mail drops.

### *Benefits of Urban Woods*

While management of the natural character of Broad Meadow Brook is a priority, and MassAudubon makes it easy to access the site, the site is not completely suitable for users to get the three benefits outlined in the literature review. Many respondents identified hiking as a primary activity at the site, a physically active use. However, the prohibition of running and biking makes physical activity more difficult than the other sites.

MassAudubon land managers readily admitted in the interview that the site is primarily suited for mental health and education benefits. Indeed, relaxing, enjoying scenery, fresh air, and nature watching received the most votes after hiking. Responses for what the user liked best include “playscape area,” “good for children,” and “education-oriented.” These responses are positive examples of mental health and education benefits.

BMB is firmly education-oriented in their approach to management. MassAudubon sees nature and culture as compatible through sustainable interactions such as education. To achieve this, BMB hosts school programs and programs aimed at families with children of all ages. One such program—Real Math Real Science—brings out almost every 5<sup>th</sup> and 6<sup>th</sup> grader from across Worcester to apply math and science to the natural world. BMB also runs a drop-in playground program at Elm Park and Green Hill Park. MassAudubon explained in an interview that the goal of these programs is to give children a taste of nature that they might have never had. The organization recognizes that many of the people working there and at other environmental organizations had strong outdoor backgrounds as children, and wants to provide a setting for children in Worcester to develop similar backgrounds. Overall, BMB is extremely effective in providing educational and mental health benefits, and less focused on active living benefits.

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