A stewardship plan for the Franklin Park wilderness

by

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A REPORT

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Abstract

Urban woodlands are essential to the health of cities. Urban woodlands produce oxygen, absorb noise and harmful particles, and improve mental health and cognitive development (Thomas & Packham 2007). Within Boston, Massachusetts, the 85-acre urban woodland known as the Wilderness in Franklin Park is overgrown and unmanaged, lowering its potential to achieve these benefits. While the 2022 Franklin Park Action Plan identified a need for ecological restoration within the park and provided detailed recommendations, the document did not go in-depth on how to make the restoration happen (City of Boston Parks & Recreation 2022). Although many potential forms exist for ecological restoration, an approach driven by stewardship, which generates social and environmental benefits throughout the process, may be most suitable for Franklin Park. A stewardship plan is both a management tool for local municipalities and land managers and an educational process for volunteer stewards and community organizations (Wood 2019). Methods of site analysis and precedent analysis were used to inform the development of the stewardship plan for the Franklin Park Wilderness. Site analysis revealed the areas where ecological restoration is needed most. Findings from the precedent analysis provided examples of successful ecological restoration practices and stewardship plans used in other urban park woodlands. The structure of the proposed stewardship plan for the Franklin Park Wilderness was based on the "Urban Forest & Natural Areas Stewardship Planning Guide" (Green City Partnerships 2014) and includes recommendations on how stewards can be involved in various restoration efforts across a ten-year period. Ultimately the Stewardship Plan for Franklin Park provides the City of Boston Parks and Recreation Department guidance on ecologically restoring the Wilderness with help from community stewards and volunteers. The results of this study contribute to a broader discussion on ecological restoration through a stewardship plan and demonstrate how other urban park woodlands can use community stewards and volunteers to support ecological restoration efforts.

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Caleb Payne
Landscape Architecture Master's Report 2023

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Urban woodlands are essential to the health of cities. Urban woodlands produce oxygen, absorb noise and harmful particles, and improve mental health and cognitive development (Thomas & Packham 2007). Within Boston, Massachusetts, the 85-acre urban woodland known as the Wilderness in Franklin Park is overgrown and unmanaged, lowering its potential to achieve these benefits. While the 2022 Franklin Park Action Plan identified a need for ecological restoration within the park and provided detailed recommendations, the document did not go in-depth on how to make the restoration happen (City of Boston Parks & Recreation 2022). Although many potential forms exist for ecological restoration, an approach driven by stewardship, which generates social and environmental benefits throughout the process, may be most suitable for Franklin Park. A stewardship plan is both a management tool for local municipalities and land managers and an educational process for volunteer stewards and community organizations (Wood 2019). Methods of site analysis and precedent analysis were used to inform the development of the stewardship plan for the Franklin Park Wilderness. Site analysis revealed the areas where ecological restoration is needed most. Findings from the precedent analysis provided examples of successful ecological restoration practices and stewardship plans used in other urban park woodlands. The structure of the proposed stewardship plan for the Franklin Park Wilderness was based on the “Urban Forest & Natural Areas Stewardship Planning Guide” (Green City Partnerships 2014) and includes recommendations on how stewards can be involved in various restoration efforts across a ten-year period. Ultimately the Stewardship Plan for Franklin Park provides the City of Boston Parks and Recreation Department guidance on ecologically restoring the Wilderness with help from community stewards and volunteers. The results of this study contribute to a broader discussion on ecological restoration through a stewardship plan and demonstrate how other urban park woodlands can use community stewards and volunteers to support ecological restoration efforts.

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Acknowledgments

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Finally, I want to thank all my classmates who have shared this journey with me. Your camaraderie and support have made my college experience unforgettable. Thank you all.

INTRODUCTION

Figure 1.2 - A Hike in the Franklin Park Wilderness

Introduction

Franklin Park is a 527-acre urban park in Boston, Massachusetts (Figure 1.3). It was designed by Frederick Law Olmsted in the late 1800s. Franklin Park is considered the "Crown Jewel" of the Emerald Necklace, a 1,100-acre chain of parks throughout Boston, shown in Figure 1.4. Olmsted believed that urban residents needed opportunities to experience nature within the city and that large public parks could provide connections with nature. (City of Boston Parks and Recreation 2022; Emerald Necklace Conservancy 2022)

Olmsted, considered to be the father of Landscape Architecture in the United States, designed Franklin Park as two distinct zones: the Country Park and the Ante Park. The intent of the Country Park was to offer passive enjoyment and leisurely walking opportunities within two central features, an open meadow and a woodland area. The geological features of the site provided a varied experience for park visitors. Acknowledging the need for active programming, Olmsted created the Ante Park with more formal design intentions for sports, play, and urban promenading. Franklin Park's juxtaposition of the two zones allows it to be loved by both passive and active recreation users. However, over time, incremental changes have been made to the park, including the addition of several structures, a golf course, a zoo, and a hospital, thus eroding Olmsted's original design and splitting the park into disconnected areas (City of Boston Parks and Recreation 2022).

Approximately 85 acres of Franklin Park is an urban woodland called the Wilderness. The Wilderness is a critical urban woodland in Boston, constituting almost eight percent of the land mass of the Emerald Necklace. Elevation changes and a dense tree canopy are signature features of the Wilderness. Olmsted intended visitors to stroll and explore this urban wild, with long views hidden by topographic changes and vegetation until guests arrived at the best lookout locations. Much of the woodlands was purposefully planted, though its arrangement is more natural and includes an understory layer. The woodland provided contrast and a backdrop to the central open meadow, creating an immersive and shaded separation between the park and the city. The state rock of Massachusetts, Roxbury Conglomerate, also known as Roxbury Puddingstone, is present throughout the woodland, thus making the soil shallow with low stormwater infiltration rates (City of Boston 2015; City of Boston Parks and Recreation 2022). The thin soil also makes it hard for large trees to thrive in this space.

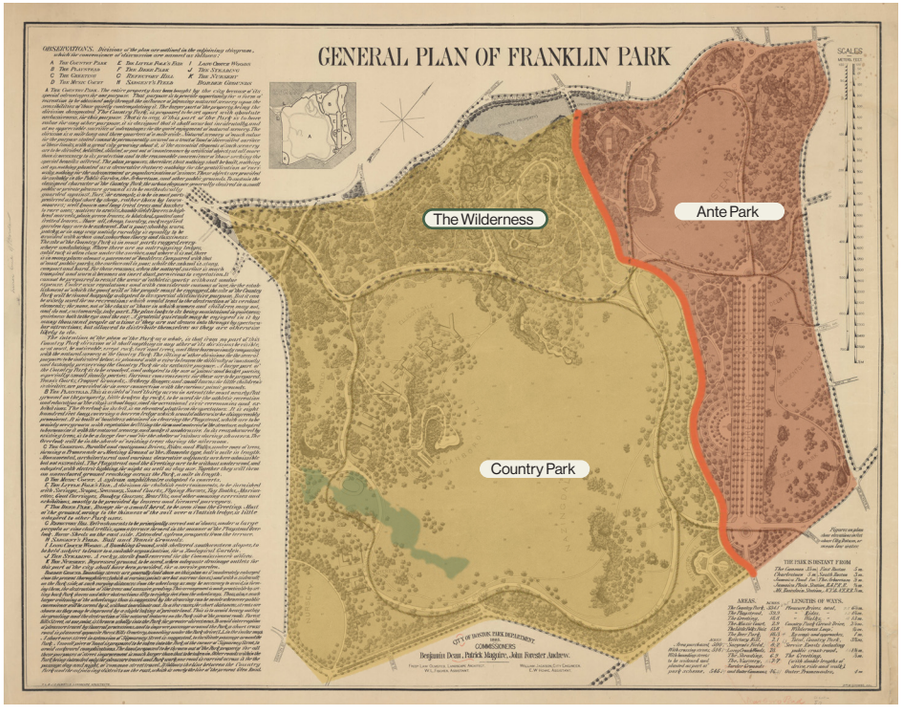

Figure 1.3 – Olmsted's Original Design for Franklin Park (Modified from Frederick Law Olmsted National Historic Site 1885)

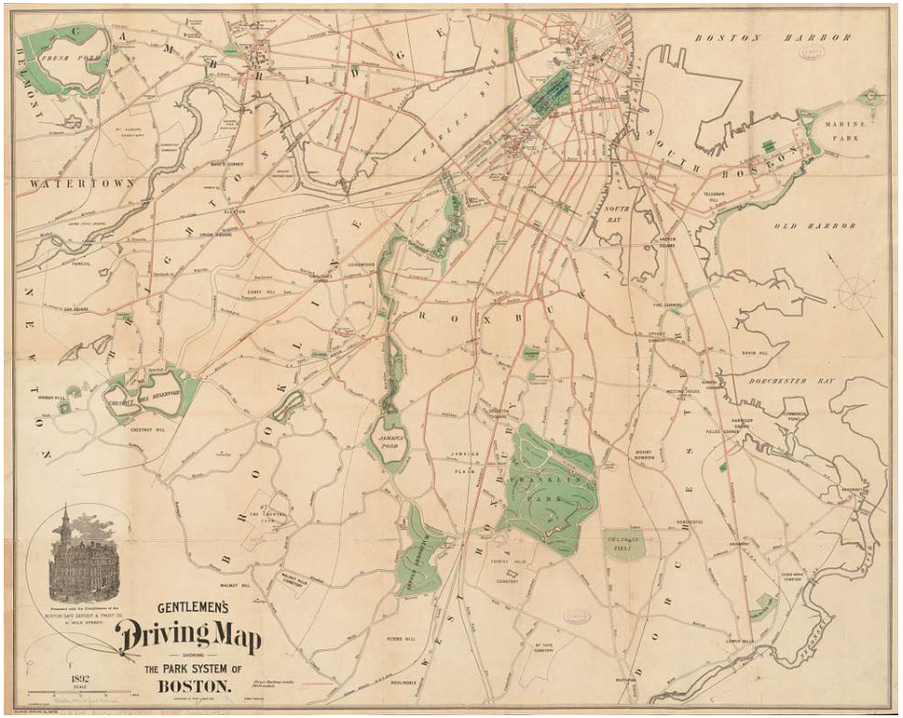

Figure 1.4 – Emerald Necklace (Boston Public Library 1892)

Before Olmsted designed Franklin Park, the site was known as the West Roxbury Park and it consisted of woodland, meadow, and farmland. The original footprint of the woodland was about 65 acres (NPS n.d.). In the design of Franklin Park, Olmsted decided to increase the extent of the woodland by proposing an additional 20 acres be added, coning the newly expanded woodland area as 'The Wilderness.' Olmsted's Wilderness was planted with native species to create a meandering and exploratory woodland.

Though the Wilderness is a distinct area and iconic landscape within Franklin Park, its ecological health is in peril due to years of deferred maintenance, heavy use by park-goers, and the emergence of invasive species and threatening pests. Tree regeneration is coming to a standstill because of an overgrown canopy and invasive species dominating the woodland understory.

Franklin Park Action Plan

To address Franklin Park's many ecological, infrastructural, and programmatic issues, in 2018, the City of Boston Parks and Recreational Department hired a team of design professionals to evaluate Franklin Park and develop a plan to improve the park in the coming years. To inform final recommendations, a robust community engagement process was used to understand the community's needs and wishes. This process included a community survey and various engagement activities. In 2022, the Franklin Park Action Plan was published. The Action Plan identified a pressing need to return the park to its original principles:

"linking people and landscape, and cultivating access to natural open space and outdoor recreation in the belief that this enhances our daily lives, improves public health, and promotes civic discourse" (City of Boston Parks and Recreation 2022, 39).

The Franklin Park Action Plan presents forward-thinking, visionary recommendations that are practical and "action-oriented." The recommendations are based on community feedback and expert input from planners, designers, and key consultants. One of the plan's central recommendations is to have the woodlands on-site be ecologically restored, which was identified as a project priority by adjacent communities through surveys. This ecological restoration would include removing invasive species, adding new plants, and improving trails and wayfinding (City of Boston Parks and Recreation 2022; Reed Hilderbrand 2023).

The recommendations of the Franklin Park Action Plan are a result from three years of research and consultation with the community and park stakeholders, and they acknowledge that the park is a landmark American public space – a landscape of cultural, social, and ecological significance.

The Franklin Park Action Plan was created through private-public partnerships between the City of Boston, Boston Parks and Recreation, Franklin Park Coalition, Emerald Necklace Conservancy, Agency Landscape + Planning, Reed Hilderbrand, MASS Design Group, and other agencies. In addition to those partnerships, the communities in the surrounding neighborhoods, which are Roxbury, Dorchester, Mattapan, Roslindale, and Jamaica Plain, had a voice throughout the process. Reed Hilderbrand, Agency Landscape + Planning, and MASS Design Group lead the 14-consultant team. This is the first comprehensive plan for Franklin Park in almost 30 years.

The recommendations that debuted in the December of 2022 Franklin Park Action Plan advocate for thoughtfully guided, community-driven improvements grounded in a deep understanding of the park's historic fabric and ecological systems and implemented through continued, dedicated investment so that the park can do what it does now, only better (City of Boston Parks & Recreation 2022).

Findings from the community engagement process helped the plan's authors develop values, goals, and recommendations for all aspects of the park, including its ecology. See Figure 1.5 for a summary.

What The Action Plan Heard from the Franklin Park Community

Needs & Wishes

Balance Ecology & Experience

"I think more needs to be done, or prioritized, to improve the ecological health of the park. This is the most pressing issue for our city at this moment in history."

"Nature in this park has been long neglected. If you did nothing more than care for trees, shrubs, get rid of invasives, and create native plant habitats, I would be thrilled."

"I hope for us to maintain a healthy environment in absorbing the beauty and love nature provides, not only for us, but for future generations to come."

"I hope for us to maintain a healthy environment in absorbing the beauty and love nature provides, not only for us, but for future generations to come."

"I think that care for the flora across the park is important, but also important is keeping the wild aspect of some of the woodlands, since that brings a rare bit of wild nature into the city!"

Values & Goals

Park Character	Preserve the park's natural character & enhance its beauty and seasonal display
Habitat & Natural Systems	Implement park-wide strategies to make ecological improvements including habitat, stormwater management, and biodiversity
Public Health	Protect the park's ecological infrastructure so that it may serve its neighbors for decades to come
Ecological Management	Use innovative management and maintenance strategies that increase the standard level of care for the park's many landscape types
Climate Change	Promote resilient and self-sustaining park ecologies

Recommendations

Regenerate the woodlands

Preserve heritage & Legacy Trees

Introduce buffers & redesign lawns to increase durability & diversity

Redirect, collect, & clean stormwater to strengthen water systems & improve drainage

Figure 1.5 – Franklin Park Action Plan's ecological recommendations process
Adapted from (City of Boston Parks and Recreation 2022, 343)

One of the stated recommendations to improve and balance the park's overall ecology and experience, is to regenerate the woodlands (City of Boston Parks and Recreation 2022, 343, 348). The Franklin Park Action Plan notes several key challenges that need to be considered and addressed when regenerating the woodlands: climate change & adaptation, pests & diseases, invasive species, and a lack of species diversity due to the single-age canopy (City of Boston Parks and Recreation 2022, 348). To address the key challenges while also balancing the park's ecology and experience, the following restoration and management recommendations were suggested for the woodlands:

- Target key pests & diseases to protect tree species at risk
- Remove invasive species to kick-start natural regeneration
- Reconnect woodland cores to improve valuable habitat
- Reforest decommissioned trails to increase diversity
- Plant along circulation to enhance experience & habitat

A second overall ecological recommendation, which also applies to the woodland area, is to preserve heritage and legacy trees. Key challenges facing the trees are an aging canopy, deferred care and environmental stress, and pests and diseases (City of Boston Parks and Recreation 2022, 364). The Franklin Park Action Plan suggests setting standards for tree care to manage the trees for long-term stability.

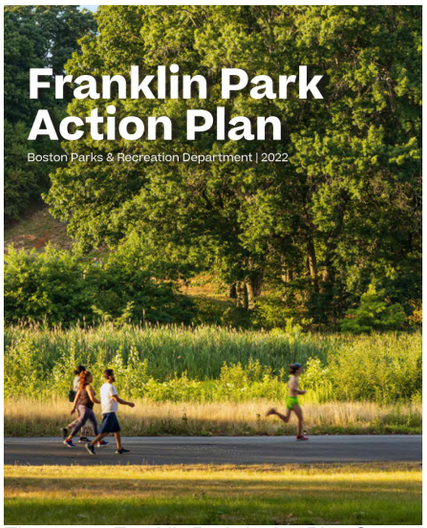

Figure 1.6 – Franklin Park Action Plan Cover
(City of Boston Parks & Recreation 2022)

The Franklin Park Action Plan developed six recommendations that suggest how the woodlands should be managed for ecological health and community use (City of Boston Parks and Recreation 2022, 350).

Remove Invasive Species

"Address colonization of invasive shrubs and trees that are outcompeting native plants to jumpstart natural regeneration of the woodlands."

Thin Understory & Open Views

"Selective thinning of vegetation not only allows more light to reach the ground layer of the forest, increasing natural regeneration, it also allows important viewsheds to be reclaimed, enhancing visitor experience."

Seed & Plant Native & Evergreen Species

"Following invasive removal efforts, increase diversity for improved ecosystem health through seeding and planting native species. Increase critical year-round habitat by integrating evergreen species in new planting efforts."

Reconnect Woodland Cores

"Join select critical areas of woodlands separated by major circulation routes by interplanting trees to fill large gaps in the canopy habitat and/or narrowing paved paths."

Minimize Circulation Paths

"Decrease opportunities for invasive species repopulation by minimizing the number of paths and trails throughout natural areas and reforesting decommissioned trails. Keep path widths to a minimum to preserve important habitat."

Balance use with Ecological Health

"Concentrate heavier impact modes of movement – like biking, running and walking – along the new Circuit Loop. Limit program in the woodlands to 'lighter touch' activities like hiking, bird watching, and taking in park views to preserve the long-term health and resilience of these ecosystems."

Project Dilemma

The Franklin Park Wilderness is in ecological decline. By rehabilitating the ecosystems within the Wilderness, restoring the Wilderness to its historical trajectory is possible. This will enhance the Wilderness' ability to cope with the effects of climate change, enhance the living conditions of wildlife, and stabilize a priceless health asset for local communities (City of Boston Parks and Recreation 2022).

Though the Franklin Park Action Plan provided some fairly detailed restoration and management recommendations, it stopped short of presenting a complete ecological restoration plan. Recognizing an opportunity to further the recommendations, this study proposes a stewardship plan that can be used to guide the ecological restoration process in the Franklin Park Wilderness. A stewardship plan is a comprehensive strategy that outlines how a particular area of woodland can be managed, protected, and sustained over time. A steward is an individual or group of individuals who have a personal stake in taking consistent and relevant actions over time to guarantee the success of a restoration process. Stewards are a critical resource for cities, as they allow for the utilization of volunteer labor, which reduces the financial burden on the city. To ensure that the ecological restoration of Franklin Park's Wilderness provides social benefits, this project asks:

What should a Stewardship Plan for the Franklin Park Wilderness entail to ensure the ecological restoration process creates social and environmental benefits?

Secondary Questions

- How can the City of Boston foster connections between people and nature through the ecological restoration of the Franklin Park Wilderness?
- How can the Boston Parks and Recreation Department galvanize an informed, involved, and active community to support the ecological restoration and stewardship of shared natural areas?
- What steps can be taken to enhance the long-term sustainability of the urban Wilderness, such as removing invasive plants and establishing the resources necessary to carry the restoration program into the future?

Project Goals

- Outline the components of a Stewardship Plan and what aspects are most applicable to Franklin Park
- Provide the various ways community members can engage and assist in ecological restoration practices
- Describe what ecological restoration practices, specifically invasive species removal techniques, are best suited for use in the Franklin Park Wilderness

Project Overview

The project was informed by a literature review along with methods of site analysis and precedent analysis. Findings helped to inform the development of a proposed Stewardship Plan for the Franklin Park Wilderness.

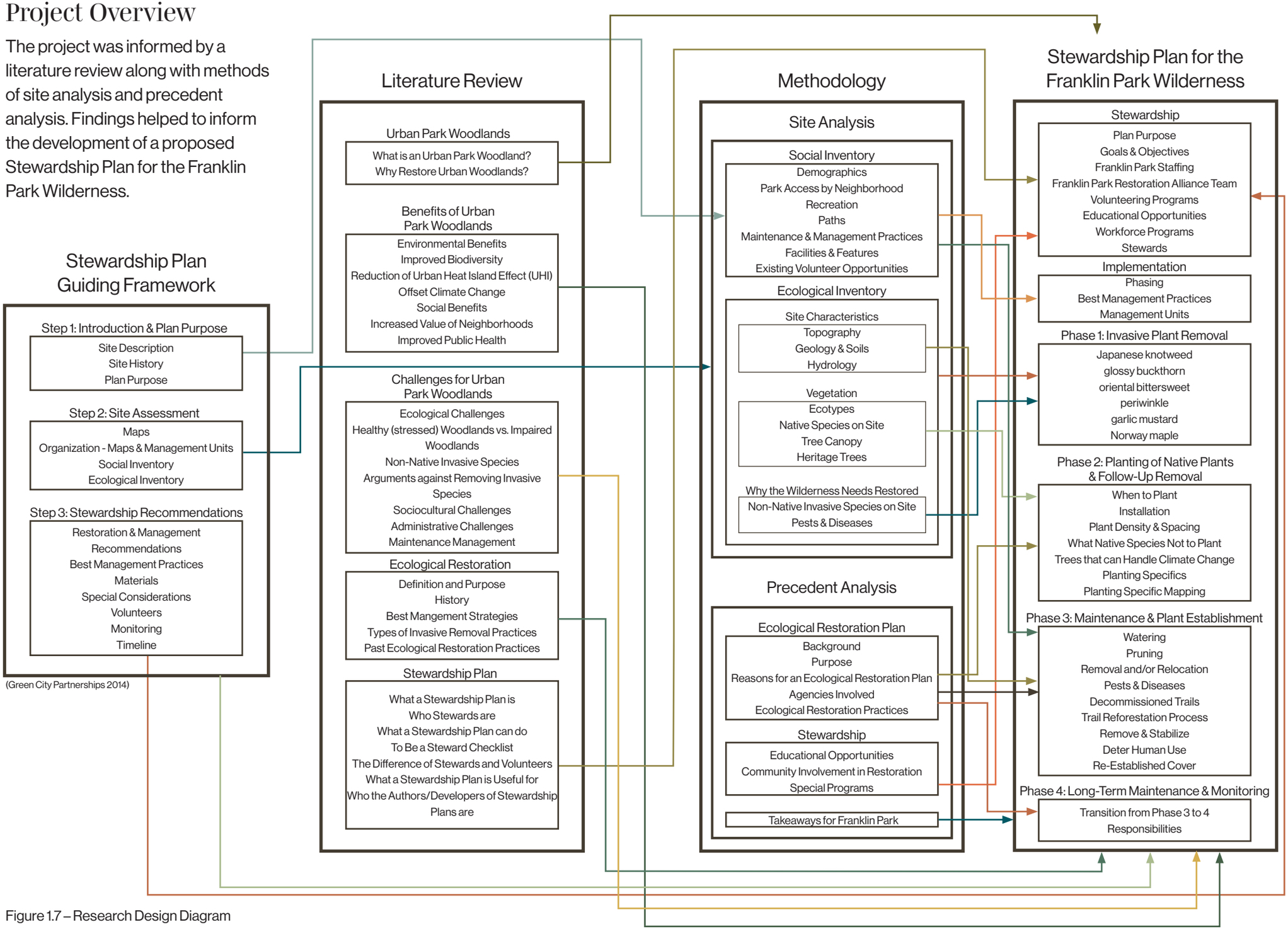

Figure 1.7 – Research Design Diagram

BACKGROUND

Figure 21 - Hidden Entrance

Stewardship Guide

In 2014, the Green City Partnership released "The Urban Forest & Natural Areas Stewardship Planning Guide" to provide a comprehensive approach to restoration planning in urban environments (Green Seattle Partnership 2014). This guide is intended to aid city staff and stewards in developing long-term plans, achievable goals, and shared visions for the care of woodlands and natural areas. The ultimate goal of the Stewardship Planning Guide is to foster an engaged and informed community, which is essential for successful environmental stewardship.

The proposed Stewardship Plan for the Franklin Park Wilderness was developed based on the layout, content, and stewardship recommendations outlined in the "The Urban Forest & Natural Areas Stewardship Planning Guide" (Green Seattle Partnership 2014). This proposed stewardship plan can serve as a valuable tool for the City of Boston Parks and Recreation Department to restore the Wilderness with the help of stewards. To understand how the Green City Partnerships Stewardship Planning Guide framework influenced the Stewardship Plan for the Franklin Park Wilderness, please refer to Figure 2.4.

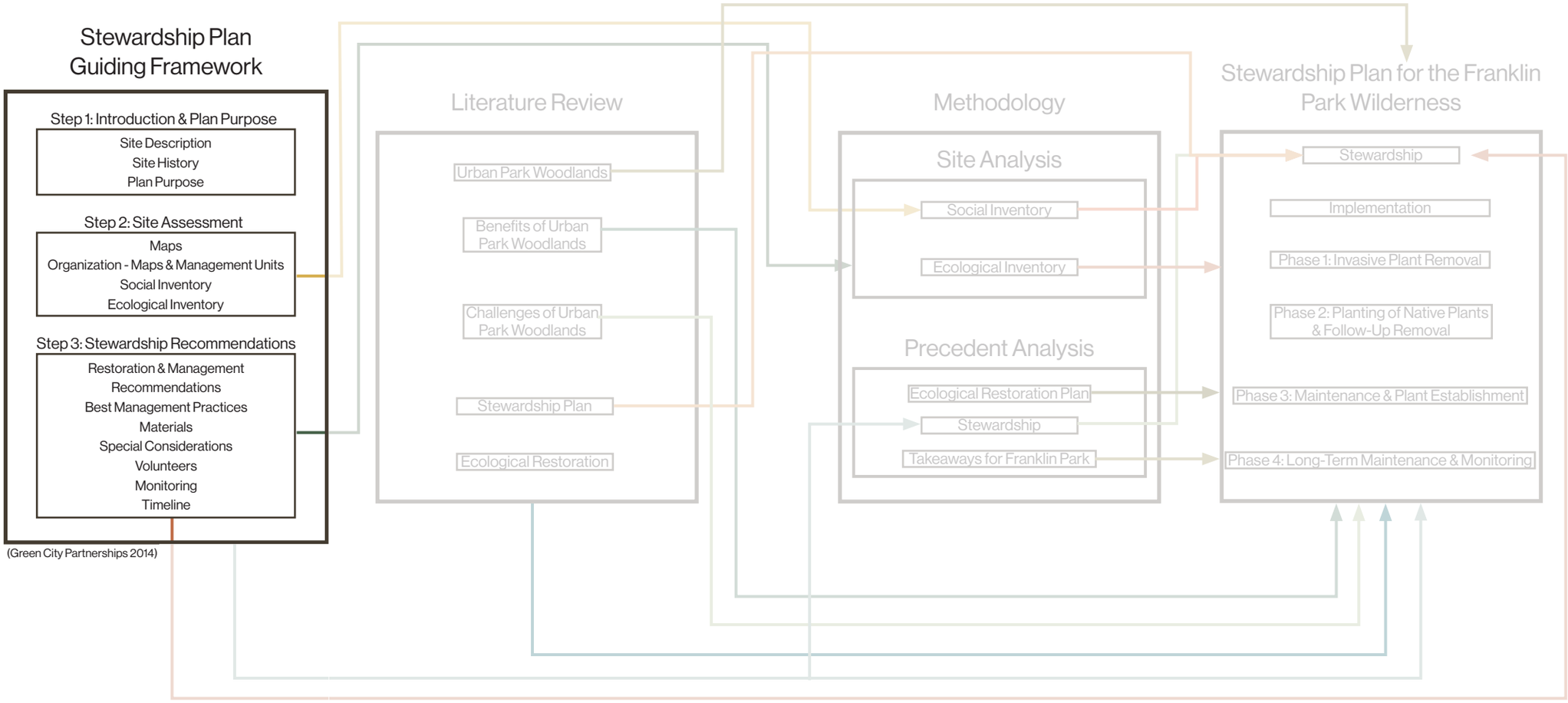

Figure 2.2 – Stewardship Guide Planning Framework Diagram

Literature Review

A literature review revealed various challenges related to maintaining urban woodlands and for implementing ecological restoration practices. Additionally, the literature helped define what a stewardship plan entails and how it differs from a traditional ecological restoration plan.

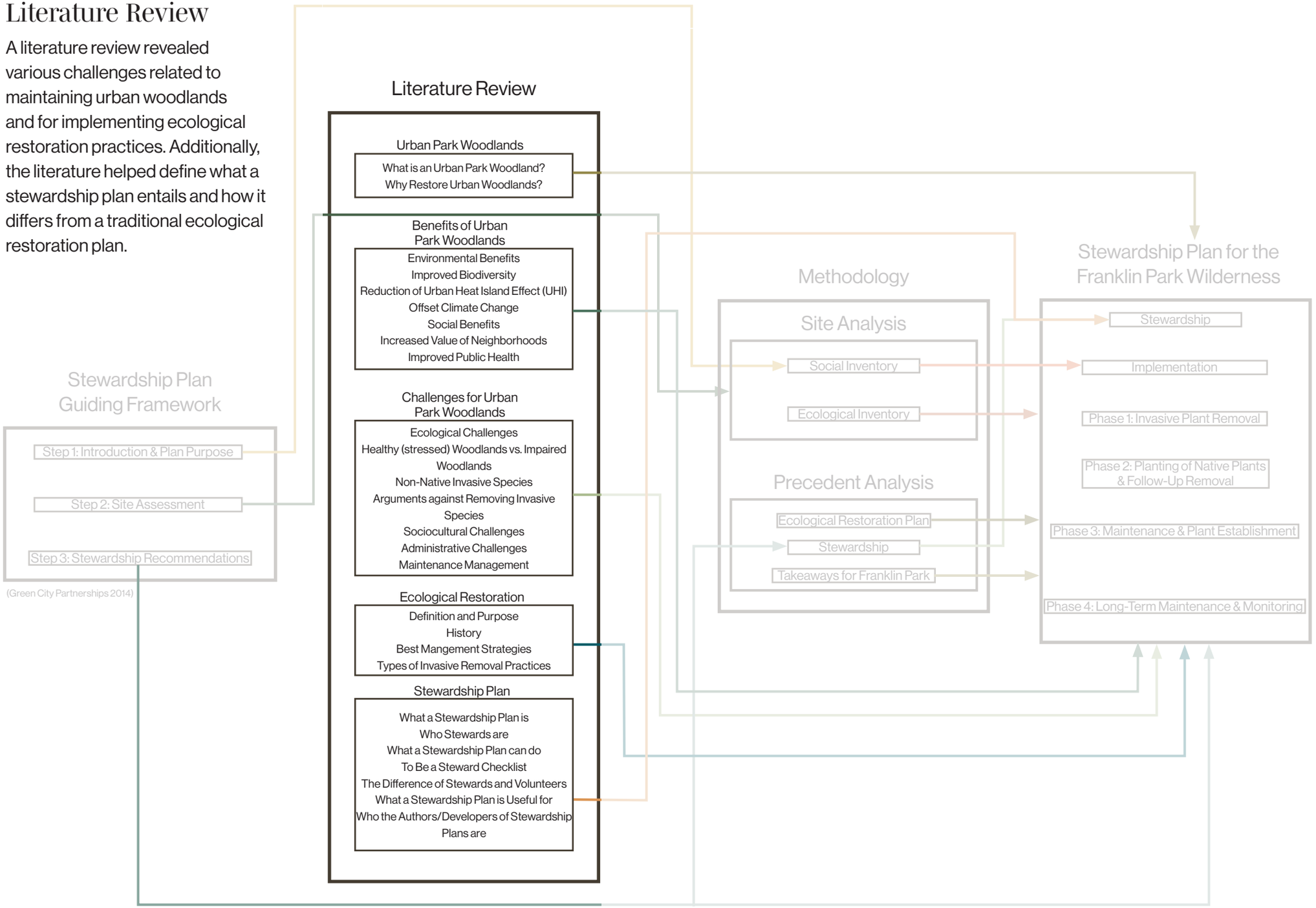

Figure 2.3 – Literature Review Diagram

Urban Park Woodlands

What is an Urban Park Woodland?

An urban park woodland is a group of trees located in an urban park. A woodland typically has a canopy with around 40% closure, meaning that 60% of the sky is visible looking up into the trees. Trees dominate urban woodlands, but many organisms live beside, beneath, and in the trees—all interacting together. Urban woodlands allow natural food chains to occur and without the woodland, many flora and fauna would be unable to exist in the urban environment. In woodlands, biodiversity is crucial for the survival of trees against invasive species and diseases (e.g., emerald ash borer, hemlock woolly adelgid, beech bark disease, and bleeding beech canker) (Thomas & Packham 2007).

Multi-storied woodlands are complex plant communities characterized by trees in the canopy layer and three additional layers below: the mid-story, the understory, and the woodland floor. All four layers are crucial to the ecological function and sustainability of the forest system. The mid-story comprises slow-growing, shade-tolerant trees well-positioned to replace the canopy layer as it ages. The understory contains small trees and shrubs, while the woodland floor consists of various small plants, such as grass and wildflowers, soil, decomposing organic matter, and a community of invertebrates and fungi that support and sustain the other layers. Each layer provides a unique habitat for a range of forest fauna (NYC Parks n.d.).

Climate, wildlife, and people are critical elements of the urban woodland ecosystem. Climate plays a vital role in determining the biological potential of woodlands, with temperature, wind, and topography influencing water availability within the woodland. The wildlife of the urban woodland includes primary consumers that eat plants, secondary consumers that eat primary consumers, and decomposers that return nutrients and organic matter to the soil. Finally, human activities can either support or harm the restoration of urban forests, with activities like vandalism and dumping undermining the woodland integrity (NYC Parks n.d.).

Why Restore Urban Woodlands?

Woodlands in urban parks provide many environmental, economic, and social benefits and are valuable assets for surrounding communities. Woodlands and forests cover around 30% of the world's surface area. They hold the most living material of all land vegetation types and are so extensive that they are among the world's most important repositories of terrestrial biodiversity (Thomas & Packham 2007).

Silviculture is the practice of both the art and science of managing forests and woodlands to ensure they are established, grown, composed, healthy, and of high quality to meet society's diverse needs and values. These needs include but are not limited to providing habitats for wildlife, restoring ecosystems, carbon sequestration, and enabling restoration activities. To achieve these goals, silviculturists use various treatments, including thinning, harvesting, planting, pruning, prescribed burning, and site preparation. Intermediate treatments like thinning improve a woodland's growth, quality, vigor, and composition after establishment (U.S. Forest Service 2014).

According to the Franklin Park Action Plan, the Wilderness canopy has low light levels that prevent germination and growth of the next generation of oak and hickory trees and understory plants that would increase diversity. The most significant canopy gaps exist along the circulation system, where invasive species are most prevalent. The circulation system also splits the woodland zones instead of one continuous zone. The canopy is overgrown, not letting the understory gather light and have new life. The soil is only a few inches deep in lots of the Wilderness because of puddingstone underneath the soil, which makes natural regeneration of oak seedlings difficult (City of Boston Parks and Recreation 2022; Emerald Necklace Conservancy 2022b)

Maintenance management and staffing is an issue for Franklin Park. Only four staff members are in charge of taking care of all 527 acres of Franklin Park. That breaks down to each person being responsible for 75 acres individually (City of Boston Parks and Recreation 2022).

As the background section stated, urban heat island is a significant concern for Boston. Franklin Park provides a natural cooling source for the surrounding community. The park helps the adjacent areas stay five to seven degrees cooler than just a few more blocks north (City of Boston 2022). The 527 open acres of Franklin Park help cool the surrounding area, but the woodlands in the park allow the area to cool at an even higher rate.

Benefits of Urban Woodland Parks

Environmental Benefits

Trees provide numerous environmental benefits, including producing oxygen and absorbing noise, dust, pollution, and carbon dioxide. An instance of this is when a fully grown beech tree, *Fagus sylvatica*, generates enough oxygen in one year to sustain ten individuals (Thomas & Packham 2007).

Improved Biodiversity

The concept of biodiversity refers to the diversity of life at all levels and in all forms. It is widely believed that ecosystem diversity is an essential indicator of ecosystem health and durability. As such, it directly impacts the benefits, resources, goods, and natural areas that can be offered to people and an ecosystem (Tyrrell et al. 2010). Biodiversity also interests the human eye, as having more plants can provide more color and texture to a landscape.

Reduction of Urban Heat Island Effect (UHI)

Buildings absorb heat during the day and re-radiate it at night, causing ambient temperatures to increase by seven degrees Fahrenheit (Nowak et al. 2007). This increase in ambient temperature is why shade and urban heat island (UHI) reduction are vital in city centers. Trees can reduce temperatures in urban areas inside and outside through transpiration and shade, lowering the need for air conditioning. Since climate change increases temperatures, increases electricity consumption, and stresses the environment, providing natural solutions to reduce the energy demand is crucial for urban centers (Nowak et al. 2007).

Offset Climate Change

The build-up of emissions from carbon dioxide, a greenhouse gas, causes climate change. Forests and woodlands offset this build-up by capturing carbon dioxide and oxidizing it into the wood, leaves, and soil (Nowak et al. 2007). This oxidation process then releases oxygen into the atmosphere, improving air quality for humans and animals (Nowak et al. 2007). Since Boston's forests store about 30% of carbon emissions from burning fossil fuels, it is vital to maintain and/or restore these urban woodlands (Colarossi 2022).

Climate change is causing an increase in temperatures and causing extreme weather events all around the world. To the east of Franklin Park, the canopy cover is particularly low, intensifying the urban heat island effect, making Franklin Park a critical resource for access to cooler temperatures, and both active and passive recreation in nature. On top of this, each individual tree also performs essential ecological functions, including sequestering thousands of pounds of carbon dioxide over their lifetimes. This makes the park's urban woodlands an irreplaceable resource.

27% of Boston is covered by tree canopy, while 50% of Franklin Park is covered by tree canopy (City of Boston Parks & Recreation 2022). This makes Franklin Park a popular place to experience nature in the city and makes the park an invaluable public health resource for the surrounding community. Urban canopy combats climate change and improves people's quality of life, by lowering temperatures, cleaning air and water, providing critical habitat, and improving our mental and physical health.

Due to the hundreds of acres of woodlands and open space in Franklin Park, a cooling effect on nearby blocks is provided by reducing temperatures by 5-7 degrees F. As you move further out into the community, the temperature elevates. The woodlands also serve as an important shaded escape from neighborhoods that lack sufficient canopy cover, like those to the east (City of Boston Parks and Recreation 2022; City of Boston 2022).

Overgrown and unmanaged canopy has reduced the amount of light that can reach the ground layer, depleting the savanna-like grasses that characterize part of the Wilderness. An unmanaged canopy and ground plane means that this single-age stand of trees does not have new saplings to take their place.

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Social Benefits

Nature sustains people by providing essential resources such as food, water, and air. Natural ecosystems and processes like photosynthesis, precipitation, and the water cycle produce and distribute these resources, making them available to humans and other living beings. Therefore, humans can help themselves by reciprocating and supporting nature (Clewell & Aronson 2013). The adaptability of urban woodlands makes them suitable for a wide range of activities. For instance, woodlands are home to lots of flora and fauna, which can lead to people bird-watching and foraging. Urban woodlands also have many trails, which can be used for commuting, exercising, and dog walking (Tredici 2016). These are just a few of the many human activities that urban woodlands can support, demonstrating their ability to support the health and well-being of society and communities.

Increased Value of Neighborhoods

Property values, neighborhood perceptions, community pride, and overall well-being are all elevated in urban locations adjacent to or near well-managed forests (Crompton 2000; Harnick et al. 2009). According to Tyrväinen's (2000) study, housing with a view of a forest is 4.9% more expensive than similar housing characteristics without a view of a forest.

Improved Public Health

The presence of urban trees and woodlands provides a variety of public health benefits to society, including oxygen, reduced psychological stress, increased physical activity, reduced skin cancer risk, and improved post-surgery recovery rates (Dwyer et al., 1992; Harnick et al., 2009; Thomas & Packham 2007). For instance, over one year, one mature beech *Fagus sylvatica* produces enough oxygen for ten people (Thomas & Packham 2007) while simultaneously allowing someone to sit under its canopy, letting the person destress and get out of the sun.

Studies have also found that associations with urban nature improve cognitive development and mental health. Maes (2021) investigated woodlands, grasslands, and blue spaces (i.e., water bodies) to determine which area offered the best scores for cognitive development and a lowered risk of emotional and behavioral problems. The woodlands had the highest score, indicating the importance of urban woodlands in supporting the overall mental health of society (Maes 2021).

Challenges for Urban Park Woodlands

Urban park woodlands have many associated challenges that all stem from ecological, sociocultural, and administrative issues. Some examples of these issues include invasive species, funding, safety, and human interaction. The challenges for urban park woodlands are different of rural woodlands because of the social aspect of urban contexts. A woodland located in an urban setting is likely to experience significantly higher levels of human foot traffic in comparison to a woodland situated in a more remote location. This presents unique challenges and requires tailored solutions to mitigate human impact.

Ecological Challenges

The environmental problems facing urban woodlands include a dense and overgrown canopy, invasive species, and shallow soil (City of Boston Parks and Recreation 2022). A dense woodland makes it hard for sunlight to penetrate to the understory to give nutrients for new trees to sprout. For a forest to be healthy, it needs multiple-aged trees to ensure the long-term vitality of the woodland. The term 'invasive species' means alien species whose introduction does cause economic or environmental harm. Alien species are any species with any biological material capable of propagating species not native to that ecosystem (USDA 1999). Invasive species can overtake native vegetation and stress a woodlands ability to regenerate naturally. An example would be when Japanese knotweed is present in an oak hickory slope ecotype area, where oak trees and flowering shrubs have to compete for survival, and thus sometimes losing which reduces the

diversity of the ecotype. The term 'native species' refers to any plant species historically occurring on-site within an ecosystem. Species are organisms with physical and genetic similarities, can interbreed, and show persistent differences from members of allied groups of organisms (USDA 1999). These issues are amplified by thin soil, which is low in nutrients and acidic and often features rock outcrops only a few inches from the surface.

Healthy (stressed) Woodlands vs. Impaired Woodlands

Urban woodlands are inherently susceptible to a range of challenges and issues. These challenges can be useful to a woodland depending on the disturbance level. Disturbance is a term used to describe disruptions of ecological functioning and the modification of biotic expression, and there are three levels of disturbance: stress, moderate disturbance, and impairment. Stress disturbance is when a woodland has to battle some things, but the stress allows the woodland to keep its ecosystem integrity. Moderate disturbance happens when an ecosystem can recover in time without assistance from humans. Impairment disturbance is when human intervention is most likely needed to prevent transformation to an alternative ecological state (Clewell & Aronson 2013).

Non-Native Invasive Species

Invasive species are a significant issue facing urban woodlands as they can overtake and replace whole communities of native species. A plant is considered invasive based on its degree of how fast it spreads, how widespread it is, and the extent of it replacing whole native communities (Sauer 1998). Together, these characteristics reduce the overall biodiversity of urban woodlands—thereby reducing their overall health.

Non-native species invaded fast in the United States. We have increased their distribution where no natural controls exist, which has set the stage for local and complete extinction (Sauer 1998). In the continental United States, 4,500 acres of public parkland each year are consumed by exotic plants (Sauer 1998).

Arguments against Removing Invasive Species

Peter Del Tredici, a horticulturist and botanist, focuses his research on plants that can grow without human care and how plants help urban areas become more livable for humans and animals (Tredici, n.d.). Tredici argues

that ecology is the absence of design and that maintenance stops ecological succession to preserve designed ecosystems. To promote ecology, sustainability efforts should focus on reducing maintenance. It is worth noting that designed spaces are typically planned, neat, and well-maintained, while ecology spaces tend to be more spontaneous, messy, competitive, and driven by evolutionary forces. Charles Darwin said, "It is not the strongest of the species, nor the most intelligent, that survives. It is the one that is the most adaptable to change" (Tredici 2016).

Sociocultural Challenges

The sociocultural issues impacting urban woodlands relate to perceptions of welcomeness and safety. Woodlands that lack signage may be perceived as uninviting due to the inability to distinguish entrances and exits of trails (Jansson et al. 2013). Without a formal entryway, people do not know if they are invited to explore the site (Tredici 2016). Furthermore, dense forests often block views and reduce light penetration, contributing to feelings of unsafety or hesitation for some potential users. It is essential to note the difference between perceived personal safety and actual safety. Perceived safety refers to an experienced feeling, whereas actual safety refers to security at risk. The fear of crime connects to feeling unsafe while outdoors. Women using a park tend to avoid poor lighting, dense vegetation, and trees (Jansson et al. 2013). The natural and wild yard might be frightening, whereas lawns and trees might be associated with perceived safety. The more woodland vegetation that is cut down, the more maintenance problems persist. Combining the qualities of urban parks and dense forests might be possible through woodland vegetation with openness to it (Jansson et al. 2013).

Administrative Challenges

Urban parks are often understaffed due to limited funding. This lack of staffing contributes to woodland areas showing neglect (e.g., overgrown shrubs, invasive species, etc.) due to under-maintenance. The impacts of administrative limits directly contribute to the ecological and sociological issues facing urban woodlands. Without the appropriate level of staff available to remove invasive species, new seedlings must compete for resources and often fail to receive adequate light or nutrients to grow. Overgrown invasive species that are not removed also contribute to users' reduced sense of safety by blocking natural light from reaching the trails.

Maintenance Management

To make anything successful without volunteers, the staff must trust each other and funding is required. DiCicco said it best: "the true strength of the plan has been the employment of a diverse and dedicated staff – supported by dedicated funding – practicing adaptive management and restoration in Prospect Park's woodlands" (DiCicco 2014).

Park maintenance is defined as keeping an area and its facilities in their original state, or close to the original state. Maintenance includes routine, recurring, repair, and minor construction work (Sternloff & Warren 1977). On average, each park maintenance staff is responsible for 38 acres of land (City of Boston Parks & Recreation 2022).

Maintaining and managing urban park woodlands can be challenging for several reasons.

One reason is human interaction. Urban parks are often heavily used by people for recreational activities such as jogging, biking, and picnicking. This can damage the woodland from foot traffic, trampling of vegetation, and littering. Additionally, human presence can create disturbances that disrupt wildlife habitats and cause stress to wildlife populations.

Another reason is invasive species. Invasive plants compete with native species for resources and disrupt the ecosystem's natural balance. This can make managing the woodland and maintaining its ecological integrity difficult.

Another reason is a limited budget. Parks and recreation departments may have limited budgets to hire and retain staff to manage urban park woodlands. This can lead to understaffing, making it challenging to maintain maintenance tasks and address issues as they arise.

Skills labor shortages are another issue. Some tasks required to maintain and manage urban park woodlands, such as tree pruning and removal, may require specialized skills and training. These skilled labor shortages can make finding qualified staff to perform these tasks difficult.

Seasonal work can be another issue in an urban park. Maintenance of urban park woodlands is often seasonal, which can make it difficult to retain staff year-round. This can result in a high turnover rate, impacting the quality of work and the ability to maintain consistent management practices.

The last maintenance challenge is staff burnout. The demands of maintaining and managing urban park woodlands can be physically and mentally taxing, leading to staff burnout. This can result in increased absenteeism, turnover, and a decreased quality of work.

To address staffing issues, parks and recreation departments may need to prioritize their budgets and allocate resources to attract and retain skilled staff, provide ongoing training, and implement programs to reduce staff burnout. Additionally, partnerships with local organizations and community volunteers can help supplement staffing and provide additional support for maintaining urban park woodlands (Herd 2023).

Ecological Restoration

Definition and Purpose

"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (SER 2004; Clewell & Aronson 2013). Degradation is the loss of biodiversity and disruption of an ecosystem's structure, composition, and functionality caused by chronic human impacts, such as long-term grazing impacts, long-term over-fishing or hunting pressure, and constant invasions by non-native species. Damage results from an impact on an ecosystem, such as logging, road building, poaching, or invasions by invasive species. Destruction results in the extinction of all macroscopic life and the destruction of the physical environment. Mining, land clearing, urbanization, and coastal erosion destroy ecosystems (SER 2004).

The goal of ecological restoration – to return a degraded ecosystem to its historic trajectory, not its historic condition (SER 2004). There are three types of disturbance levels: stress, moderate disturbance, and impairment. Stress maintains an ecosystem's integrity. Moderate disturbance can recover over time without assistance. Impairment is when human intervention may be needed to prevent transformation to an alternative ecological state (Clewell & Aronson 2013).

It is important to note that restoration does not make ecosystems recover. Restoration instead creates the conditions needed for recovery so that ecosystems can heal themselves over time. The initial recovery can happen

quickly, but full recovery can take years, decades, or even hundreds of years (SER 2004).

Restoration is complete when a self-organizing ecosystem fully recovers (SER 2004). Restoration practitioners are like doctors. An ecosystem's recovery is like a patient's recovery, where they heal themselves with the doctor's supervision (Clewell & Aronson 2013).

History

The desire to restore the land dates back centuries. Modern-era ecological restoration began in the early 20th Century with renowned conservationist Aldo Leopold. Since then, ecological restoration activities have branched from large-scale projects like the Everglades or Louisiana wetlands to small-scale projects like tree planting. Ecological restoration started digging in traction in the second half of the 1900's, and is now considered a science and studied in many research institutions. International societies such as the Society for Ecological Restoration are dedicated to furthering knowledge of restoration science and practice (Vaughn et al. 2010). Although restoration can successfully restore biodiversity, structure, and function to a degraded ecosystem, ecological restoration does not justify destruction or unsustainable practices (SER 2004).

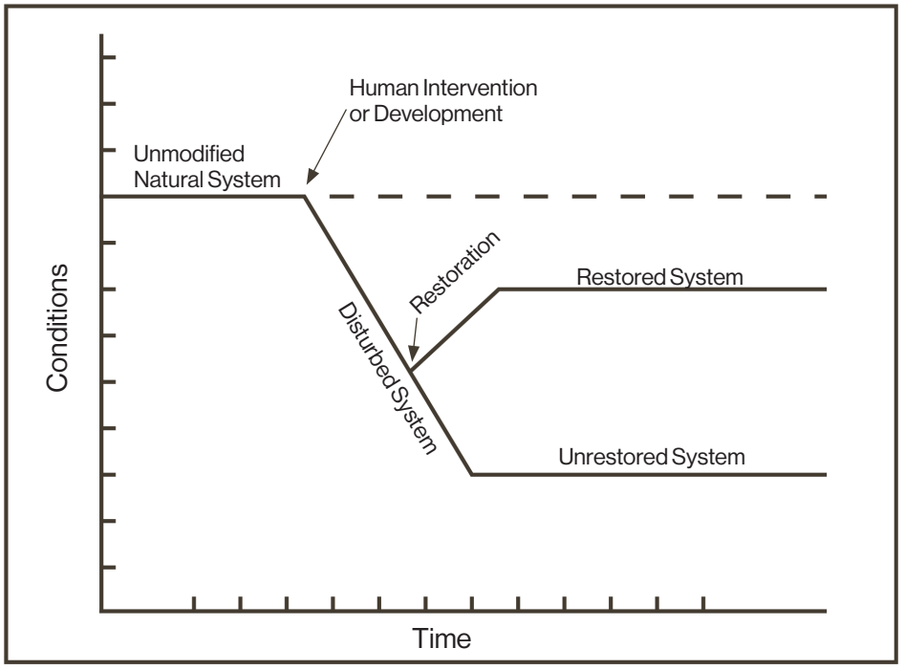


Figure 2.4: Nature vs. Restoration Timeline (adapted from Gobster & Hull 2000; Sylvan 1994)

Figure 2.4 shows the process of a degraded urban woodland with and without restoration. It starts with an unmodified natural system before humans have intervened. Human intervention usually brings invasive species or development, completely wiping the site out. The thought of 'nature will heal itself' after the human intervention is wrong with urban woodlands, and the urban woodland will continue to decline. If restoration happens, a restored ecosystem can happen (Katz 2000).

Best Management Strategies

A four-step process is needed to restore a woodland. The first step involves removing invasive plants, which can take longer than a year. Step two is repeating step one and then planting native species. Step three is repeating steps one and two with monitoring the site, which lasts around five years. Step four is a three-to-five-year cycle of looking for new invasive plants and ensuring the forest stays on the beginning goal (Green Seattle Partnership 2018).

After this four-step process is completed, do not leave permanently. In 50 years, the site could become a disturbed system again, leading to an unrestored system, shown in Figure 2.3. After completing the ecological restoration, maintaining the area is still important.

Types of Invasive Removal Practices

There are many different types of invasive management. The type that is chosen for each species is based on these factors: the type of invasive plant, treatment area size, density and maturity of invasive plants, length of time available for treatment, time of year that invasive plant control or planting work needs to begin, sensitivity of native populations to herbicide, proximity to wetlands, available workforce, current city and state laws, or budget for site preparation and maintenance.

Mechanical control is cutting or pulling the plant material. A chainsaw can be used with city, state, or federal government permission. Girdling is the process where the cambium is stripped in a continuous ring around a tree to disrupt the flow of water and nutrients. Mowing is also a mechanical control method when combined with chemical control (NYC Parks n.d.).

Chemical control uses herbicides to get rid of invasive species. It sometimes does not need repeated visits to fully remove. It is important to minimize

chemical exposure to non-target species. A licensed applicator is needed for safety, as well as knowing what to spray (NYC Parks n.d.).

The last main form of invasive management is biological control. Biological control is the release of a pest or predator that targets the undesirable plant species. This can be more economical than chemical or mechanical control in large areas. The USDA must okay the use (NYC Parks n.d.).

Past Ecological Restoration Practices in Emerald Necklace

A restoration happened in the Wilderness in 1999. The Urban Wilds Initiative did a project in the Wilderness aiming to remove the invasive plant Japanese knotweed. Almost one acre of plants were removed and replaced by 70 native trees and shrubs were planted by the BYF and a volunteer group from City Year. It was funded by the Fund for Parks and Recreation (Boston Parks and Recreation Department 2002).

Justine Mee Liff Fund is a major endowment for parks restoration and maintenance . The Liff Fund launched the Olmsted Tree Society to raise $1 mil to replace damaged trees and replant in more than 1,100 acres of public land in the Emerald Necklace. The Liff Fund committee will bring in sponsors such as foundations, corporations, institutions, community-based organizations, and private citizens. Their contributions will focus on completing a detailed tree inventory, a comprehensive master plan, and a planting and management program. This will also educate citizens on the importance of trees and protecting the urban environment. (Emerald Necklace Conservancy 2022c).

An Emerald Necklace Tree Management Plan was developed by Kyle Zick Landscape Architecture in 2013 that inventoried more than 8,000 trees within 200 acres. The plan included implementation strategies, timelines, and cost estimates (Emerald Necklace Conservancy 2022). These trees were assessed for $80,000. 12% of the trees needed to be removed, 14% had a risk rating of extreme, high, or moderate, and 64% of trees were in less than good health. 113 tree species were identified, with 34 of those trees being specimen trees (Bartlett Tree Experts 2013).

The Olmsted Tree Society was founded in 2013 to preserve and maintain trees in the Emerald Necklace. The Society has provided over $1.7 mil for the important work of assessing tree conditions and planning their healthy future. The Society will protect heritage trees, protect healthy trees, plant new trees in Back Bay Fens, Riverway, Olmsted, Park, Franklin Park, and Jamaica Pond, and educate the community in the process (Emerald Necklace Conservancy 2022)

The Franklin Park Coalition works with groups to pull invasive weeds that threaten to crowd out young trees, lay wood chips on paths, remove litter and refuse, and clean up walkways and entrances (Franklin Park Coalition n.d.).

A Maintenance Division's Urban Forestry Unit is responsible for pruning and removing all trees on the Park's Department land. In 2013, they pruned over 2,100 trees, removed 680 trees, responded to 3,150 maintenance requests, and answered 927 emergency tree calls (City of Boston 2015).

Ecological Restoration Through Stewardship

What a Stewardship Plan Can Do

A stewardship plan is an ecological restoration process that combines ecological restoration goals with human well-being objectives to benefit a community (Fernández-Manjarrés et al. 2018; Fischer et al. 2021). An ecological restoration plan with a community and ecological perspective can enhance the process and outcomes of restoration by allowing a better connection between ecologists, social scientists, practitioners, and the community (Fisher et al. 2021). Encouraging a sense of responsibility and acknowledging human influence within the natural world can lead to more responsible behavior towards the environment (Diekmann 2011; Higgs 2003; Hobbs & Higgs 2001; Jordan 2000).

What a Stewardship Plan is

A stewardship plan is a comprehensive strategy that outlines how a particular natural area will be managed, protected, and sustained over time. A stewardship plan serves as a roadmap for the sustainable management and conservation of a particular area, ensuring that it can remain a valuable asset for both the environment and the community for years to come (Wood 2019). In ecological restoration projects, concern is often placed on ecological processes, while social attributes are neglected. (Duguma et al. 2015). A community-minded ecological restoration project puts social benefits and ecological restoration side by side, working together to provide success socially and ecologically.

The Difference of a Stewardship Plan and an Ecological Restoration Plan

Ecological restoration refers to the deliberate process of restoring an ecosystem to its historical trajectory of health and functionality (SER 2004; Clewell & Aronson 2013). A stewardship plan involves a long-term management strategy that may or may not include restoration (Wood 2019). It is important to note that an ecological restoration project typically does not encompass ongoing management or maintenance activities. By incorporating a stewardship plan, the management and maintenance activities necessary for the long-term health of an ecosystem can be systematically and effectively carried out.

Who Stewards are

Stewards are dedicated and trained volunteers who serve as the backbone of an ecological restoration (Green Seattle Partnership 2022). Stewards are a person or group of people who take responsibility for the care, management, and protection of a natural area. The stewards role is to ensure that a natural area is healthy and sustainable for present and future generations. Stewards play a crucial role in ensuring that urban areas remain a valuable community asset that benefits both people and the natural environment.

Stewards can evolve from volunteers who want more responsibility and leadership in their communities. Stewards can be anyone from a community, as long as they are 18 years or older. In order to recruit stewards, paid staff could engage in a variety of activities aimed at engaging community members. For instance, they could canvas neighborhoods, create educational materials, post signs, and attend neighborhood meetings (Kraft 2006). By adopting this multifaceted approach, paid staff can cast a wide net and increase the likelihood of attracting a diverse group of community individuals who are passionate about stewardship and committed to preserving a natural area. Additionally, cities have many schools and universities that stewards could come from. There are also community organizations that have shared initiatives that might support becoming a steward. Stewards are discussed in further detail in chapter 6.

Stewards are volunteers who devote a significant amount of their personal time and energy to their volunteer work and invest a considerable part of themselves in these efforts. Therefore, recognition and appreciation from the city are essential. Stewards are especially important for municipalities that have financial constraints and who may otherwise not be able to fund the implementation of an ecological restoration plan (Wood 2019).

Volunteer stewards can be motivated by achievement, affiliation, or influence. Those motivated by the 'achievement' technique tend to focus on goals and prefer measurable data showing progress and personal or program achievements. In contrast, the 'affiliation' type of steward prioritizes team-oriented tasks, values interaction with fellow stewards, and appreciates expressions of gratitude, such as 'thank you.' Lastly, the 'influence' type of steward is motivated by realizing their vision and enjoys seeing their ideas come to life. It is common for volunteer stewards to have a combination of these motivations, and it is possible to simultaneously implement measures that acknowledge and cater to all three types (Wood 2019).

The Difference of Stewards and Volunteers

A steward is a type of volunteer who takes on a particular responsibility or leadership role within the ecological restoration process, while a volunteer is someone who contributes their time and skills with no leadership role. Volunteers can serve in a variety of capacities by contributing their time, energy, and expertise to various aspects of the restoration process. Volunteers can be involved by removing invasive species, planting native species, maintaining trails, and educate the community. This concept of a steward and volunteer can be likened to the relationship between a square and a rectangle, whereby a square is a specific type of rectangle, yet not all rectangles possess the qualities of a square.

What a Stewardship Plan is Useful For

Implementing a stewardship plan is integral to the success of ecological restoration, particularly in urban environments. Involving stewards in the restoration process fosters an engaging and inclusive community where knowledge and skills are shared. Having educational goals lead stewardship projects allows the community to gain valuable knowledge and practical experience in the process of ecological restoration. As a result, the community can collaborate to drive policy changes that promote green spaces in their communities, creating local actions that have far-reaching regional and global benefits (Wood 2019).

Notably, a stewardship plan offers an opportunity to achieve ecological restoration while allowing people to make the world greener. It enables individuals to explore, learn, form new friendships, and engage in enjoyable activities.

Who the Authors/Developers of Stewardship Plans are

Stewardship plans are typically created by or on behalf of city governments, but the authority to authorize such plans is not limited to government officials. Stewardship plans can be created as part of university courses (Kraft 2006). These university courses should focus on the stewardship aspect, for ecological restoration plans to succeed, stewardship is essential. Without stewardship, restored ecosystems are likely to degrade once again after the class leaves (Kraft 2006). That is because the problem may come back if there is not someone watching over the natural area. For example, invasive species could very well come back to an area that got rid of them, and if not managed after the students leave, could cause an ecological decline again.

METHODOLOGY

Figure 3.1- Edge of Wilderness

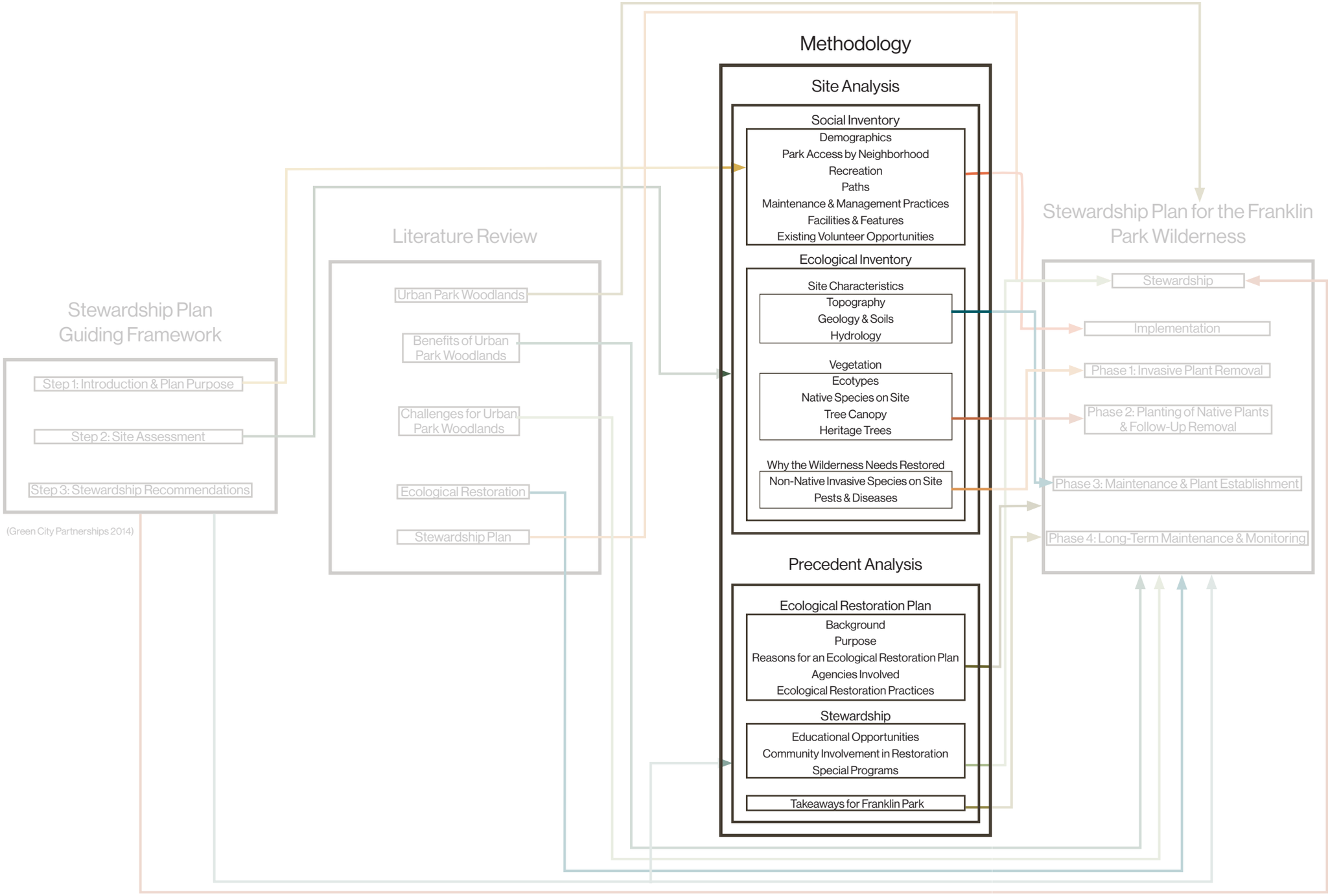


Figure 3.2 – Methodology Design Diagram

Introduction

In order to address the research question:

what should a Stewardship Plan for the Franklin Park Wilderness entail to ensure the ecological restoration process creates social and environmental benefits?

The study employed two key methods: site analysis and precedent analysis. These methods yielded valuable insights that informed the development of a comprehensive Stewardship Plan tailored to the unique needs of the Franklin Park Wilderness and surrounding communities.

Site Analysis

Site analysis was used to identify relevant information needed for developing a Stewardship Plan for Franklin Park's Wilderness. For this project, site analysis included a review of the historical design of Franklin Park and the 2022 Franklin Park Action Plan, as well as documentation of select ecological and social factors that most impact the health of the Wilderness.

Procedure

The main data for the site analysis came from the Franklin Park Action Plan (City of Boston Parks & Recreation 2022) and from a site visit that occurred on September 28, 2022. To standardize the findings, the content is organized by social and ecological inventory. Each category has a list of headers, purpose, and questions to find essential answers. Having this framework helped guide the site analysis to completion that would then help build the Stewardship Plan for the Wilderness.

Topic	Purpose	Driving Questions
Social Inventory		
Demographics	To understand who lives around Franklin Park and how they interact with the Wilderness	What are the demographics surrounding Franklin Park? What is the average surrounding income of the community? What are the poverty rates of the surrounding neighborhoods? What is the housing tenure of the community?
Park Access by Neighborhood	To understand how the different neighborhoods use Franklin Park.	How does the community use the Wilderness? Are there activities that happen in the Wilderness? How does the community get to Franklin Park? How does the community enter Franklin Park?
Recreation	To know why people currently visit Franklin Park.	What recreational activities exist on site? What does the community like to do in Franklin Park?
Paths	To understand the path system in the Wilderness.	What are the pathways made out of? How is the trail system? Is there too many or not enough?
Facilities & Features	To know what facilities exists within Franklin Park.	How has the community benefited from Franklin Park? What does the community like about Franklin Park? Should there be features added into the Wilderness?
Existing Volunteer Opportunities	Educational: To know what educational opportunities already exist in Franklin Park or Boston area. Special Programs: To know if any workforce training exists on the site today or in Boston Community Involvement in Restoration: To know if there are currently any volunteer opportunities in Franklin Park or the Emerald Necklace today to implement an existing volunteer system to restore the Wilderness.	Are there any educational opportunities in Franklin Park/Emerald Necklace? If so, what are they? How long have they been around? Have they been successful? Are there any workforce training opportunities in Franklin Park/Emerald Necklace? If so, what are they? How long have they been around? Have they been successful? Are there any volunteering currently happening at Franklin Park or the Emerald Necklace today? Who runs the existing volunteer system? How many volunteers come to events? What time of year do the volunteers mostly work? What do they do? Who runs the existing volunteering system?

Ecological Inventory		
Site Characteristics	To understand how the Wilderness works.	What is the topography in the Wilderness? What geology and soils exist in the Wilderness? What is the hydrology like on site?
Vegetation	This information will reveal the composition of plant species existing on site, as well as the health of the Wilderness, which comes from the amount of ground-level light, canopy health, and understory diversity. This will impact the Wilderness' adaptability to become a self-sustaining ecosystem.	What ecotypes exist in the Wilderness? What are specific plant types in the Wilderness? Are there any gaps in the canopy? Is there a presence of an understory? Does the ground have enough access to light?
Why the Wilderness Needs Restored	To understand how the ecotype, woodland composition, and invasive species are interlinked today	How does the ecosystem work today? Does it work together or separately? What challenges exist today? What non-native species exist on site? What pests and diseases exist on site?

Precedent Analysis

A precedent analysis was done to learn how other areas/organizations have used stewardship plans to guide ecological restoration efforts in other urban park woodlands. A total of four precedent projects were selected for analysis (see selection criteria below). Each precedent provides an example on how to foster connections between people and ecological restoration. Findings are intended to inform recommendations included in the proposed Stewardship Plan for Franklin Park.

Procedure

The precedents studied are notable parks in the United States that had years of neglect and needed ecological restoration. Either during this restoration or after, the surrounding community was involved in the upkeep and ongoing care of the park. To standardize the findings, the content is organized into the ecological restoration plan and the stewardship program on site currently.

Selection Criteria

For a precedent to be considered relevant for analysis, the following selection criteria were used:

- The park includes an urban woodland/forest area
- A comprehensive ecological restoration plan for the park exists
- There is active community involvement with woodland ecological health today

Precedents studied:

- New York City Parks
- Seattle Parks
- Piedmont Park
- Fairmount Park

The parks' ecological restoration plans, stewardship and volunteer programs, and their websites as of March 2023 were reviewed to understand what restoration activities have occurred and how the community was involved during the processes and what ongoing efforts are happening. The information gained through the precedent analysis informs recommendations in the proposed Stewardship Plan for the Franklin Park Wilderness.

Topic	Purpose	Driving Questions
Background	The information will guide Franklin Park in balancing both maintaining the park and restoring the woodland on a staff level.	How is the site maintained? How many staff workers work annually? How many staff workers work seasonally? Is maintenance contracted out? What was the maintenance difference between restoring the first year vs. year five? How did the maintenance crew remove invasive species? How did the maintenance crew increase the ground-level light? How did the maintenance crew regenerate canopy health? Who funds the site? Who funded the restoration efforts? What is the funding difference between private vs. public organizations? What is the annual funding amount? What was their funding goals at the beginning? Is this a good source of funding to copy onto Franklin Park?
Purpose	To understand the start of the restoration plan along with what it entails.	How did the plan come to be? Who designed the plan? Who wanted to start the plan? What were their restoration steps? How did they remove invasive species? How long did the plan take?
Reasons for an Ecological Restoration Plan	To understand the issues of why the plan exists.	What issues were on site originally? How did that affect the current environment?
Agencies Involved	The purpose of this information is to know who the driving forces of restoration were for each precedent and if Franklin Park should have any of the same investors.	Who wanted the restoration first? Who is involved in the restoration process? Are there any agencies that were listed in the plan that should be involved in Franklin Park's restoration?

Ecological Restoration Practices	The purpose of this information is to understand what practices they proposed and the steps to complete the practices	What are their specific actions/activities to fulfill the plan? Have they changed their approach as they learn throughout the process? What kind of invasive species did the plan identify? What issues are the invasives causing? How are invasives being addressed?
Educational Opportunities	Understanding how parks have educated their communities in the past will allow a compare and contrast and then answer on what should happen at Franklin Park.	Who runs the education programs? What types of programs exist? What do the programs do? What time of year do the programs exist? What age groups are included in the programs? What organizations are involved?
Community Involvement in Restoration	To understand their volunteer process and what works and what does not in terms of getting the community involved.	What kind of volunteer system exists? Who runs the volunteer system? How many volunteers come to events? How many hours per year do volunteers contribute? What time of year do the volunteers mostly work? What do they do?
Special Programs	Workforce training is a great way to get the community involved and give them the knowledge to have a job afterward. Understanding how a project went about this process is vital to be able to repeat it.	What types of workforce training programs exist? What age groups are included in the training? What time of year does the training exist?
Takeaways for Franklin Park	To understand what the precedent did well that could also benefit Franklin Park	What can be taken away and applied to Franklin Park? How can this help Franklin Park? What should not be repeated in Franklin Park?

SITE ANALYSIS

Figure 4.1 - Trail

Site analysis was used to understand the issues and opportunities for conducting a stewardship driven ecological restoration in the Wilderness. This chapter is split into two categories: social and ecological inventory. This chapter provides site maps, inventory, and the environmental conditions of the Wilderness.

Social Inventory

The social inventory documents how the local community utilizes the Wilderness. The inventory procedure began by taking a broad view of Franklin Park's overall context and then narrowed down to specific social details that are relevant to the park.

Demographics

Franklin Park is surrounded by four neighborhoods: Dorchester, Mattapan, Roxbury, and Jamaica Plain (see Figure 4.4). The Franklin Park Action Plan survey revealed that the western side of Franklin Park exhibits a distinct pattern compared to the north and east sides, across several data points. Demographically, the neighborhoods on the north and east sides share more similarities, with higher proportions of communities of color, households with children, and lower-income households. However, Franklin Park's open spaces and programs serve residents from all areas.

Race, poverty, and housing tenure of the four neighborhoods are compared on the next page. This is important to understand for the Stewardship Plan for Franklin Park to know the way people use and interact with the park and Wilderness. For example, the surrounding neighborhoods that are predominantly lower-income do not have many green spaces or woodlands, as shown in Figure 4.2, as Jamaica Plain has the most green spaces, so other neighborhoods are more likely to need Franklin Park for their everyday green space.

Knowing the demographics of the surrounding neighborhoods helped inform decisions about the types of programs and activities offered at the park. Understanding the race and housing tenure of the surrounding neighborhoods is important for ensuring that the park is accessible and welcoming to all members of the community with programming and amenities that are culturally relevant and accessible.

Overall, knowing the demographic makeup of the surrounding neighborhoods can help to ensure that the park is managed, maintained, and restored in a way that meets the needs of the community it serves and promotes equity and inclusion for all.

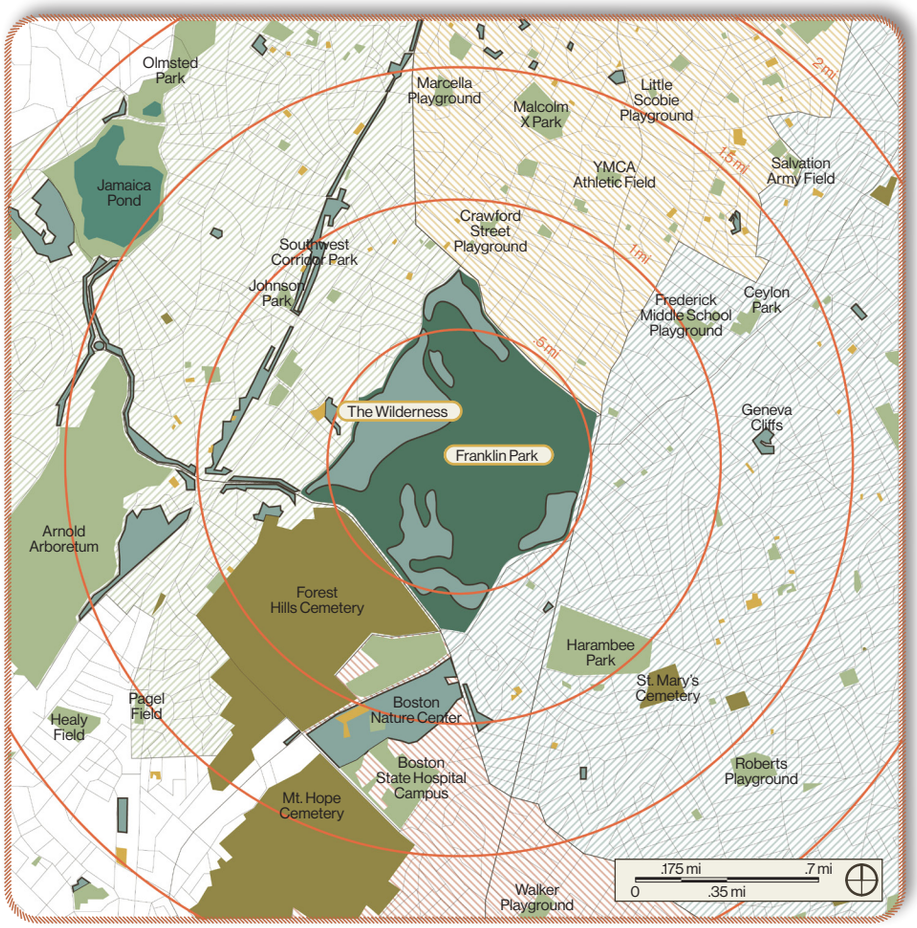


Figure 4.2 – Open Space Context of Franklin Park

- Franklin Park
- Parks and Playgrounds
- Urban Wilds and Parkways
- Cemeteries
- Community Gardens
- Dorchester
- Roxbury
- Jamaica Plain
- Mattapan
- Mile Markers

Race and Ethnicity

Boston is a diverse city compared to Massachusetts and the United States as a whole. Boston is more diverse in the Dorchester, Mattapan, and Roxbury neighborhoods, but is less diverse in the Jamaica Plain neighborhood.

	Total Population	Non-Hispanic White	Non-Hispanic Black/ African-American	Hispanic or Latino	Non-Hispanic Asian	Other races or multiple races
United States	321,004,407	61.5%	12.3%	17.6%	5.3%	3.4%
Massachusetts	6,789,319	72.9%	6.7%	11.2%	6.2%	2.9%
Boston	669,158	44.9%	22.7%	19.4%	9.4%	3.6%
Dorchester	125,947	21.5%	45.4%	18.1%	9.4%	5.6%
Jamaica Plain	39,314	55.1%	11.2%	23.7%	6.2%	3.9%
Mattapan	25,586	6.8%	73.0%	15.3%	18.%	3.1%
Roxbury	52,944	10.5%	51.5%	30.0%	3.7%	4.3%

(Boston Planning & Development Agency 2019; U.S. Census Bureau 2018).

Poverty Rates

Poverty rates refer to the minimum income level considered sufficient for a given country. This line is typically determined by approximating the total expenses required to cover one year's basic necessities for an average adult.

	Total population	Total in Poverty	Poverty rate	Percent of Boston's impoverished
United States	321,004,407	45,650,345	14.6%	-
Massachusetts	6,789,319	727,546	11.1%	-
Boston	669,158	128,618	20.5%	-
Dorchester	125,947	29,905	23.9%	23.3%
Jamaica Plain	39,314	5,961	15.5%	4.6%
Mattapan	25,586	5,199	20.7%	4.0%
Roxbury	52,944	16,758	33.9%	13.0%

(Boston Planning & Development Agency 2019; U.S. Census Bureau 2018).

Housing Tenure

Boston has almost double the amount of renter occupied units compared to Massachusetts and the United States.

	Total housing units	Total occupied % of total housing units	% of owner-occupied units	% of renter occupied units
United States	135,393,564	87.8%	63.8%	36.2%
Massachusetts	2,864,989	90.3%	62.4%	37.6%
Boston	285,660	92.1%	35.3%	64.7%
Dorchester	47,891	92.1%	34.8%	65.2%
Jamaica Plain	16,810	95.7%	46.5%	53.5%
Mattapan	9,638	92.0%	37.9%	62.1%
Roxbury	21,136	91.8%	20.5%	79.5%

(Boston Planning & Development Agency 2019; U.S. Census Bureau 2018).

Park Access by Neighborhood

77% of Franklin Park Action Plan survey respondents live in a neighborhood that touches Franklin Park (City of Boston Parks & Recreation 2022).

Over half of the Action Plan survey participants identify as African American or Black.

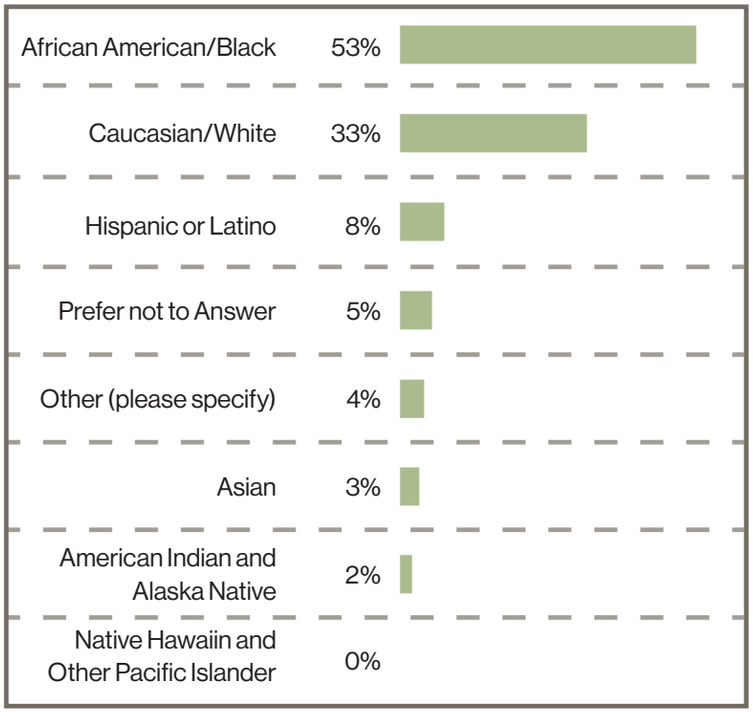


Figure 4.3 – Franklin Park Action Plan Respondents Demographics (Adapted from City of Boston Parks & Recreation 2022, 94)

The demographic of visitors accessing the park from the western region, which is where the Wilderness exists, is primarily composed of nearby Jamaica Plain residents. This could be in part because there is no better pedestrian access along this edge with less through traffic (City of Boston Parks and Recreation 2022). This population segment enjoys the most convenient means of retreat to the tranquil surroundings offered by the park. While pedestrian access from Jamaica Plain is readily available, it should be noted that only a select few, with an innate familiarity of the area, may find it easily accessible. This is attributed to the scarcity of entry and arrival signs, numbering a mere three, on the periphery of the Wilderness. The Wilderness edge of Franklin Park is the second most-used edge, with 34% of survey respondents stating they access the park from Forest Hills Street and 21% said Walnut Avenue (City of Boston Parks and Recreation 2022).

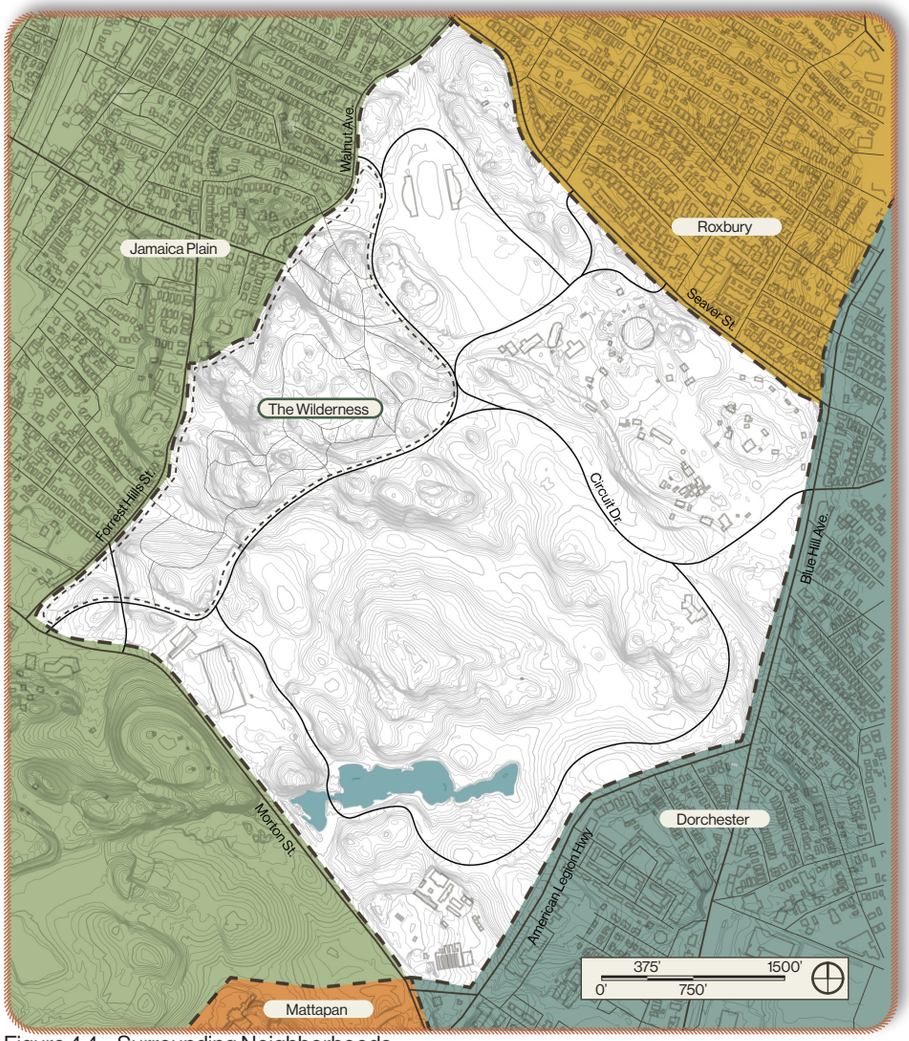


Figure 4.4 – Surrounding Neighborhoods

Recreation

Figure 4.5 shows that exercise is the top activity that the Franklin Park Action Plan's survey respondents reported doing in Franklin Park. When asked how they arrive at the park, 43% of survey respondents said they typically walk or run, while 17% said they usually arrive by bicycle. Figure 4.6 shows what amenities the Wilderness and surrounding park have to offer. The main amenities in the Wilderness are trails for hiking, walking, or running, picnic tables, structures designed by Olmsted, and ruins right outside the Wilderness. It is important to know what exists in the Wilderness and how people use the area as to not defer people from using their favorite spaces, but instead improving the spaces.

Figure 4.5 – Current Park Use (Adapted from City of Boston Parks & Recreation 2022, 115)

70% of Action Plan survey respondents identified access to nature as their most appreciated thing about the park.

Figure 4.6 – Amenities (Adapted from City of Boston Parks & Recreation 2022, 107)

- Trails
- Ruins
- Picnic Areas
- Playground
- Tennis Courts
- Basketball Courts
- Baseball Fields
- White Stadium
- William J. Devine Golf Course
- Parking (locked)

Paths

Olmsted designed the park to have different types of paths for separate uses. Path widths and materials had a hierarchy serving as important cues for movement and wayfinding throughout the Wilderness. Today, the clarity is lost in arbitrary and abrupt changes in width and materials. Figure 4.7 shows the different path materials in the Wilderness.

Knowing where the path materials exist on site is important to know because the Franklin Park Action Plan listed 'Minimize Circulation Paths' as one of their six recommendations within the Wilderness. This recommendation included keeping paths to a minimum to preserve habitats and reforesting decommissioned trails. To understand what paths could be eliminated, an inventory of path materials was created. The map of the trails that were decommissioned is in chapter 6.

Maintenance & Management Practices

Maintenance is defined as keeping park areas in their original state, or close to the original state (Sternloff & Warren 1977). The park staff has not been able to do that, as there are only four staff workers for the park. That means that each staff member is responsible for 75 acres of regular maintenance (City of Boston Parks and Recreation 2022, 178). The maintenance staff has not been able to maintain the site to its original state, therefore an ecological restoration plan is needed to restore the site not to its original state, but the site's historic trajectory.

Figure 4.7 – Path Materials (Adapted from City of Boston Parks & Recreation 2022, 142)

- Asphalt
- Stone
- Gravel
- Unpaved

Facilities & Features

Franklin Park has many facilities on-site, all bringing something unique. There is the Franklin Park Zoo, White Stadium, Playstead, Shattuck Hospital, William J. Devine Golf Course, Scarboro Pond, Maintenance Yard, Overlook Shelter Ruins, Long Crouch Woods, and the Wilderness. The public open space of the park has 289 acres; 220 acres of wooded area, 19 acres of mown lawn, and 7.5 acres of water bodies.

Figure 4.8 – Facilities

The array of programming and experiences to be had at Franklin Park is unparalleled, yet according to the Franklin Park Action Plan's surveys, where people live and what entrance they enter from strongly impacts what spaces neighborhoods use the most. Figure 4.9 shows the acreage of features in Franklin Park.

The Wilderness is 16.1% of Franklin Park's land. Only behind the golf course in size, the Wilderness has a great opportunity to help with climate change adaptation.

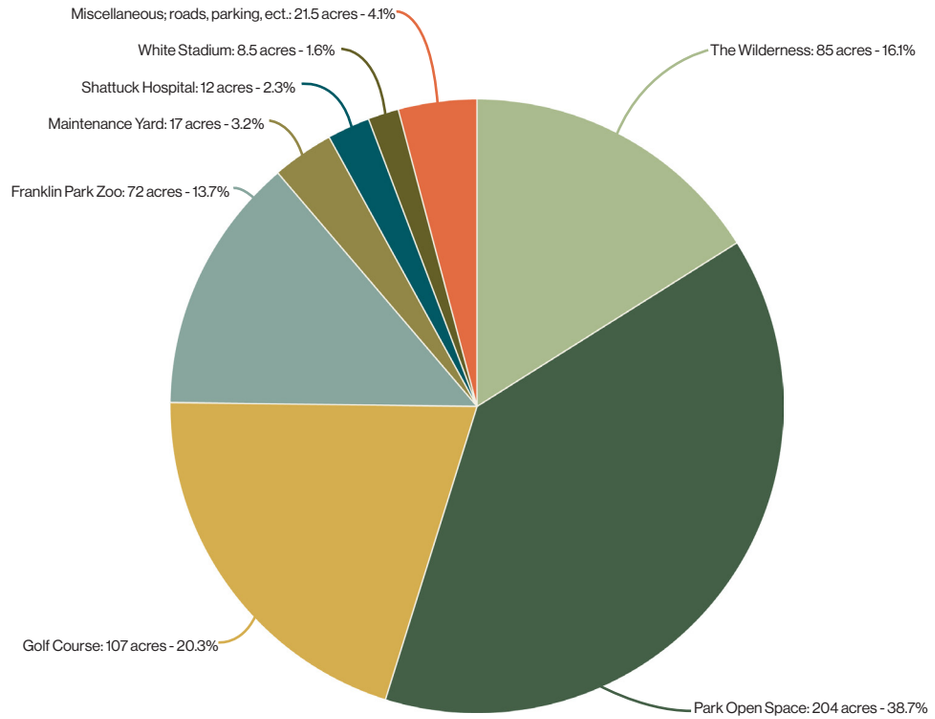


Figure 4.9 – Facility Acreage (Adapted City of Boston Parks & Recreation 2022, 106)

The Wilderness

An 85-acre woodland in Franklin Park with signature features of elevation changes and a dense tree canopy. Olmsted intended visitors to stroll and explore this urban wild, with long views hidden with typographic changes and vegetation until guests arrive at the best viewpoint of that area.

Long Crouch Woods

A 26-acre woodland on-site that hosts many trails for people to explore nature close to the city. Volunteers have cleared out invasive glossy buckthorn trees for years, making the trails more user-friendly. The Bear Dens was one of the first Zoo exhibits when it opened in 1912, which is within Long Crouch Woods. Bears do not still live here, but the beautiful stone bas-relief carvings of bears holding up the city seal and a staircase leading to the old cages are still present (Franklin Park Coalition 2023b).

Playstead

Currently, the Playstead is a large open field with two softball diamonds. It is used for baseball, softball, rugby, soccer, football, and cricket games and practices. The Playstead houses two basketball courts and two of the park's tennis courts (the other pair is adjacent to the Shattuck Picnic Grove) (Franklin Park Coalition 2023d).

Scarboro Pond

Olmstead did not want a pond, but he designed one after a push from the city. It took two years of excavation. They tried to connect it to Ward's Pond in Brookline, but that did not happen. Instead, It connects to Jamaica Pond with underground pipes.

Franklin Park Zoo

The Zoo was founded in 1912 and is home to lions, tigers, giraffes, and more (City of Boston Parks and Recreation 2023)

White Stadium

The stadium holds 10,000 people and is used by Boston Public School athletics for football and track. The stadium's construction ended in 1949, costing $2 million. In the 1960s and 70s, Blank Panther rallies and big concerts happened at White Stadium, with Elma Lewis' school hosting the concerts (read Elma Lewis below) (Franklin Park Coalition 2023c).

Shattuck Hospital

Opened 24/7, the hospital is a fully accredited teaching facility providing patient care. Their services of 255 beds help economically and socially challenged patients get good cost-effective care. Today, the future is uncertain for the hospital, as some people want to transform it back to Olmsted's original intent of an open field (Commonwealth of Massachusetts 2023).

William J. Devine Golf Course

Originally a sheep meadow in Olmsted's design, this 18-hole facility is the country's second-oldest public golf course (City of Boston Parks and Recreation 2022).

Maintenance Yard

What was originally the park's Nursery to cultivate plants, is now the City's maintenance yard (City of Boston Parks and Recreation 2022).

Overlook Shelter Ruins

Frederick Law Olmstead's only ever-designed building sets place in Franklin Park. This building had a rustic feel, was low to the ground, and was hidden by plantings, with a viewing area to the sports fields below. A fire in the 1940's destroyed most of the building, but the original "Overlook" view still exists, along with stone steps, an archway, water fountains, and benches (NPS 2022). In 1966, Elma Lewis cleaned out some of the ruins and made it into a concert venue.

Elma Lewis

Elma Lewis founded the Elma Lewis School for Fine and Performing Arts in the 1950s, providing cultural education and artistic development for thousands of African American students until the 1980s. She also spearheaded the renovation of Olmsted's Overlook Shelter into the Playhouse stage, which hosted a successful summer concert series for 12 years. Today, the Elma Lewis Playhouse in the Park carries on her legacy,

hosting weekly events that draw large crowds.

The staff have regular maintenance responsibilities, such as taking care of frequented paths and highly used areas, such as The Playstead, playgrounds, and Circuit Loop. Around these areas, cutting and trimming the grass, de-littering, cleaning, emptying trash, clearing drains, and removing leaves and snow are all needed. Clean-up and trash removal require time. Restrooms, drinking fountains, and signage require regular repair. The available tools and equipment lack what needs to be done. (City of Boston Parks and Recreation 2022).

Special events require preparation from the maintenance crew, such as putting out temporary trash reciprocals and cutting grass. After the event, trash pickup, clearing, and repairs from damage is needed. Periodic special projects are usually contracted out, like utility maintenance, pruning, and canopy management (City of Boston Parks and Recreation 2022). Special event tasks take energy and time away from regular park maintenance. There is often a lack of communication between events and event support, meaning the maintenance crew is left to do everything. The peak season is April-November, and the special event support is needed on Saturday and Sunday, requiring 6-8 hours per week (City of Boston Parks and Recreation 2022).

It is important to know what currently happens in Franklin Park and how the maintenance staff can handle day-to-day work as well as special events. The four maintenance staff (City of Boston Parks and Recreation 2022) are already overwhelmed with their current work load. They do not have the time to complete an ecological restoration plan, which is one of the reasons why a stewardship plan would work well at Franklin Park.

Existing Volunteer Opportunities

Current Educational Opportunities Involving Restoration

A new city workforce program, Power Corp, is expanding access to green jobs through paid training and hands-on work focusing on tree care, urban wilds maintenance, and park rangers work (City of Boston Parks and Recreation 2022).

Today, several volunteer opportunities are available for individuals seeking to contribute to the betterment of Franklin Park and the surrounding Emerald Necklace. The Franklin Park Coalition works with groups to pull invasive weeds that threaten to crowd out young trees, lay wood chips on paths, remove litter and refuse, and clean up walkways and entrances (Franklin Park Coalition n.d.).

The Emerald Necklace Conservancy has done a lot of restoration work within the Emerald Necklace. One project they did in Franklin Park was the restoration of Long Crouch Woods. The Hemlock Woolly Adelgid, an invasive insect, infected mature Hemlock tree's in the Long Crouch Woods. The Conservancy removed the dead Hemlock trees, leaving the trunks standing 20 ft in the air to promote woodland habitat. Then they planted the forest floor with native plants (Emerald Necklace Conservancy 2022b).

Another program is the Green Team Summer Program in the Emerald Necklace. This six-week program with 30+ youth crew members combines nature connection, environmental education, team building, and work skills development all into one unique program. Applicants must be Boston residents and between the ages of 15-18. The students gain an awareness and understanding of natural systems through nature connection activities (Emerald Necklace Conservancy 2022a).

Special Programs

The Franklin Park Action Plan started in 2020 and significantly involved the community. Even amid the Covid-19 Pandemic, the design team conducted community engagement events on Zoom. Eventually the team was able to hold in-person, mask-mandated meetings, which were well attended. Getting the community's feedback was extremely important so that the designers could design for the community's wants and needs.

The Emerald Necklace Conservancy has an Emerald Partners Program, with levels of donations for the Emerald Necklace. These Emerald Partners get exclusive benefits; the more money you donate, the more benefits you receive. There are $25,000, $10,000, $5,000, $2,500, and $1,000 levels. The $10,000 and $2,500 level donators get a 'Day in the Dirt', a private volunteering opportunity on Emerald Necklace projects for up to 100 or 60 people, respectfully (Emerald Necklace Conservancy 2022d). This donation and fieldwork could be a great way to raise money for Franklin Park's restoration and promote environmental stewardship.

Ecological Inventory

An ecological inventory was done to gather information for management and restoration strategies proposed in the Stewardship Plan for the Franklin Park Wilderness. The Ecological Inventory characterizes the physical site features as well as all the attributes that make up the Wilderness's ecological system – plants, soils, water, ect.

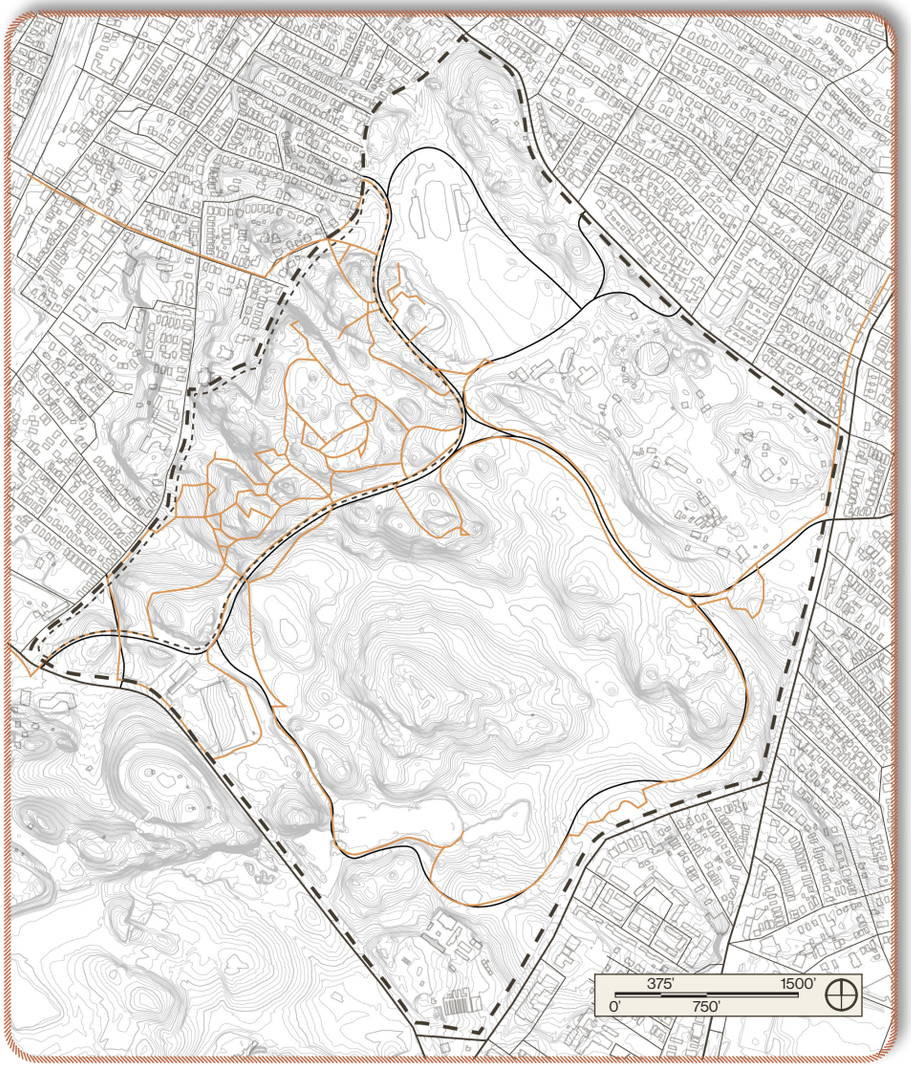


Figure 4.10 – Site Observations Path of Travel

On-site observations were conducted on September 28, 2022. The Strava app was used to track the path traveled during the observations. Photographs were taken to understand the character of the Wilderness.

Site Characteristics

The Wilderness boasts an array of diverse pathways, ranging in size and composition, intermingled with a rich variety of flora, including many trees and plants. Additionally, the site is adorned with historic structures, including the iconic 99 Steps and the esteemed Ellicottdale Arch, which add to the overall ambiance of the woodland. Moreover, the terrain showcases prominent puddingstone outcrops and imposing rock formations bereft of surface soil.


Figure 4.16 – Unpaved trail

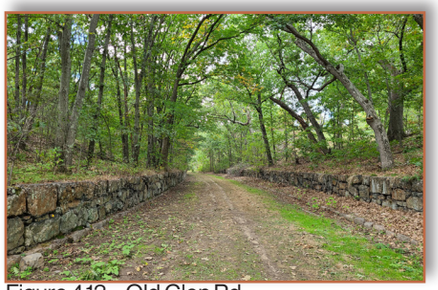


Figure 4.13 – Old Glen Rd


Figure 4.17 – Ellicott Stream

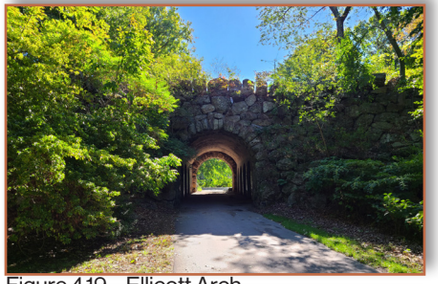


Figure 4.19 – Ellicott Arch


Figure 4.20 – Gravel trail


Figure 4.23 – Large puddingstone outcrop


Figure 4.24 – Topography


Figure 4.11 – Evergreen regrowth


Figure 4.12– Puddingstone rock outcropping


Figure 4.14 – A view in the Wilderness


Figure 4.15 – Topography of the Wilderness


Figure 4.18 – Top of 99 Steps

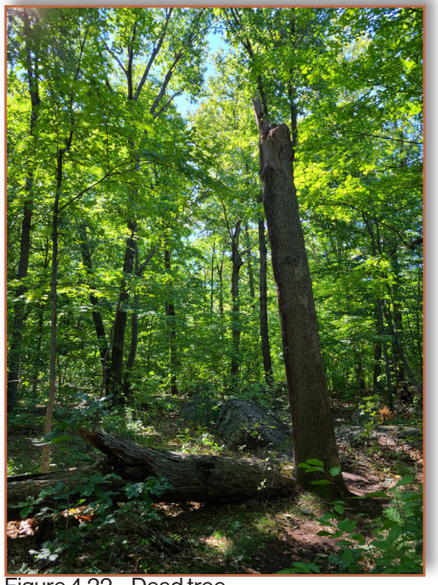


Figure 4.22 – Dead tree


Figure 4.21 – Picnic area


Figure 4.25 – On top of a hill


Figure 4.26 – Looking up 99 Steps

Topography

The Wilderness has the most elevation change in all of Franklin Park, with the lowest point at 42 ft and the highest at 186 ft. Certain portions of the Wilderness exhibit challenging terrain, including areas that are difficult to traverse on foot and slopes that require climbing to ascend as the slope exceeds past 20%. Most of the trails in the Wilderness are not ADA accessible.

Figure 4.27 – Topography of the Wilderness

Geology & Soils

Glaciers shaped the soils in the park and varied across elevations, with thin soils over bedrock on hills and deeper sands in valleys. Soils in the woodlands, on slopes, and near rock outcrops are broadly shallow with a fine sand and silt composition. They are prone to prolonged infiltration rates, but the presence of organic matter helps retain nutrients and water for plant regrowth. Healthy soils are critical to healthy places (City of Boston Parks & Recreation 2022).

Figure 4.28 shows the puddingstone rock outcrops, and that is important to know because planting cannot exist in these spaces. All of the Wilderness has shallow soil, but the map shows where there is either no soil or next to no soil above the puddingstone.

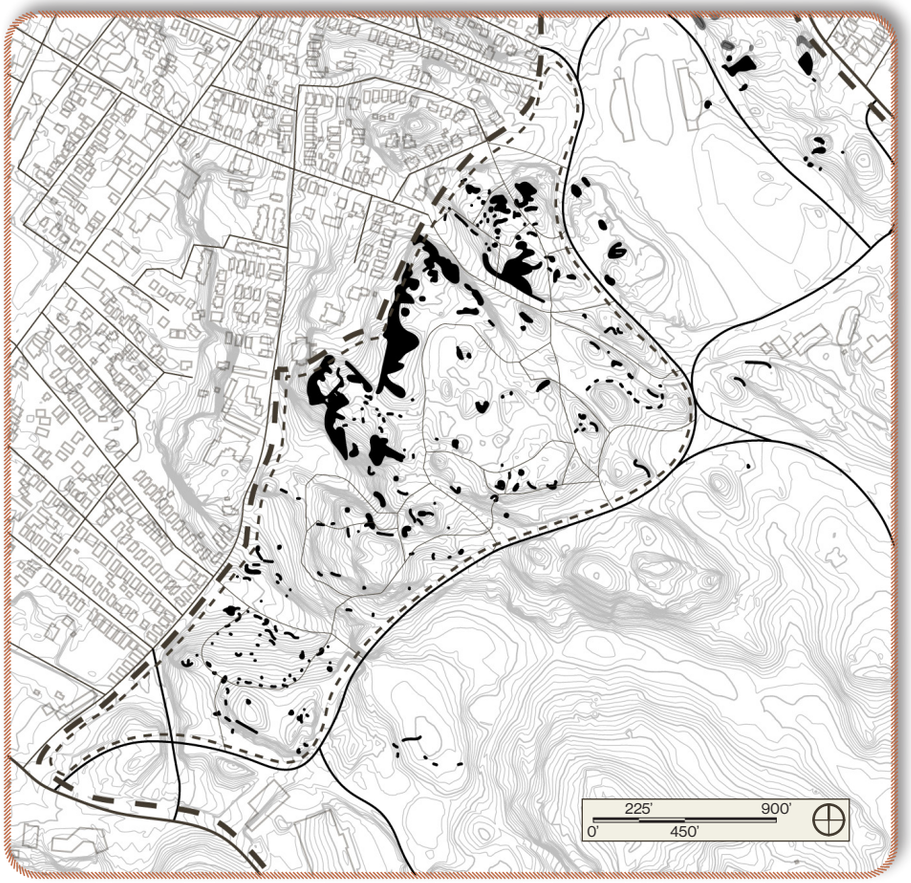


Figure 4.28 – Puddingstone Outcrops Map (Adapted from City of Boston Parks & Recreation 2022, 189)

Puddingstone Rock Outcrops

Hydrology

Franklin Park's old drainage system makes many high-traffic areas unusable during rain events. Stormwater runoff carrying debris and pollutants discharge directly into Scarboro Pond or the city's drainage system, impacting water quality and flooding downstream. Franklin Park's acreage offers opportunities to manage and infiltrate the park's own stormwater and positively influence downstream impacts by reducing urban flooding and improving water quality (City of Boston Parks and Recreation 2022).

Franklin Park has two watersheds, with most of the park over the Canterbury Brook Watershed. The Wilderness is over the watershed divide, with the Canterbury Brook Watershed runoff discharging to the Scarboro Pond on-site. The Stony Brook Watershed discharges to the Ellicott Arch Stream, which then goes to the Stony Brook Conduit System, eventually reaching the Charles River (City of Boston Parks and Recreation 2022).

The Ellicott Stream is a unique aquatic feature in the lowest area of the park. It is a healthy stream with good water quality and needs to be protected to clean stormwater runoff from nearby Circuit Drive and Forest Hills Street.

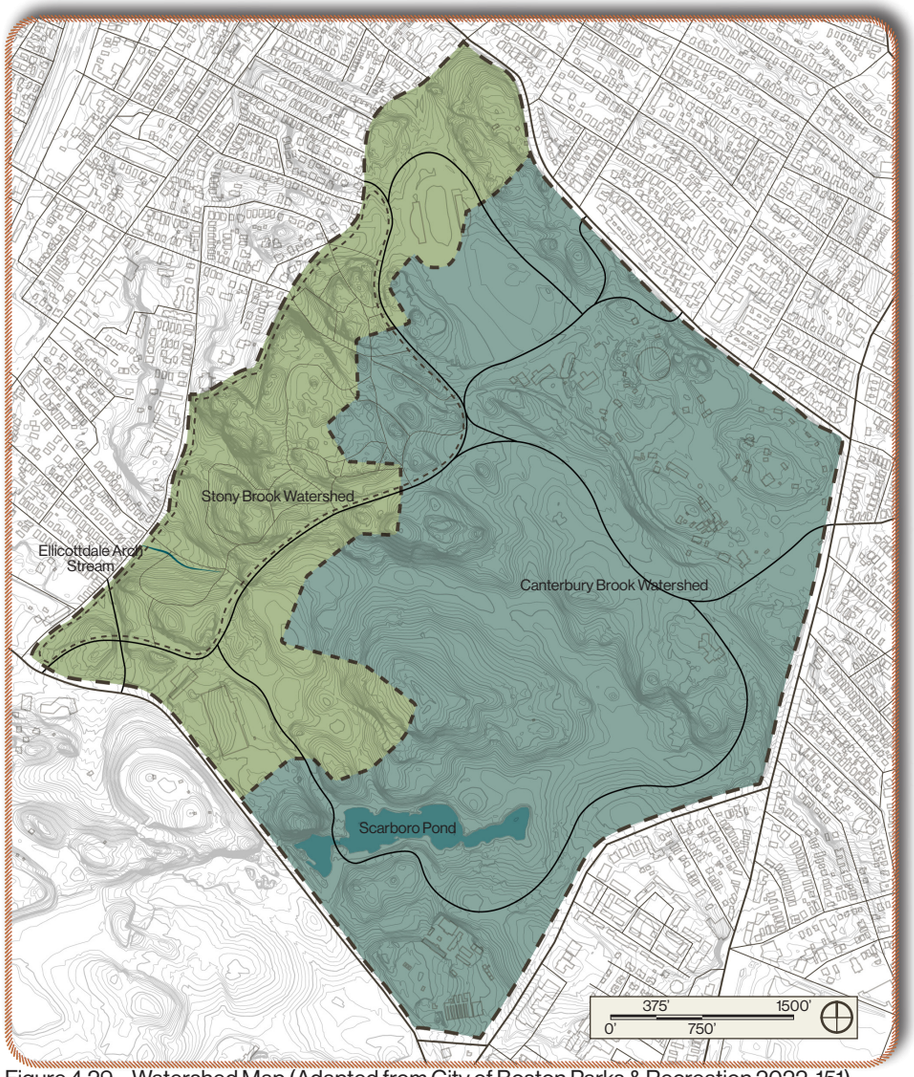


Figure 4.29 – Watershed Map (Adapted from City of Boston Parks & Recreation 2022, 151)

Vegetation

Ecotypes

The ecotypes existing in the Wilderness are: oak pine savanna summit, Oak Hickory Woodland Slope, Beech forest, open woodland, and wet woodland. The two main ecotypes in the Wilderness are oak pine savanna summit and oak hickory woodland slope (City of Boston Parks and Recreation 2022). This shows that the Wilderness has two central ecotypes, but has many different types of ecosystems within one Wilderness. This indicates what species may be more or less suited for a particular area.

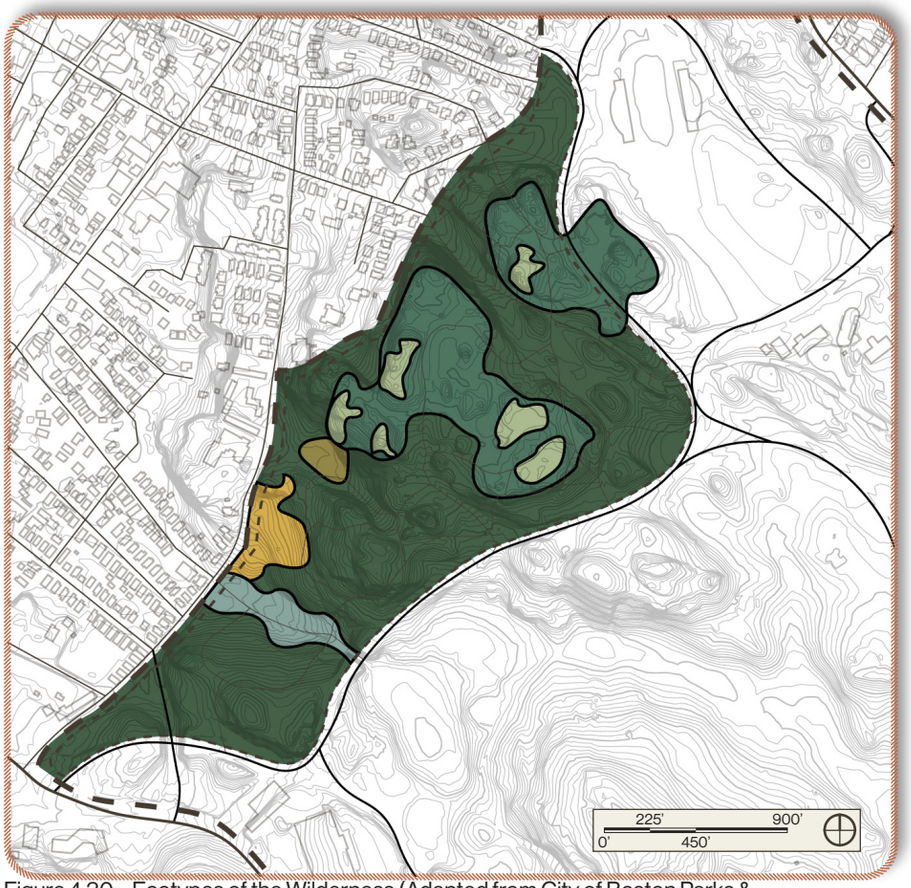


Figure 4.30 – Ecotypes of the Wilderness (Adapted from City of Boston Parks & Recreation 2022, 157)

Native Species on Site:

These are some of the native tree species on-site (City of Boston Parks and Recreation 2022).


Figure 4.31 – American beech


Figure 4.32 – American holly


Figure 4.33 – American sycamore


Figure 4.34 – black cherry


Figure 4.35 – black tupelo


Figure 4.36 – eastern hemlock


Figure 4.37 – eastern red cedar


Figure 4.38 – pin oak


Figure 4.39 – red maple


Figure 4.40 – shagbark hickory


Figure 4.41 – silver maple


Figure 4.42 – sugar maple

Seasonal Variation Plants:

These seasonal variation plants are flowering and berry-producing understory trees and shrubs (City of Boston Parks and Recreation 2022).

Figure 4.43 – black huckleberry

Figure 4.44 – lowbush blueberry

Figure 4.45 – maple-leaved viburnum

Figure 4.46 – witchhazel

Flowering & Winter Species:

These trees visually pop against the snow and give color during the dark winter (City of Boston Parks and Recreation 2022).

Figure 4.47 – American yew

Figure 4.48 – Cornelian cherry

Figure 4.49 – crabapple

Figure 4.50 – flowering dogwood

Figure 4.51 – horse chestnut

Figure 4.52 – serviceberry

Olmsted Plant Palette:

Understory trees and shrubs were typically ornamental, herbaceous, and often had a flowering component. Large drifts of understory plants added seasonal interest and a more intimate sense of enclosure, further evoking the New England landscape character (City of Boston Parks and Recreation 2022).


Figure 4.53 – American beech


Figure 4.54 – black cherry


Figure 4.55– eastern hemlock


Figure 4.56 – eastern red cedar


Figure 4.57 – flowering dogwood


Figure 4.58 – maple-leaved viburnum


Figure 4.59 – pin oak


Figure 4.60 – serviceberry


Figure 4.61 – shagbark hickory


Figure 4.62 – silver maple


Figure 4.63 – sweet birch


Figure 4.64 – white oak

Tree Canopy

A survey by the U.S. Forest Service found that Boston lost around 1.2 mil trees between 2003 and 2008. Roads, sidewalks, and other impermeable surfaces increased by 2% during these years. Only 28% of Boston's land is tree canopy, compared to the national average of 35% (Emerald Necklace Conservancy 2022c). Because of this, it is essential to keep what woodlands are left in the city healthy and thriving.

Heritage Trees

A heritage tree is a specimen that is a significant individual tree or grouping of trees considered irreplaceable for their significance. These trees contribute unique beauty, strengthen the spatial framework of the park, and embody the park's cultural significance within the city. Some of these trees date to the park's construction. A heritage tree is defined by its age, rarity, size, aesthetic, botanical, ecological, and historical value. A heritage tree has a caliper of at least 33". A caliper inch is the standard unit for measuring trees. The measurement is from the tree trunk at chest height and is used to compare the size of trees to one another.

Figure 4.65 – Heritage and Legacy Trees (Adapted from City of Boston Parks & Recreation 2022)

Non-Native Invasive Species on Site

Invasive species have a presence on site that outcompetes native understory trees and shrubs for space, nutrients, and light. An excessive number of trails and almost no active management in the Wilderness has increased the spread of non-native invasive specie populations. Invasive species growth further stresses the forest, reducing diversity and blocking views, causing some visitors to feel unsafe. Figure 4.65 is a map of all of the invasive species, made with information from the Franklin Park Action Plan, the Emerald Necklace Conservancy, and on-site observations. On the following pages is the history of the most threatening invasive species in the Wilderness according to the Franklin Park Action Plan. This is important to note for the Stewardship Plan as 'Remove Invasive Species' is recommendation #1 from the Franklin Park Action Plan for the woodlands. Removing these invasive shrubs and trees will jumpstart natural regeneration.

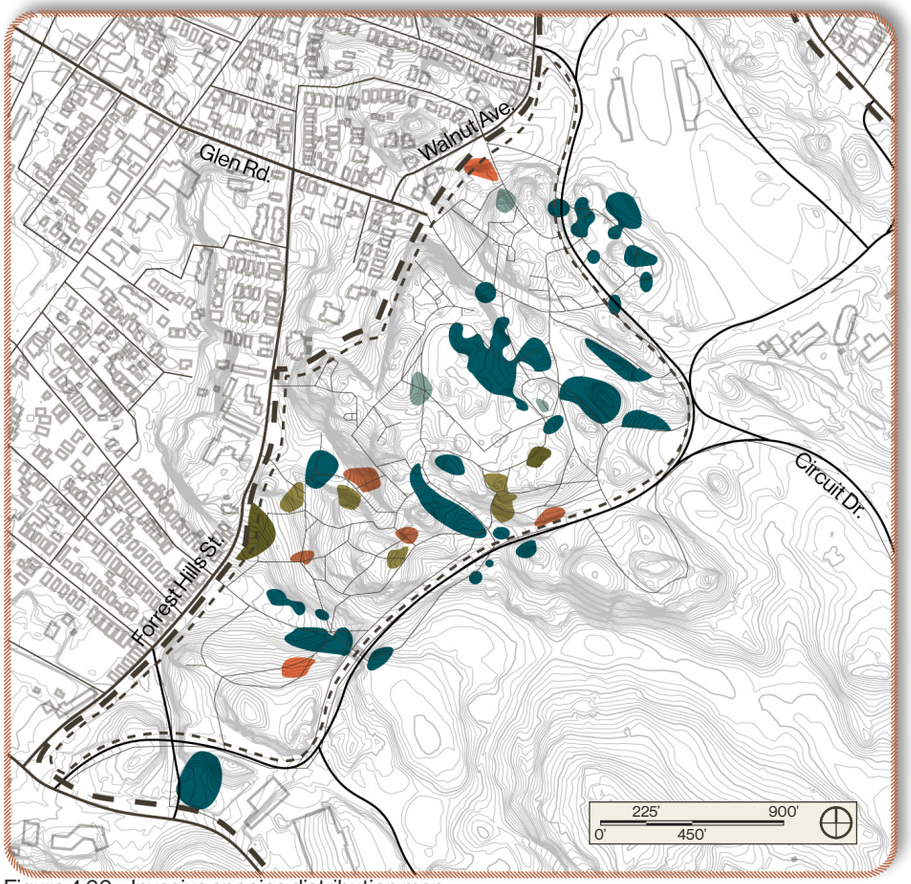


Figure 4.66 – Invasive species distribution map

- Japanese knotweed
- oriental bittersweet
- glossy buckthorn
- periwinkle
- garlic mustard
- Norway maple

Japanese Knotweed

Japanese knotweed was once sold as a perennial ornamental plant and is now one of the most problematic invasive species in the world today. It grows well in riparian habitats, abandoned agricultural fields, polluted postindustrial wastelands, roadway verges, and infrastructure edges (Barney et al. 2006; Del Tredici 2017). Once the plant establishes itself, it spreads from deep underground rhizomes and its seeds (Del Tredici 2017). Knotweed's fruits are small and easily movable, making spreading easy (NYC Parks n.d.).

Figure 4.67 – Japanese knotweed map

Figure 4.68 – Leaves and flower

Figure 4.69 – Stems

Figure 4.70 – Up close knotweed

Figure 4.71 – Animal path through knotweed

Figure 4.72 – Grouping of knotweed

Figure 4.73 – Japanese knotweed on both sides of a path

Oriental bittersweet

Oriental bittersweet is a vine introduced to the United States in the 1860s as an ornamental and erosion control. It smothers plants and uproots trees due to its weight. Bittersweet attacks trees like a boa constrictor by squeezing the tree's life out while smothering the understory. Bittersweet keeps berries after the leaves fall, thus being a favorite snack for birds that transport them to new places (University of Minnesota 2015).

Figure 4.74 – oriental bittersweet map

Figure 4.75 – oriental bittersweet taking over land

Figure 4.76 – Climbing a tree

Figure 4.77 – Vines and leaves

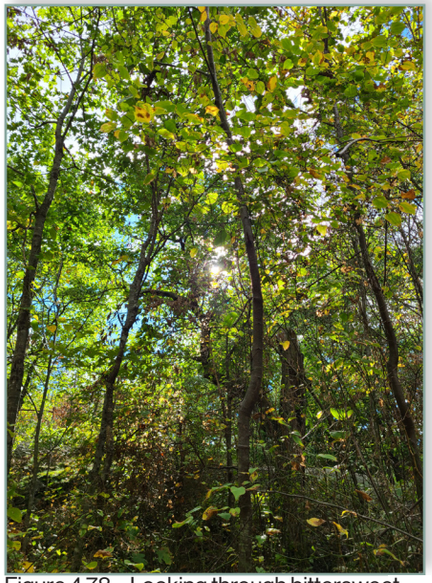


Figure 4.78 – Looking through bittersweet

Glossy buckthorn

Glossy buckthorn is a multiple-stem shrub or small tree that can grow up to 20 ft. tall. This plant's importation, distribution, trade, and sale has been banned since January 1, 2009. Buckthorn produces many seeds that birds and other berry-feeding animals disperse. Both male and female reproductive parts are consolidated into one plant (Wenning 2011).

Figure 4.79 – glossy buckthorn map

Figure 4.80 – Fruit

Figure 4.81 – Stretching limbs

Periwinkle

In the 1700s, periwinkle was introduced to the United States as an ornamental ground cover. It invades natural areas and forms dense and extensive mats along forest floors, displacing native herbaceous and woody plant species, and it spreads through rhizomes (Swearingen et al. 2010).

Figure 4.82 – periwinkle map

Figure 4.83 – periwinkle around a tree

Figure 4.84 – periwinkle by path

Figure 4.85 – periwinkle's spread

Garlic Mustard

In the 1800s, garlic mustard was brought over from Europe for herbal use, medicinal qualities, and erosion control. Garlic mustard can be harvested and eaten when young and less bitter. When it gets older, it contains cyanide and has to be cooked. It adds spice to dips, sauces, salads, and stir-fries. In its two-year life cycle, garlic mustard can produce more than 7,000 seeds before dying. It spreads through the wind and emerges in spring before many native plants, thus blocking sunlight and taking moisture and nutrients of native plants. The roots release chemicals that alter the underground network of fungi that connects nutrients between plants (Nature Conservancy 2020).

Figure 4.86 – garlic mustard map

Figure 4.87 – garlic mustard flower

Figure 4.88 – garlic mustard

Figure 4.89 – garlic mustard spread

Norway maple

Norway maple is an invasive species that goes under the radar because it looks like any other tree but will take over an entire woodland if given the opportunity. It is an alright street tree because it cannot reproduce as well as in a woodland (Sauer 1998). Because of their hardiness, Norway maple is tolerant of many different environments and are a popular tree to plant in front yards and along streets. Their winged seed reproduction rate make it easy to disperse in the wind and germinate quickly. Norway maples have a dense canopy that leaf out early in spring, limiting the diversity in the Wilderness. Their shallow root system makes it harder for native shrubs and wildflowers to grow in the understory (Cornell University 2019).

Figure 4.90 – Norway maple map

Figure 4.91 – Small stems and leaves

Figure 4.92 – All seedlings are close together

Figure 4.93 – Leaves

Figure 4.94 – Canopy

Figure 4.95 – Leaf size comparison to hand

Pests & Diseases

Invasive plant infestations are a serious health threat to the urban woodland in Franklin Park and beyond. But other issues can impact the woodland's sustainability and resilience, such as exotic insects, tree diseases, and decay. These are a natural part of a healthy woodland ecosystem because dead and decaying trees provide valuable habitats for wildlife and continue natural ecological processes (Zobrist 2011). However, in the context of the small woodlands in Franklin Park, even a small infestation of hemlock woolly adelgid or beech bark disease can raise concern. In addition to tree diseases and pests, other risks to urban woodlands in Boston include pollutants or chemicals, flooding, and animal damage.

The pests threatening the health of the Wilderness are hemlock woolly adelgid, bleeding beech canker, beech bark disease, and possibly new ones such as the oak wilt and beech leaf disease. If left untreated, they can impact entire stands of critical woodland habitat (City of Boston Parks & Recreation 2022).

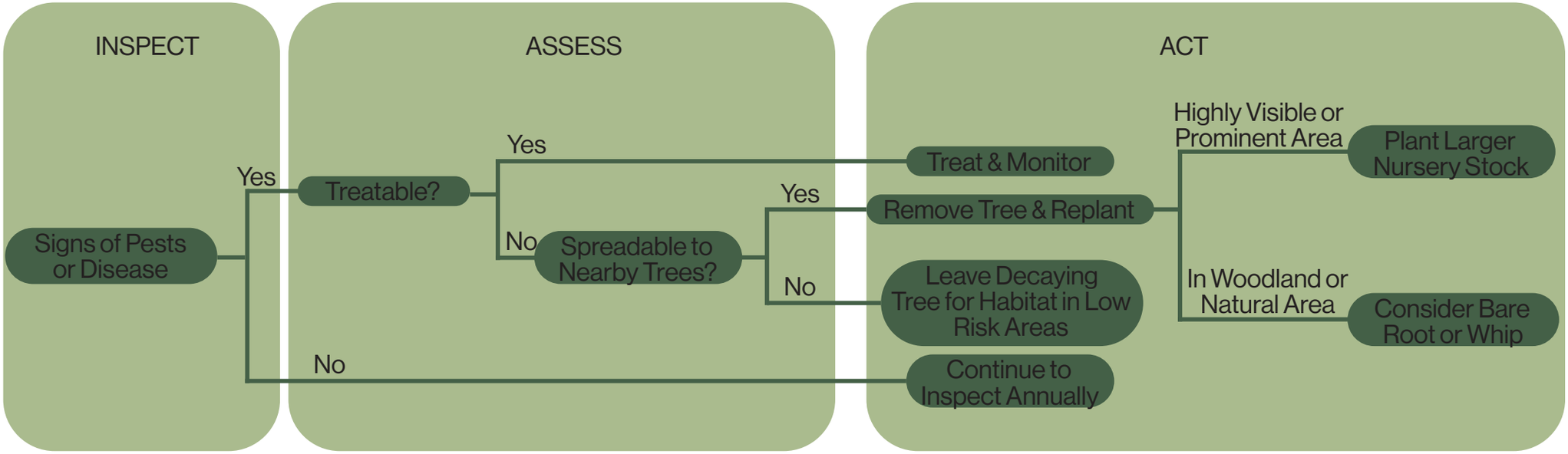


Figure 4.96 – Tree Removal Decision Making Process (Adapted from City of Boston Parks & Recreation 2022, 353)

PRECEDENT ANALYSIS

Figure 5.1 - Tree Canopy

SEATTLE

Background

The Green Seattle Partnership was formed in 2004 by a Memorandum of Agreement between the City of Seattle and the Cascade Land Conservancy. The Green Seattle Partnership is a 20-year investment in the restoration of Seattle's Forests. Seattle is full of forested parklands that are dominated by deciduous trees nearing the end of their life. Of the 3,700 acres of open spaces managed by Seattle Parks and Recreation, 2,500 acres need to be restored (Green Seattle Partnership 2006). In order to do that, the annual funding amount for restoration costs range from $2,800 to $28,000 per acre (Green Seattle Partnership 2006).

The analyzed Seattle documents were the Green Seattle Partnership's 20-year plan, the Urban Forest and Natural Areas Stewardship Planning Guide, Creating Strong Communities through Healthy Forests 2017 Strategic Plan Update, and their website, Welcome to the Green Seattle Partnership. These all combine into one analysis.

Purpose

Goal – to promote a livable city by re-establishing and maintaining healthy forested parklands throughout Seattle (Green Seattle Partnership 2006). The most critical element was to get the community concerned and committed to restoring their forests.

The ecological restoration's main goals are to get rid of the following species that the plan identifies: English ivy, clematis, morning glory, blackberries, Himalayan blackberry, Scot's broom, and knotweed (Green Seattle Partnership 2006).

Reasons for an Ecological Restoration Plan

The ecological restoration plan was responding to non-native invasive plants such as the English ivy smothering out native vegetation. Seattle's trees are aging and dying, and invasive species are speeding up that process by choking out the seedlings that would be replacing today's forests. Within

Figure 5.2 – map of Seattle's Parks in the Green Seattle Partnership 20-year restoration plan

20 years if nothing is done, 70% of Seattle's forested parklands will be an ecological 'dead zone'. This 'dead zone' is a place where trees are dead or dying, invasive plants are dominant, and wildlife habitat does not exist.

Invasive species are both a problem on the ground and in the trees. On the ground, they block native trees from sprouting by crowding the natives out. English ivy can kill deciduous trees within 20 years. By climbing up tree canopies, they cover leaves and block photosynthesis. Their weight alone can break branches and stunt growth. Before restoration, the SUNP concluded that in Seattle, all the ivy on public land would cover 630 football fields, while blackberries could cover 900 fields (Green Seattle Partnership 2006).

The plan exists because the thought of 'natural areas take care of themselves' is not true. Seattle's Forests are Disappearing because of declining canopy, invasive-dominated understory, native trees struggling to regenerate, and inadequate funding for forest management. So, Seattle's neighborhoods started to work with the City government to gain support for their declining forested parklands. In 2004, Mayor Nickels asked the Cascade Land Conservancy to help the City make the reality of thriving forested parklands come true.

Agencies Involved

The Green Seattle Partnership (GSP) oversaw the restoration process that promoted a livable city by re-establishing and maintaining healthy forested parklands. The City of Seattle has many offices involved, including the office of sustainability and environment, Seattle Parks and Recreation, and the Seattle Public Utilities. There is a Forest Steward group with more than 100 forest restoration groups, such as 'Friends of' or 'Adopt-a-Park. The Cascade Land Conservancy launched a 100-year vision for conservation and economic growth for the Pacific Northwest, at the heart is building vibrant urban communities, such as Seattle. Some nonprofit organizations include EarthCorps, Student Conservation Association, and the Seattle Conservation Corps. Commercial crews help the restoration plan come to fruition when things are too dangerous for volunteers, such as private landscape and habitat restoration crews, which will be hired as budget and needs allow. Lastly, funders like corporate sponsors, foundations, and private donors exist.

Organizations that support and fund the restoration efforts are the Seattle Park Utilities stormwater drainage capital improvement program that funded $900,000 over six years. Seattle Parks and Recreation urban forestry capital improvement program funded $975,000 over three years. Cascade Land Conservancy raised $3 million in the first 5 years from philanthropic support and community awareness through a widespread Green Seattle Partnership Community Campaign.

Ecological Restoration Practices

Seattle Urban Nature Project (SUNP) in 2001 found that 90% of forested land in Seattle hosts invasive weeds. On more than half of Seattle's forested acres, invasive plants account for at least 50% of understory cover. To fight this, SUNP came up with a 4-phase approach to restoration fieldwork and a range of hours it should take for labor that this project adapts in chapter 6. The first step is invasive plant removal, which should take 50-800 hours/acre, depending on the vastness of invasive plants. The second step is planting and secondary invasive removal. This should take 50-200 hours. It is not enough to remove invasives once, they will come back. The third step is to establish planting. This should take 25-100 hours an acre for up to three years. The last step is long-term monitoring and maintenance which should take 0-20 hours annually (Green Seattle Partnership 2006).

In 2022 alone, 31 new acres were enrolled in restoration, 70,000 native plants were installed, including 8,595 trees, and 14.3 restored acres were maintained. Since the start of the plan in 2006, 1,899.4 acres have been restored, within a total of 119 Seattle Parks (Green Seattle Partnership 2023).

The outcomes of the ecological restoration was to save Seattle's dying forest, The city did not want their forests to disappear forever. Seattle's forests are currently thriving. They made that happen by being on track of three outcomes: by restoring all 2,500 acres of Seattle's forested parklands by 2025. Second, by establishing financial and volunteer resources to provide long-term maintenance and ensure the sustainability of forested parklands. Lastly, to galvanize an informed, involved, and active community around forest restoration and stewardship (Green Seattle Partnership 2006).

Stewardship

Educational Opportunities

The Green Seattle Partnership strives to help the youth understand their unique role to play in the future of restoration. Climate change is reaching a boiling point that the GSP is trying to prevent, which gives the youth a unique opportunity to gain valuable restoration experience early, and continue that throughout their lives.

Anyone can volunteer, which is the quickest and easiest way to get involved. They have events across the city almost every day of the year. Volunteers will learn about habitat restoration, best management practices for managing invasive species, proper planting technique, and community action. They will get hands-on experience with help from a forest steward or GSP staff member. Anyone can make a difference by helping Seattle's forested parklands thrive. Their volunteers' work contributes to the health of Seattle's green spaces and ensures that Seattle will have access to thriving natural areas well into the future.

After a person has volunteered a couple of times, they can become a Forest Steward, who dedicates a portion of their time to steward a park. They remove non-native noxious weeds, plant native plants, help plan for the park's restoration, and host volunteer events.

Several of GSP's partners hire youth to work within Seattle's parks. This is a great way to get job experience, learn about a variety of topics, and contribute to the stewardship of Seattle's urban forest.

Community Involvement in Restoration

The Forest Steward programs wanted to build the educational value of forested parklands. By 2018, 354 Forest Stewards that have been trained in restoration, maintenance, and stewardship practices. In 2022, there were 187 active Forest Stewards (Green Seattle Partnership 2006; 2018; 2023). In 2022 alone, there were 32,959 volunteer hours completed, 13% being completed by the youth, saving the city an astonishing $1,009,862. The Green Seattle Partnership supported 123 paid and stipend positions (Green Seattle Partnership 2023).

Their volunteer map on one Saturday in February 2023 had a total of six volunteer events that anyone could sign up for. The name, location, and number of people who signed up out of the limit were listed for each event. On this particular Saturday, 70% of the spots were taken. Anyone could sign up for backyard bird counting, which is a program through Cornell that counts and keeps tracks of birds migration patterns. Another volunteer event is helping restore the Food and Medicine Forest at a cultural center, planting over 4,000 traditional food and medicines. The last volunteer event that will be discussed is volunteering to help forest restoration. This work involves removing invasive plants, planting native species, and mulching new plantings. There are a total of 11 different sites that someone can volunteer to restore (Green Seattle Partnership 2023).

Special Programs

Some sites are unsuitable for volunteers because of extreme invasive plant infestations, steep slopes, riparian areas, and wetlands. The Green Seattle Partnership prioritized contracting with organizations that provide training and development of a 'Green Collar Workforce'. The 'Green Collar Workforce' are stable jobs with a living wage that are focused on forest habitat restoration. Some examples of 'Green Collar Workforce' are nonprofit employment-training crews such as Seattle Conservation Corps and EarthCorps that will be hired for both volunteer management and at difficult sites

Takeaways for Franklin Park

Exploring Seattle's comprehensive ecological restoration plan for the entire city enabled the Stewardship Plan for the Wilderness to envision a future beyond its confines and contemplate its potential post-restoration. This realization has sparked a greater ambition for the Stewardship Plan, which could aspire to expand and serve as a model for all of Boston, drawing inspiration from Seattle's approach.

The biggest takeaway is that Seattle has been successful with their stewardship program and it has saved the City $1,009,862 (Green Seattle Partnership 2023).

Central Park

Background

Central Park is an infamous 810-acre park in New York City that was designed by Frederick Law Olmsted and Calvert Vaux in 1858. The original purpose of the design was to offer urban dwellers an experience of the countryside and a place to escape the stresses of urban life. This is still true today as the park has over 42 million visitors yearly.

Part of the Stewardship analysis in this Central Park analysis is over New York City Parks as a whole, not just Central Park.

Purpose

The mission of the Central Park Conservancy is to restore, manage, and protect Central Park and to educate and serve its users and patrons. When the park is seen as a benefit, businesses notice that a healthy, vibrant park attracts top executives and companies to Manhattan (Madden et al. 2002). The Conservancy wanted to restore the forests back to a healthy forest ecosystem. A healthy forest ecosystem cools peak summer temperatures, absorbs and filters stormwater, absorbs air pollution, releases oxygen, stores carbon in vegetation and soils, supports biodiversity, and allows city residents respite from the frenzy of urban living (NYC Parks n.d.).

Reasons for an Ecological Restoration Plan

In the 1970s, a fiscal crisis hit NYC, which led to Central Park experiencing neglect. During this time, the elegant fountains were turned off, lawns turned to dust, and stone bridges were covered in graffiti. Illicit activities happened everywhere and people were scared of the parks under-populated pathways (Madden et al 2002).

The Department of Parks and Recreation attempted a large master planning effort in 1973, but did not happen because of funding. By the late 70s, NY Senator Daniel Patrick Moynihan called the park a disgrace and proposed turning the park over to the National Park Service. During this time, citizen groups united and established the Central Park Task Force. In 1979, the group

Figure 5.3 – Central Park

became the Central Park Conservancy with Elizabeth Barlow Rogers as president. She was then appointed the first Central Park Administrator by Commissioner of Parks Gordon J. Davis. To show support, Davis launched the first restoration project in years to restore the 22-acre sheap meadow. The first goal of the Conservancy was to re-establish the maintenance skills that were lost after years of mismanagement (Madden et al. 2002).

Agencies Involved

In 1998, the New York City Department of parks and Recreation and the Central Park Conservancy signed a long-term contract making the Conservancy responsible for all the park's maintenance responsibilities including: cleaning of facilities, playgrounds, drains and walkways; landscape maintenance; repairs and painting; and capital improvements. The city pays the conservancy an annual fee based on how much the conservancy raises and spends on the park and how much income is generated from concessions (Madden et al. 2002).

The Partnerships for Regional Invasive Species Management and Long Island Invasive Species Management created a ranking system for invasives based on their disturbance level, and prioritizes their management. An invasive removal technique should follow the principals of Integrated Pest Management (IPM) (NYC Parks n.d.).

The Central Park Conservancy is the primary caretaker of the park with 216 staff members and a board of 52 members. After 15 years of Rogers leading in 1995, the conservancy raised $110 millin to restore the park. Rogers also developed a fundraising and support organization from 3 to 175 employees. (Madden et al. 2002).

An organizations that supports the restoration effort of Central Park is the MillionTreesNYC. They provide funding to NRG for full-time staff to fight invasive plants, revitalize soil, and restore forests back to health (NYC Parks n.d.) Another organization that helps raise money is the women's committee in the Conservatory Garden. The Conservatory Garden hosts the largest fundraising event that is an annual luncheon that raised $2 million in 1998. This money helps the Conservancy provide two-thirds of the park's $22 million budget (Madden et al. 2002).

Ecological Restoration Practices

The restoration process starts with the areas with high-density invasives. Multiple treatments will be needed in these areas because the invasives will re-sprout. After the first round of treatment for one invasive species, another one will pop up. Adjustments to the treatment over the years will be necessary (NYC Parks n.d.).

Small canopy gaps are ideal reforestation sites. The intact forest will provide shelter and may have seeds in the seedbank. To minimize your site preparation efforts, prepare the site as soon as the disturbance happens. Gaps created by a storm or tree falling, site preparation may be just bucking up and dispersing the down wood for new plants to grow. Older gaps may have invasive plants established. These invasives found in gaps typically happen by being carried by birds, mammals, or water. A gap along a stream may quickly be overtaken by Janpanese knotweed if there is a population upstream (NYC Parks n.d.)

The invasive species the plan identified are Japanese knotweed, porcelainberry, oriental bittersweet, Japanese honeysuckle, and phragmites. treatment, knotweed will survive from rhizomes. Until new trees grow tall enough to block sunlight, remove any that re-emerges periodically by pulling or digging out its rhizomes. This will need to be done for 3-5 years. Unfortunately, knotweed will most likely always exist (NYC Parks n.d.).

Factors to consider when determining the best approach for invasive control are the species of invasive plants, treatment area size, density and maturity of invasive plants, and the length of time available for treatment, sensitivity of native populations to herbicide, proximity to wetlands, available workforce, current city and state laws, and the budget for site preparation and maintenance.

Mechanical Control - Cutting or pulling plant material. Can use chainsaw when you get permission from city, state, or federal. Girdling - process where the cambium is stripped in a continous ring around tree to disrupt the flow of water and nutrients. Mowing is also a mechanical control method when combined with chemical control

Chemical Control - Herbicides. Might not need repeated visits. Research most effective chemical choice, timing, and application method for each species. also minimize chemical exposure to non-target species. Licensed applicators are needed.

Biological Control - The release of a pest or predator that targets the undesirable plant species. This can be more economical than chemical or mechanical in large areas. USDA has to ok it.

Vinelands - are areas dominated by invasive vines. New York City contains hundreds of acres of vineland. Vinelands require the longest post-planting maintenance due to the persistence of the seeds in soil, rapid growth, and resisting chemicals. Include a large buffer zone so no re-colonization happens. Vinelands often occur in canopy gaps. NRG has found burnt out cars, building foundations, old roads, homeless encampments, and dumping under carpets of vines, along with spring ephemerals, salamander habitat, and native seedbanks.

Japanese knotweed is a main concern in Central Park as well. Knotweed requires at least two to three years of foliar spray herbicide treatment three times each growing season before planting can begin. Even after this aggressive

Invasive plant management must be a part of the project before, during, and after planting. Planting new plants before managing surrounding patches of established invasive species will make it harder to maintain. Invasive plants, even ones weakened by herbicide applications, can threaten newly planted species for water, nutrients, and light. Plan on continuously weeding until the tree canopy closes. After that, monitor the site every few years, especially after storms where fallen trees create new gaps. (NYC Parks n.d.)

Stewardship

Volunteering allows the community to give back to the community and the park. Central Park is for all New Yorkers, and being able to say that you are a part of helping the park look the way it is is highly satisfying (Central Park Conservancy 2023).

Educational Opportunities

One educational way to volunteer is on Teen Volunteer Days (ages 13-18). Teenagers are invited to give back to their community by helping with season projects like raking, weeding, or mulching. These projects are April through June and September through December on Saturdays 12:30-2:00. Teenagers must complete a guardian consent form before the project, and sign up for a shift in advance. This promotes good stewardship to the community teenagers (Central Park Conservancy 2023).

One way for the whole family to learn things is the Family Volunteer Days. This allows parents to grab their kids and get some quality time with them while giving back to the Park at the same time. Tasks are raking or spreading mulch. Children must be four years old and up. All minors must be accompanied by a guardian, and a maximum of three children per guardian exists for control. The Family Volunteer Days happen April through June and September through December on Saturdays, 10:00-11:30.

Community Involvement in Restoration

There are lots of opportunities for the community to get involved in the restoration process. One way is to be on a seasonal volunteer team (ages 18+). These teams make an immediate difference in the Park by painting and weeding in spring and summer, raking in the fall, and shoveling snow in the winter. The horticulture annual projects start as soon as the snow and ice melt away and out pop the first weeds. Volunteers will be there instantly to give native plants an advantage against invasive species. In the summer, vlunteers do intensive detail work that keeps Central Park looking like a sculpted masterpiece. In the fall, volunteers do leaf removal and compost them. In winter, volunteers either help shovel snow off pathways and playgrounds, or cut and prune back the growth from last year to make room for spring's bloom (Central Park Conservancy 2023).

Another way to volunteer is to be on the Saturday Green Team (ages 18+).

The Saturday Green Team meets every Saturday and helps with landscape maintenance such as raking, mulching, pulling weeds, and planting. This opportunity gives the community to enjoy the outdoors and get a workout in, all while giving back to the Park. The Conservancy provides all tools needed.

The last volunteer session is Community Volunteer Days (ages 18+). This allows people on the fence about volunteering or not to try it out with no strings attached. On these days, volunteers focus on making room for the bloom in the Park by strolling through some of Central Park's less travelled paths and picking up what the wind and weather have been hiding all winter (Central Park Conservancy 2023).

Special Programs

Committed Volunteer Opportunities allow volunteers to commit to a regularly scheduled weekly shift. There is additional screening and interviewing that happen for these opportunities such as being a greeter or helping in the landscape management. The Landscape Management lets the community work side by sied with a member of the Conservancy field staff each week. These volunteers help the Park meet its horticulture and maintenance needs. While working every week, volunteers develop a great deal of knowledge, ownership, and pride about Central Park. The tasks include weeding, mulching, and raking. To become a Landscape Management Volunteer, they must complete three or more Flexible Volunteer Opportunities (listed under 'Educational and Research Opportunities' and 'Community Involvement in Restoration'), complete the interview and training processes, be interested in horticulture, commit to one three-hour shift per week for up to six months, be able to do physically demanding work, and have internet access to record work hours and email. These shifts are 9:00-12:00 Tuesday, Wednesday, or Thursday.

Become a Steward

The Stewards program empowers individuals to take charge of their local parks and advocate for the benefits of nature in urban areas. Whether working solo or leading a team of volunteers, Stewards can organize projects, apply for mini-grants, connect with other volunteers, and gain valuable insight into the agency's operations. The New York City Parks and Recreation Department provides training, support in selecting and accessing worksites, and the necessary resources to make projects a success (NYC Parks 2023).

The type of Stewards

Care Captains – take care of street trees

NAVIgators – take care of forests and meadows

Shorekeepers – take care of wetlands

Trail Maintainers – Help manage our nature trails

Types of Stewardship Projects

All five burrows of New York City (Bronx, Brooklyn, Manhattan, Queens, and Staten Island) have a list of upcoming Stewardship Projects in their area. They have a list of Stewardship Projects about a month out. Depending on the burrow, they show 2-15 projects in the month of April (NYC Parks 2023).

Some of the forest related Stewardship Projects are repeated at different parks but consist of tree planting, forest restoration, ecology park spring awakekning, and ecology park clean-up & tour. Every Stewardship Project has a month or more to sign up on the website, the date, location, meeting location, description, and the schedule of the event (NYC Parks 2023).

How to Become a Steward

NYC Parks trainings and workshop offer valuable insights from industry experts on effective strategies for urban landscape projects. At these events, stewards in training cultivate support, access useful tools, and enhance the project's benefits for the team and the environment.

Joining gives people the ability to acquire the knowledge and skills needed to make a meaningful impact in the community. Becoming a Steward is a four-step process:

1. Attend a Volunteer Event

To be eligible to become a Steward, a person must attend one of NYC Parks public steward events and get their hands dirty. Some of the events are listed above.

2. Attend an Intro Workshop

After participating in a volunteer stewardship event, a person has the opportunity to enroll in an Intro Workshop. Led by the knowledgeable staff, this workshop provides an overview of landscape management in New York City and highlights the crucial role advanced stewardship volunteers play in the broader context. Insight into the available resources, tools, support, and guidance are given. These informative workshop are conducted indoors for everyone's comfort

3. Complete Advanced Training in the Field

Advanced trainings provide hands-on experience in the great outdoors, and are tailored to specific landscapes such as street trees, forests, and wetlands, During the Intro Workshop, the Steward-in-training will determine which landscape aligns with their interests, and add them to the list for the upcoming Advanced Training in that preferred area. Advanced Trainings equips them with the skills and knowledge needed to organize and execute their own events, teach technical skills to new volunteers, and navigate the challenges of working in an urban landscape.

4. Select Your Site

Once the Steward has completed their training, NYC Parks offer one-on-one support to help them to choose an appropriate site and evaluate the site by identifying key features, review the project approach, and assist in addressing any site-specific concerns or challenges.

With the worksite in place, the exciting work can begin!

Volunteers

Volunteering gives people a chance to give back to their parks. NYC Parks and the hundred of partners hold organized events throughout the year asking the community to pitch in and paint, clean, rake, and generally take care of the city's great and vast park system. People can volunteer as groups or individuals across the city (NYC Parks 2023).

Takeaways for Franklin Park

Through this study of Central Park, the Stewardship Plan for the Wilderness gained a wealth of knowledge on both the ecological and social aspects of the park. The ecological aspect provided extensive information on the eradication of invasive species, while the stewardship component offered a detailed guide for individuals seeking to become stewards. Overall, this analysis proved to be incredibly beneficial for the Stewardship Plan.

PIEDMONT PARK

Background

Piedmont Park is a 189-acre park in Atlanta, Georgia (Madden et al. 2002) that was originally a forest, and then in 1834, Samuel and Sarah Walker purchased the land for $450. The Walkers transformed the woodland into farmland (Piedmont Park Conservancy 2023). Since then, there have been five different master plans prepared with none of them coming to fruition. The park is owned by the Atlanta Department of Parks, Recreation and Cultural Affairs, and the main organization is the Piedmont Park Conservancy. There are currently 11 staff members for the Piedmont Park Conservancy (Madden et al. 2002).

Purpose

The Piedmont Park Conservancy aims to foster environmental values that promote long-term sustainability in and around Piedmont Park.

The Piedmont Park Conservancy wants the park to be a recreational resource that enhances the quality of life for all Atlantans. The Conservancy wants the park to be a healthy green space that the community can go and use (Madden et al. 2002).

Figure 5.4 – Map of Piedmont Park

Reasons for an Ecological Restoration Plan

In the mid 1980s, a proposed sewer improvement plan was going to negatively impact the park. That brought attention to the declining conditions of Piedmont Park. A consensus was made between the Midtown Business Alliance, the parks commissioner, and the Friends of Piedmont Park. In 1989, the Piedmont Park Conservancy was formed to work a public-private partnership to improve the park conditions and to protect the park from negative encroachments. Today, the conservancy has over 1,000 members that keep the park's entrances, landscapes, and historic structures up to date (Madden et al. 2002; Piedmont Park Conservancy 2023).

One master plan was done the the Olmsted brothers in 1912. Throughout all of these master plans, the English Romantic design of meadows, rolling hills, a lake, and a hardwood tree woodland has stayed (Madden et al. 2002). The Conservancy believes the success and health of future generations of the community are linked to the prosperity and overall welfare of Piedmont Park.

What the Ecological Plan Entails

The Piedmont Park Conservancy's mission is "to facilitate and contribute to the renewal and preservation of Piedmont Park as a vital, healthy green space and as a cultural and recreational resource which enhances the quality of life for all Atlantans" (Madden et al. 2002). Their goal is to invest in natural areas of the park to preserve and protect Atlanta's abundant tree canopy and wildlife habitat while simultaneously encouraging human respite and refuge (Atlanta parks & Rec 2021).

Agencies Involved

Since the Piedmont Park Conservancy was founded in 1989, it has raised more than $66 million in private funds to renovate different areas of the park, contributing more than $3.5 million annually in the past few years (Piedmont Park Conservancy 2023). The primary caretaker of the park is the Atlanta Department of Parks, Recreation and Cultural Affairs (Madden et al. 2002).

Ecological Restoration Practices

Parks are not passive investments. They are an active investment. They are constantly looking for trees that have died from old age or disease, replanting with new trees, and removing invasive species.

The ecological restoration was accomplished through the Piedmont Park Conservancy's volunteer and donation programs discussed on the next page. These programs make it so the park is not losing money on restoring and keeping their park up to date.

The outcomes of the Piedmont Park Conservancy's plans have been fantastic since it was founded in 1989. The park was transformed from a declining and ditrty park into a thriving community park (Madden et al. 2002; Piedmont Park Conservancy 2023).

Stewardship

Educational Opportunities

A couple educational programs exist on site. The Environmental Educators is a program that can be brought to the school, or the children can come to the park. The Piedmont Park Conservancy has a travel trunk that teachers can have for one week with park teaching materials. Each trunk includes activities, bio facts, video lessons, and more. There are also educational videos online. There are field trips and travel trunks offered to all grades K-12, with different experiences for almost all age of students (Piedmont Park Conservancy 2023).

By educating young community members about sustainability, they are inspired to become future advocates for causes such as clean energy, wildlife protection, and pollution prevention. This increased awareness and appreciation for park preservation and nature conservation ensures that park's future will be well taken care of (Piedmont Park Conservancy 2023).

Community Involvement in Restoration

There is an existing volunteer system where anyone can sign up on their website as an individual, corporate group, or school or nonprofit organization. There is a volunteer manager specifically for Piedmont Park. As a corporate group, there are different ways you can help. By donating $1,000, you get one 3-hour volunteer project for up to 15 people. For $2,500, you get one 3-hour volunteer project for up to 30 people. For $5,000, you get one 3-hour volunteer project for up to 60 people, and for $10,000, you get one 3 to 5 hour volunteer project for up to 100 people. These levels all include recognition in the Conservancy's annual report, and the $5,000 and $10,000 get a special listing in the quarterly volunteer email, a recognition post on social media, and a behind the scenes tour with the Conservancy's President and CEO (Piedmont Park Conservancy 2023).

In 2021 alone, 2,024 people volunteered a total of 6,180 hours, saving the Piedmont Park Conservancy a total of $176,379. Volunteers planted 1,400 trees and kept over 40 acres of lawn space clear of trash.

Mondays and Thursday are trash pickup days. Wednesday is landscape project day, where you can volunteer to weed, remove invasive plants, prune trees, mulch areas like the dog parks, plant native vegetation, and plant seasonal colors in fall and spring (Piedmont Park Conservancy 2023).

Special Programs

The Piedmont Park Conservancy wants to engage, empower, and encourage all employees by providing training opportunities to promote their sustainability goals. This training will help employees understand the impact they can have on the environment in their everyday work (Piedmont Park Conservancy 2023).

Takeaways for Franklin Park

The analysis conducted for Piedmont Park proved to be immensely valuable in terms of stewardship and volunteer efforts. The park's volunteer website is brimming with a plethora of information and a wide array of events to choose from. By perusing the website, the Stewardship Plan for the Wilderness gain a comprehensive understanding of the various initiative Piedmont is currently undertaking to engage the community, such as stewardship programs, volunteering opportunities, and educational events.

Fairmount Park

Background

Fairmount Park was established in 1855 to protect the city's water resources and was designed by Olmsted and Vaux. Figure x.x only shows Fairmount Park, 2,600 acres, while the park system includes over 8,900 acres, which is 10% of the area of Philadelphia. (ANSP 1999). Out of that 8,900 acres, 5,441 acres is natural landscapes.

When colonizers came over from Europe in the 16th century, they were in awe of the large trees within a closed canopy forest. Historians estimate that the oak trees found then grew for 300 to 400 years (ANSP 1999; Wildman 1933). Initially, an unbroken forest of mature trees stretched for miles in Philadelphia. There were non-forested uplands, thought to be maintained by Native Americans either by burning or active farmland. By 1681, the Europeans had cleared the forests and replaced them with fields, crops, and orchards. This not only removed the forest, but also interrupted the Native American lifestyle, which relied on the unbroken forest. Slopes were spared from the plow because of their steepness but were still cut for timber and fuel. No forest today on the east coast is the same as before Europeans arrived (ANSP 1999).

The forest had a closed canopy when settlers arrived in the New World with 300-400-year-old trees (ANSP 1999; Wildman 1933). The forest was full of oaks, hickories, maples, and sycamores (ANSP 1999). The forest's understory was very open, described as 'park-like' (Budd 1966). The Fairmount Park Conservancy's (FPC) day-to-day management of the park system is carried out by approximately 225 full-time staff (ANSP 1999).

The William Penn Foundation funded the Academy of Natural Sciences to work on a Natural Lands Restoration and Environmental Education Program (NLREEP) with a $26 million grant in 1996 for a five-year restoration effort from June 30, 1997-June 30, 2002. This grant was the largest single gift granted by a private foundation to a public park in the country. This grant was given to restore natural land areas and build environmental education centers (ANSP 1999).

Figure 5.5 – Fairmount Park

Purpose

The goal of Restoration: restore the composition and structure of the native vegetation in the parks so that they can establish self-sustainable ecological communities. This self-sustainable community should be capable of producing, nutrient cycling, and supporting typical plants, plant-eating animals, and carnivores (ANSP 1999). Forested upland restoration increased the biodiversity of forested flora and fauna.

Reasons for an Ecological Restoration Plan

The first comprehensive park master plan was established by the Fairmount Park Conservancy (FPC) in 1983. The plan established goals, policies, and guidelines for preserving the site. It also made strategies for land acquisition, finance, and administration of the park system until 2000. The plan distinguished three areas: designed landscape, historic structures, and natural lands. The natural land was over half of the total land mass of Fairmount Park (ANSP 1999).

Fairmount Park's waterways could no longer withstand the urban context's hold on the streams. Human traffic has compacted the soil, limiting the ability of the soil to soak up the water and has caused severe losses of forest topsoil. Exotic plants worldwide have spread throughout the park, eliminating many native plants. Deer have multiplied, which has led to many shrubs and wildflowers being overeaten to the point of no regeneration. To fix these problems, William Grant funded a 5-year grant starting in October 1996 (Goldenberg 1999).

Agencies Involved

The Natural Lands Restoration and Environmental Education Program (NLREEP) was the lead responsible for the restoration process. The process was led by a team of six individuals – program administrator, natural lands restoration manager, environmental education manager, volunteer manager, finance and information systems manager, and administrative assistant (Goldenberg 1999). The Academy of Natural Sciences of Philadephia (ANSP) brought a team together made up of scientists, botanists, ecologists, zoologists, stream bioengineers, landscape architects, planners, and staff from the Natural Lands Trust, Munro Ecological Services, and Morris Arboretum to follow behind the six leaders (ANSP 1999).

Because the William Penn Foundation grant is only good for five years, they made another grant to a partnership with Yale School of Forestry and Environmental Studies and Community Resources to develop a comprehensive monitor and evaluation program after the five years (Goldenberg 1999).

Ecological Restoration Practices

The city's actions to fulfill the restoration plan were to enhance native species and natural processes by protecting and enhancing healthy systems, use and promote natural processes, recognize the dynamic nature of natural systems, ecological condition is the primary justification for restoration activities, and enhance terrestrial and aquatic organisms by habitat improvement (ANSP 1999).

The restoration plan identified the following species as invasive:

Trees – Norway maple, tree-of-heaven, paper mulberry, and sycamore maple (ANSP 1999).

Shrubs/Vines – Oriental bittersweet, Japanese honeysuckle, grape, poison ivy, Akebia quinate, common milkweed, wisteria, multiflora rose, winged Euonymus, wineberry, Amur honeysuckle, celandine, goutweed, Japanese hops, garlic mustard, Japanese stiltgrass, mile-a-minute, Japanese knotweed, and kudzu (ANSP 1999).

Stewardship

Educational Opportunities

Fairmount Park has many ecology types, from woodlands, streams, ponds, lakes, meadows, and wetlands, allowing all ages to learn from the natural world. The Fairmount Park system is sometimes the only nature experience Philadelphians have, offering a unique opportunity to build an understanding and appreciation for the environment that may lead to lifelong advocacy for conservation. Social skills can be learned, such as our relationship to the environment and community (Goldenberg 1999). Fairmount Park has classes, nature walks, workshops, and other activities to promote community participation in restoration efforts and a greater understanding of the natural world (Goldenberg 1999).

NLREEP helped Fairmount Park create several environmental education centers, integrating them into communities and thousands of Philadelphia schoolchildren and families, thus creating a strong bond between citizens and their parks (Goldenberg 1999).

Before the restoration plan, the park had two environmental education centers. By the end of the five-year plan, they plan to have six fully operational centers serving an estimated 40,000 school-aged children, 15,000 preschoolers, and 39,000 adults annually (Goldenberg 1999). These centers will have a place for both serious study and recreational activities. People can come for information, see exhibits, use resource books, or have coffee (Goldenberg 1999).

NLREEP has worked closely with Philadelphia School District administrators and teachers to integrate numerous activities that can take place in Fairmount Park in the curriculum framework. This framework provides teachers with grade-specific examples and tasks that students can do to develop those skills (Goldenberg 1999).

Community Involvement in Restoration

Fairmount Park has a program called the 'Park Friends Network' with 130 volunteer groups. Each group is dedicated to its own neighborhood park. The volunteers help maintain their common spaces within the park for future generations to enjoy.

The Fairmount Park Conservancy brought the Stewardship program to the community environmental leaders, which could amplify their efforts many times. The neighborhood volunteers are the most important thing about the park system. They do not call the time and effort they put into the park's work, because they are doing what they love and are called 'Park Champions' (Fairmount Park Conservancy 2022).

Special Programs

Three restoration projects happened before 1999, with 137 students combining for 880 hours with NLREEP leading each project (Goldenberg 1999). In November 1997, Philadelphia College of Textiles & Science students helped plant 560 native hardwoods to help re-establish a once-forested hillside that had lost its plants due to stormwater runoff caused by the streets and golf course above. The students monitor the hillside by measuring survival rates and the extent of deer browsing (Goldenberg 1999). In February 1998, St. Joseph's University students worked with controlling the invasive akebia vine on four acres with the park staff. They monitor the success rate of various control techniques (Goldenberg 1999).

Takeaways for Franklin Park

William Grant granted Fairmount Park a whopping $5 million in funds. If the Stewardship Plan for the Wilderness delve deeper into the funding aspect, this project could serve as an excellent precedent to emulate for Franklin Park by providing insights into how Fairmount Park secured the grant and how similar funding could be integrated for Franklin Park.

A STEWARDSHIP PLAN FOR THE FRANKLIN PARK WILDERNESS

Figure 6.1 - Fork in the road

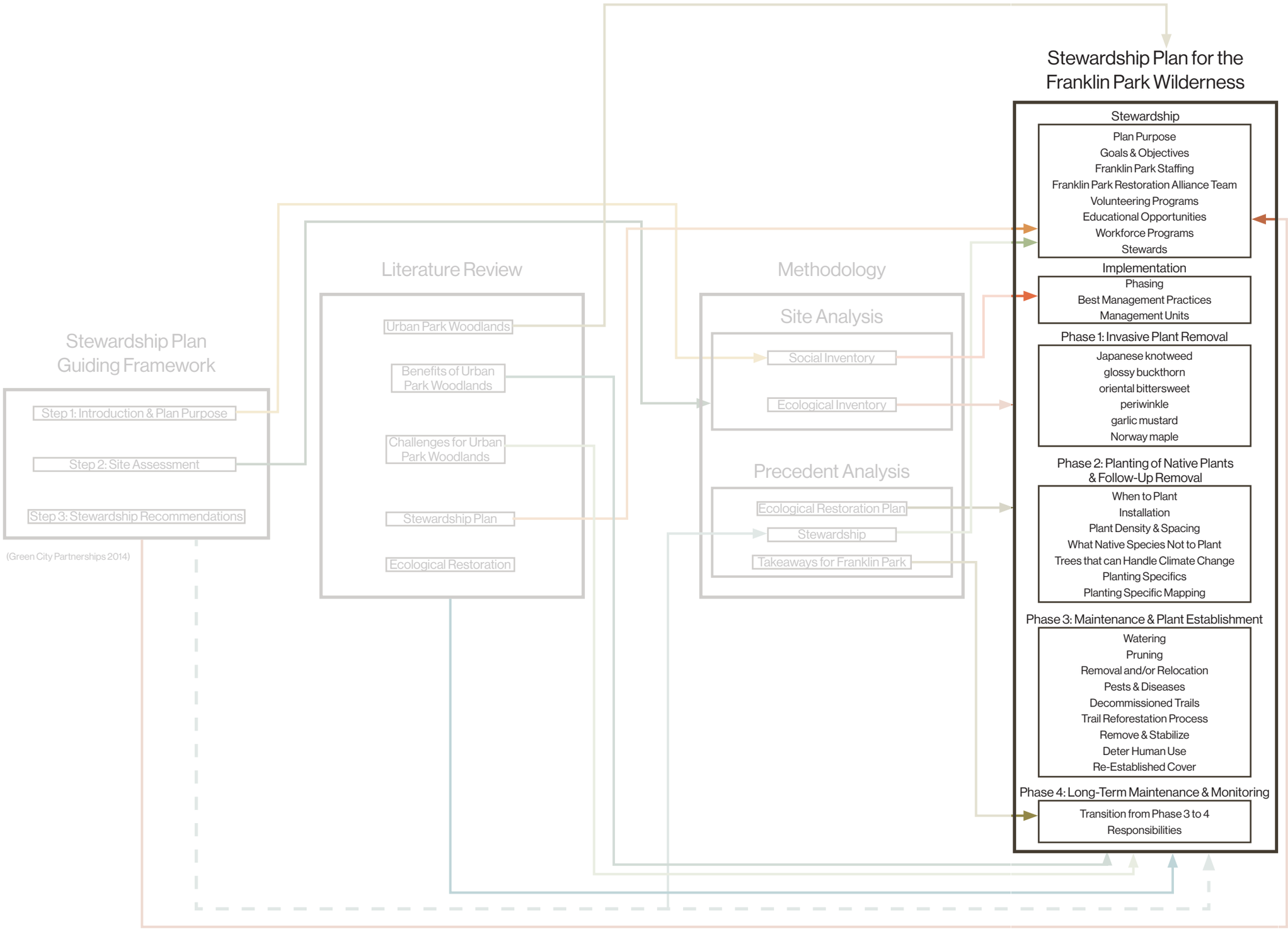


Figure 6.2 – Stewardship Plan for the Franklin Park Wilderness Diagram

A Stewardship Plan for the Franklin Park Wilderness

Plan Purpose

The Stewardship Plan for the Franklin Park Wilderness was developed to provide a comprehensive, robust, and effective stewardship plan for the Wilderness area of Franklin Park. This plan gives specific actions and methods for the City of Boston Parks and Recreation Department to restore and enhance the Wilderness's natural resources. This stewardship plan can be used as a management tool and educational resource for the City of Boston, land managers, community groups, stewards, and volunteers. The Stewardship Plan for the Franklin Park Wilderness can also facilitate communication between city employees and the stewards as they implement stewardship activities. This plan has both a social and ecological aspect that simultaneously benefits the other. The Stewardship Plan for the Franklin Park Wilderness was informed by findings from a social and ecological analysis and the stewardship goals and objectives listed for the Wilderness in the Franklin Park Action Plan (City of Boston Parks & Recreation 2022).

Implementing this stewardship plan will ensure that the restoration efforts are sustained during and after the ecological restoration process, thereby maximizing the benefits of the restoration project. The Stewardship Plan for the Franklin Park Wilderness presents recommendations for ecological restoration and management practices and outlines how the City of Boston's Parks and Recreation Department can utilize community stewards to assist in the ecological restoration process.

A Four-Phase Stewardship Plan for the Franklin Park Wilderness is proposed. This four-phase approach was adapted from Seattle's "Urban Forest & Natural Areas Stewardship Planning Guide" (Green City Partnerships 2014), which was described in the precedent analysis on pg. 128-133. The first two phases focus on ecological restoration, and the last two phases focus on ongoing management and maintenance.

- **Phase 1:** Invasive species control
- **Phase 2:** Installation and Follow-Up Removal
- **Phase 3:** Plant Establishment and Maintenance
- **Phase 4:** Long-Term Maagement

(Green City Partnerships 2014)

One of the key takeaways from the document is that an involved and knowledgeable community is a crucial factor in achieving successful environmental stewardship (Green Seattle Partnerships 2014).

Franklin Park Restoration Alliance

The first step in initiating the Stewardship Plan for Franklin Park is to form the Franklin Park Restoration Alliance. This alliance will be a core team of people who are responsible for overseeing and implementing all ecological restoration tasks in the park. The alliance team will include new paid staff positions, as well as dedicated stewards, and volunteers. Without the Franklin Park Restoration Alliance, a stewardship based restoration may not be possible. Figure 6.3 shows a possible staffing scenario for the proposed Franklin Park Alliance. This scenario builds on the current park staffing structure, which includes the position of the Core Park Crew, and suggests the addition of the Area Superintendent, Maintenance Crew Foreman, Restoration Crew Foreman, Natural Resources Crew, and Community Coordinator as new paid positions. Additionally, the staffing incorporates unpaid stewards and volunteers. Making decisions about the hiring process will need to be facilitated by the owners of Franklin Park, the City of Boston Parks and Recreation Department.

Goals & Objectives of the Franklin Park Restoration Alliance

The goals on the right were adapted from the literature review and precedent studies, and they address both ecological and social aspects of a stewardship based restoration process. The goals can facilitate in the development of a sustainable natural environment while concurrently fostering social and economic benefits.

The goals aim to improve the health and function of the natural systems in the park, such as increasing plant biodiversity and producing more oxygen. These environmental benefits not only support the health and well-being of the community but also contribute to mitigating and adapting to climate change and conserving and restoring local ecosystems.

The goals also aim to foster community engagement and promote physical activity, education, and leadership-building activities while increasing community appreciation and pride for nature and public greenspaces. This can help to create a sense of ownership and responsibility for the park, ultimately leading to more outstanding care and protection of the environment. Additionally, these goals aim to promote public health, team well-being, and employee engagement, which can positively impact the overall well-being and productivity of the community.

Regenerate the Woodlands

- Target key pests & diseases to protect tree species at risk
- Remove invasive species to kick-start natural regeneration
- Reconnect woodland cores to improve valuable habitat
- Reforest decommissioned trails to increase diversity
- Plant along circulation to enhance experience & habitat

Preserve Heritage & Legacy Trees

- Set standards for tree care to manage for long-term stability

(City of Boston Parks & Recreation 2022)

Involve the community throughout the Ecological Restoration Process

- Increase the community's respect for nature and Franklin Park
- Improve community well-being by promoting physical activity and providing opportunities to meet friends
- Promote stewardship of the environment and public greenspaces by educating the community about native plants and promoting character and leadership-building activities
- Foster appreciation and connection to nature and Franklin Park, and give the community a sense of pride and ownership of the park
- Increase the value of surrounding neighborhoods by enhancing public health, team well-being, and employee engagement

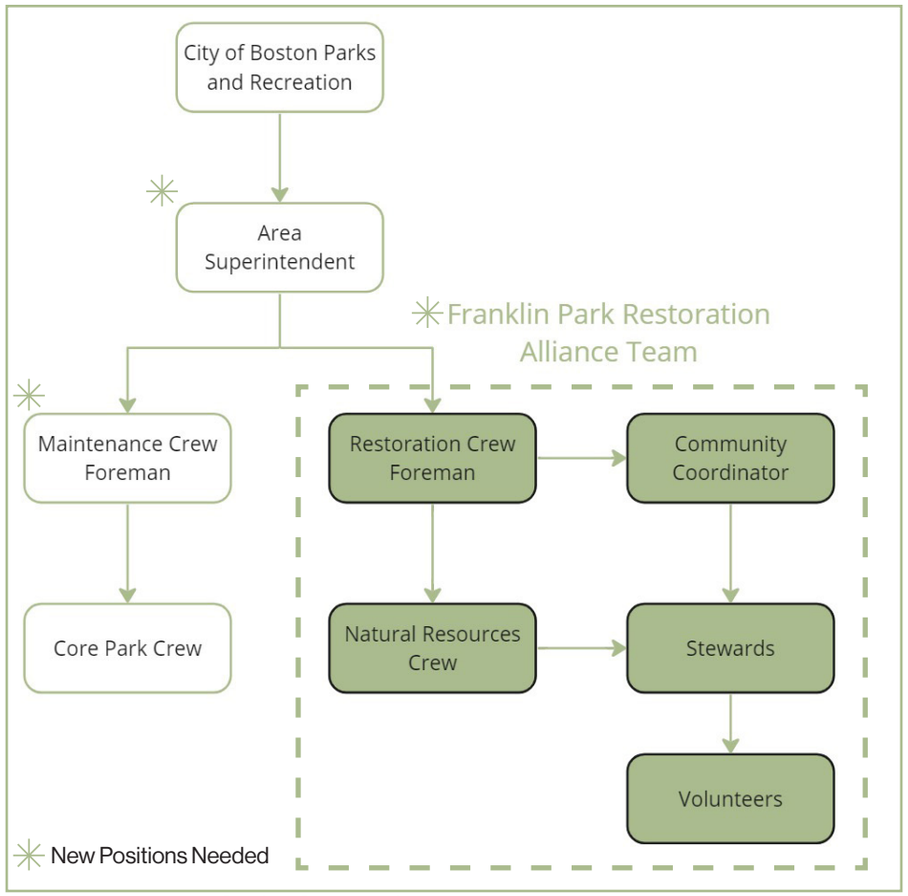


Figure 6.3 – Proposed Staffing Structure for the Proposed Franklin Park Restoration Alliance (Informed by City of Boston Parks & Recreation 2022)

Franklin Park Staffing

Area Superintendent - paid position

The Area Superintendent will be a new position with responsibilities of overseeing all operations in Franklin Park. Selecting someone not from the current staff for this role is recommended, as they can bring fresh ideas to the expanding team.

Maintenance Crew Foreman - paid position

The Maintenance Crew Foreman will be a new position that should be in charge of supervising the primary park crew. If the City of Boston Parks & Recreation Department believes that an existing staff member is capable of overseeing the maintenance of Franklin Park, they may choose to fill this role internally.

Core Park Crew - paid positions

Franklin Park is a large and complex landscape that currently has four maintenance staff, termed the Core Park Crew (City of Boston Parks & Recreation 2022). The existing park requires more care than it is currently receiving. The Franklin Park Action Plan recommends building the Core Park Crew to four to eight staff in the near term and continuing to grow after that (City of Boston Parks & Recreation 2022, 422).

Franklin Park Restoration Alliance Team

Restoration Crew Foreman - paid position

The Restoration Crew Foreman will be a new position that must possess adequate training in ecology or natural resources management, as they will be responsible for directing the Natural Resources Crew, stewards, and volunteers on the tasks to be performed. The Franklin Park Action Plan states that the Boston Parks and Recreation Department "maintenance crew at Franklin Park should grow and be complemented by a restoration/ natural resources-focused crew to manage the landscapes within the park that require specialized training" (City of Boston Parks & Recreation 2022, 423). The Restoration Crew Foreman should meet monthly with the Natural Resources Crew and the Community Coordinator to discuss the tasks that need to be completed during the month. Each steward will be expected to attend at least two of these meetings annually, with a maximum of two stewards per monthly meeting to ensure ample learning opportunities about their assigned management units.

Natural Resources Crew - paid positions

The Natural Resources Crew consist of three new positions comprising full-time staff, seasonal employees, and Power Corps members. The staff positions require a minimum of one year of experience in groundskeeping, forestry, or related hands-on experience. No current full-time team is assigned to the Wilderness area, but it should be expanded to at least three full-time workers. Each worker will be assigned to oversee specific management units, with one person responsible for management units 1-3,

another for 4-6, and the last for 7-10 (see management units in chapter 6). They will collaborate with the Restoration Crew Foreman and stewards to identify the necessary actions within their assigned management units. In addition, they are in charge of organizing the Intro Workshops, which provide interested volunteers with an opportunity to become stewards, as well as the Saturday Volunteer Restoration Project. The Natural Resources Crew will be responsible for carrying out tasks that involve herbicide spraying, chainsaw use, or steep terrain.

COMMUNITY COORDINATOR - paid position

The Community Coordinator should be a new position with a degree in marketing or relevant field that will have responsibilities such as promoting the Franklin Park Restoration Alliance. They will work closely with the Restoration Crew Foreman, Natural Resources Crew, and stewards to develop effective promotion strategies for Franklin Park. All volunteer and educational events should be posted on the Franklin Park Coalition website, while the Community Coordinator should maintain an up-to-date Instagram and Facebook account for the Franklin Park Restoration Alliance. Furthermore, the Community Coordinator will collaborate with the team to identify the best candidate to run educational sessions in the "Educational Opportunities" section. If a steward position becomes available, the Community Coordinator will promote this volunteer position.

STEWARDS - unpaid positions

There will be at least 10 stewards on the Franklin Park Restoration Alliance team. Each are assigned to a specific management unit and are expected to collaborate closely with the Natural Resources Crew in charge of the same management unit and the Community Coordinator to organize volunteer events within their designated zone. Stewards must attend at least two monthly meetings with the Restoration Crew per year. They are also responsible for running at least four volunteer events annually, but this number can be as big as they are willing. Some of these four events can be the Saturday Volunteer Restoration Projects. Additionally, stewards are encouraged to work together to enhance the effectiveness of their events and achieve a broader impact in their management unit. The Stewardship Plan demonstrates how engaged, volunteer community members, "stewards", can work collaboratively with the City of Boston, the Franklin Park Coalition, and the Emerald Necklace Conservancy to ecologically restore the

Franklin Park Wilderness, for ecological and social benefits.

To first get stewards, the City of Boston will need to grow the staff in Franklin Park, and the Restoration Crew Foreman and the Community Coordinator will have to work together to recruit community members by canvasing neighborhoods, preparing educational materials, posting signs, and attending neighborhood meetings (Kraft 2006). If not enough community members are interested in becoming stewards, look next towards Boston's many colleges and universities. Any undergraduate or graduate students in the following degrees may be interested in becoming stewards that could have more time to donate then the surrounding community members of Franklin Park:

Horticulture, Park Management & Conservation, Environmental Science, Conservation Biology, Ecology, Forestry, Wildlife Biology, Environmental Engineering, Sustainable Agriculture, Natural Resources Management, Botany, Environmental Studies, and Landscape Architecture. Any Greek Life (fraternities and sororities) organization may also be interested in volunteering, as most Greek Life organizations require a certain number of community service a semester.

There are also many community organizations that have many shared initiatives that might be interested in becoming a steward such as the Boston Environmental Department, the Community Engagement Cabinet, Arnold Arboretum, or the Boston Public Health Commission.

It would be ideal to have the Restoration Crew Foreman and Natural Resources Crew train all stewards. At the start of the process, if there are people interested in being stewards and not enough staff to train them, the City of Boston could reach out to the National Park Service that has a Rivers, Trails, and Conservation Assistance program (RTCA) that supports locally-led restoration projects throughout the United States through professional services and technical assistance (NPS-RTCA 2023).

VOLUNTEERS - unpaid positions

Volunteer events are open to participants of any age above five, and there are no restrictions on attendance. However, volunteers below the age of 18 must be accompanied by a parent or guardian. Individuals interested in volunteering for the Franklin Park Restoration Alliance can register for volunteer events by visiting the 'Volunteer' tab on the Franklin Park Coalition website once the Community Coordinator gets the website running.

Volunteering Programs

Every step of the Stewardship Plan for the Franklin Park Wilderness should include community volunteers. The following pages list what programs the City of Boston could implement for volunteers and what that process would look like.

Community engagement was an important aspect for the development of the Franklin Park Action Plan. In the plan's survey of the surrounding community, 77% of respondents indicated they lived in a neighborhood that borders Franklin Park. One place to start advertising about the stewardship program and volunteer opportunities is within already engaged communities. However, program stewards and volunteers can come from communities outside the immediate neighborhoods as well.

Another way to get volunteers is to build off of what the Emerald Necklace Conservancy has already done. They have restored parts of the Emerald Necklace, including the Mother's Rest in Back Bay Fens, Ward's Pond in Olmsted Park, and Long Crouch Woods in Franklin Park (Emerald Necklace Conservancy 2022b). The Harold Whitworth Pierce Foundation gave a grant for restoring Long Crouch Woods because the restoration will produce long-range benefits for the surrounding area (Emerald Necklace Conservancy 2022b). The existing Franklin Park Coalition and the City of Boston Parks and Recreation Department should seek grant funding from local and national foundations to fund ongoing ecological restoration efforts.

The Franklin Park Restoration Alliance's Community Coordinator should develop a volunteer program and coordinate restoration efforts with the Emerald Necklace Conservancy. Public outreach about the stewardship program and volunteer opportunities could be marketed on signs in the park, on the Franklin Park Coalition website, and in social media.

The Emerald Necklace Conservancy has an Emerald Partners Program that allows people to donate money and get exclusive benefits. One of the benefits on two out of the five donator levels is a 'Day in the Dirt', a private volunteering opportunity on Emerald Necklace projects for up to 100 people (Emerald Necklace Conservancy 2022d). As part of the 'Day in the Dirt' program, businesses can donate to funding to the stewardship program and then they are offered volunteer project hours for their employees. Essentially a business can make a monetary and volunteer labor donation to the park. Here are some examples:

- Olmsted Team - $1,000 for one three hour volunteer project for up to 15 people and recognition in the Coalition's annual report.
- Premier Partner - $10,000 for one three to five hour volunteer project for up to 100 people, recognition in the Coalition's annual report, special listing in the next quarterly volunteer email, recognition on a post on Facebook, Instagram, and LinkedIn, and a behind the scenes tour for up to 25 of your team or clients.

If there were four levels and each level had four groups volunteer their time each year, that would almost equal 2,400 hours. Volunteering projects could be from clearing out invasive species in the first few years, planting new native species, and pruning plants and trees. The restoration areas should always be maintained annually for years to come, but that will require less time than the initial restoration practices. Additional projects in the Wilderness could include mulching trails, improving picnic tables, picking up trash, creating signs, and seasonal planting.

A proposed initiative to promote community participation and generate funds involves establishing an 'Adopt a Zone' program, modeled after the 'Adopt a Highway' program. Under this program, 10 management units within the Wilderness will be available for adoption. Interested organizations can make a financial contribution and assist with ecological restoration efforts in their adopted zones. In recognition of their contribution, the organization's name will be displayed on signs and featured on the Franklin Park Coalition website and a part of the volunteer emails sent out.

After a person volunteers one time, they will be put on an email roster that all volunteers are a part of. This email chain can advertise significant volunteering events in the Wilderness.

Every Saturday, weather permitting, the Franklin Park Restoration Alliance should seek to host at least one volunteer based restoration process. This Volunteer Restoration Project should be approximately four hours and lead by alternating Natural Resources Crew and Stewards. These events will include removing invasive plants, weeding, pruning, planting, and mulching. The event will begin at the maintenance shed marked on Figure 6.5. Volunteers will need to sign a waiver form and register before the event on the Franklin Park Coalition website. The Franklin Park Restoration Alliance will provide:

- Tools including pruners, shovels, wheelbarrows, ext.
- Instruction and a structure that allows for volunteers to learn
- Soap and water for washing available in public restroom

What volunteers should bring with them:

- Gloves (if needed, the Franklin Park Restoration Alliance can provide)
- Volunteer should bring their own water bottle
- Closed-toed shoes, lightweight long pants, and a long sleeve shirt
- If the volunteer owns pruners or other tools, feel free to bring them

Volunteers will learn the following while on-site from the Natural Resources Crew:

- Identification of plants
- Proper weedy plant removal techniques
- Compost pile building (not for all invasives)
- Proper planting techniques
- After the demonstration, the employee should always ask if anyone has questions

Working in Franklin Park will give the community a greater appreciation and better connection to both nature and Franklin Park. It will give volunteers a sense of ownership and pride over the park. The volunteers may become friends who want to return and do it again together.

Educational Opportunities

Stewards naturally have a deep and ongoing commitment to restoration. However, it can be lengthy to communicate messages effectively, establish trust, and foster strong relationships that attract and retain volunteers. Offering educational opportunities is a way to show appreciation. These opportunities enhance stewards' experience in working with community volunteers.

Franklin Park should develop an educational program for local schools. It can be called the Environmental Educators program and brought to a school, or children can go on a field trip to the park. Field trips can offer on-site STEM education programs fo K-12 grade levels. One example is adapted from The Piedmont Park Conservancy 2023. The educational sessions will be offered by the Community Coordinator who will arrange for staff volunteers to teach the lessons. Some examples are below:

Kindergarten – Swimmers to Jumpers

- Does a baby frog look like its parents? How do plants and animals grow as small or big as they do? Answer these questions and more! Play games, explore our collection of skulls, furs, and tracks, and see what it is like growing up in the wild!

5th Grade to 7th Grade –

- Step into the lab and become a scientist! Students build cell models, learn microscope basics, and even make their own slides in this hands-on program

9-12 Grades – Playground Physics

- Come investigate physical forces on our playscape. Students will analyze and experiment on the playscape equipment to determine which forces are observed. Using what they've learned, students will design their own play structures and identify the forces in them.

Another educational opportunity can be the Intro Workshop, which are organized by the Natural Resource Crew. The Intro Workshop provide interested volunteers a deeper dive into landscape management in Boston and highlights crucial roles stewards play in the broader context of the city. Attending an Intro Workshop is essential for being able to become a Steward, however the workshops are open for anyone to attend.

Workforce Programs

According to the Franklin Park Action Plan, the ecological restoration of the Wilderness may cost $5-7 million (City of Boston Parks & Recreation 2022, 417). This cost may be financially burdensome to the city, thus why a Stewardship Plan is recommended for the ecological restoration process. A stewardship plan would allow money raised for the park go towards other things recommended by the Franklin Park Action Plan such as increasing the Core Park Crew (City of Boston Parks & Recreation 2022) and positions needed in the Franklin Park Restoration Alliance. Hiring positions listed in the Franklin Park Restoration Alliance section and then promoting unpaid stewards and volunteers will allow the Stewardship Plan for the Franklin Park Wilderness achieve its ecological restoration goals.

To receive funding assistance, the City of Boston should apply to the National Park Service – Rivers, Trails, and Conservation Assistance Program (NPS-RTCA). This program helps locally-led restoration projects find funding (NPS-RTCA 2023).

The Emerald Necklace Conservancy has hosted an educational program called the Green Team Summer Program that is within the Emerald Necklace. This six-week program has 30+ youth crew members that meet for 25 hours each week. This program combines nature connection, environmental education, team building, and work skills development all into one unique program. Applicants must be Boston residents and between the ages of 15-18. The students learn about and understand natural systems through nature connection activities (Emerald Necklace Conservancy 2022a). This would be a fantastic program to grow, with the possibility of one group doing all Emerald Necklace projects and another group explicitly working on restoring the Wilderness. A program like this would increase people's stewardship for nature and the park while keeping teenagers busy during the summer. 30 crew members working 25 hours a week for 6 weeks equals a total of 4,500 hours of work.

A new job training program in the City of Boston is the Power Corp, which gives the community access to green jobs through paid training and hands-on work, focusing on tree care, urban wilds maintenance, and park rangers work (City of Boston Parks and Recreation 2022). This is another excellent option that Franklin Park could invest in.

If a restoration task needs staffing, beyond what the Franklin Park Alliance Team can provide, collaborating with PowerCorpsBOS could be beneficial. This program is a 6-month, paid, green job learning experience for ages 18-30 with training, career readiness support, and connections to employers in green industries. Their goal is to promote workforce development for youth in careers related to environmental stewardship (City of Boston 2023; City of Boston Parks & Recreation 2022).

To be eligible to work for PowerCorpsBos, individuals must:

- Be 18-30 years old and a Boston resident
- Have your high school diploma or its equivalent
- Be unemployed/underemployed and not in college or a career track
- Have an interest in outdoor, hands-on training

(City of Boston 2023)

The groups of people who are given greater importance in being accepted into PowerCorpBos are known as priority populations. They include individuals who have been involved with the court system, residents who have been incarcerated and reintegrated into society, young people who have faced homelessness or unstable housing situations, individuals who have been in foster care, and other communities who have been marginalized. During the training program, Power Corps instructs its members on a range of transferrable soft skills and forestry skills. These include identifying native and invasive plant species, practicing environmental conservation, and maintain parks with a focus on tree care and the urban Wilderness. The workers get paid $15.75 an hour at 35 hours per week (City of Boston 2023; City of Boston Parks & Recreation 2022). The training can be throughout Boston, but Franklin Park's wide variety of ecosystems makes it a crucial location for the program and an excellent opportunity to expand the local workforce.

Stewards

The Stewardship Plan for the Franklin Park Wilderness empowers individuals to take charge of their local park and advocate for the benefits of nature in urban areas. Whether working solo or leading a team of volunteers, stewards can organize projects, apply for mini-grants, connect with volunteers, and gain valuable insight into the Franklin Park Alliance operations. The City of Boston Parks and Recreation Department will provide all the necessary training, resources, and tools to support the ecological restoration process and make it a success.

Becoming a steward gives people the ability to acquire the knowledge and skills needed to make a meaningful impact in the Boston community. Lead by the Natural Resources crew, becoming a Steward is a three-step process (Adapted from NYC Parks 2023):

1. Attend a Volunteer Event

To be eligible to become a steward, a person must attend one of the Wilderness' volunteer events and get their hands dirty. These volunteer events could include removing invasive species, planting native species, managing the Wilderness, or any other event listed in the 'Volunteer' and 'Special Programs' above.

2. Attend an Intro Workshop

After participating in a volunteer event, a person has the opportunity to enroll in an Intro Workshop. Led by the Natural Resources Crew, this one day workshop provides an overview of landscape management in Boston and highlights the crucial role advanced stewardship volunteers play in the broader context. Insight into the available resources, tools, support, and guidance are given.

3. Complete Advanced Training in the Field

Advanced training is a two day training course that provides hands-on experience outdoors. Advanced Training equip stewards with the skills and knowledge needed to organize and execute their own events, teach technical skills to new volunteers, and navigate the challenges of working in an urban landscape.

To become a steward someone must attend a volunteer event, attend an Intro Workshop, and complete Advanced Training in the field. After those steps are completed, potential stewards must agree to these responsibilities and duties (Adapted from Green City Partnerships 2014):

- Serve as a steward for at least two years
- Serve as the key contact for a management unit (a management unit is a work area in the Wilderness, described in chapter 6)
- Coordinate volunteer ecological restoration events and activities in the management unit (MU). At least four volunteer events per year per management unit
- Attend at least one volunteer event in a different management unit.
- Work with the Community Coordinator to manage event postings and sign-in sheets
- Work with the Restoration Crew Foreman to stay up-to-date in the Invasive Species management unit checklist
- Participate in an annual site planning visit with the Restoration Crew Foreman to agree on an identified plan for volunteer work
- Go to two of the Restoration Crew monthly meetings a year
- Plan the restoration and engage the community with an anti-racist lens
- Maintain a positive work relationship with staff, volunteers, donors, and community members
- Must be 18+ years old
- Pass a background check

Implementation

Phasing

The Stewardship Plan for the Franklin Park Wilderness is divided into a four-phase restoration approach that describes the ecological restoration tasks and stewardship activities for each management unit. The four phases of restoration are:

- Phase 1: Invasive species control
- Phase 2: Installation and Follow-Up Removal
- Phase 3: Plant Establishment and Maintenance
- Phase 4: Long-Term Management

Adaptive management is an ongoing process for improving management policies and practices by applying knowledge learned through the work already done (Gann et al. 2019; McDonald et al. 2016). It is important to note that this Stewardship Plan for the Franklin Park Wilderness is a ten-year plan, but it might take longer to implement. The restoration plan has some overlap and flexibility built into it for this reason, but if something gets delayed, it is important to do the next phases correctly rather than on time.

This four-phase approach to restoration fieldwork was adapted from Seattle's Green Seattle Partnership to accomplish the ecological restoration of the Wilderness (Green Seattle Partnership 2006).

- Phase one is invasive plant removal, which takes an average of 400 hours/acre, depending on the vastness of invasive plants.
- Phase two is secondary invasive removal and new planting, taking around 125 hours an acre.
- Phase three is establishing planting, taking about 65 hours/acre for up to three years.
- Phase four is long-term management, taking on average 10 hours an acre annually

That is a total of 62,050 hours for restoration over 10 years and four phases, shown in Figure 6.4.

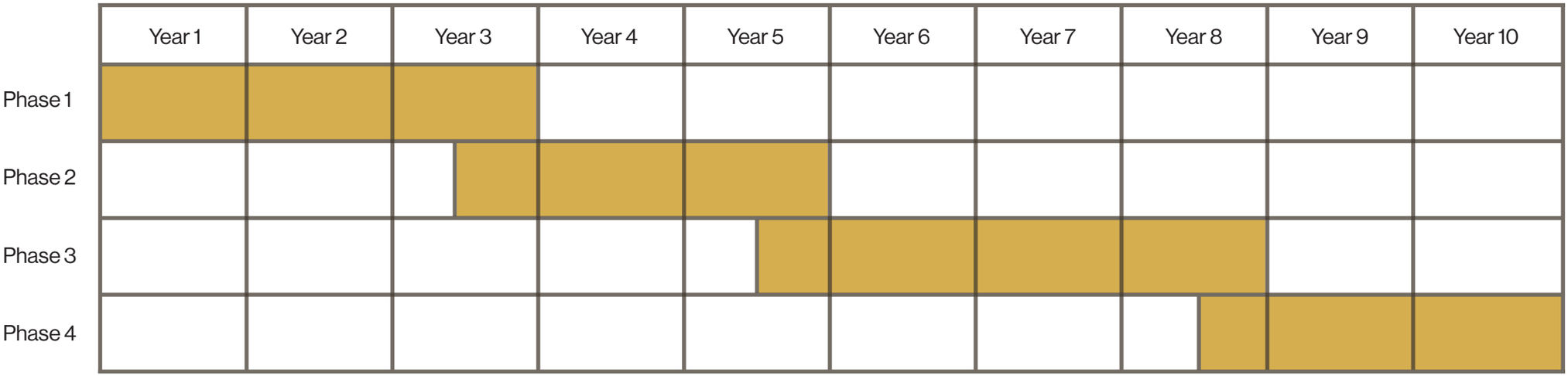


Figure 6.4 – Four-Phase Restoration Timeline

Best Management Practices

A best management practice (BMP) is a suite of methods or techniques that has consistently shown positive or successful results when compared with other methods. Each stewardship recommendation will have an explanation of the best management practices. The following section provides an overview of the best practices for the primary issues faced in urban woodland restoration, including invasive plant management, horticultural techniques for new native plant installation, and long-term management.

A landscape maintenance program is needed to complement the landscape quality and structure of the park's size and complexity, usage levels, maintenance infrastructure, and staffing and volunteer structures. The key points to this are assessing different staffing models for in-house staff, maintaining expertise and specialty skills on staff, and using volunteers. It is important to remember that one model does not fit all (NPS 2007).

When faced with the decision of assigning tasks to Stewards and Volunteers versus the Natural Resources Crew, several factors should be considered. Firstly, it is important to acknowledge that not all restoration practices are suitable for volunteers, and may require specialized training and equipment. Secondly, any application of pesticides, including foliar spray, must be conducted by individuals who possess a license or certification issued by the Massachusetts Department of Agricultural Resources (UMass 2018), which the PowerCorp possesses. Lastly, tasks involving the use of chainsaws or work on steep slopes may pose a risk to volunteers and therefore may not be suitable for them to perform.

Management Units

The Wilderness and surrounding area is divided into ten management units. Management units (MUs) define work areas, make tracking restoration activities easier, and helps monitor the progress over time (Green Seattle Partnerships 2014). A Natural Resource Crew member will be responsible for keeping track of 3-4 MUs, while a steward is responsible for one MU that is the same as a Natural Resource Crew member. The phases are ranked 1-10 with how bad the invasive species are. When starting the phases, it is best to start at MU 1 and then 2, 3, and so on from there. That is not always the case, for example, if it is January when you are starting at MU 1 which only consists of Japanese knotweed (See Figure 6.6), and Japanese knotweed removal does not start until May (see Figure 6.7), start at the next management unit.

There is a maintenance yard in Franklin Park, but it is far away from the Wilderness. Having at least a shed to supply tools would be good to have by the Wilderness. Figure 6.5 has marked an empty parking lot in red that could host a maintenance shed for the staff, stewards, and volunteers to leave supplies, as well as a bathroom.

Figure 6.5 – Management Units Map

Management Unit Boundary

Empty Parking Lot where Maintenance Shed Could Be Built

According to Green Seattle Partnerships an MU should be 10 or less acres for organizational purposes. The MUs are split up mostly from the pathways on-site to give workers a boundary as well as keeping them as close to 10 acres or less. The MUs are generally in order of greatest to least invasive species presence. MU 9 and 10 are included even though they are outside of the Wilderness because Japanese knotweed exists outside of the Wilderness. If not taken care of, it could migrate over to the Wilderness. This is the Franklin Park's Wilderness Stewardship Plan, so anything that benefits Franklin Park is also benefiting the Wilderness.

Figure 6.6 – Management Units and Invasive Species Map

- Management Unit Boundary
- Japanese knotweed
- oriental bittersweet
- glossy buckthorn
- periwinkle
- garlic mustard
- Norway maple

Figure 6.7 shows how the seasons, management units, and restoration activities relate. When a MU is not on the schedule, Stewards from that unit can go assist Stewards of another MU, or wait and do the bulk of their work in the season that is most suitable for their MU.

Year	Season	MU	Activity
1	Winter	2, 5, 6	Mow periwinkle
	Winter	3, 4, 5	Remove oriental bittersweet
	Winter	7, 8	Remove Norway maple by cut stump method
	Spring	2, 6	Remove glossy buckthorn
	Spring	7, 8	Remove Norway maple by basal bark method
	Spring	2, 5, 6	Go back and spray periwinkle
	Spring	2, 5, 6	Where not mowed, pull periwinkle by hand
	Spring	5, 6	Remove garlic mustard
	Spring	1, 2, 3, 4	Remove Japanese knotweed
			2 weeks later, come back and dig rhizomes
	Summer	5, 6, 7, 9, 10	Remove Japanese knotweed
			2 weeks later, come back and dig rhizomes
	Summer	All MUs	Continue removing what was not removed in spring
	Fall	3, 4, 5	Remove oriental bittersweet
	Fall	2, 5, 6	Mow periwinkle
2	Repeat what was not gotten to in year 1 and what has grown back		
3	Repeat year 2		
4	Winter	All MUs	Keep looking for invasive species
	Spring	All MUs	Start planting new native plants.
	Fall	All MUs	Fall is the ideal time to plant new speecies for the best survival rate
5	Repeat Year 4		
6	Winter	All MUs	Most plants need three years of establishment care to ensure plant survival in the future
	Spring	All MUs	Start watering and pruning plants
	Summer	All MUs	Start focusing on decommissioning trails
	Fall	All MUs	Start removing or relocating unwanted plants
	Winter	All MUs	Make decommissioned trail signs
7	Repeat Year 5		
8	Winter	All MUs	Repeat year 6
	Spring	All MUs	Repeat year 6
	Fall	All MUs	Start transition from phase 3 to 4
9	Year round		Conduct a through inspection of the MUs
		All MUs	Inspect the Wilderness for any health issues
		All MUs	Develop planting projects to address these issues
10	Repeat Year 9		

Figure 6.7 – Season Guide for Restoration Activities of the Franklin Park Restoration Alliance

Phase 1: Invasive Species Control

The methods used for invasive plant removal will vary by species, location, and level of cover. Methods will also be determined based on the type and level of staffing available to conduct the work.

The primary ecological restoration process will be by mechanical and chemical control, depending on the type and size of invasive species that is being dealt with. Some invasive species chemical control will happen first, followed by mechanical control weeks later, while other species will have mechanical control first followed directly by chemical control.

As mentioned in the background and site analysis chapter, invasive species are an issue in urban woodlands because they replace whole communities of native species. Each invasive species has different removal steps, listed on the following pages. A detailed map and spreadsheet should be kept that marks where invasive species have been removed, when they were removed, and how they were removed. Keeping these updated records will aid in an easier process.

The intended outcomes of removing the invasive species in the Wilderness is that more species will thrive. Removing a few species of non-native invasive species will let the native vegetation not be construed by vines, have ample sunlight, and have room to grow. This means that diversity will increase and native plants will thrive. A survey from the Franklin Park Action Plan asked what would encourage the users to visit or spend more time in the park, and 42% of respondents said 'Greater feeling of Safety'. One way to increase safety is to open up views in the Wilderness. Japanese knotweed and oriental bittersweet block views tremendously.

The Franklin Park Action Plan lists a process on how to manage invasive species (City of Boston Parks & Recreation 2022):

- Micro map invasive species populations
- Determine priority areas
- Create a natural resource plan
- Perform initial restoration
- Monitor and establish (usually 2-3 years)
- Enhance and maintain long-term

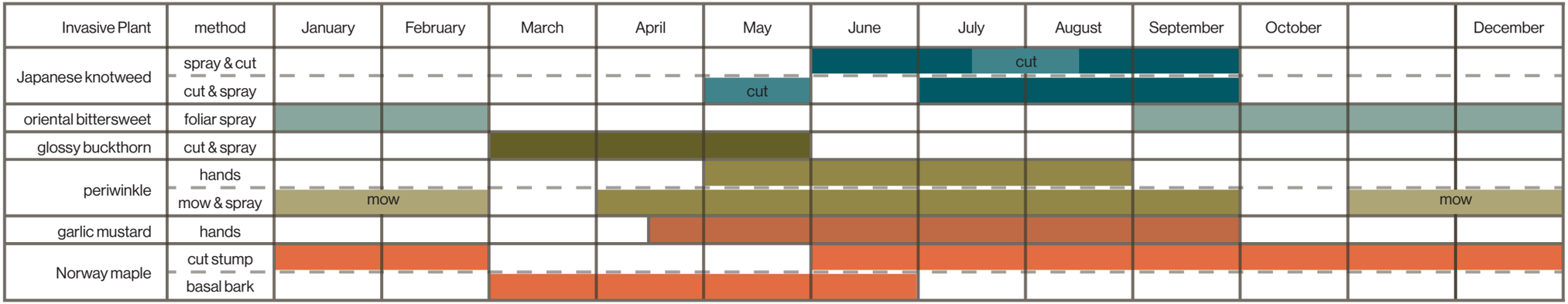


Figure 6.8 – Invasive Plant Removal Timeline

As the ecological restoration moves through the Management Units in the Wilderness, Figure 6.9 is a checklist that should be used to keep track of what has happened in each MU. The gray cells represent invasive species that should not be in the zone, but always keep an eye out for all invasive species. The Restoration Crew Foreman is the person responsible for marking this checklist and keeping the checklist up to date based on the team's feedback.

	Japanese knotweed		oriental bittersweet		glossy buckthorn	periwinkle		Garlic mustard	Norway maple		Slope Stabilization	Native Plant Installation
Management Unit	spray & cut	cut & spray	foliar spray	cut & spray	cut & spray	hand pulled	spray	spray	cut stump	basal bark		
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Figure 6.9 – Invasive Species MU checklist

Japanese Knotweed

Japanese knotweed can grow up to ten feet tall. The stalks are like bamboo, hollow and segmented. The leaves are dark green and are broad, complete, and alternating. At the end of summer, each stalk flowers, producing clumps of small, white flowers (Cameron & Wheeler 2020). Japanese knotweed is hard to miss in the Wilderness. The areas that the knotweed it is in, it is the only thing in that area.

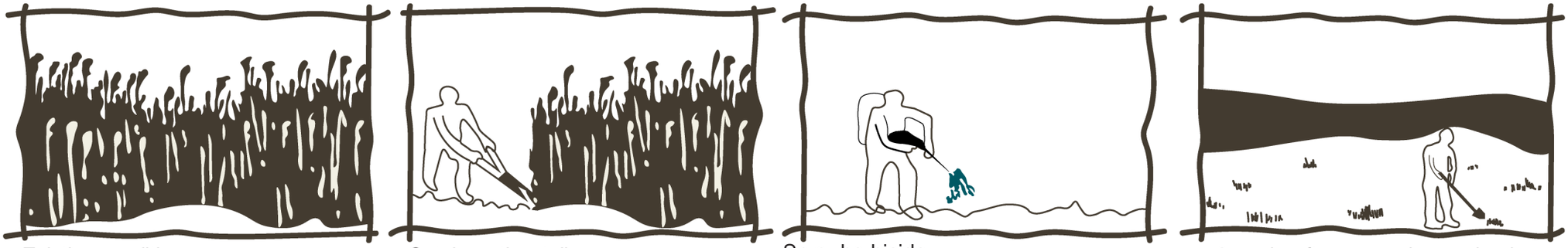
Japanese knotweed roots are hardy. To remove from an area, someone has to dig out its rhizomes completely. It blocks sunlight out for native plants to grow while also taking minerals and nutrients from the soil (Cameron & Wheeler 2020). Even with aggressive treatment of foliar spray herbicide three times each growing season, knotweed will grow back for many years until newly planted trees grow high enough to block out sunlight. Some knotweed will most likely always exist on-site. After the three years of removal and then planting, expect to be still pulling and digging out rhizomes for three to five years after planting. Soil disturbance, such as ripping and digging, makes knotweed more vigorous. Only dig when there is a follow-up with spray (NYC Parks n.d.).

Figure 6.12 – Key Map – Japanese knotweed

Spray & Cut vs. Cut & Spray

When Japanese knotweed is tall (more than two feet, which it will be the majority of the time), cut down the stalks first and then apply the herbicide. When Japanese knotweed is short (less than three feet), spray herbicide on the foliage. Either way, weeks after the herbicide gets sprayed, come back weeks later to pull and dig up the rhizomes. If the rhizomes are not pulled, the plant will regrow.

Figure 6.10 – Cut & Spray (Adapted from NYC Parks n.d.)



Existing conditions | Cut down the stalks | Spray herbicide | 2 weeks after removal, come back and dig up rhizomes

Invasive Plant	method	January	February	March	April	May	June	July	August	September	October	November	December
Japanese knotweed	spray & cut						cut						
	cut & spray					cut							

Figure 6.11 – Japanese knotweed removal timeline

Oriental bittersweet

To identify oriental bittersweet, look for the flowers and berries all over the stem, along with yellow seed capsules. The berries keep after the leaves fall.

Controlling oriental bittersweet is the easiest in autumn after the leaves fall. Someone should cut the vine and then spray herbicide on the end that they cut (University of Minnesota 2015). It is important to come back and cut the dead material in four to six weeks with hedge trimmers or a chainsaw. Wait several weeks for lush new green growth, then re-spray (NYC Parks n.d.).

Figure 6.15 – Key Map – oriental bittersweet

Figure 6.13 – Foliar Spray Method (Adapted from NYC Parks n.d.)

Existing conditions

Cut the vine and then spray herbicide where cut

In four weeks, come back and cut dead vegetation

Site is cleared of existing oriental bittersweet. Clear all dead vegetation from site

Invasive Plant	method	January	February	March	April	May	June	July	August	September	October	November	December
oriental bittersweet	foliar spray												

Figure 6.14 – oriental bittersweet removal timeline

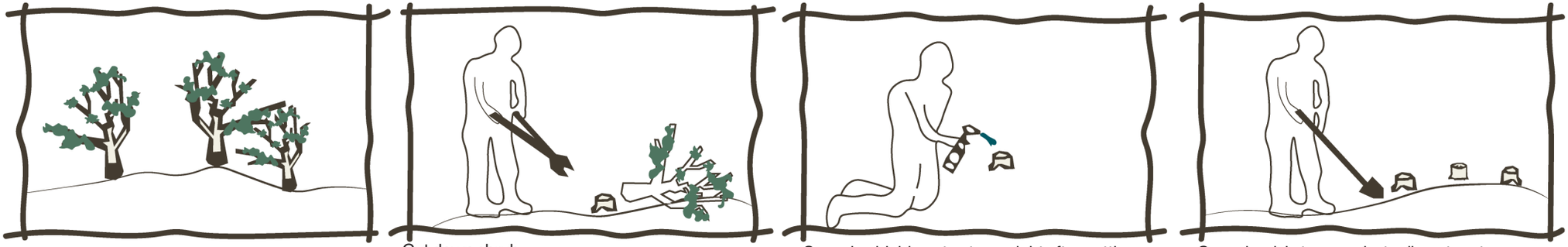
Glossy Buckthorn

Identifying glossy buckthorn starts with a multiple stem shrub or small tree that can grow up to 20 feet tall, although the site analysis did not find any on-site that large. The leaves are alternate, glossy or shiny on top, and dull on the underside. This plant produces many seeds from July to October that can be dark purple or red (Wenning 2011).

This plant flowers from April through June. In March is the best time to cut and immediately spray, and then in two weeks come dig and pull up the roots before flowering begins (Wenning 2011). Glossy buckthorn produces many seeds that are dispersed easily by birds, so this timing is important.

Figure 6.18 – Key Map – glossy buckthorn

Figure 6.16 – Cut & Spray (Adapted from NYC Parks n.d.)



Existing conditions | Cut down shrub | Spray herbicide onto stump right after cutting | Come back in two weeks to dig out roots

Invasive Plant	method	January	February	March	April	May	June	July	August	September	October	November	December
glossy buckthorn	cut & spray												

Figure 6.17 – glossy buckthorn removal timeline

Periwinkle

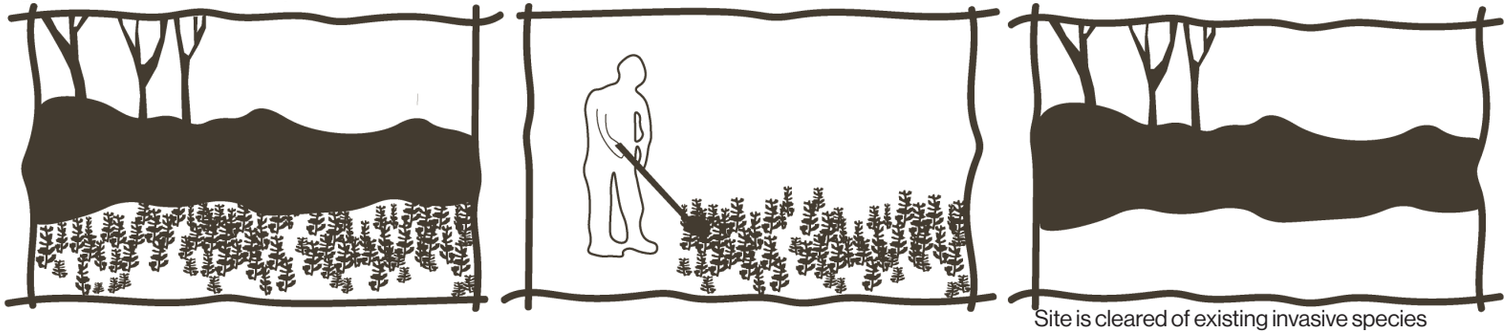
Periwinkle is identified by a dense and extensive mat along woodland floors. Their leaves are dark green, opposite, glossy, oval to lance-shaped, and thick-textured. The flowers can be blue, lavender, white, or purple, and are about 1 inch across with five petals arranged in a spiral all with a blunt tip. There are no fruits or seeds typically.

Figure 6.22 – Key Map – periwinkle

Hands vs. Spray vs. Mow & Spray

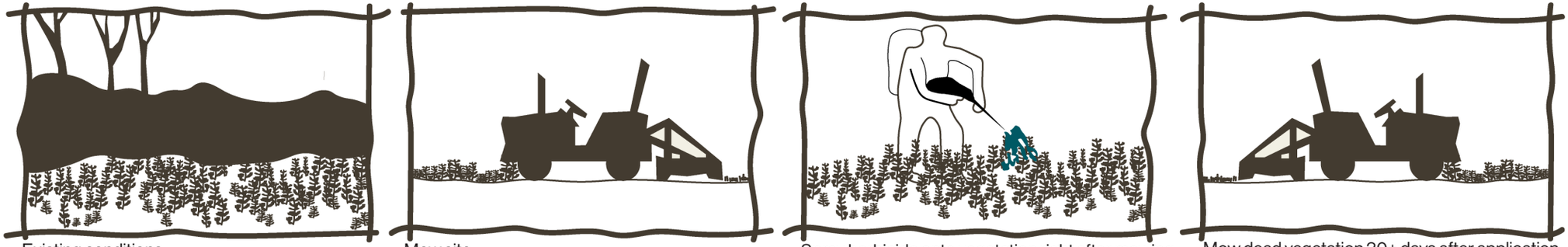
There are two different ways to remove periwinkle. To effectively eradicate this plant, it can be manually controlled by pulling it by hand, digging it up, or raking it out, with the utmost care taken to eradicate the roots. The second is that periwinkle can be mowed and then applied a systemic herbicide (Swearingen et al. 2010). This plan recommends mowing and spraying herbicides where a mower can get to easily, and then mechanically controlling where a mower cannot get to easily.

Figure 6.19 – Hands (Adapted from NYC Parks n.d.)



Site is cleared of existing invasive species

Figure 6.20 – Mow & Spray (Adapted from NYC Parks n.d.)



Existing conditions | Mow site | Spray herbicide onto vegetation right after mowing | Mow dead vegetation 30+ days after application

Invasive Plant	method	January	February	March	April	May	June	July	August	September	October	November	December
periwinkle	hands					■	■	■	■				
	mow & spray	mow	mow		■	■	■	■	■	■		mow	mow

Figure 6.21 – periwinkle removal timeline

Garlic mustard

When trying to identify garlic mustard, look for triangular, heart-shaped leaves with toothed edges and four white petal flowers (Nature Conservancy 2020).

The goal is to get rid of this plant before it can develop and spread seeds. To remove completely takes 2-5 years. Someone must pull up the plant before they set seed, and a good practice to do that is to pull garlic mustard after it rains when it is easier to get the roots out of the ground. After you pull them out, bag them up and throw them away. Do not put them in a compost pile. Always clean off boots and clothes afterward to reduce spreading (Nature Conservancy 2020).

Figure 6.25 – Key Map – garlic mustard

Figure 6.23 – Hands (Adapted from NYC Parks n.d.)

Existing conditions

Pull the garlic mustard by hand

Bag up the garlic mustard and throw away

Site is cleared of existing invasive species

Invasive Plant	method	January	February	March	April	May	June	July	August	September	October	November	December
garlic mustard	hands												

Figure 6.24 – garlic mustard removal timeline

Norway maple

To help identify Norway maple, the tree has simple, green, and opposite leaves that are usually wider than they are tall, with five prominent lobes. The bark is grayish black and furrowed. The flowers are yellowish and approximately 8 mm in diameter and are found in clusters that are present from April to May. In the summer, fruits mature into helicopter-like blades. In the Wilderness there is also sugar maples, which are totally harmless. To tell the difference, cut the leaf stalk and if a milky substance oozes out, it is a Norway maple, as well as bud tips are more blunt on Norway maples, whereas sugar maples are sharp (Cornell University 2019).

Invasive trees are easier to remove than invasive plants because they take much longer to establish its roots, grow, and take over an area.

Cut stump vs. Basal Bark

Saplings of Norway maple can be pulled after it rains before they get too large. If pulling it up does not work, digging the tree as well as the root system will work. With more mature trees, someone can cut the tree down and then spray herbicide on the stump immediately after, or girdling (basal bark) the tree is another option, which should be done in the spring. When to cut the tree down or girdle the tree can be based on position. If the tree is in a hard spot like on a slope, then basal bark is the method to go.

Figure 6.29 – Key Map – Norway maple

Figure 6.26 – Cut Stump (Adapted from NYC Parks n.d.)

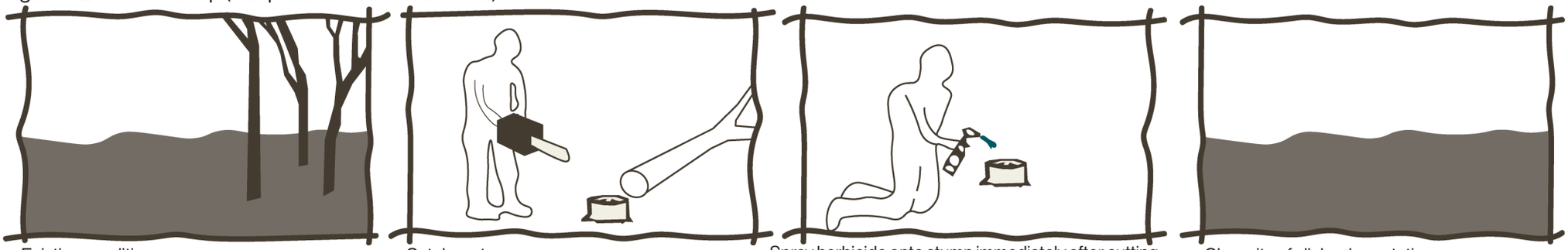
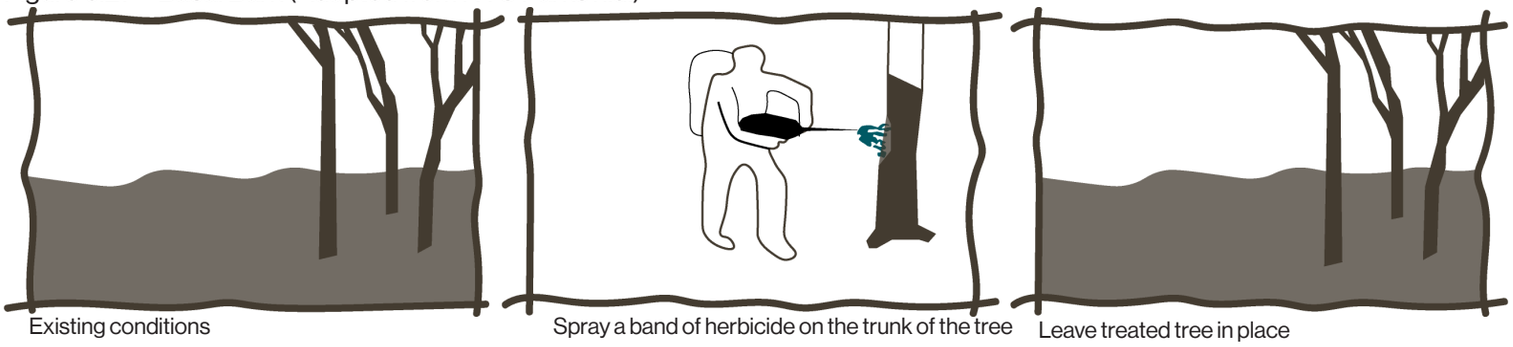


Figure 6.27 – Basal Bark (Adapted from NYC Parks n.d.)



Invasive Plant	method	January	February	March	April	May	June	July	August	September	October	November	December
Norway maple	cut stump												
	basal bark												

Figure 6.28 – Norway maple removal timeline

Phase 2: Installation and Follow-Up Removal

Proper landscape horticultural practices are also a key component to ensure plant survivorship and restoration success.

Topics include:

- Live stake species
- Restoration superstars
- Sourcing plants locally
- Planting diagrams
- Planting tips
- Timing: winter/fall
- Calculating plant quantities and spacing inspecting plant deliveries

The second phase in the restoration process involves installing plants. It is recommended to wait for a period of 2-3 years after the initial invasive removal before planting. This approach ensures that if invasive species do return to the site, they will not affect the newly planted vegetation. Most invasive species require their root systems to be dug up, and planting new vegetation beforehand may result in accidentally disturbing the new plant's roots. Additionally, waiting for this time period will prevent the possibility of disrupting new plants growth.

Some plants in the Wilderness will not be able to survive on-site in 100 years because the warming of climate change will make it hard for survival (City of Boston Parks and Recreation 2022) in Boston's hardiness zone of 6b (McKeag 2014). What that means for Franklin Park is that plants that are 6b or a lower number zone should be able to survive on-site, while the native plants with higher numbers will not be able to survive. The plants listed below are not invasive so do not remove, rather, do not replant. Invasive plant management must be a part of the project before, during, and after planting. Planting new plants before managing surrounding patches of established invasive species will make it harder to maintain. Invasive plants, even ones weakened by herbicide applications, can threaten newly planted species for water, nutrients, and light.

The intended outcomes of not regenerating species that will not be able to stand the test of time and planting species that will be able to stand the test of time is that an urban woodland will still exist in Franklin Park in 100 years. This will create a long-term renewal management of the Wilderness that will change its focus over the years from destroying invasive plants to preserving the desired plants.

When to Plant

Native plants installed in the fall have the best survival rate in forest restoration projects. Rainfall is usually plentiful and temperatures along with heat stress are lower. Planting in the fall while the soil is still warm allow the roots of plants to grow until the ground freezes, setting the plants up for success the following spring. By the time the hot and dry conditions of summer arrive, the plants have an extensive root system that can capture water and nutrients more readily. Shrubs with berries also give wildlife much needed for the winter (Commonwealth of Massachusetts 2023b). Most new plantings in the Wilderness will not be in close proximity to water for irrigation. The earlier in the fall these new plants get planted, the more time they have to recover from transplant shock, adapt to the site, and expand their root systems before the ground freezes (Green Seattle Partnership 2022).

In low points of the Wilderness where the soil is saturated most of the year, such as around the Ellicott Arch Stream, prime planting time is usually between late spring and early fall. Most plants will be able to also be planted in the spring. There are more specifications in the 'Planting Palette' section on pages 206-209.

Installation

Plant survival can be greatly influenced by the proper installation techniques. When working with volunteers, it is essential to take the time to teach them the correct planting methods. To facilitate learning, have volunteers work in pairs.

Preparing the Hole

Improper planting depth can harm the plant's survival – planting too deep can result in stem rot, while planting too shallow can cause root dehydration.

- Before planting, ensure that the planting area is free of loose materials like leaves, mulch, rocks, and branches. It is crucial to install the plant in mineral soil and avoid planting it in layers of debris or mulch.
- When digging the hole for the plant, ensure that it is wide enough to allow for the complete spread of the roots without bending or crowding them. If you are planting a container plant, it is recommended to dig a cylindrical hole that is twice the width of the container.
- Clear a designated area next to the hole and pile the soil in that area. Before using the soil to backfill the hole, ensure that it is free of plant roots and grass clumps.
- Ensure that the hole is deep enough to allow the plant's root crown to sit flush with the soil surface when placed in the hole. You can use a shovel as a level to achieve the desired depth. When planting a container plant in the ground, use the level of soil around the base of the container as a guide. Avoid digging the hole deeper than necessary to prevent soil settling.
- If the sides of the hole appear to be slick or claylike, roughen them to facilitate the penetration of new roots into the surrounding soil.
- When planting conifer trees or other woody species, it is recommended to incorporate up to one gallon of woodchips or mulch into the local soil. This will help improve the soil quality and promote microbial activity.

Planting on Slopes

When planting on a slope, ensure that the plant hole is dug deep enough so that the root collar is level with the lower edge of the slope. This will help the plant to grow straight up rather than perpendicular to the slope. Make sure to position the plant accordingly to achieve this planting orientation.

Mulching

After planting, apply a wood-chip mulch in a circular shape at least 12 inches wide and 3 inches deep around the plant, taking care not to touch the stem. This mulch ring will help retain soil moisture, suppress weeds, and provide nutrients as the mulch breaks down.

Watering

After planting and mulching, if possible, water the plant immediately to settle the soil and remove any air pockets. If necessary, add more soil to ensure that the plant is firmly anchored in the ground.

Plant Density and Spacing

Plant and Stock Type	Desired Plant Density	Spacing Average (on center)
Trees	Dense	6 ft.
	Medium	8-10 ft
	Sparce	15 ft.
Shrubs	Dense	3 ft.
	Medium	4 ft.
	Sparce	5 ft.
Herbaceous/Ground Cover	Dense	2 ft.
(4" pots in groups of 3)	Medium	3 ft.
Herbaceous/Ground Cover	Dense	2 ft.
(1 gallon pot)	Medium	3 ft.

What Species Not to Plant

In the present-day park landscape, suitable plant species should be selected with a discerning approach. Including invasive or unsuitable plant species, including cultivars or hybrids of prohibited plants, is not advisable in the park's vegetation. Using such species in the past has demonstrated undesirable traits that make them unsuitable for planting in the park presently. (Boston Parks and Recreation 2022; City of Boston Parks and Recreation 2022; O-Neil-Dunne & Safavi 2020).

- barberry bush – *Berberis vulgaris*
- bell's honeysuckle – *Lonicera x bella*
- black walnut – *Juglans nigra*
- burning bush – *Euonymus alatus*
- European buckthorn – *Frangula alnus*
- swamp white oak – *Quercus bicolor*

Trees that can handle climate change:

These species need to either come into Franklin Park or multiply because they can handle the warm effects of climate change (Boston Parks and Recreation 2022; O-Neil-Dunne & Safavi 2020). It is important to note that these new trees should not be planted all at once, but over the upcoming years.

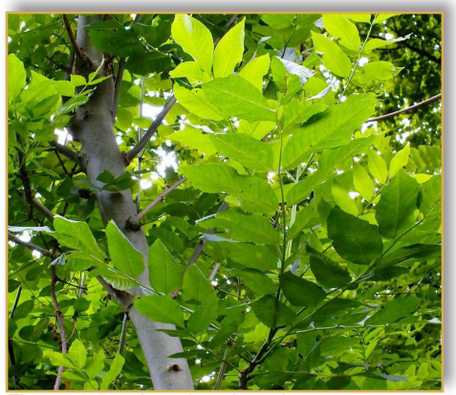


Figure 6.30 – American beech


Figure 6.31 – American holly


Figure 6.32 – bitternut hickory


Figure 6.33 – black locust


Figure 6.34 – black oak


Figure 6.35 – black tupelo


Figure 6.36 – pin oak


Figure 6.37 – sassafras


Figure 6.38 – silver maple


Figure 6.39 – sugar maple


Figure 6.40 – white oak


Figure 6.41 – yellow birch

Planting Palette

Certain species can handle more intense sun exposure, common to south and southeast facing slopes. Almost all of the soil in the Wilderness is a rock outcrop shallow soil with low infiltration rates. That means that bitternut hickory, black locust, black oak, cornelian cherry, eastern hemlock, eastern red cedar, flowering dogwood, lowbush blueberry, arrowhead viburnum, and pin oak should be planted the most in the Wilderness. The other plants in the table below should be planted in specific locations. The following table was put together with plant recommendations from the Franklin Park Action Plan, and the planting palette was found from Borzoi Book and PictureThis (City of Boston Parks & Recreation 2022; Borzoi Book 1980; PictureThis 2023).

These plants were selected to create a cohesive design that considers factors such as climate, soil type, light availability, and aesthetic preferences. This is a starting point for species and a local, knowledgeable expert should be consulted in developing a specific list which may have to be parsed by MUs. This knowledgeable expert may be a staff member on site within Franklin Park. If such an expert is not available in-house, engaging the services of a specialist from the Arnold Arboretum would be a recommended course of action.

Common Name	Scientific name	Type	Light Preference	Habitat	Hardiness Zone	Planting Time	Planting Zone
American beech	*Fagus grandifola*	Tree (deciduous)	Partial Shade - Full Sun	Moist rich soils of uplands and well-drained lowlands	5 to 11	Spring, Summer	Oak hickory woodland slope
American holly	*Ilex opaca*	Tree (evergreen)	Partial Sun	Moist or well-drained soils, mixed-hardwood forests	8 to 9	Spring, Fall	Oak pine savanna summit
American linden	*Tilia amercano*	Tree (deciduous)	Partial Shade - Full Sun	Moist soils of valleys and uplands; in hardwood forests	3 to 7	Fall	Oak hickory woodland slope
American sycamore	*Platanus occidentalis*	Tree (deciduous)	Partial Sun - Full Sun	Wet soils of stream banks, dominant in mixed forests	4 to 9	Spring, Fall	Mixed forest & shrub edge
American yew	*Taxus canadensis*	Large shrub (evergreen)	Full Shade - Full Sun	River bluffs, slopes, and moist ravines; in hardwood forests	7 to 9	Fall, Winter	Oak hickory woodland slope
arrowhead viburnum	*Oughish arrowwood*	Shrub (deciduous)	Partial Sun - Full Sun	Moist to dry soils, at border and in understory of forest	5 to 9	Spring, Summer, Fall	Mixed forest & shrub edge
bitternut hickory	*Carya cordifornis*	Tree (deciduous)	Full Sun	Moist soil of valleys and dry upland soil	4 to 9	Spring	Oak hickory woodland slope
black cherry	*Prunus serotina*	Tree (deciduous)	Partial Sun - Full Sun	On many sites but not very wet or very dry soils	3 to 9	Spring, Fall, Winter	Oak pine savanna summit
black huckleberry	*Gaylussacia baccata*	Shrub (deciduous)	Partial Sun - Full Sun	Upland rocky woodland, wooded slopes, and rocky bluffs	4 to 7	Spring	Oak hickory woodland slope
black locust	*Robinia pseudoacacia*	Tree (deciduous)	Partial Sun - Full Sun	Moist to dry rocky soils, woodlands	3 to 11	Spring, Fall	Oak hickory woodland slope
black oak	*Quercus velutina*	Tree (deciduous)	Partial Sun - Full Sun	Dry upland sandy and rocky ridges and slopes	3 to 8	Spring, Fall	Oak hickory woodland slope
black tupelo	*Nyssa sylvatica*	Tree (deciduous)	Partial Sun - Full Sun	Moist soils of valleys and uplands in hardwood and pine forests	3 to 10	Spring, Fall	Oak pine savanna summit
Cornelian cherry	*Cornus mas*	Shrub (deciduous)	Partial Sun - Full Sun	Dry deciduous forests and brushlands	3 to 7	Spring, Winter	Oak pine savanna summit

easterm hemlock	*Tsuga canadensis*	Tree (evergreen)	Full Shade - Full Sun	Rock outcrops, especially north-facing bluffs	3 to 7	Late summer, early fall	Oak pine savanna summit
eastern red cedar	*Juniperus virginiana*	Tree (evergreen)	Partial Sun - Full Sun	Dry uplands to flood plains and swamps	3 to 9	Spring, Fall	Oak pine savanna summit
eastern white pine	*Pinus strobus*	Tree (evergreen)	Partial Sun - Full Sun	Well-drained sandy soils; sometimes in pure stands	4 to 9	Spring, Fall	Oak pine savanna summit
flowering dogwood	*Cornus florida*	Small Tree (deciduous)	Partial Sun - Full Sun	Moist and dry soils of valleys and uplands in understory of hardwood forests	5 to 9	Spring, Fall	Oak pine savanna summit
horse chestnut	*Aesculus hippocastanum*	Tree (deciduous)	Partial Sun - Full Sun	Shade and street tree in rich moist soils	6 to 10	Spring, Fall	Wet meadow
lowbush blueberry	*Vaccinium angustifolium*	Shrub (deciduous)	Partial Sun - Full Sun	Rocky upland woodland and rocky bluffs	2 to 8	Spring	Oak pine savanna summit
northern red oak	*Quercus rubra*	Tree (deciduous)	Full Sun	Moist, loamy, sandy, rocky, and clay soils	5 to 9	Spring, Fall, Winter	Oak pine savanna summit
pin oak	*Quercus palustris*	Tree (deciduous)	Partial Sun - Full Sun	Poorly drained, wet uplands	5 to 9	Spring, Fall	Oak pine savanna summit
red maple	*Acer rubrum*	Tree (deciduous)	Full Sun	Wet or moist soils of stream banks, valleys, and uplands and sometimes on dry ridges	3 to 9	Spring, Fall	Wet meadow
sassafrass	*Sassafras albidum*	Tree (deciduous)	Partial Sun - Full Sun	Moist, sandy soils of uplands and valleys, forest openings	5 to 10	Spring, Fall	Oak pine savanna summit
serviceberry	*Amelanchier canadensis*	Shrub (deciduous)	Full Sun	Rocky slopes and stream banks in open forests	4 to 7	Spring, Fall	Oak hickory woodland slope
shagbark hickory	*Carya ovata*	Tree (deciduous)	Partial Sun - Full Sun	Moist soils of valleys and upland slopes	4 to 8	Fall, Winter	Oak hickory woodland slope
silver maple	*Acer saccharinum*	Tree (deciduous)	Partial Sun - Full Sun	Wet soils of stream banks and flood plains	3 to 9	Spring	Wet meadow
sugar maple	*Acer saccharum*	Tree (deciduous)	Partial Sun - Full Sun	Moist soils of uplands and valleys	3 to 9	Fall, Winter	Oak pine savanna summit
sweet crabapple	*Malus coronaria*	Small Tree (deciduous)	Partial Sun - Full Sun	Moist soils in openings and borders of forests	4 to 8	Fall, Winter	Oak hickory woodland slope
sweet birch	*Betula lenta*	Tree (deciduous)	Partial Sun - Full Sun	Cool, moist uplands; with hardwood and conifers	3 to 8	Fall, Winter	Oak pine savanna summit
white oak	*Quercus alba*	Tree (deciduous)	Partial Sun - Full Sun	Moist well-drained uplands and lowlands	3 to 9	Spring, Fall	Oak pine savanna summit
whitchhazel	*Hamamelis virginiana*	Shrub (deciduous)	Full Shade - Full Sun	Moist soil in understory of hardwood forests	3 to 8	Fall, Winter	Oak pine savanna summit
yellow birch	*Betula alleghaniensis*	Tree (deciduous)	Partial Sun - Full Sun	Cool moist uplands, with hardwoods and conifers	3 to 7	Fall, Winter	Oak pine savanna summit

Planting Specific Mapping

The table above shows full shade to partial sun or partial sun to full sun which was mapped from the topography of the site. The oak pine savanna communities, which include the grassy openings, occur at the highest elevations in the Wilderness. These are notorious for being dry and drought-prone, thin, low-nutrient, acidic soils and having puddingstone rock outcrops. The oak hickory woodland slope occurs at the middle elevations and is the majority of the woodland ecology. Soils are typically only a few inches deep before hitting rock. In the oak hickory woodland, native species have to compete with invasive species, shown in figure 6.43.

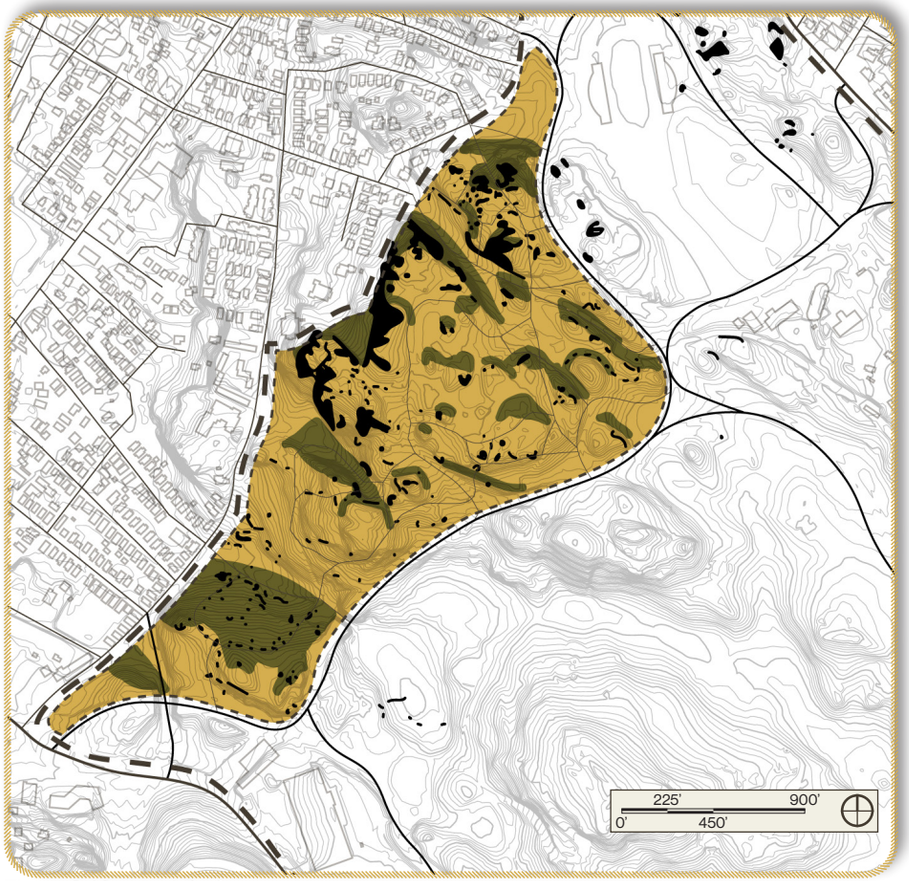


Figure 6.42 – Light Preference Map

- Puddingstone rock outcrops
- Full shade – partial sun
- Partial sun – full sun

The puddingstone rock outcrops is shown in both maps because planting on top of rock outcrops is not recommended. Invasive species are included in this map to show where there will need to be new plants.

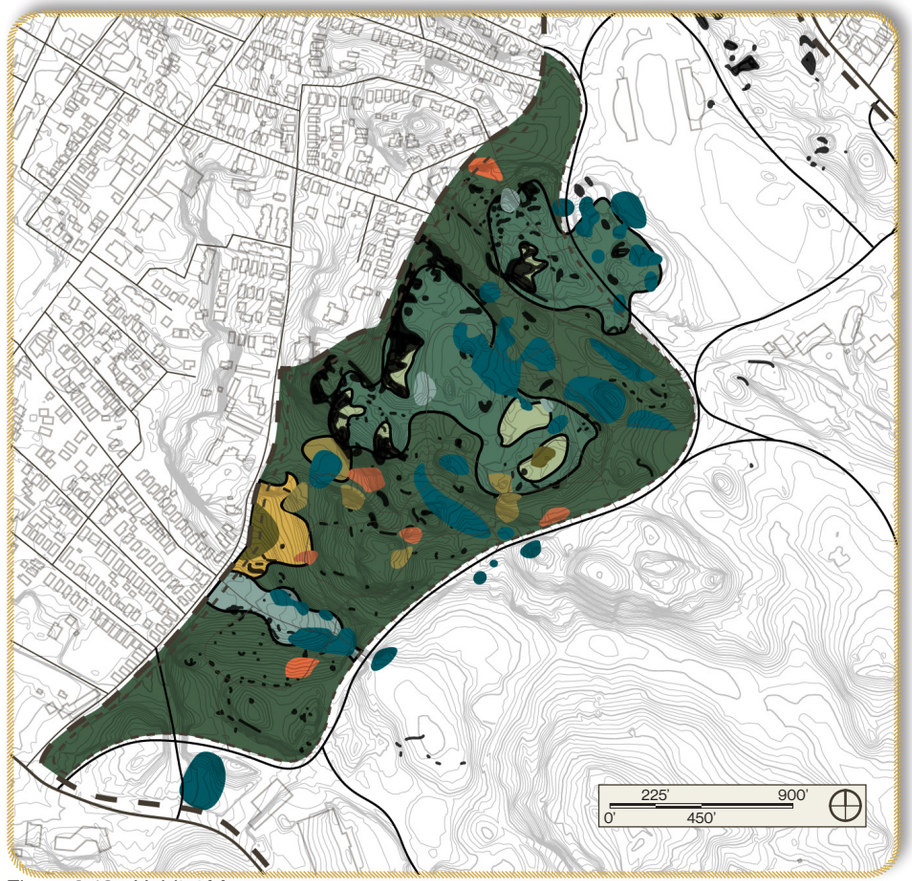


Figure 6.43 – Habitat Map

- Puddingstone rock outcrops
- Oak hickory woodland slope
- Oak pine savanna summit
- Grassy openings
- Wet meadow
- Mixed forest and shrub edge
- Beech forest
- Japanese knotweed
- glossy buckthorn
- oriental bittersweet
- periwinkle
- garlic mustard
- Norway maple

Phase 3: Plant Establishment and Maintenance

This phase focuses on establishing native plants. The Wilderness continues to be mulched, weeded, and watered as needed. Most plants require at least three years of establishment care to ensure plant survival in the future. Volunteers can play a significant role in ensuring the survival and growth of plantings during their initial ears. Some of the tasks they can do include replenishing mulch rings, watering, removing weeds, and performing supplemental planting or plant replacement where necessary. It is important to remember that not all plants are expected to survive, and this is accounted for in the planting plan density. A survival rate of at least 80% is a good indicator of successful establishment. On top of establishing plants, phase three includes decommissioning trails.

Watering

Watering new plants in the Wilderness can be challenging due to access and practicality issues. According to the Action Plan, there is no water source in the Wilderness, but existing water infrastructures are located near the White Stadium, the zoo, the golf course clubhouse, and an extensive irrigation system serving the golf course exists. Volunteers may have to transport water from one of those closest sources using buckets or watering cans. Ideally, each plant should be saturated with two gallons of water every one to two weeks from June through September during the first two years after planting.

Pruning

Over time, the Wilderness may require some adjustments to ensure their continued success. Pruning can be a useful tool for managing plants that were installed in less-than-ideal sites. It can also help create more space for slower-growing evergreens to thrive.

Removal and/or Relocation

It is important to remove any plants that have growth habits that are incompatible with the trail and cannot be fixed with pruning. However, native plants, including seedlings of larger plants that may appear, can be carefully transplanted to a more suitable location during the winter season.

Pests and Diseases

Pests and diseases threaten the overall health of the Wilderness. Pests and diseases can impact the woodland composition and adaptation over the next 100 years by their ability to destroy whole tree species (City of Boston Parks and Recreation 2022). To combat pests and diseases, the City of Boston should conduct a site-wide insect and disease inventory to identify key populations. A certified arborist should inspect and monitor trees prone to pests annually. Like keeping track of invasive species, do the same for pest problems. Apply modern treatments for these issues, for example, for hemlock woolly adelgid, treat it with a systemic stem application. For bleeding beech canker and beech bark disease infections, use the air spade technique, which is mulching with composted hardwood chips that prevent pooling water at the base of trees. To prevent decline, improve growing conditions for high-risk specimens and groups of trees under environmental stress such as soil compaction, drought, and salt runoff. Lastly, through the tree inventory work, identify trees for removal.

Decommissioned Trails

The Wilderness has an excessive number of trails that encourages the spread of invasive plants. After the majority of the invasive species have been removed and new plants are starting to be planted, start decommissioning trails that are marked in Figure 6.44.

Trail Reforestation Process

The proposed elimination and replanting of trails will be determined by taking into account the historical trail layout, the potential for enhancing navigation, and controlling the proliferation of invasive species.

Remove & Stabilize

Remove the trail path material (paving, base, gravel, ect.) rototill the soil, and immediately seed with a native woodland cover crop, such as rye, oats, ryegrass, winter wheat, and buckwheat. These options grow organic matter, choke out weeds, and make sure soil will not erode during rain (UMass 2013). The native woodland cover crop will stabilize the soil and provide vegetative cover.

Deter Human Use

At the time of path removal and seeding, plant the ends of decommissioned trails where they meet active trails with shrubs and whips to deter human use. Select these shrubs and whips from the 'Planting Palette' section on pages 206-209. A whip is a young tree that has no branches yet (Kurtz 2020).

Re-establish Cover

Over time, cover crops, shrubs, and whips will fill in and mature in the place of previous trails, blending with the established surrounding woodland.

Making signs to deter people from wandering onto these decommissioned trails might be needed. A few examples can be found in Figures 6.45-6.47.

Figure 6.45 – Sign marking direction of trail

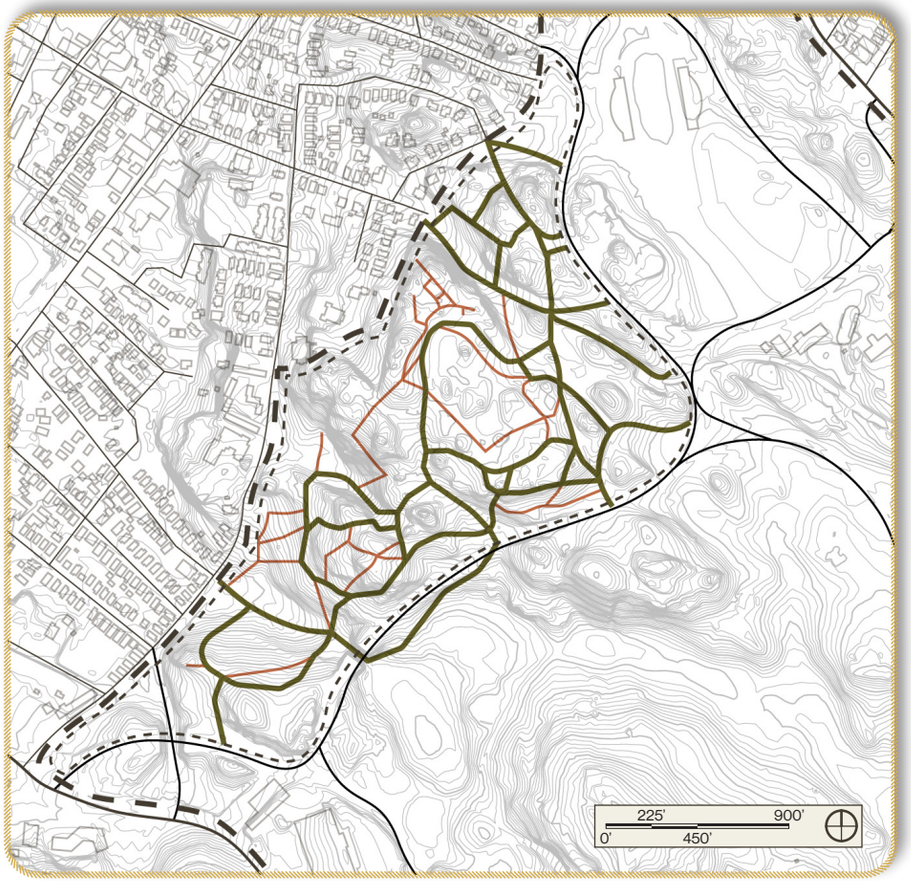


Figure 6.44 – Decommissioned Trails

Decommissioned Trails

Trail to remain

Figure 6.46 – Healing Trail Sign

Figure 6.47 – Restoration Sign

Phase 4: Long-Term Management

Phase 4 emphasizes the importance of enduring stewardship and upkeep, encompassing tasks such as tracking the emergence of new invasive species, assessing the impat of social uses, and monitoring other indicators of ecosystem health.

After each management unit (MU) in the Wilderness has gone through invasive removal and new planting is established, each MU may be able to move into the fourth and final phase of restoration: Long-term Management. Phase 4 takes should take on average 10 hours an acre annually, depending on the health of the Wilderness. This ten hours an acre could be walking different areas of the Wilderness throughout the year looking for invasive species. If they are spotted, then someone should take more time to get rid of them. This phase is marked as taking two years in the plan, but should continue forever. The Wilderness should be almost self sustainable, with a little bit of guidance to make sure the invasive species do not come back and take control of areas of the Wilderness again.

Transition from Phase 3 to 4

Phase 4 should start about eight years after the beginning of restoration, but a management unit should not move to phase 4 until it passes these six criteria:

- Native tree regeneration
- Regenerating native tree diversity
- Canopy cover
- Shrub and groundcover density
- Shrub and groundcover diversity
- Invasive species removed fully

Responsibilities

Once an MU enters Phase 4, the volunteer responsibilities may change. Phase 4 maintenance and stewardship in one MU may take place only once a year, depending on the condition of the Wilderness. Phase 4 checklist:

- To identify new or recurring invasive species in MU's, conducting a thorough inspection by organizing a small or medium-sized volunteer event to search for particular plant species that pose a problem. Alternatively, volunteers can disperse and walk through the MU, carefully scanning for any and all weeds. It is important to remain vigilant near the boundary where park property meets adjacent properties instead of road, as garden-variety weeds may infiltrate the park. Accurate identification of species requires a keen eye, so be ready to provide volunteers with photos or identification cards or consider restricting participation to a smaller group of experienced volunteers.
- Bring flags to mark problem areas or to mark specific species for future treatment. Consider capturing the GPS coordinates and taking photos for easier follow-up communication.
- Keep a close watch on the area for any social-use impacts that require remediation through restoration activities, such as off-trail hiking.
- Regularly inspect the forested area for any signs of health issues, such as localized root rot or damage caused by storms.
- Develop planting projects to address these impacts.

CONCLUSION

Figure 7.1 - Trail Blockage

Conclusion

Summary of Research Findings

The research question: What should a Stewardship Plan for the Franklin Park Wilderness entail to ensure the ecological restoration process creates social and environmental benefits?

To ensure that the ecological restoration process in the Franklin Park Wilderness generates social and environmental benefits, a Stewardship Plan has been created. The first action item in this plan is for the City of Boston to establish the Franklin Park Restoration Alliance, which will be responsible for organizing and performing ecological restoration work. Before the Stewards begin their work, a Restoration Crew Foreman and Community Coordinator, as well as at least one Natural Resources Crew member, should be hired. These individuals will be responsible for setting up the necessary activities and familiarizing themselves with the Wilderness in advance, so they can respond to any questions that the stewards or volunteers may have. This approach will facilitate a smooth and efficient ecological restoration process.

The Stewardship Plan for Franklin Park provides the City of Boston Parks and Recreation Department guidance on ecologically restoring the Wilderness with help from community stewards and volunteers. The results of this study contribute to a broader discussion on ecological restoration through a stewardship plan and demonstrate how other urban park woodlands can use community stewards and volunteers to support ecological restoration efforts.

Project Strengths

The proposed Stewardship Plan describes how ecological restoration can be accomplished primarily through the use of Stewards and Volunteers, who in turn benefit from engaging in the process. Though ambitious, this approach has been done in other cities. The Plan also proposes a four phase ecological restoration process, with detailed steps for each phase. This process will achieve the ecological restoration goals for the Wilderness and effectively advance the recommendations provided in the Franklin Park Action Plan.

Project Limitations

This project did not interview anyone from the park or supporting organizations. Having real-world input would have strengthened the work and ensured it was contextually appropriate.This project also did not go in-depth into funding and the realities of the city being able to hire staff. Only being on-site once was also a limitation, as having opportunities to go more than once would have a positive impact on the site analysis.

Project Challenges

Trying to figure out what to call this plan was challenging and took many evolutions. It was initially an ecological restoration plan with community benefits, and that made it seem like the community was an afterthought. The project was then transformed into a socio-ecological restoration plan, then a social-ecological plan. Those both mean huge issues within the social scene exist, which is not the case around Franklin Park. Finally, the term Stewardship Plan was found, and that fit perfectly.

Future Research

This project did not do any community engagement. It took what engagement the Franklin Park Action Plan had, (City of Boston Parks & Recreation 2022) but that engagement was for all of Franklin Park and not specifically the Wilderness. The next steps would be to engage the community specifically about restoring the Wilderness and knowing what they would like to see it become and if any active community members are willing to become a Steward for the Franklin Park Restoration Alliance.

5 years after the stewardship plan has started, a survey should be sent out to the stewards asking them if they strongly disagree, disagree, neither agree nor disagree, agree, strongly agree, or not sure to multiple questions. These questions would let the City of Boston know how successful the stewardship plan has been with the benefits to people. An example of a question that could be asked, with subquestions beneath that question –

Participating in stewardship activities within the Wilderness contributes to:

- Mental well-being (ex. I feel more relaxed and peaceful)
- Staying in shape and getting physical exercise
- Learning and sharing knowledge with others about nature
- Thinking about how my actions affect the environment.
- Feeling connected to living things and the environment

(Reining et al. 2022)

After the Stewardship Plan

The Stewardship Plan for the Franklin Park Wilderness can be a starting point to grow a larger stewardship program for all of Boston. Once the Wilderness is done, the rest of Franklin Park can develop a stewardship program, and then after that, it can grow to the 1,100 acres of the Emerald Necklace while working with the Emerald Necklace Conservancy. Stewards can continue to grow as the stewardship plan's grow to new places. Steward training can be tailored to specific landscapes such as street trees, forests, and wetlands. Then a further step can be added onto the Stewardship Training Process, 'Select Your Site'.

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Figure 8.1 - Fall Colors

Glossary

Abiotic - Non-living materials along with condition of an ecosystem. Examples: rock, atmosphere, weather, climate, topographic relief and aspect, nutrient regime, hydrological regime, and fire regime (Gann et al. 2019; McDonald et al. 2016).

Adaptive Management – An ongoing process for improving management policies and practices by applying knowledge learned through past projects. It revisits management decisions and revises them with new information (Gann et al. 2019; McDonald et al. 2016).

Alien Species - with respect to a particular ecosystem, any species, including it seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (USDA 1999).

Biodiversity – The variability among living organisms within species and ecosystems (Gann et al. 2019; McDonald et al. 2016).

Climate readiness – "Refers to a circumstance where restored genetic material has been selected, on the basis of climate science and genetics, to improve a species' likelihood of persisting under anticipated climate change" (Gann et al. 2019).

Control - As appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions (USDA 1999).

Damage – a harmful impact upon an ecosystem such as logging, road building, poaching, or non-native invasive species taking over (SER 2004).

Degradation – human impacts resulting in the loss of biodiversity and disrupts an ecosystem's structure, composition, and functionality. Examples: long-term grazing impacts, long-term over fishing or hunting pressure, and persistent invasions by non-native species (SER 2004).

Destruction – the most sever level of impact, when degradation or damage removes all macroscopic life and ruins the physical environment. Examples: land clearing, urbanization, coastal erosion, and mining (SER 2004).

Ecological Reference - The intended characteristics of an ecosystem after it has gone through ecological restoration (Clewell & Aroson 2013).

Ecological States - A state is the manifestation or expression of an ecosystem, particularly its biotic community. Abiotic – nonliving – aspects of an ecosystem, such as its geology, topography, and so forth, contribute to the state as the setting or backdrop for the biotic community. A system's biotic community is governed by its species composition and community structure. The latter is a function of the sizes, life forms, abundance, and spatial configurations of its species. When we use the word **state** in this book, we refer to an ecological state (Clewell & Aroson 2013, 7).

Ecosystems – the complex of a community of organisms and its environment (USDA 1999).

Ecotones – The transition zones between ecosystems (Clewell & Aroson 2013).

Invasive species - an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (USDA 1999).

Landscapes - two or more ecosystems that interact with each other and have a level of ecological cohesiveness in a location (Clewell & Aroson 2013).

Landscape Restoration - "Some or all ecosystems that comprise a landscape can be subjected to restoration treatment simultaneously or sequentially with the resulting intent of landscape-scale restoration. However, ecosystems remain the basic unit and focus of ecological restoration" (Clewell & Aroson 2013, 12).

Native species - With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem (USDA 1999).

Species - A group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms (USDA 1999).

Sustainability - Ecological viewpoint - Self-sustaining ecosystem that has the resilience to recover if it suffers. Socioeconomic context - Ecological principles to derive ecosystem services continuously without causing harm to the ecosystem (Clewell & Aroson 2013).

Whip – A young tree with no branches that have grown yet, it is a seedling (Kurtz 2020).

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