
Transforming Cemeteries:

A Framework for Enhancing
Ecosystem Processes and
Human Uses In Formerly Rural,
Urban Cemeteries.



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Abstract

The purpose of this research is to document the operational elements used to effectively adapt formerly rural, urban cemeteries into more multi-functional urban open spaces, with expanded ecosystem and passive recreation functions. The goal is to create a transferable framework to guide the process of adaptation of these cemeteries into community open spaces that support ecosystem processes. This project has two motivations: 1) the urban planning problems of inadequate quantities of public open spaces in some cities, and 2) some planners and property owners viewing formerly rural, now urban cemeteries as liabilities due to a lack of perpetual care or the occurrence of anti-social activities.

The method documents the successful adaptation of Eugene Masonic Cemetery, and compares and contrasts it with the Eugene Pioneer Cemetery. Findings show how the Eugene Masonic Cemetery site was transformed from an underused liability to a well-loved community open space, and what elements of its adaptation can be included in a broadly transferable framework to help other communities reach similar goals. Specifically, the research shows how, through sociocultural and biophysical interventions, exotic invasive plant species were replaced with a robust native shrub layer, and how this process improved the cemetery's appeal and the perception of care within the adjacent community. The processes used to transform the Eugene Masonic Cemetery, and those used maintain and manage the Eugene Pioneer Cemetery, inform the framework for urban cemetery adaptation. This transferable framework can guide managers through the processes of evaluating sociocultural and biophysical conditions, determining desired future conditions, and determining how to progress from the present to desired future conditions through the collaborative creation and implementation of a management plan.

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Thanks to my family, especially my beautiful daughter Arie, for giving me a reason to change the world, and for supporting me on my path to become someone who can. Also, thanks to David Hulse and Chris Enright for all of their work guiding me through this project.

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Introduction



“Good friend for Jesus sake forbear,
To dig the dust enclosed here.
Blessed be the man that spares these stones,
And cursed be he that moves my bones.”

-W. Shakespeare's epitaph



1.1 CONTEXT AND SIGNIFICANCE

Over a hundred years ago, Fredrick Law Olmsted made an argument for the need for urban open space, writing, “If we had no relief from the town at all during our waking hours, we should all be conscious of suffering from it. It is upon our opportunities for relief from it, therefore, that not only our comfort in town life, but our ability to maintain a temperate, good-natured, and healthy state of mind depends” (Olmsted 1871). This idea is as valid today as it was in 19th century New York. With population growth, immigration, constraints on urban expansion, and increased densities, open spaces in urban areas are increasingly important. Viable open-space improves the quality of life for urban dwellers, while raising property values and providing ecosystem services, yet creating new open-space can be difficult, due to existing land

uses and high land values in urban areas (Mattingly 1999). One solution to urban land scarcity is to create places that can serve multiple needs and programs for open space and infrastructure. Underpasses become skate parks and natural history walks, while landfills become grasslands with connected transportation and historical interpretation. Most urban cemeteries, for many complex reasons, have yet to fulfill their multiple-use potential.

Urban cemeteries are often seen by planners and developers as underutilized urban spaces, in otherwise valuable locations. They are difficult to remove because of legal and social restrictions on disinterment, and they frequently become neglected because of a perpetuity of use without a perpetuity of funding for care (Basmajian 2010), (Koonce 2011), (Clark 2015).

When these areas suffer neglect, they tend to

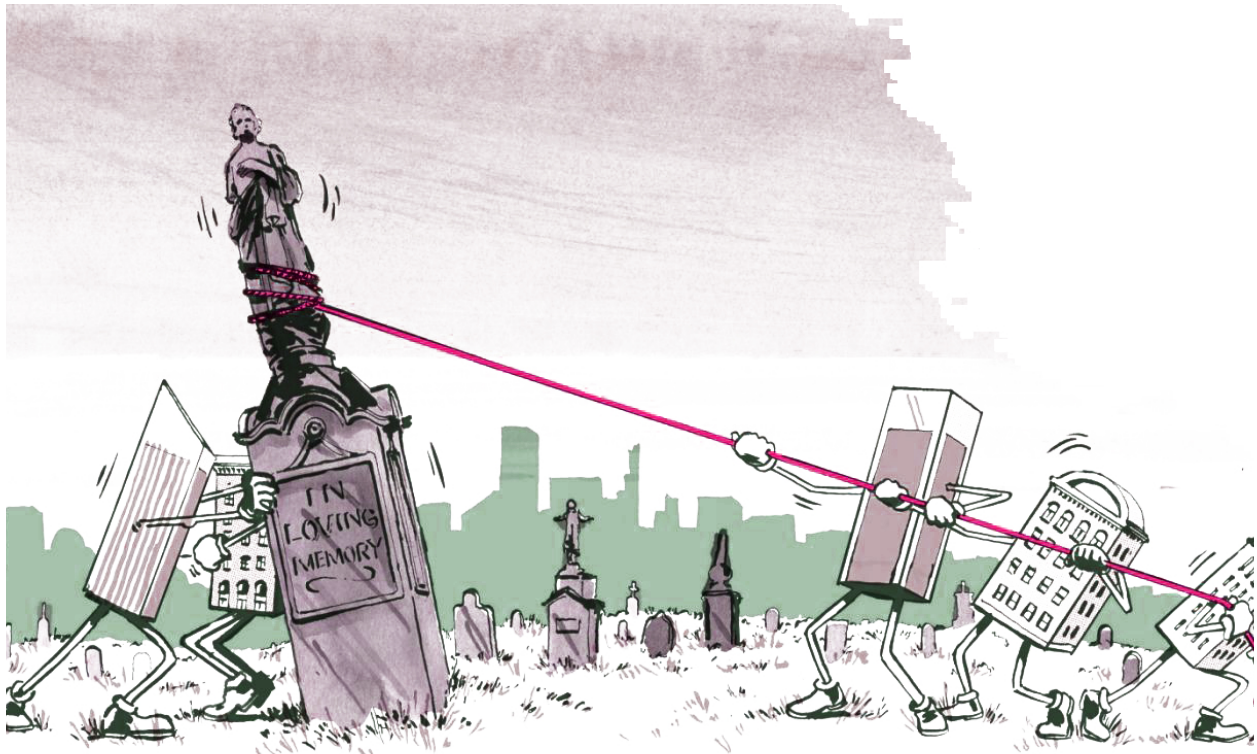


Figure 1: Next City Cartoon, Historic Cemetery Restoration in Austin, TX

foster anti-social uses and become problematic for the community. Often, they are located in areas which weren't originally urban, but now are, as the cities have grown up to surround them (Abernathy 1970). In some cities, derelict historical cemeteries have been removed to make way for development, or as an attempt to stop anti-social uses (Koonce 2011).

A cartoon published in *Next City*, referring to the new plan for historical cemeteries in Austin, Texas, illustrates the issue with humor. (*Figure 1*) Landscape Architecture Magazine published an article in September 2015 discussing the City Master Plan for Austin Texas, which brings five historic municipal cemeteries under the care of the Austin Parks and Recreation District. The article states, "...questions about ownership, evolving attitudes about burial, and all-but-dried-up funding streams are pressing. Some even threaten to obsolesce historic cemeteries altogether, condemning them to a future of disrepair. Many historic urban cemeteries, hundreds of years old and hemmed in by development, are at capacity. From a financial perspective, once a cemetery is full, it becomes a liability. Without burial plats to sell, there is no revenue stream and city officials are left trying to figure out where the money for maintenance or tree care is going to come from" (Schuler, 2015).

One solution to these parallel issues is to use urban historical cemeteries for multiple purposes within the city. They exist within most cities in the United States, as open-spaces, and many of them are in need of care, adaptation, and restoration (Koonce, 2011). Many of them are closed to the public, even when located in areas with limited public open spaces, because they have become "attractive nuisances" (Abernathy, 1970). If we chose to use these spaces as ecosystem preserves and public open-spaces, they can become more valuable to the community through an increased potential for use and an expanded sense of community ownership and care.

1.2 HISTORICAL CONTEXT

The Rural Cemetery Movement, also called the Park Cemetery Movement, advocated cemeteries be located outside of the bustle of the city, but close enough to reach them easily for day-trips and passive recreation in a natural setting. Some of the first of these were Mount Auburn in Boston in 1831, Laurel Hill in Philadelphia in 1836, and Greenwood in New York in 1838 (Sloane, 1991),(Weed, 1912). A painting by Thomas Church shows Mount Auburn Cemetery in Boston in Figure 2. This was the first rural cemetery established in the United States, setting the stage for the both the Rural Cemetery Movement and later the Public Parks Movement. They were often designed with wide strolling paths and central squares, usually located in the middle of the space or at the top of a hill. These cemeteries, as they became very popular and heavily used, inspired the Urban Park Movement, which changed the way our culture designed and used open space in urban areas (Garvin, 2011).

Both of the case study sites of this project were designed under the precepts and in the era of the Rural Cemetery Movement, and they have both slowly become urban spaces as Eugene and the University of Oregon have grown around them. This condition is common for cemeteries incorporated outside of growing cities during The Rural Cemetery Movement. The two sites are shown in Figure 3 in a 1930 air photograph. Some of the characteristics of these cemeteries of The Rural Cemetery Movement are used to define the case study sites as formerly rural, urban cemeteries in a series of questions to determine whether or not a site fits this category. The primary criteria used in this masters project to determine if a cemetery is a formerly rural, urban cemetery are whether it was constructed during the era of The Rural Cemetery Movement, between 1831 and 1920, and whether it was sited outside of the city limits at the time of its construction.

1.3 FLOWCHART DEFINING FORMERLY RURAL, URBAN CEMETERIES

To determine whether or not to apply the framework included in this document to any specific cemetery, first it must be determined if the cemetery fits into the definition of a formerly rural, urban cemetery which is not now functioning to its full ecosystem and passive recreation potential. Whether a place is functioning to its full potential may prove difficult to determine, but the framework included in this project suggests that this question be answered by current community users and potential community users of the space.

There are several qualities a site must have to be defined as a formerly rural, urban cemetery. These include the cemetery being incorporated during the Rural or Garden Cemetery Movements, initially being established outside the city, being inside the city now, at the time of assessment, and being underutilized for ecosystem or passive recreation functions. Determining information about an individual cemetery requires a robust inquiry into the place, its history, and its contemporary function. This is a vital step to determining whether or not the adaptation of a specific cemetery to perform ecosystem and passive recreation functions is appropriate or necessary. Once information is gathered, the flow-chart, which is shown in Figure 5, can help determine whether a cemetery fits the definition of a formerly rural, urban cemetery.



Figure 2: *Painting of Mount Auburn Cemetery in Boston, by Thomas Church*

1.4 THE TWO CASE STUDY SITES

THE EUGENE PIONEER CEMETERY

The Eugene Pioneer Cemetery was established in 1872 by the Spencer Butte Lodge No. 9 International Order of Oddfellows. It is the second oldest incorporated cemetery within Eugene's city limits. The original cemetery was ten acres, but an additional six were added on the south side of the property in 1907.

One important feature of Eugene's Pioneer Cemetery is the civil war memorial plot created by the Eugene chapter of the Grand Army of the Republic (GAR) organization in 1887. The plot came into existence when George Doty, a local Civil War veteran, passed away without resources for burial. Eugene Grand Army of the Republic Post #7, an organization of which Doty was a member, paid for half of his funerary and burial expenses while the city provided the rest. The area of Eugene's Pioneer Cemetery where Doty was buried became the GAR plot, and over the course of the next fifty years, fifty more veterans of the Union Army were laid to rest in the plot, plus a few of their family members (Eugene Pioneer Cemetery Association, 2016).

The GAR plot is a popular attraction on Memorial Day, when an annual ceremony is held to honor and remember the Union soldiers buried here. The celebration includes the organization Sons of Union Veterans performing a color ceremony in Union army uniforms, and, in 2014, the ceremony included the dedication of a grave marker for the grave of a Union soldier which was previously unmarked (The Register-Guard, 2014). Figure 3 shows a photograph of the Memorial Day Color Guard at Eugene Pioneer Cemetery.

The Eugene Pioneer Cemetery is also well-used. Many University of Oregon students and faculty walk through the site on the way to and from

campus. People also use the space to exercise, walk dogs, and smoke cigarettes.

The Eugene Pioneer Cemetery is now owned and managed by the Eugene Pioneer Cemetery Association, but for decades, two separate corporations were involved in making decisions for the cemetery. The Pioneer Memorial Park Association, or PMPA, was allied with the University of Oregon and the State Board of Higher Education and was formed in 1954, when the University was attempting to gain ownership and control of adjacent properties. The PMPA bought the cemetery from the Oddfellows in 1957, which caused a heated legal battle with the other cemetery association affiliated with Eugene Pioneer Cemetery. (Eugene Pioneer Cemetery Association, 2016).

The Eugene Pioneer Cemetery Association, or EPCA, was formed in 1930 and started as a plot-holder's organization composed mostly of descendants of the interred who wished to see the site preserved and maintained, which was the mission of the organization. The PMPA focused their energies on the potential for development of the site. In 1962, The Oregon State Supreme Court ruled that PMPA's claim to the title of the cemetery was legitimate. Even as the potential for development disappeared, the PMPA continued to own and administer the cemetery for



Figure 3: Picture of Memorial Day Color Guard at Eugene Pioneer Cemetery



Figure 4: 1930- View looking south to Pioneer and Masonic Cemeteries

FLOWCHART DEFINING FORMERLY RURAL, URBAN CEMETERIES

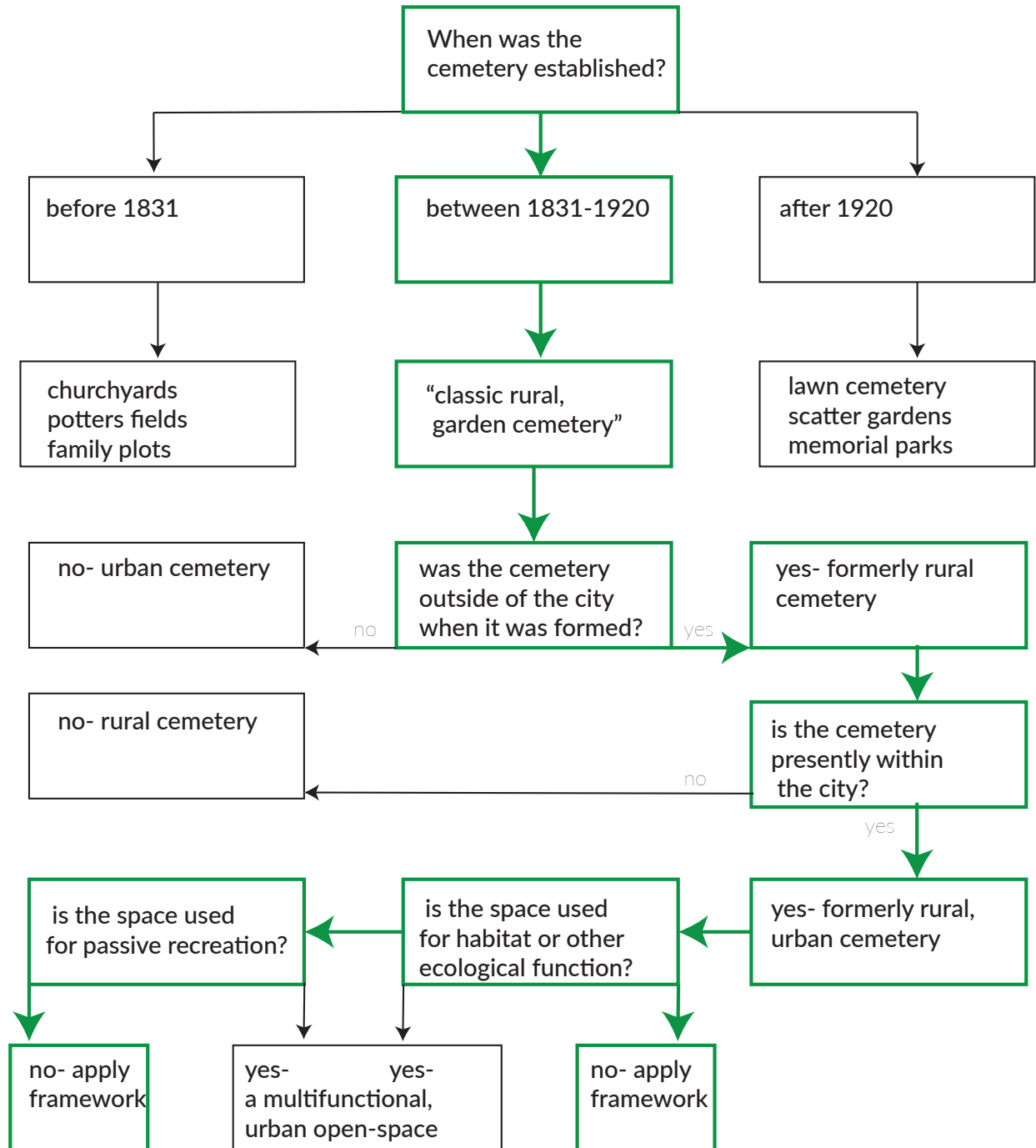


Figure 5: A Flowchart to Define Formerly Rural, Urban Cemeteries

many years, and the organization granted the University a perpetual easement in 1978 along the West side of University Street. In 2004, the PMPA volunteered to dissolve and turn over the association's assets, including the title to the cemetery, to the EPCA on the condition that the University of Oregon be allowed to appoint one member of the EPCA board. The EPCA agreed, and took on full responsibility for the site (Smith, 2004).

THE EUGENE MASONIC CEMETERY

The Eugene Masonic Cemetery was established before the Eugene Pioneer Cemetery, in 1859, when the Eugene Lodge #11 of the Free Masons purchased 10.1 acres in the hills south of Eugene

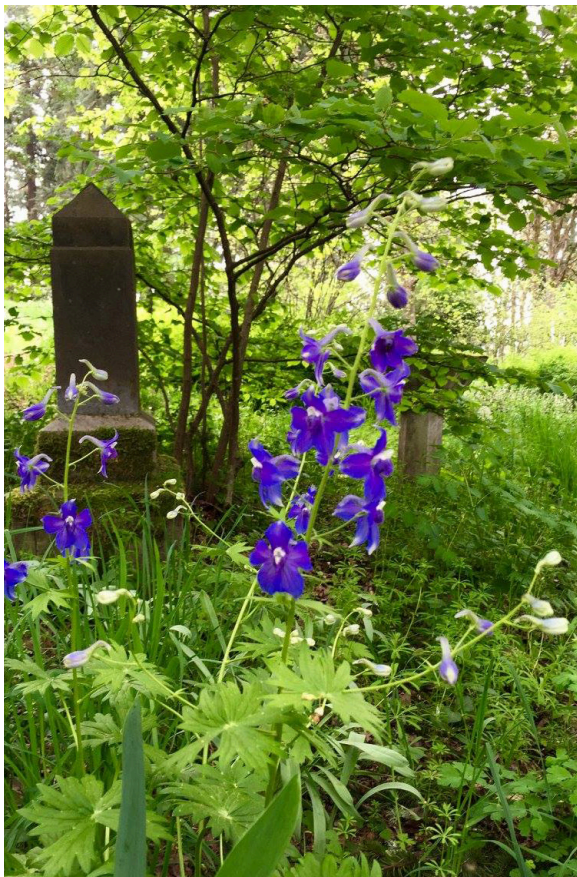


Figure 6: Native Delphinium at Eugene Masonic Cemetery

from Fielding McMurry, an Oregon pioneer who had claimed the land. Like Eugene Pioneer Cemetery, the site of Eugene Masonic Cemetery was several miles outside of the city when it was constructed and was located and designed to follow the model of the Rural Cemetery Movement (Siedel 1999).

An aerial photograph taken in 1930 (Figure 4) shows the Eugene Pioneer Cemetery in the foreground, surrounded by mature Douglas-fir trees, with the Eugene Masonic Cemetery on the hill in the background.

The Eugene Masonic Cemetery continued to operate through the early 20th century, though changes in burial trends, and the subsequent establishment of Rest-Haven Memorial Park in 1921, drew users and income away from the Eugene Masonic Cemetery. By 1960, the space was overgrown with exotic invasive plant species, and had an ongoing issue with vandalism. This condition persisted until 1994, when the community rallied to form a non-profit organization to take responsibility for the historical landscape's care (Siedel 1999).

To re-establish the care and management practices, in 1996, the Eugene Masonic Cemetery Association hired Charmane Landing, a recent Landscape Architecture graduate from the University of Oregon, to develop a management plan. She envisioned a return to the Rural Cemetery concept.

A local community member and expert botanist, Bruce Newhouse, advised Landing that several native plant communities were present under the blanket of invasive blackberry and English ivy which had overtaken the space. Landing and Newhouse identified the potential to restore these native plants, and foster native biodiversity within the historical framework of a rural cemetery (Interview #8, 2016). Figure 6 shows the native delphinium at the Eugene Masonic Cemetery in bloom.

The project to enliven Eugene Masonic Cem-

etry was successful. As of this writing, 115 native plant species have been confirmed growing on the site, up from 82 native species in 1995 (Newhouse 1995, 2015). The neighborhood surrounding the cemetery uses it as a park, riding bicycles, walking dogs, jogging, and using the space as an outdoor classroom for art, botany, history, and naturalism. Events such as Memorial Day commemorations, concerts in the summer, and volunteer work parties, help raise interest in caring for the space (Interview #4, 2016).

The Eugene Masonic Cemetery is a successful example of a cemetery transformed to foster multiple uses in Eugene, Oregon. The project's success is based on the goals and objectives outlined in the Eugene Masonic Cemetery Landscape Management Plan, and whether these objectives were met since the plan was published in 1998. All of the 15 objectives, including controlling invasive plant species, increasing wildlife habitat, and improving public access, are met. The confirmation that these objectives are met is made through analysis of the change in plant inventories compiled by Salix Associates, one from 1995 and another from 2015, as well as interviews with local experts who have observed the project, document analysis, and site observation.

1.5 RESEARCH CONTEXT AND METHODOLOGICAL PRECEDENTS

This master's project explores multiple topics in two broad themes: 1) the history of cemeteries and the land-use and planning practices which affect cemeteries and 2) urban ecology, native plants, and how these systems affect passive recreation.

To span these themes, case study analysis is used as the predominant research method. Evaluating case-studies and precedents is an established approach for those studying landscapes, and whether or not they are performing certain func-

tions.

Additionally, I supplement the case studies with guided interviews with experts. Guided interviews are often used in the humanities and social sciences to determine information about people's behavior, values, and beliefs. This method is also, though less frequently, used to extract knowledge from experts which may be yet unpublished or outside of the scope of general knowledge in the field. I use the guided interviews in both of these ways. The guided interviews reveal detailed information about the cemeteries themselves, the management of these places, and the native ecology of both of these sites. Lists of the interview questions, profiles of the respondents, and key quotes are available in Appendix A and B.

Though I use interviews as supplements, the primary method is an in-depth case study of Masonic and Pioneer cemeteries. This information is combined with that gathered through guided interviews and then synthesized into a transferable framework for potential application at other formerly rural, now urban cemeteries.

Below, I summarize key findings from the review of related literature.

1.6 KEY FINDINGS FROM LITERATURE REVIEW

Literature Review is used in this project to re-enforce key findings, explain the history of cemetery design in the United States and the specific case-study sites, and to collect information about local applied ecology to be used in the framework.

Some sources were key to the findings of this project, such as the management plan for Eugene Masonic Cemetery, newsletters published by the cemetery associations that manage the case study sites, and Bruce Newhouse's plant inventories. These documents are cited throughout the project, as they were used to analyze the case

study sites and form the framework.

Julie Archambeault's thesis, *New Life for Historic Sites: Adaptive Reuse in Four Northwest Cemeteries, 2004*, is a case study analysis of Eugene Masonic Cemetery as a successful example of adaptive re-use. She discusses the use of native plant walks and wildlife habitat plantings as powerful tools to increase passive recreation in underused cemeteries (Archambeault, 2004).

Several other works explore modern, adaptive re-use in underutilized urban cemeteries, including *Urban Green: Innovative Parks for Resurgent Cities, 2010*, by Peter Harnik. This book contains a chapter on cemeteries, which includes in-depth description of five successful case-studies in the United States, and information about how these park cemeteries are managed. These descriptions supplement information gathered from the Eugene Masonic Cemetery about private/public partnerships and non-profit organizations (Harnik, 2010).

Cemeteries in the Urban Plan: Opportunities and Constraints, 2011, by Collin Koonce, and *An Ecosystem Approach for the Evaluation of an Abandoned Cemetery as a Green Area: The Case Study of Ankara, 2010*, by Aysel Uslu, are both graduate student works, and both explore topics of adaptive re-use of cemeteries for passive recreation and ecosystem functions. *Cemeteries in the Urban Plan: Opportunities and Constraints* discusses several individual case study cemeteries and some of the challenges faced by communities who have adapted them as urban open spaces. Uslu's thesis explores one successful example in great detail, and includes specific data and information about the ecological relationships present in a cemetery that has been adapted to perform ecosystem functions (Koonce, 2011), (Uslu, 2010).

Other sources provide information on implementing applied ecology projects or the use of native plants in urban environments. *Measuring Social-Ecosystem Dynamics Behind the Generation of Ecosystem Services, 2007*, is a study of

maintenance practices in urban open-spaces and how those practices effect biodiversity, and it also uses case studies as a method (Andersson, 2007). Publications which combine many methods of inquiry, such as *The Living Landscape, 2008*, by Frederick Steiner, and the textbook, *Management of the Urban Environment: The Challenge of Environmental Management in Urban Areas, 1999*, are used to better understand applied ecology in urban areas. In both of these texts, the authors use case-study analysis to provide detailed information about projects designed and successfully implemented to increase the ecosystem services present in urban areas (Steiner, 2008), (Mattingly, 1999).

1.7 RESEARCH QUESTIONS

The two primary research questions explored in this master's project are:

- 1) How did masonic cemetery association successful adapt a formerly rural, now urban cemetery to accommodate more ecological and passive recreation function?
- 2) What aspects of this success are reproducible or transferable at other formerly rural, now urban cemeteries?

1.8 PROJECT MOTIVATION

This project is based on the premise that public open space in urban areas can be preserved through the wise adaptation of formerly rural, urban cemeteries by increasing the potential for ecosystem function and by accommodating and encouraging passive recreation uses.

In the course of this research, I compare and contrast the sociocultural and biophysical conditions, management, and goals of two of Eugene's now urban, but formerly rural, cemeteries. The Eugene Masonic and Eugene Pioneer Cemeteries' management practices are analyzed, as they relate to establishing and maintaining native plant communities to foster expanded ecosystem and passive recreation functions.

Determinations are made about the relationships between evaluation of a site's sociocultural and biophysical conditions, site management, the presence of native plant communities, and how to expand opportunities for passive recreation. Recommendations follow in the form of a transferable framework for increasing the presence of native plant communities through a process of collaborative site evaluation and the formation and implementation of a management plan.

In this project, the presence of a native shrub layer serves as an important indicator of the plant communities present in these two sites. These two cemeteries were chosen as case study sites partially because of the wide disparity they show in regards to a native shrub layer. Native trees are abundant in both of these places, but native shrubs are prevalent in only one. Eugene Masonic Cemetery contains an abundance of native shrubs, while Eugene Pioneer Cemetery has only a handful of Oregon-grape and snow-berry plants in the entire 16 acre site (Interview #2, 2016). Native shrubs provide food and habitat for native invertebrates, birds and other creatures, and diversify the structure and composition of plant communities, which can lead to an increased interest in passive recreation, education, and other human uses (Archambeault, 2004).

1.9 OBJECTIVES

The primary objective of this master's project is to develop a framework for transferring the successes at Eugene Masonic Cemetery to other formerly rural, urban cemeteries. After determining what aspects of the success of the Eugene Masonic Cemetery are transferable, this project distills the reasons for that success in order to inform the creation of a general, actionable framework to: 1) foster ecosystem functions and, 2) enhance options for passive recreation, in formerly rural, but currently urban, cemeteries. This framework reflects the lessons learned

studying biophysical and sociocultural conditions and the management goals and practices of the case study sites, the Eugene Masonic Cemetery and the Eugene Pioneer Cemetery. The steps required to implement the framework include evaluation of sociocultural and biophysical conditions, and creating a management plan in response to those conditions to enhance these spaces capacity for historical preservation, native plants, and passive recreation.

This transferable framework incorporates information learned from experts, in guided interviews, about the practices used to transform the plant communities and structures at Eugene Masonic Cemetery through the evaluation and subsequent manipulation of sociocultural and biophysical conditions.

The guided interviews reveal exactly how these spaces are being managed and by whom, clarifying the work it takes to get and keep an ecological, historic cemetery functioning. The interviews also help identify the organization and structure of the communities responsible for maintenance decisions and labor, which will contribute to understanding how a community can successfully create and maintain these multi-functional urban spaces.

Methods

To answer the research questions put forth, and to develop a transferable framework, a method for gathering and distilling large amounts of information about the sites is needed.

The methods of inquiry for this project, case study with site analysis, document analysis, and guided interviews, provide the information needed to answer the research questions through a deeper understanding of the case study sites.





METHODS OF INQUIRY

This study uses several descriptive methods, such as case study, secondary observation through historical documentation, and guided interviews, to form a complex description of the two study sites. The combination of these methods was chosen because, according to Deming and Swaffield, “The combination of different observation techniques builds up a richer and more complete account,” and “Different descriptive sources can also reveal different types of information” (Deming and Swaffield, 2011).

The case study and description, interviews, literature review and the definition inform the creation of a transferable framework for evaluating the potential for adaptive re-use of formerly rural, urban cemeteries to perform ecosystem and passive recreation functions through the establishment of more robust native plant associations. The framework is a tool to begin to evaluate elements of the sociocultural and biophysical conditions forming these landscapes, decide on desired future conditions, and plan interventions for altering these conditions by retrofitting the landscape to serve more ecosystem and passive recreation functions, through the collaborative formation and execution of a management plan.

The methods of this Master’s Project are diagrammed in Figure 7. This diagram shows the process used to gather information and distill it into a transferable framework for adaption of formerly rural, urban cemeteries.

CASE STUDIES

I chose the Masonic and Pioneer Cemeteries as the case studies for this project for several reasons, including their proximity to one another. At the outset of this project, I thought that the culture and community context would be similar for the two sites, because they are only seven blocks between the two sites. They are both formerly rural, urban cemeteries which were incorporated before the lawn cemetery movement took hold, and one of them has been successfully adapted to support more ecosystem and passive recreation functions.

A major component of the methodology of this project is to determine the previous and current conditions of each of the case study cemeteries, particularly in regard to the native plant communities, and attempt to determine what practices have resulted in the current conditions on site, and which of these practices or policies could be universally transferable, and therefore suitable for use in a transferable framework.

The information gathered from the case studies is used to determine what elements should be included in the framework, as determined by what policies and practices are widely transferable. This information is gathered using several techniques, including collecting and analyzing documents, management plans, and the data of other researchers, making site visits, site photography, and the observation of current site uses.

DOCUMENT ANALYSIS

The documents most important to this project are: 1) The flora and fauna inventories created by Bruce Newhouse, which were created both at the beginning of the project in 1997, and again in 2015, are used to determine the species present at Eugene Masonic Cemetery and the change in that species since the management plan implementation began (Newhouse, 1997, 2015); 2) The management plan prepared by Charmane Landing for the Eugene Masonic Cemetery Association, which is used to document the desired future conditions, goals, management, and maintenance of the site (Landing, 1998); and 3) A booklet called *Full of Life*, by Karen Siedel, which documents the distant and contemporary history of Eugene Masonic Cemetery, including the process of forming the Eugene Masonic Cemetery Association and the decision to pursue the goal of fostering native plant associations for increased ecosystem and passive recreation functions (Siedel, 1999). Several other documents such as cemetery association newsletters, brochures, signs, and websites were also analyzed.

PROCESS OF THE METHODS DIAGRAM

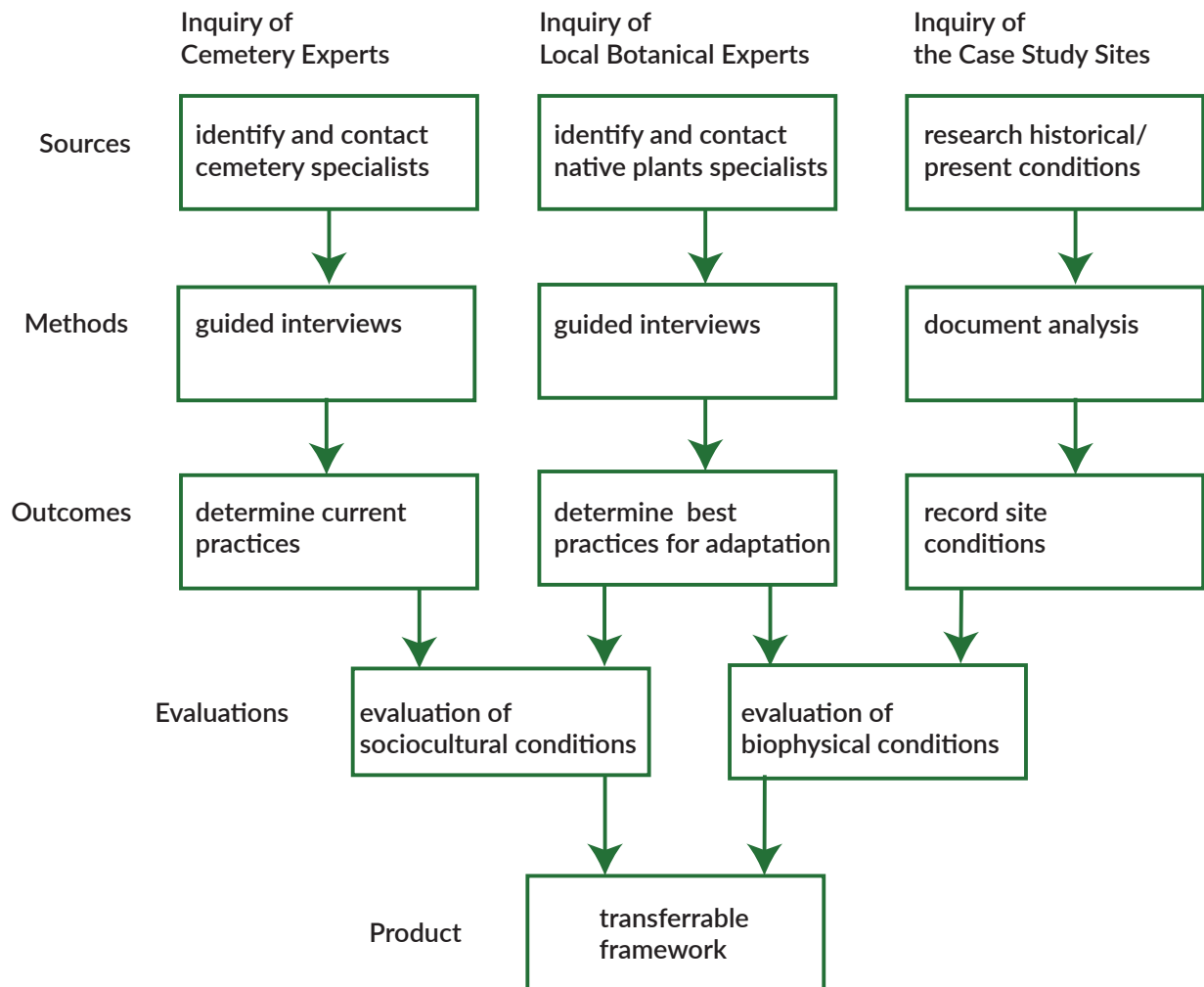


Figure 7: Process of the Methods Diagram

Of these documents, the management plan created by Charmane Landing for the Eugene Masonic Cemetery Association had the most to offer for forming a deeper understanding of how changes are made to a landscape over time and across management changes.

The information learned through the course of analyzing these documents is supplemented with the other major aspect of the methodology of this project, a series of guided interviews with experts.

GUIDED INTERVIEWS

These interviews are intended to determine and confirm the recent history of Masonic and Pioneer Cemeteries, information on local native plant communities, including their ecology and maintenance, and new knowledge about each of the individual case study cemeteries. The interviews complement the other aspects of the method by revealing unpublished and insider information, and confirming the information gathered in the case study and document analysis.

The first questions of each interview inquire about the qualifications of the expert. Each individual had very different qualifications stemming from different experiences, so I chose to use a definition of expertise from an expert. Experts are those who have specialized knowledge of their field beyond the knowledge of the general population. In addition, experts are recognized as having “socially institutionalized expertise” (Sprondel, 1979). For the purpose of this study, I define socially institutionalized expertise as formal education and professional experience. To qualify as an expert in native plants and ecosystems, the respondents must have a degree in landscape architecture, botany, or ecology, and five years of experience working with native plants in a volunteer or professional capacity.

Other interviews were conducted with individuals who have personal experience with the case study cemeteries, such as maintenance workers,

board members, and community users. These individuals are qualified as experts by having spent 100 hours working at, volunteering at, studying, or using one or both of the cemeteries.

Many of the experts interviewed provided additional and unexpected information about the trophic relationships of native plants, the history and conditions of the sites, or the wider social context of the spaces’ management and use. These unexpected insights were documented and used in this project, even if the information didn’t answer any of the questions posed to the experts. Through the process of these guided, but open, interviews, much new and important information was discovered. Throughout this process, the list of guided interview questions was adapted to include new subjects of inquiry.

The original questions focused on the maintenance practices used in the cemetery sites and the needs and benefits of native shrubs. Many of the questions that were added later probed the topics of the role of community support and involvement in the management of the cemeteries, the sociocultural conditions affecting the community perception of the sites, and the ways in which the cemetery associations determine the desired future conditions of the sites and how they work to achieve those conditions. Not every respondent was asked every question, instead the questions asked were selected from the list based on the individual respondents’ interests and areas of expertise.

To use interviews for this research, approval from the Human Subjects Review Board at The University of Oregon was required. To gain an exemption from this board, one requirement was the confidentiality of participants in the survey process. For this reason, none of the experts interviewed are named in this document.

IDENTIFYING EXPERTS

Many of the experts in native plants and ecology were identified through previous course work at the University of Oregon. Others were recommended by professors at The University of Oregon. All of the individuals who were identified or recommended were contacted with a standard e-mail requesting an interview. The original e-mail received four affirmative responses of nine e-mails sent, and many of the responses, both affirmative and negative, recommended other individuals as possible experts. This led to a second round of e-mails requesting interviews. This second round included six requests, with five affirmative responses. Eventually, nine experts were interviewed.

To determine what questions to ask in the interview, the findings from site analysis, case-study, and document analysis were compiled and any missing information was noted. Information which was missing or unconfirmed guided the content of the questions.

The interviews were held at public coffee shops, and lasted between one and three hours. I requested a half hour interview, but each interview evolved into conversations which revealed unique information pertinent to the project. A complete list of the questions which were asked of the respondents (Appendix A), and the profiles of each person interviewed and important quotes from the interview transcripts (Appendix B), are included at the end of this document.

Findings

The methods of inquiry for this project, case study and site analysis, document analysis, and guided interviews, produced both expected and unexpected findings about the adaptation of formerly rural, now urban cemeteries.

Two important findings of this master's project are that community support is necessary for efforts to adapt a formerly rural, now urban cemetery for enhanced ecosystem and passive recreation uses to succeed, and that the creation and use of a management plan is how groups of people can bridge the sociocultural and bio-physical conditions, as well as the present and desired future conditions.





3.1 SOCIOCULTURAL CONDITIONS

The two case study cemeteries are affected by very different sociocultural conditions. The two cemetery associations have different cultures, values, and goals. Also, the Eugene Masonic Cemetery is surrounded by low-density residential uses, while Eugene Pioneer Cemetery is bordered on three sides by a large, public university, and the adjacent residential area is mostly high-density student housing. It is 16 acres of unlit cemetery that, “undergrads stumble through on their way from a frat party back to the dorms” (Interview #5, 2016). While the Eugene Masonic Cemetery is surrounded on all sides by single family housing, much of which is used by long-time residents and home owners, the neighborhood users of Eugene Masonic Cemetery consider it a destination. By comparison, many users of Eugene Pioneer Cemetery consider the site a convenient short-cut on their way to or from the university (Guided Interviews, #6, #5, #2).

OWNERSHIP

Many cemeteries are owned by Nonprofit Organizations (NPOs), as is the case with both of the case study sites in this project. The Eugene Masonic Cemetery is owned by The Eugene Masonic Cemetery Association, and Pioneer by The Eugene Pioneer Cemetery Association. Forming a NPO, and securing ownership of the site by the NPO, has been very beneficial for both sites. The NPO status of these two cemetery associations allows for a reduction in personal liability for those making decisions in regards to the cemeteries’ management and use, it allows tax-exempt fund-raising, and requires a higher level of accountability through the formation of a board of directors collaboratively making decisions about the site.

PROJECT SUPPORT

The interviews conducted show that adaptive changes to support passive recreation are desired by the community users and management of Eugene Pioneer Cemetery, but fewer stakeholders or community members support the establishment and maintenance of a native shrub layer on site. As far as biophysical management of Eugene Pioneer Cemetery, the Eugene Pioneer Cemetery Association’s board’s goals are focused on clearing most of the shrub layer and low hanging branches for increased visibility. The cemetery is perceived as an unsafe space when visibility is reduced, and increasing the safety and visibility of the cemetery has been the primary goal related to interventions in the structure and composition of the plant communities in this space.

Other respondents are more concerned about crimes that have taken place in the Eugene Pioneer Cemetery, and that any obstruction of sight



Figure 8: Volunteers cleaning up at Masonic Cemetery

lines may correlate with an increase in crime in the area. This concern is what caused the Eugene Pioneer Cemetery Association to focus their vegetation management efforts on clearing dense shrubs and low limbs on trees for improved visibility (Interview #6, 2016). Figure 9 shows cleared sight-lines in Eugene Pioneer Cemetery that have resulted from the implementation of the Eugene Pioneer Cemetery Management Plan.

A primary reason that the project at Eugene Masonic Cemetery succeeded in improving conditions for passive recreation and ecosystem functions was a strong desire by the surrounding community to steward and use the space, and that desire being matched by action. Figure 8 shows volunteers cleaning the fence around a plot at the Masonic Cemetery. The first, and most important, sociocultural condition required to foster this type of project is demand and support from owners and managers of the site and

the community. Without that support, the project likely will not succeed.

Support from the community and management may be a requisite sociocultural condition to foster adaptive interventions, it is not, however, the only sociocultural condition required to begin a project to adapt a formerly rural, urban cemetery to support more ecosystem and passive recreation functions.

MANAGEMENT

Both of the case study sites studied in this project are managed by NPOs and an elected board of directors, with the exception of the one board member of the Eugene Pioneer Cemetery Association who is appointed by the University of Oregon. Both cemeteries have management plans in place. They also both rely heavily on community donations of time, expertise, and



Figure 9: Cleared sight-lines at Pioneer Cemetery

money to continue operating smoothly. The Eugene Masonic Cemetery Association calls its plan a management plan, and the Eugene Pioneer Cemetery Association calls its version a preservation plan, which reflects the most important goals of the Pioneer Cemetery Association, and highlights some of the cultural differences between the two managing organizations. The desired future conditions, goals and objectives of the two management plans are very different. The Eugene Pioneer Cemetery Association is very focused on the preservation and memorial of history, including the history of the individuals and families buried in the cemetery. Every Memorial Day, there are events in the cemetery to honor veterans and remember their service. Figure 10 shows Boy Scouts participating in the Memorial Day festivities at Eugene Pioneer Cemetery.

The Eugene Masonic Cemetery Association also includes historic preservation and local history interpretation in its management goals and practices, but with more negotiation, and allowance for other goals taking precedence in some management decisions. For instance, vegetation is allowed to grow tall and obstruct headstones in Eugene’s Masonic Cemetery, to meet the objective of allowing native grasses and forbs to complete their life-cycles and set seed prior to any mowing taking place (Landing 1997).

When the vegetation is considered in the Eugene Pioneer Cemetery Preservation Plan, it is often through the perspective of how the vegetation may damage headstones, or how it might impair or improve visibility and therefore the perception of safety. Both cemeteries have elements of the management plans that address invasive plants, but for different reasons.

The Eugene Pioneer Cemetery Association Preservation Plan states, “Each burial plot should be evaluated to determine what invasive shrubs and plants need to be removed. Removal should

be completed on a case-by-case basis with guidance from a person knowledgeable about various plant types. Remove trees and shrubs (often these are small volunteer saplings and suckers) that are disturbing the headstones or causing damage to the curbs. Limb up trees that hang over the burial spaces and might damage headstones. Holly saplings, ivy, wild blackberry vines and other volunteer plants are overtaking some of the individual plots and should be removed at each. Caring for cemetery lots involves removing invasive plants” (Smith, 2004). It seems that this plan calls for the removal of invasive species because they may actually dam-



Figure 10: Boy Scouts at the Memorial Day celebration at Eugene Pioneer Cemetery

age the memorial structures, and not necessarily for ecological purposes.

In contrast, the Eugene Masonic Cemetery calls for the removal of invasive species as an objective to help meet the goal of increasing native plant diversity (Landing, 2007).

A caretaker at Eugene Pioneer Cemetery explained why he thinks tidiness is important, “One reason is respect. These are war veterans and their families. These guys were military, and I imagine they would like the grass and everything tidy and trimmed short. The people who come to pay their respects, too. They just want it to look like it’s taken care of, out of respect for their dead” (Interview #7, 2016).

This comparison illustrates the very different goals of the management at these two spaces. These differences in values and priorities of the two cemetery’s communities and users can partially be explained by the community context around each site, and by the different interests and values of the cemetery association members, volunteers, and users of each cemetery. The more traditional and history-minded culture of Eugene’s Pioneer Cemetery places a high value on the tidiness of the landscape, which may be at odds with establishing diverse native plant associations, which can appear messy to some.

FUNDING

“In public funding terms, the burial ground presents typological problems. While the cemetery itself may be publicly owned and accessible, the individual plots and monuments likely remain in private hands, and so grants for improvement could be contested from the point of view that public money is being spent on private benefit. This delicate private/public ecology has implications for both architectural and landscape integrity. Kitsch monumental tombs may destroy the overall architectural effect, as may inappropriate planting” (Warpole, 2007).

Both the Masonic and Pioneer Cemeteries secure their fund-raising potential by being owned and managed by NPOs. In addition to this tax-free legal status, both case-study cemeteries benefit financially by performing occasional new burials. Neither cemetery is full to capacity, but both are close, allowing just a few new burials a year in each site. In many formerly rural, urban cemeteries, this will not be the case. These cemeteries are often full to capacity, and other sources of funding and resource inputs must be secured.

Both of the case study cemetery’s managers and boards have found innovative ways to secure funding for ongoing care of the sites. The Eugene Pioneer Cemetery Association has an endowment fund in which donations are invested and managed to increase the overall resources available to the cemetery association. In the case of the Eugene Pioneer Cemetery Association, they acquired the volunteer work of an expert in law and funding, who worked to secure donations and wisely invest them. According to the Eugene Pioneer Cemetery’s newsletter, *the Spirit of the Pioneer*, “Alton C. McCully was a lawyer (graduate of the U of O, and the U of O Law School). He was a charter Board member of the Eugene Pioneer Cemetery Endowment Fund Corporation. As its treasurer, he canvassed banks, businesses, and civic-minded individuals for donations to the non-profit corporation, and saw the Fund’s assets rise from \$100 in 1975 to over \$340,000 when he stepped down in 1999. He oversaw investments that increased the fund safely” (Holmes, 2004).

The Eugene Masonic Cemetery has also established an endowment fund to increase the resources available to the Eugene Masonic Cemetery Association. In the past the Masonic Cemetery Association has secured funding by winning full and matching grants, business contributions, individual and estate donations, and fees for events and burials held in the cemetery. “The Masonic Cemetery Association has raised

thousands of dollars” (Interview #7, 2016), since the restoration project began in 1994.

The Eugene Masonic Cemetery Association is currently implementing a “long range plan, working to grow our endowment, and developing new sources of earned and contributed income” (Hellesvig, 2016). The cemetery association has recently won two grants to install two new steles, or monument walls, for the cemetery’s scatter and memorial garden. These specific grants not only secure funding for current needs, but also open the possibility for future income by expanding the capacity for paid cemetery services.

Both the Eugene Pioneer Cemetery and Eugene Masonic Cemetery rely heavily on community support through donations of money, time, and expertise. Tax-deductible donations can be made to NPOs, and are made to both cemeteries annually by community members and descendants of the deceased buried at the sites. The need for funding can be reduced through the use of volunteer labor and donations of time, service, and materials. Both sites host volunteer work parties, and have dedicated volunteers with practical expertise in elements of cemetery care and management. Eugene Pioneer Cemetery has a genealogical historian on their NPO board, while historic preservation, ecology, and landscape architecture experts have given hundreds of hours of their time to work at Eugene Masonic Cemetery (Interview #2, 2016).

Public/private partnerships, formed because of mutual benefits to a cemetery association and the city a cemetery is in, can be forged with some municipalities. If a city’s open space, ecosystem, or recreation goals are helped or met by a project to adapt a formerly rural, now urban cemetery to perform more ecosystem and passive recreation function, the city may be willing to provide additional funding, labor, equipment, or other support.

ACCESS

Whether or not a space is open and accessible to the public or has potential to be opened to the public largely depends on the ownership of the site and the existing conditions on site. Some formerly rural, urban cemeteries have degraded to a condition that they are considered a menace to the public, and access is prohibited. In Oregon, cemeteries in this condition are allowed to be acquired by municipalities through eminent domain and other means, but seemingly only for the purpose of removal of such cemeteries, and not their improvement (ORS 97, 2013).

The Eugene Pioneer Cemetery was closed to the public for several years while it was owned by the Pioneer Memorial Park Association. Figure 10 shows the no-trespassing sign that used to warn potential visitors that they were not welcome. The cemetery was also nearly condemned and removed by the University of Oregon on three separate occasions, the last in 1963, but the legislation that would have allowed this died in committee, and the space was added to the National Registry of Historic Places in 1997 (Eugene Pioneer Cemetery Association, 2016).

USES

Both of the case study cemeteries are well used by community members, in similar and different ways. The Eugene Masonic Cemetery is used for passive recreation such as walking, jogging, dog walking, observation of wildlife, and the studies of history, botany and architecture. Several groups, including the University of Oregon, Department of Landscape Architecture, have used the site to learn about native plants and native plant communities. Historic preservation students surveyed the headstones in the cemetery for the record of the cemetery in The National Register of Historic Places, as a service to the cemetery and to practice and learn their chosen profession. The history, ecosystems, architec-

ture, and interpretation present in the Masonic Cemetery invite a wide range of contemplative and educational uses. (See Appendix C, Community Use Observations)

The Eugene Masonic Cemetery provides interpretive signs about important native plants and historical figures present on the site. Figure 12 shows three large signs at the entrance of the cemetery that inform visitors of the various micro-climates, plant communities, and wildlife present. This interpretation may greatly enrich user's passive recreation experience, and it may help protect historic and natural resources of the site.

The Eugene Pioneer Cemetery is used in very similar ways, and as a practice area for running teams. This use of the Eugene Pioneer Cemetery fits nicely with its size, location, and path

infrastructure. The runners are able to go all the way around the outside of the site on fairly even surfaces. Another observed use at Pioneer Cemetery is smoking cigarettes. This use was observed, discussed in interviews, and is constantly apparent from traces on site in the form of cigarette butts littering the ground. There are signs asking users not to smoke in the cemetery, but the smokers seem to pay little mind. (See Appendix C, Community Use Observations)

If a community is to establish native plant communities, or work towards any adaptive re-use interventions in a formerly rural, now urban cemetery, certain sociocultural conditions must first be in place. Throughout the course of this Master's project, I have learned that the sociocultural conditions of the cemetery site are of paramount importance to improving the biophysical conditions for ecosystem and passive



Figure 11: No Trespassing Sign at Pioneer Cemetery

recreation functions. In fact, these sociocultural conditions are required before any intervention in the biophysical conditions can successfully be made. The sociocultural conditions required for these types of projects are: 1) strong support from cemetery management and the community, 2) community values aligned with the goals of passive recreation and ecosystem functions, 3) willingness by the community to provide both funding and labor, and 4) cooperation between multiple stakeholders.

3.2 BIOPHYSICAL CONDITIONS

The biophysical conditions of the site must also be analyzed and understood before informed choices can be made about desired future conditions or necessary management practices. An important reason for using native plant associations in formerly rural, historic cemeteries is that they

can often thrive with fewer energy inputs, such as water, fertilizer, pesticide, and pruning, than horticultural plantings. To determine what native or near-native plant communities can thrive on a specific site with little maintenance, information about the biophysical conditions needs to be obtained. In this project, the biophysical characteristics are generalized into the broad categories of climate, soils and stability, solar aspects and light, and vegetation.

CLIMATE

While the regional climate for the two case study sites is the same, the two sites actually have different climate conditions because of the distinct slopes, topography, and vegetation of each.

The regional climate data for the Eugene region can be found in Appendix F.



Figure 12: Signs Providing Information To Visitors At The Entrance To Masonic Cemetery

TOPOGRAPHY, SOLAR ASPECT AND LIGHT

A site's slopes determine the solar aspects, and the solar aspect is one factor in determining how much sunlight is available in any specific spot. The varied topography of Masonic Cemetery allows for a high degree of biodiversity. Because the cemetery is sited on a small but dramatic hill, with some steep topography and flatter areas, it contains a diversity of solar aspects.

The majority of the site faces west and southwest, and this side of the cemetery includes steep and gradual slopes, with small areas which are nearly flat. The steepest slopes face north, and that side of the cemetery is stabilized with terraced plots. Most of the direct south and east facing topography of the hill Eugene Masonic Cemetery is located on is residential housing and not part of the cemetery. However, small areas of south and east facing slopes are included in the cemetery, and a large area of relatively flat south southwest facing land receives direct light most of the day.

Most of the north facing side of Masonic Cemetery is shaded by dense vegetation, including both evergreen and deciduous species in the canopy. The west and southwest facing slopes include areas with dense tree canopies, partly sunny, savanna-like conditions, and small areas with no shade, as shown in Figure 13. This diversity of solar aspects and canopy cover allows for a diversity of micro-climates, and consequently a diversity of native plant communities.

The aspects and topography present at Eugene Pioneer Cemetery are less diverse and dramatic, and create less dramatically diverse conditions. This site is also on a hill, but with less change in elevation throughout the site than at Masonic Cemetery. It also has almost opposite aspect conditions, with the majority of the site gradually sloping to the east and north. There is a small strip of west facing slopes on the west edge of the site, and the south side of the site is almost flat in some areas, and sloping gradually to the east in others.

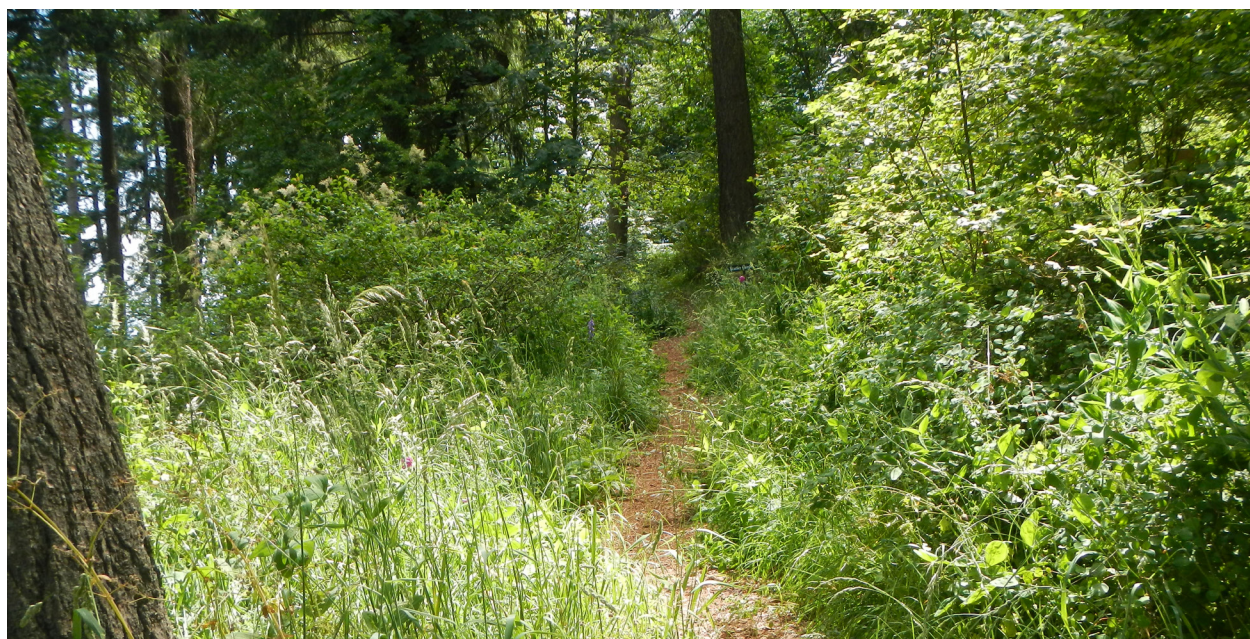


Figure 13: Conditions of path and vegetation on west facing slope at Masonic Cemetery

The original ten-acre lot of Eugene Pioneer Cemetery is mostly shaded by native evergreen trees. These trees were part of the original cemetery design, and are mature and tall. This side of the site is mostly shaded year-around. The southern side of the site, the six acres added to the cemetery after original planting, has fewer trees which are also less mature. Some of this area receives full sun, some part sun, and a few small areas that are mostly shaded.

SOILS AND STABILITY

The Eugene Masonic Cemetery has at least two distinct soil profiles on the site, partially due to the topography. The soils at the bases of slopes have a high clay content, and therefore do not drain freely. This provides hydric conditions that support specific native plant communities. Clay was mined in the northeast corner of the site in the late 19th century to provide material for bricks to be used in construction at the University of Oregon (Siedel, 1999). This history explains some of the severe erosion and dramatic

slopes and terraces in this area. This portion of the cemetery was used for burials, and terraced for increased stability, yet the burial plots and headstones in this portion of the site have obviously slid downhill significantly. The dense vegetation may be stabilizing the slopes in this area now, but that is difficult to determine within the timescale of this project. No recent signs of erosion are present after the winter rainy season, 2015-2016.

There is little sign of current use of the Masonic Cemetery causing any serious erosion problems. This could be partially due to regular path maintenance and user education through interpretive signs explaining the cultural and natural resources on site.

The soils at the top of the hill and the upper portion of the slopes contain less clay and drain more freely.

Though the topography is much flatter, the Eugene Pioneer Cemetery does have problematic erosion caused by contemporary users. In this



Figure 14: Paths used to cut through Pioneer Cemetery

site, user's walking routes have carved desire lines throughout, an image of one of these paths is shown in Figure 13. These paths are several inches deep in some areas and water runs in them, like little creeks, in high rainfall periods. This use without infrastructure is causing damage to some site features by undercutting the curbs around individual plots and washing away soil at the base of some grave-markers.

Along the east edge of Eugene Pioneer Cemetery, where the University of Oregon's easement was used to expand University Street and include parallel parking, there is an erosion problem. In my opinion, this is the most pressing and immediate problem of any kind on either site. Without prompt intervention to stabilize this slope, which is shown in Figure 14, students will be finding bones on their way to class within a few years. There are already plot curbs beginning to be exposed due to this erosion, and the caskets are only a few feet away. This slope runs

the length of the cemetery. It is as steep as 100 percent grade in some spots, and no less than 20 percent grade.

Most major rainfall events cause the sidewalk along this erosive slope to be covered in soil and bark mulch. There are no long-term stabilization techniques being used at this point, though the soil is covered in mulch annually, and the slope isn't vegetated except for some spring bulbs.

VEGETATION

At the Eugene Masonic Cemetery, five distinctive micro-climates were identified, each with different biophysical characteristics and each supporting different plant communities. These zones are distinguished by different solar aspects, available light, and available soil moisture and soil composition.

Remnant native species were also present at the Eugene Masonic Cemetery before adaptive in-



Figure 15: Eroding eastern edge at Pioneer Cemetery

terventions were made, and the presence of these species helped inform the board and managers about what specific plant communities were appropriate for the different zones in Eugene Pioneer Cemetery. The zones are “the meadow zone,” “the wet zone,” “the pioneer zone,” “the wild zone,” and “the wilder zone”(Landing, 1998). Figure 19 shows a photograph of the camas in bloom in the “wet zone” management area. Though the names of these zones don’t tell us much about the native plant communities present, in the management plan prepared by Charmane Landing, each of these areas have very specific native plants listed as appropriate, based on the biophysical conditions of the site. For example, the “wet zone” lists:

Trees:

Oregon Oak

Forbs:

Elegant brodiaea

Common camas
Cat’s ear
Two color lupine
Large leaved lupine
Monkey flower
Beaked buttercup
Oregon saxifrage
Blue eyed grasslands
Mule’s ear

Grasses, Sedges, Rushes:

Soft rush

(For complete lists of native plants found at Masonic Cemetery, see Appendix F for Bruce Newhouse’s lists.)

There are tall native evergreen trees shading much of the Pioneer Cemetery site. They were part of the original design, which formed four squares, partitioned by roads flanked in allees of monumental douglas-fir trees. Over the years, other trees have been planted outside of this



Figure 16: The Carriage Road and Mature Conifers at Eugene Pioneer Cemetery

grid formation, but the oldest trees follow this form. The carriage road and mature conifers are pictured in Figure 16.

The vegetation present at Eugene Pioneer Cemetery reflects different management goals and priorities compared to the Eugene Masonic Cemetery. Eugene Pioneer Cemetery has fewer micro-climates, though it is also on a hill, the solar aspects and soils do not vary as dramatically on the site. This results in the general conditions of sun and shade, with a gradient of partial shade.

The vegetation at Eugene Pioneer Cemetery also reflects the goals of Eugene Pioneer Cemetery Association's management plan, one of which is to clear the shrub layer and low hanging branches to improve visibility. This management has resulted in a vegetation structure of a high tree canopy, and a low ground-cover layer, with under-story and shrub layers largely absent.

Another goal of the management plan at Eugene Pioneer Cemetery is to preserve cemetery heirloom species, which is a management goal of both of the case study cemeteries. In Pioneer, the results are that the only shrubs preserved and encouraged are heirloom species such as roses, lilac, and spirea.

PASSIVE RECREATION INFRASTRUCTURE

Eugene Masonic Cemetery has added several elements of passive recreation infrastructure since the mid 1990's, when work began, to increase ecological and passive recreation functions. Some of the most important pieces of added infrastructure are interpretive and informational signs. There is a clear sign at the entrances telling visitors the rules and hours for use of the cemetery, as well as requesting respect for the monuments and the need to clean up after pets. This sign is shown in Figure 17. A large sign in the southwest corner of the cemetery explains



Figure 17: The Rules and Hours Sign at Eugene Masonic Cemetery

COMPARISON OF CONDITIONS AT THE CASE STUDY SITES

COMPARING CONDITIONS

	EUGENE MASONIC CEMETERY	EUGENE PIONEER CEMETERY
sociocultural conditions		
ownership.....	EMCA.....	EPCA
support.....	botany, landscape architecture.....	heirloom horticulture, historic preservation
management.....	native plants, passive recreation.....	memorial, safety
funding.....	burial, donation, endowment.....	burial, donation, endowment
access.....	open to the public.....	open to the public
uses.....	naturalists, passive recreation.....	G.A.R. memorial events, through-way, smoking
biophysical conditions		
regional climate.....	temperate.....	temperate
topography.....	dramatic.....	gradual
aspect, light.....	mostly west/southwest.....	mostly east/northeast
soils and stability.....	erosion of north slope.....	erosion at east edge
vegetation.....	varied structure, native shrubs.....	canopy and ground layer structure, heirloom shrubs
infrastructure.....	paths, interpretation, seating.....	carriage roads

Figure 18: Table Comparing Conditions at Case Study Sites

the micro-climates and innovative management undertaken by the Eugene Masonic Cemetery Association. (Figure 12) In addition to this information, signs signify important native plant species throughout the cemetery and biographies of important historical figures at their grave sites.

The paths are bark-mulch covered and maintained regularly, and seem adequate for user's needs. There is also a bench at the top of the cemetery, and dog-waste bag dispenser.

The Eugene Pioneer Cemetery has maintained paths that follow the foursquare pattern of the original cemetery design. These are surfaced with gravel and bark. They are quite wide, as they used to serve as carriage roads. Many people walk these routes, but many people use alternative paths through the cemetery which are not designed or maintained. These desire lines are discussed more in the soils and stability section. The existence and condition of these routes suggest that adaptation to the path system may be required to prevent further damage to the site.

There are also signs at the Eugene Pioneer Cemetery. At the entrances, signs indicate rules for cemetery use and hours. The signs say no smoking, but the cemetery is a very popular place for people to go smoke, possibly because it is not allowed on the University property (See Appendix C-Community Use Observations). Another large sign in the middle of the cemetery provides some history of the site, and the location of important features, such as the G.A.R. plot.

BRIDGING SOCIOCULTURAL AND BIOPHYSICAL CONDITIONS: A MANAGEMENT PLAN

Biophysical interventions are successfully made over time, as individuals join and leave community efforts, through a management plan. In the case of Eugene Masonic Cemetery and Pioneer Cemeteries, this was accomplished by creating

collaborative management plans with clear goals and strategies to meet those goals. This is another important aspect of the success of the project to adapt Eugene Masonic Cemetery. Each zone in the management plan has specific management goals for higher levels of ecosystem function. For example the “wet zone” management goals listed are:

- *maintain open and seasonal quality of wetland
- *maintain water source for wetlands
- *create contiguous wetland by connecting existing patches
- *increase grass and wildflower populations typical to southern Willamette Valley wet prairie
- *provide habitat for insects, birds, reptiles, and other wildlife
- *create a riparian zone along the ditch to the west of Hope Abby

For each one of these management goals, specific and detailed strategies to achieve them are listed in the management plan. For instance, to achieve the goal to “maintain open and seasonal quality of wetland,” the management plan states the following strategies:

1. Annual mowing in fall is recommended as an alternative to annual burning. Burning could pose to great a fire risk to the residential neighborhood.
2. All tree and shrub seedlings should be pulled with the exception of oaks that may grow to replace older existing ones.

Figure 18 shows the “wet zone” management area at Eugene Masonic Cemetery with the native Camas in bloom.

Though I found that Eugene Pioneer Cemetery has a management plan (they call it a preservation plan) I was unable to attain a copy to study. Some goals from this plan include clearing low hanging branches and shrubs for improved visibility, repairing or replacing damaged markers, and controlling certain invasive species such as

Himalayan blackberry, vinca, and holly saplings.

COMMUNITY AND EXPERT COLLABORATION

One reason the work was possible at Eugene Masonic Cemetery was that local landscape architects, ecologists, and botanists were involved in the project from the beginning. Gathering this quantity of specialized information about the Eugene Masonic Cemetery site would have been impossible without the help of experts in ecology and native plants. The more individuals that can be gathered to collaborate on site assessment and development of management plans, the more thorough and robust the management plan will be. Including many knowledgeable and passionate individuals will inevitably cause differences of opinion, which happened during the development of the Eugene Masonic Cemetery management plan. These differences of opinion

can foster a lively exchange of ideas, and bring up issues previously unconsidered, making management plans more robust and better suited to meet a community's goals.



Figure 19: The “Wet Zone” Management Area at Eugene Masonic Cemetery



A Framework

For Establishing Native Plant Communities in Formerly Rural, Now Urban Cemeteries

Part One-
Collaborative Evaluation of
Sociocultural and Biophysical Conditions

Part Two-
Determining Desired Future Conditions

Part Three-
Collaborative Creation of Management Plan





This framework is composed of three parts, 1) research and evaluate past and present sociocultural and the biophysical conditions, 2) determine desired future conditions, and 3) create a management plan. Figure 15 illustrates the general structure of the framework. The framework first requires assessing the past and present sociocultural and biophysical conditions, because before decisions can be made about what interventions would benefit the site and its users, the present conditions must be known. The application of the framework requires first achieving a sociocultural condition which can support the desired biophysical condition, and then determining the desired future conditions, before steps are made to improve the biophysical conditions.

4.1 PART ONE COLLABORATIVE EVALUATION OF SOCIOCULTURAL AND BIOPHYSICAL CONDITIONS

Much of this information requires specific skills or training to obtain. This may be an opportunity to begin the community collaboration process, as interested stakeholders might need to contact planners, botanists, historians, and other specialists to accurately assess, and plan to modify, the conditions on site.

EVALUATE THE SOCIOCULTURAL CONDITIONS OF THE SITE OWNERSHIP

Who, or what organization, owns the site itself is an important factor for several reasons. Other sociocultural conditions, such as access, directly depend on the owner or owners of the site. If a site is to be opened to the public, permission and support is usually required from the property owner. If a cemetery is privately owned, in most states, the only people who have a legal right to access the cemetery are the descendants of

those buried there. The laws regarding cemetery access and ownership vary widely from state to state. Knowing the local laws pertaining to cemetery ownership and disinterment may be required in cases where ownership of the site is unknown or subject to change.

The lack of legal support for pursuing municipal ownership of abandoned cemeteries may be a major obstacle to transitioning them to park status open spaces, however, if the cemeteries remain privately owned, and are made safe for human occupation, they can be opened to the public. This is another task that can be aided by the formation of an NPO, which would protect the property owner from personal liability should someone fall to harm in the cemetery. Owner liability may be a major obstacle in a community pursuing opening a privately owned cemetery to the public. A NPO can be formed for management and fund raising while retaining private ownership if that is desired, or the NPO can obtain ownership rights of the site itself if that is desired by current land-owners. The key to protecting these spaces may be not allowing them to fall into disrepair in the first place, because in this condition, in many states, municipalities are legally permitted to acquire the property and remove the cemetery (ORS 27, 2014).

Who owns the cemetery?

Some formerly rural, urban cemeteries are publicly owned, many others are owned by NPOs, as is the case at Eugene Masonic Cemetery and Pioneer Cemeteries, or collectively by family plot holders. In some cases, especially with formerly rural, urban cemeteries, which for all purposes have been abandoned by individual plot holding families, ownership may be difficult to determine. Though these plots are often long forgotten by the descendants of the interred, due diligence should be made when attempting to determine ownership and in contacting potential

plot holders and descendants of the deceased.

Ownership must be established or obtained before work can begin. In some cases, no one will make a claim of ownership of the cemetery or individual plots, and the city the site is located in may be legally permitted to acquire the property. (ORS 27, 2014).

Once ownership of the cemetery is determined, the individual, individuals, or association with ownership of the space must be contacted and interest in a project to adapt the site for increases ecosystem and passive recreation function must be determined. All involved parties must desire this type of adaption and be committed to the success of the project for it to succeed. Reaching an understanding of the level of support for a project will likely require meetings with the owners, management, and interested public. For owners and managers to commit to a renovation project, they often require confidence that the project will receive financial and volunteer support from the community and local governments.

PROJECT SUPPORT

Is the cemetery open to the public? If not, are the owners of the site interested in opening the site to the public?

If the cemetery is not already open to the public, determining whether the site's owners want it to be opened to the public is a first step in evaluating whether or not interventions to increase ecosystem and passive recreation functions are appropriate for the site.

If a site owner is not initially interested in opening the site to the public, there is a possibility they may be persuaded by clarifying information about any legal issues, and by providing the owners with certain forms of liability protection. If a cemetery owner does not want the public in the cemetery because of a fear of personal or organizational liability, in the case that someone

would come to harm in the space, a non-profit organization or limited liability corporation can be formed to protect the owners.

The owners may also have substantial tax benefits and reduction of costs and liability if they support the formation of a non-profit cemetery association and simply donate or sell the cemetery site to such a managing organization. There are also cases of land ownership being retained, while an organization such as an NPO forms and takes on the responsibilities of funding, use, and management of the site.

Are the owners interested in increasing passive recreation function?

Another important step in evaluating whether or not adaptive interventions are appropriate is to determine if the site's owner or owners want the management goals to be adapted to include interventions that would increase passive recreation functions. Some cemetery owners, whether they are individuals or associations, may see increased passive recreation function as in conflict with existing management goals. For instance, if a site is severely eroding, and efforts to stabilize eroding areas are seen as undermining a goal of historic preservation, management may have the goal of decreasing use of the site until historic preservation and archeology specialists can aid in solving the problem. Inquiring about existing management goals is essential to understanding the potential for increased passive recreation and ecosystem functions.

Are owners interested in increasing ecosystem functions?

Again, in some situations it may be determined that increasing ecosystem function may not support other management goals, or could be harmful to the cemetery owners goals overall. For instance, the management at Eugene Pioneer Cemetery do not support the establishment of a native shrub layer, because it contradicts the es-

FRAMEWORK PROCESS DIAGRAM

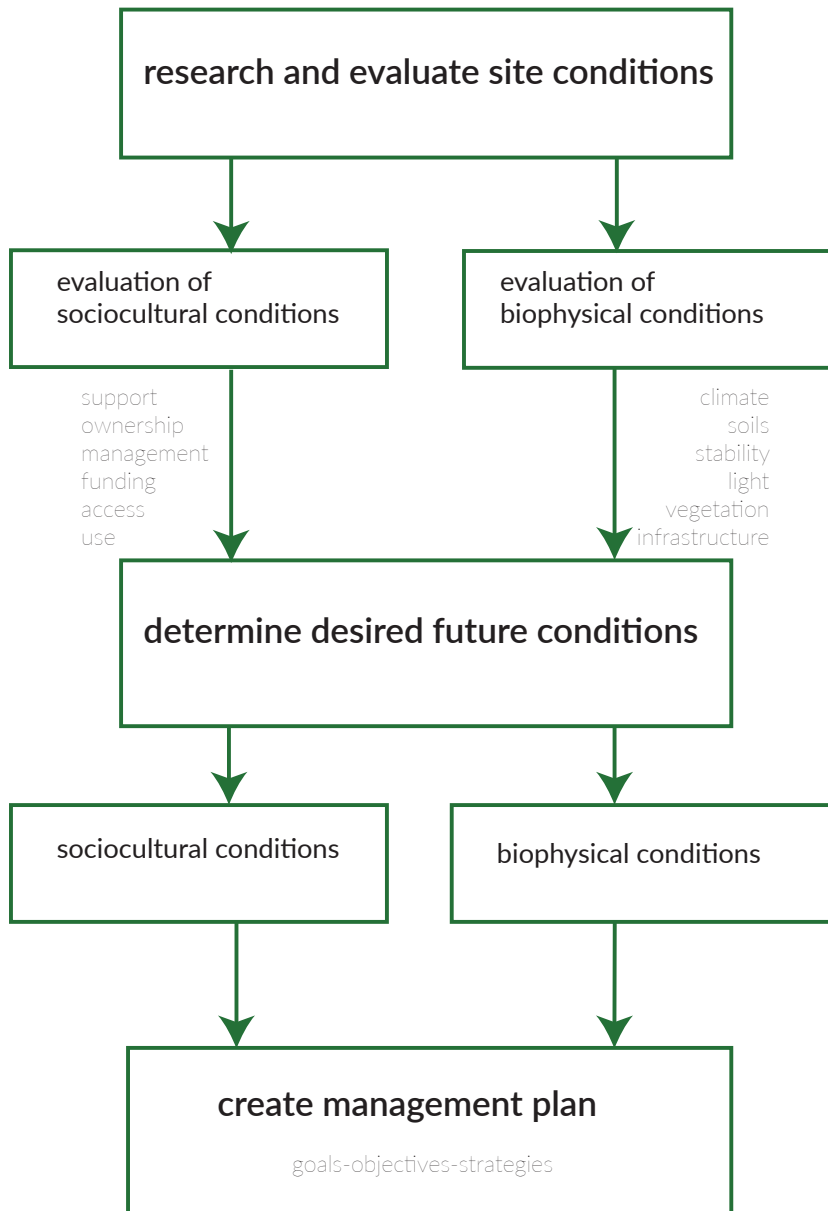


Figure 20: Framework Process Diagram

established management goal of clearing all of the site's sight lines for safety reasons. Determining whether there is interest in using increased ecosystem function to support passive recreation function is a vital step in this process because if the support isn't there, the project cannot successfully move forward.

Is the surrounding community interested in using the cemetery for passive recreation?

For a project to increase ecosystem and passive recreation functions in a formerly rural, now urban cemetery, there must be an interested user group willing to passively recreate at the site, and to begin to spend time caring for the site. Reasons for a lack of interested users may be an abundance of high quality open space nearby, where community users already satisfy their passive recreation and volunteering needs, a community culture of fear or dislike of cemeteries, a cultural perception of danger in the cemetery site, or a community culture which generally doesn't place a high value on outdoor, passive recreation.

In some regions and cities, air quality or several other environmental factors may cause many people to recreate and exercise indoors. The attitudes and values of a community, and how those values relate to interest in using formerly rural, now urban cemeteries for passive recreation, must be known before any desired future conditions can be determined. The best way to determine the cultural attitudes of a community is to ask. Setting up meetings for community members to come and discuss their needs and values is a good way to do this. Interviews, surveys, and social media are also powerful tools for gaging support for a project within a community.

MANAGEMENT

Is the cemetery managed by a NPO?

If the space is managed by a non-profit organization, they also must be included in all stages of planning, beginning with determining and fostering an interest in the project. In this situation, a proposal for the project would be drafted and voted on by the members of the board of the non-profit. If there is not a NPO in place to care for the cemetery, it may be beneficial to establish one, with the support and assistance of the property owners and local community. A brief guide to forming a NPO is included in Appendix D.

Is there a public/private partnership in place?

If the cemetery is or could be open to the public, there may be the opportunity to forge a partnership with the managing organization and the city in which the cemetery is located. If the cemetery can serve as a public open-space and ecosystem infrastructure, funding and other support may be available through the city parks budget. For a rehabilitation project such as this to be successful, as many resourceful stakeholders as possible should be brought to the table.

Is there a management plan in place?

Determining how the space is currently managed and what goals for management are being pursued will inform what changes need to be made to effectively establish and maintain native plant communities on the site. Once interest and support are determined, and organizations are formed to support the project, a management plan must be produced. A management plan should include specific information about where work is to begin, what actions will be taken, and clear and measurable goals and objectives. Management plans should be produced in co-operation with local experts on native plant culture and historic preservation.

FUNDING

How is care funded?

This type of project requires perpetual funding for care, like any city park. One of the benefits of securing public/private partnerships, forming non-profit organizations, and involving adjacent community members is to help secure this support. Funding can come from city budgets, grants written by NPO staff, and donations and fundraising provided by the community. These individuals and organizations can also coordinate volunteer efforts, causing lower overall funding requirements.

Is there a user group interested in providing financial or volunteer support for expanding human and ecosystem uses of the space?

The success of a project to re-structure a cemetery to support multiple uses, including ecosystem function and passive recreation, requires the cooperation and support of the land owners, the local government, local native plants and historic preservation enthusiasts, and the community users. Strong local interest and involvement is necessary to perpetuate the care of formerly rural cemeteries with robust native plant communities. More labor is often required to remove invasive species and re-establish native ones than is typical for parks with a mowing based maintenance regime. Establishing this type of support may require outreach efforts and education.

ACCESS

Is the site open to the public?

The ability of a cemetery to be used by the public is an initial requirement of this type of renovation project. If the space is not open to the public, it must be able to be opened to the public in the future. If the space is condemned, factors leading to its condemnation must be addressed, and the space must be made safe for human use.

USES

How is it used by the public?

If the space is currently open to the public, it must be determined how the space is being used to plan for expanding and enhancing the diversity of socially acceptable human uses, while becoming aware of possible anti-social human uses. Interviews can determine how the space is being used, along with observations of the users themselves and site traces. An example of a simple observational study to gather information on community use is included in Appendix C.

What are the rules and hours for public use?

When the space is open for use by the public, acceptable uses should be established and unacceptable uses should be discouraged. Uses deemed destructive by the managing organizations can be discouraged with polite signs, community monitoring and accountability, and frequent use. Techniques for this can be outlined in the management plan. Acceptable uses should impose minimally on historic and ecosystem resources, thus protecting the multiple use infrastructure.

Are there barriers to public use?

Access and circulation infrastructure should be repaired and maintained to allow use without damage to historical and ecosystem resources. Passive recreation infrastructure such as seating, informational signs, and trails should be decided on and included in the management plan.

EVALUATE THE BIOPHYSICAL CHARACTERISTICS OF THE SITE

Once interest and support is established and organized, a management plan must be developed, or existing plans modified to reflect new goals. Depending on the current and desired conditions of the site, the management plan may focus on native trees, shrubs, and/or forbs. This framework uses knowledge of the current and desired conditions of the native shrub layer, but it could be adapted to apply to native trees and forbs.

Knowledge of native shrubs in the region, and possibly the site, can be obtained through research and interviews with local experts.

CLIMATE

Before any decisions are made about desired future conditions for a site, information must be gathered about what can reasonably grow in a region and in a specific area. The broadest constraint on what plants can thrive with minimal maintenance on a site is the climate of the region.

The lowest winter temperatures in an area in the United States determines its USDA hardiness zone, but this classification fails to account for summer high temperatures, precipitation, elevation, or distance from the ocean, all of which can affect the ability of plant species to thrive. A zone system that takes these important factors into account is the Sunset zone system, but it only covers the Western United States. The Sunset zone system may be sufficient to ascertain the climate in areas of the Western United States, but anywhere else the individual climate metrics of the high and low temperatures in a region, and in what season they occur, regional precipitation by season, elevation, distance from the ocean, and climate change projections will need to be obtained and compared to the needs of individual plant communities.

In most cases, the native plant communities of a region will comfortably thrive in the climate of that region. However, if significant investment is to be made in establishing native plants on a site, managers should be as confident as possible that the chosen plants will be able to thrive with minimal maintenance once established. Some key questions to answer when investigating a regional climate are:

What are the yearly winter low temperatures and summer high temperatures?

What are annual precipitation rates?

What time of year does the majority of precipitation occur and in what form?

How far is the site from the ocean?

What is the elevation above sea level of the site?

What are the regional climate change projections for the area?

SOLAR ASPECT AND LIGHT

What are the solar aspects on site?

The aspect of slopes on site help determine the micro-climates and what native plant communities are appropriate for any location. The aspect determines the amount of light available to plants and affects the soil moisture levels in different seasons. Aspect partially determines how much sunlight is available, but existing on-site vegetation and adjacent architecture may also contribute to shading a site.

If the site is sunny or shady, and what degree and intensity of sunlight a site receives, is essential to determining what plants can thrive in any given cemetery. This includes a knowledge of the solar aspect and topography of the site, and also the shade created by structures and existing vegetation. The amount of sunlight available directly determines what native plant communities can thrive in a given area. If the site is shaded by

tall trees and buildings, or has area on the north side of a steep slope (in the northern hemisphere), the plant associations should be chosen partially for shade tolerance. If the site receives full sun all day, and has a southern facing slope, the plant associations chosen will need to thrive in full sun. The solar aspect also effects the levels of soil moisture, as a south facing slope in the blazing sun will usually dry much faster than a north facing slope with similar soil composition.

SOILS AND STABILITY

The type of soils present on site has a significant affect on what plant communities will thrive there. The soil composition determines the ability of a soil to drain freely, which determines which plants will tolerate the conditions. The soil composition also determines and indicates the quantity of nutrients available to plants, and whether or not amendments will be required to establish the desired native plant communities.

Information about soil types and composition can be obtained in the United States through the United States Department of Agriculture Soil Survey. This resource may or may not provide meaningful information on any given site, as many urban sites which have undergone extensive excavation are described as soil complexes composed of urban fill. On site soil testing may be required. The soil composition information can be acquired by digging a test pit or by using the core cutting method. The chemistry of soils can be tested by taking samples and sending them to a soil laboratory.

What is the soil composition?

Information about soil compositions of a site allows managers to make choices about what native plant communities can reasonably be expected to survive with minimum maintenance inputs.

Is the site stable or eroding? Where is erosion occurring?

The stability of the slopes and soils of a site are important prerequisites to establishing robust native plant communities which can self-propagate and self-select. If serious erosion is occurring, it may be a serious hindrance to establishing plantings.

VEGETATION

What is the current plant community composition and structure?

Understanding the plant communities on site is essential to knowing how to achieve the desired future conditions. Local botanists and native plant groups should be asked to participate, as volunteers or funded by grants. Plant inventories should be made, as this will allow managers, in the future, to determine whether or not management plan goals about plant biodiversity have been met.

What native plant communities are appropriate for the site?

If native shrubs and other plants are found on site, they should be retained and protected. The presence of these species can indicate what plants the conditions support, and possible ecosystem relationships already in place. Beyond what may exist on site, decisions about what plants are desirable for the site should come from research into local native plant communities and their cultural requirements.

Are there invasive exotic species which may out-compete native plantings?

The presence of aggressive, invasive species should be noted, and steps for the removal of such plants should be established and outlined in the management plan. If the invasive species is also an important heirloom species, the decision to retain some specimens may be made

by the board, owners, or other parties. If this is the case, a plan for controlling the spread of the plant should be determined. Methods for controlling unwanted plants should not threaten cultural or natural resources. Specifically, burning and careless mowing can damage headstones and aren't appropriate maintenance regimes for old cemeteries.

Knowing what invasive species are present on site and how each invasive species present is best controlled is also essential to the creation of an effective management plan.

Are there cemetery heirloom species on site?

Determine which heirloom species are present on the site, and which can co-exist with native plant communities. Determine which species are to be retained, and which are to be controlled and how. Some invasive heirloom species are culturally important, such as the English Holly planted in triangular formations in the Eugene Masonic Cemetery. This particular planting represents the Freemasons, and the management plan allows them because of their cultural importance.

Is there a distinct shrub layer on site? Are there trees? Forbs and grasses? Are they native, naturalized, or invasive?

Understanding the current conditions of the vegetation on site is necessary before informed management decisions can be made. If native plant communities and ecosystem functions are present, they should be protected, and their presence should inform choices about what types of plant communities are appropriate for the conditions. On the other hand, if desirable plant communities or structural layers are conspicuously missing, this may also help determine the desired future conditions. If there aren't any trees, or if the shrub layer is obviously missing, these may be desirable additions. These decisions depend on the native plant associations and

trophic relationships of the region, space and other site constraints, and the desires of management and community users.

PASSIVE RECREATION INFRASTRUCTURE

Certain infrastructure should be in place to encourage passive recreation uses and to protect the site against the wear and tear of daily use.

Are the entry points of the cemetery clearly marked?

Are cemetery rules and hours clearly listed?

Encouraging passive recreation uses starts with informing people that this is a function of the space, and that it is open to the public. Signs indicating rules and hours for use is one way to do this.

Are elements of the cemetery in need of interpretation and educational signs?

Signs can also inform and educate the public about natural and historic resources, creating richer passive recreation experiences.

Are the existing paths adequate for current and future uses?

Paths are the primary passive recreation infrastructure. They should be robust enough to protect the cultural and natural resources of the site, and extensive enough to allow users to explore the site without leaving the paths. If desired uses include biking, the path structure will be different than if only foot traffic is to be encouraged.

How can existing paths be reinforced without harming natural and historic resources?

In cemeteries, the creation of new path systems may prove difficult because of the existing features of the site. Paths and roads that exist on site should be retrofitted where possible, and evaluated to determine if these will provide adequate circulation infrastructure.

Is there any seating, such as benches or picnic tables?

Providing seating can encourage passive recreation, especially for populations who need rest regularly and have a hard time sitting on the ground, or getting up from it. Picnic tables are a nice addition so users can have a meal, use a computer, or engage in other activities which require a table.

4.2 PART TWO DETERMINING DESIRED FUTURE CONDITIONS

If interest exists, the next step is to determine what future conditions will achieve these goals and are desirable to the community. As soon as the process of evaluating the sociocultural and biophysical factors affecting a site is reasonably accomplished, the desired future conditions of the site must be determined.

Many factors may influence what conditions are desirable in different formerly rural, urban cemeteries. Board members, community users, owners, and local experts in law, historic preservation, planning, and ecology should be gathered, the information learned in the evaluation portion of this framework should be presented, and as many individuals as possible should be invited to discuss and decide on possible trajectories. There are many factors to consider when determining the desired future conditions of a formerly rural, urban cemetery, and the more experts, community members, and stakeholders that are involved in the process of determining the desired future conditions, the more robust the consideration of each of these factors will be. Local specialists in native ecology, plants, historic preservation, and landscape architecture should be invited to participate in every step of this process whenever possible.

A crucial aspect of this process is determin-

ing an effective way to communicate with the community, experts, users, and possible volunteers. Making sure that all interested individuals are aware of meeting times and places will allow them the opportunity to participate. Local newspapers, radio, television, fliers posted at the cemetery site, social media announcements, and announcements at community meetings are some techniques to inform the public of meeting times and locations.

These postings and advertisements may include an invitation to volunteers with special expertise that applies to the specific cemetery in question. Through the course of the evaluation, specific and individual site issues will surface, and experts could prove crucial to solving these problems. For instance, there may be derelict historic architecture on the site, as was the case at Eugene Masonic Cemetery, and it may require the energy of a historic preservation specialist. There may be rare native flowers on the site, which would benefit from a botanical inventory, or the site may have such severe erosion problems that a landscape architect or engineer would be required to envision and design erosion control measures such as retaining walls, improved paths, or vegetative slope stabilization.

Once decisions have been made about what the community users want and need from the space, and how these goals can be accomplished through interventions, a management plan should be developed, or standing management plans should be amended to include new practices related to establishing the desired native plant communities and encouraging the desired passive recreation functions.

SOCIOCULTURAL CONDITIONS

Sociocultural conditions can be more difficult to manipulate than biophysical characteristics, but desired future sociocultural conditions should still be determined and these conditions can be fostered. Community outreach and communications can create more interest in and support of the project.

COMMUNITY SUPPORT

Is more community support needed for labor, funding, or use?

Does the community know about the cemetery?

Does the community know about possible adaptation projects at the cemetery?

OWNERSHIP

If the cemetery is privately owned by an individual, is it a beneficial property for them? Do they want to retain ownership?

Is the cemetery owned by a non-profit organization?

MANAGEMENT

Is the cemetery owned and managed by the same organization or individuals?

Are management decisions made by an individual or group of individuals?

Is the present management effective?

FUNDING

Is the present funding adequate?

What are possible revenue streams for management of the site?

Are donations made to the cemetery association, if one exists?

Can funded efforts be replaced with volunteer

and donation contributions?

ACCESS

Is the present site access adequate?

USE

Are present uses of the site desirable?

Are there uses that need to be discouraged?

Are there possible uses of the space that aren't being realized?

Is more or adapted infrastructure needed to reach the full potential for passive recreation uses?

BIOPHYSICAL CONDITIONS

The biophysical conditions this framework suggests manipulating are primarily the vegetation communities, and secondarily, the passive recreation infrastructure. Several questions in the biophysical evaluation portion of this framework are included because those factors directly affect the conditions which can reasonably be manipulated, and not because those factors themselves could or should be manipulated.

Many aspects of the biophysical conditions of a site are outside of human control, and cannot be created or changed on a site scale. Others can certainly be controlled, but at a high resource cost which would negate many of the benefits of establishing native plant associations. Some of the biophysical factors managers will have to accommodate when determining the desired future conditions are the regional climate, the solar aspects and slopes of the site, soil composition, and existing native plant communities and ecosystem services.

Managers certainly could intervene to increase the amount of water available or to improve the soil composition, but these are often high-energy resource inputs, and would likely require

more funding and labor than is affordable for a cemetery association or private cemetery owner. Changing the biophysical conditions to this extent is often costly, time consuming, and likely unnecessary for hardy native plant associations. The more manageable and economical the chosen interventions are, the more likely they are to succeed and endure.

VEGETATION

What are the desired plants, plant associations, and ecosystem functions of the site?

To determine what plant associations should be established or encouraged to achieve the desired future conditions, managers, volunteer experts, and community members should investigate the native plant associations of the region, the biophysical requirements of these plant associations, and some of the trophic relationships of those plant communities.

What were the likely plant associations on the site before urban development?

By understanding what plant associations were present before urban development, determinations can be made about what types of plants are native to the site. This allows cemetery managers to choose plants and plant associations which will require minimum inputs once established, and which can support the habitat needs of native wildlife.

What habitats are threatened in the area?

Understanding what habitat types have been lost or reduced in an area can inform managers about what types of habitats and plant associations are needed to support local, native wildlife which may be in decline due to habitat loss. In some cases, it may be more beneficial to wildlife and human users to create plant associations which were not originally present on the site, but that still support ecosystem and passive recreation functions.

What local creatures or plants captivate the community imagination?

One option for deciding desired future conditions of a site is to begin with a specific species of invertebrate, bird, or mammal which has suffered habitat loss in the area, possibly a species with declining population numbers, and learn what its specific habitat needs are. Determine if the habitat of this creature is suitable to establish on site, given the biophysical conditions in the cemetery. If it is, it may be decided that a desired future condition of the site is the presence of the creature's habitat, or even the presence of the creature itself. The mere possibility of some species of wildlife and plants, especially those known to be declining in population, can lead to expanded community interest and support.

It may be beneficial to select well-loved species, as it might inspire people to donate time, money or other resources if they're personally invested in the success of a project because it can help their favorite beautiful butterfly or the cutest fuzzy mammal. Cuteness or beauty are common attributes of these celebrity species. They are usually the butterflies and birds, rather than the mayflies, beetles, or spiders. Choosing species that are very popular, familiar, and suffering from loss of habitat in the area may also increase passive recreation function by attracting people hoping to see, hear, and photograph the beloved creatures. The desired future condition of the presence of a celebrity species, or at least their native habitat, will likely also provide interpretive and educational opportunities to reinforce increased passive recreation function.

What types of plant and animal associations can reasonably be accommodated on the site?

Understanding the contemporary conditions of a site allows informed decisions to be made about what habitats can reasonably be accommodated in the cemetery. For instance, a site with hydric soils would support different native plant

communities than a site with well-drained soils. A very small cemetery may only support one habitat type, while a very large one may be able to support several. Also, soils and solar aspects determine what types of plant communities will exist in a given area with minimum maintenance requirements. Understanding the cultural requirements of the native plant communities of the region, and the conditions in any given area, are essential to determine the appropriate native plant communities in a site.

Some species and habitats aren't suited for urban conditions. Many creatures with declining populations and many suffering from habitat loss have habitat needs that cannot be accommodated in an urban environment, or cannot be accommodated in the space available at a specific cemetery site. Understanding how much of a certain type of habitat is required for a species, and whether the species uses the habitat for food, nesting, hiding, or other needs, is essential when determining whether or not it is appropriate to include in a list of desired future conditions. The desired future conditions, as well as the goals and objectives outlined in the management plan, should be possible to achieve considering the information gathered about the sociocultural and biophysical conditions of the site in the process of evaluation. Chose habitat types and target species that are likely to do well in the conditions as they are, without a high degree of maintenance.

Once desired future conditions are agreed on, specific goals about the presence of native plant communities, target species, and changes in passive recreation infrastructure should be written. The goals for the adaption of a formerly rural, urban cemetery to increase ecosystem and passive recreation functions form the foundation of the management plan.

PASSIVE RECREATION INFRASTRUCTURE

What passive recreation infrastructure is important, but missing?

How are the uses of the site being supported by the infrastructure or not?

Are there areas where passive recreation users are damaging the cemetery? If so, what infrastructure changes might protect cultural and natural resources?

Is there anything the users need to know, but isn't clearly posted? Is there important history or ecology features that should be pointed out? Do users know the hours and rules for public use?

4.3 PART THREE COLLABORATIVE CREATION OF A MANAGEMENT PLAN

The key to bridging the sociocultural and biophysical conditions, and transforming the current conditions into the desired future conditions, is the formation and execution of a collaborative management plan. Once the sociocultural and biophysical conditions are adequately evaluated and understood, and the desired future conditions agreed to, a plan must be created to achieve the desired future conditions.

The management plan should include the specific goals decided on in the process of determining the desired future conditions. For every cemetery, these goals will be different, but they can be accomplished in the same way, by outlining clear objectives and strategies to meet these goals, and following them as closely as possible.

The goals are essentially the desired future conditions for the cemetery site. (An example is to have a robust native shrub layer present on the site.) The objectives are specific and measurable indicators that the goals are or are not being met. (An example is to have six different species of native shrubs, and at least three individuals of each species present within five years of man-

agement.) The strategies are what, exactly, must be done to reach the objectives. (An example is to plant one shrub of each of the target species, in the appropriate management zone, every April, for the next four years, and provide water weekly for the first year, bi-weekly for the second year, and monthly for the third year.)

Each micro-climate on the site should become its own management zone, with individual goals, objectives, and strategies. Each of these zones should have comprehensive lists in the management plan specifying what individual plants should be planted, protected, or removed to reach the desired future conditions. Some native plants will require innovative strategies to establish because many desirable native plants cannot be purchased at nurseries. This may include seed collection and propagation as a strategy. Some plants may be omitted from the management plan because of difficulty finding, establishing, or maintaining a specific plant species.

Understanding how to make the goals of the management plan a reality will take experts and/or research into maintenance and management practices for the specific plant communities desired on site. The objectives and strategies used to create or maintain a wet prairie are very different from those used to create and maintain a dry fir forest.

Throughout the course of work, I found that no specific operational elements are transferable to every case of a formerly rural, now urban cemetery with a potential for increased ecosystem and passive recreation functions. Every site has a unique combination of sociocultural and biophysical conditions, that to discover truly transferable elements, one has to analyze the processes performed at a high level of abstraction. The processes of evaluation of existing sociocultural and biophysical conditions, determining desired future conditions, and the collaborative creation of a management plan to bridge the sociocul-

tural and biophysical conditions, as well as the existing and desired conditions, are the basis of the transferable framework included in this document.



Conclusions

The transferable framework presented in the preceding chapter is the result of the specific inquiries of this master's project and the methods used, which presented unexpected findings in regards to the most important elements in adaptation of formerly rural, now urban cemeteries for increased ecological and passive recreation function.

Conclusions and final thoughts on the project follow, with a brief description of the limitations of this research and topics for further study.





RESEARCH GOALS AND QUESTIONS

The primary goal of this research is to document the sociocultural and biophysical conditions needed to effectively adapt formerly rural, urban cemeteries into more multi-functional urban open spaces, and to determine which of these conditions can be manipulated and are transferable to other formerly rural, urban cemeteries with potential for increased ecosystem and passive recreation function.

The primary research questions which this project answers are:

- 1) How did masonic cemetery association successful adapt a formerly rural, now urban cemetery to accommodate more ecological and passive recreation function?
- 2) What aspects of this success are reproducible or transferable at other formerly rural, now urban cemeteries?

Though these goals are met, and the questions answered, many of the findings were not expected. Many specific actions were taken to adapt Eugene Masonic Cemetery for more ecosystem and passive recreation function, and these actions are documented in the findings chapter of this document, but these actions are not the elements that comprise the transferable framework.

This work has shown that any formerly rural, now urban cemetery has a complex system of sociocultural conditions which directly affect the desirability and feasibility of creating a plan for interventions to adapt it to a higher level of ecosystem and passive recreation functions. Before any prudent biophysical interventions can be made, first certain sociocultural conditions must exist, such as community and owner support for, and interest in, the project, and potential for public access to the site.

Through the course of the guided interviews, case-study, and document analysis, I found that the most important factor to the success of a project to adapt any formerly rural, now urban cemetery is a careful evaluation and consideration of the unique combination of sociocultural and biophysical conditions of the individual site. These factors, when evaluated, may indicate that adaptive interventions are not appropriate for a specific site, are too costly, or that there isn't enough community interest to sustain such a project.

Contrary to my initial expectations, I have learned that because of the importance of community support, the inclusion of a robust native shrub layer is not an aspect of the success of Eugene Masonic Cemetery that can be transferred to Eugene Pioneer Cemetery. This is because such a change is not supported by the Eugene Pioneer Cemetery Association or the community who uses the cemetery.

I came to this conclusion through responses to the interview question "Would you support establishing a robust native shrub layer in Eugene Pioneer Cemetery? Why or Why not?" Only two respondents think that a native shrub layer is an appropriate intervention in Eugene Pioneer Cemetery, the two with the most adamant support of the use of native shrubs in almost any situation, and both affiliated with the Eugene Masonic Cemetery. One of these two respondents said, "Indian plum should be planted everywhere"(Interview #2, 2016). Other than these two native shrub lovers, there was no support from users or management to establish a native shrub layer in the Eugene Pioneer Cemetery.

Though I set out to determine what conditions and practices can be universally applied to establish and maintain native plant communities in formerly rural, now urban cemeteries, I found that no specific goals, interventions, or practices were universally appropriate or desirable. With

the goal of creating a transferable framework for increasing ecosystem function and passive recreation opportunities in these sites, the work of this project and the content of the framework shifted, based on the key findings, to creating a transferable framework for evaluation of sociocultural and biophysical conditions, determination of desired future conditions, and the collaborative formation of a management plan with clear goals and objectives to achieve the desired future conditions.

The significance of this master's project and the reasons for exploring this topic are succinctly explained by Ken Warpole in a briefing for a British publication called *Cabe Space*,

“Urban burial grounds in the 19th century were originally envisaged as public open spaces, and were professionally designed to be attractive places to visit in their own right. Today, many cemeteries are neglected, with little to attract anyone apart from those visiting specific burial plots. This lack of design, planning and ambition means that the potential health and environmental benefits of cemeteries are not being realized” (Warpole, 2007).

Though establishing a native shrub layer is not necessarily a transferable aspect of Eugene Masonic Cemetery's success, the framework proposed here is transferable, and it allows the Eugene Pioneer Cemetery to choose if introduction of native plant communities, and which ones, are appropriate and align with existing management goals. They may support native forbs or native under-story trees, for example.

To begin the process of adapting a formerly rural, urban cemetery to support more ecosystem and passive recreation function, I argue that the first step is performing a thorough evaluation of the sociocultural and biophysical conditions affecting the individual site, followed by a determination of the desired future conditions, and lastly, the collaborative creation of a man-

agement plan. I found that the creation and use of a management plan is how people and groups can successfully bridge the sociocultural and biophysical conditions of a site, as well as find the most efficient way to move from the present conditions to the desired future conditions of a formerly rural, now urban, cemetery.

RESEARCH LIMITATIONS

The methods of this project only allowed the consideration of the two case-study sites discussed. Though common features exist in most formerly rural, now urban cemeteries, two examples cannot possibly represent all or even most sites like this. No abandoned urban cemeteries were examined, nor any which aren't already open to public use, though these possible conditions are addressed in the proposed framework

The proximity of the two case study sites allowed a more robust comparison because they share a regional climate, state laws, and city-wide culture, but this factor also limited the comparisons and lessons learned to exclude sites which fit the definition of formerly rural, now urban cemeteries, but have vastly different natural and cultural resources. The proposed transferable framework is not regionally specific, but the sites and organizations analyzed to form the framework are.

The information gathered in this master's project about the Eugene Masonic Cemetery and its association is much more thorough and complete than the information about the Eugene Pioneer Cemetery and its association. Less interview participants were found for Pioneer Cemetery, and the management plan for this site wasn't available for study. The method of this project allowed some of this information to be obtained through publications such as newsletters and newspaper articles, but not in the level of detail the information about Eugene Masonic Cemetery was obtained.

FURTHER RESEARCH NEEDED

Several researchers cited in the literature review link ecosystem functions, education about those functions through interpretation, and increased passive recreation in public open-space. A study inquiring about these possible connections should be conducted, because the correlation between increased ecological function and increased passive recreation is largely anecdotal and relies heavily on places where increased ecological function occurred simultaneously with improvements to access and passive recreation infrastructure. The Eugene Masonic Cemetery, for example, began improving the passive recreation infrastructure and the native plant communities simultaneously, and use did increase after these changes, but it is impossible to attribute this increase to improved ecosystem functions.

There is information available about how burial practices might cause damage to ecological function and human health, in regards to the effects of embalming chemicals and other possibly harmful substances as they dissipate into soil and join trophic systems. Further research is needed to understand how plant and fungal organisms are effected by this pollution and how it may be contained or re-mediated.



Resources

References

Definitions of Key Terms

Appendices:

A- Guided Interview Questions

B- Interviews and Participants

C- Observational Study of Use

D- Forming a Non-Profit

E- Bruce Newhouse's Plant Inventory

F- Regional Climate Data



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IMAGE SOURCES

Cover Image-Abandoned Mount Moriah Cemetery, Philadelphia, PA: © Tom Kirsch, <http://opacity.us>

Figure 1: Next City Cartoon, Historic Cemetery Restoration In Austin, Tx. Lukas, Alex. “Designing for the Dead: The Perfect City Cemetery, How Austin is mixing historic preservation and visionary planning to create an ideal urban resting place.” Next City. 2015. <https://nextcity.org>

Figure 2: Painting Of Mount Auburn Cemetery by Thomas Chambers. https://upload.wikimedia.org/wikipedia/commons/2/25/Thomas_Chambers_-_Mount_Auburn_Cemetery.jpg

Figure 3: Picture Of Memorial Day Color Guard At Eugene Pioneer Cemetery. Paul Carte. <http://registerguard.com/rg/news/local/31637819-75/celebration-cemetery-eugene-memorial-pioneer.html.csp#>

Figure 4: 1930- View Looking South To Pioneer And Masonic Cemeteries. [1930 photograph], Eugene Print Photograph Collection, PH213-[PH213_009], Special Collections and University Archives, University of Oregon, Eugene, Oregon 97403-1299.

Figure 5: A Flowchart To Define Formerly Rural, Urban Cemeteries- Author

Figure 6: Delphinium In Bloom At Eugene Masonic Cemetery. https://www.facebook.com/search/photos/?q=Eugene%20Masonic%20Cemetery&place_id=113913508638492&surface=tyah

Figure 7: Process of the Methods Diagram- Author

Figure 8: Volunteers Cleaning Up At Masonic Cemetery-<https://www.facebook.com/search/>

[photos/?q=Eugene%20Masonic%20Cemetery&place_id=113913508638492&surface=tyah](https://www.facebook.com/search/photos/?q=Eugene%20Masonic%20Cemetery&place_id=113913508638492&surface=tyah)

Figure 9: Cleared Sight-Lines At Pioneer Cemetery- Author

Figure 10: Boy Scouts At The Memorial Day Celebration At Eugene Pioneer Cemetery. Paul Carte. <http://registerguard.com/rg/news/local/31637819-75/celebration-cemetery-eugene-memorial-pioneer.html>.

Figure 11: No Trespassing Sign At Pioneer Cemetery. Aaron Ragan-Fore <https://foursquare.com/v/eugene-pioneer-cemetery/4b4e2977f964a52097e326e3>

Figure 12: Signs Providing Information To Visitors At The Entrance To Masonic Cemetery- Author

Figure 13: Conditions of path and vegetation on west facing slope at Masonic Cemetery- Author

Figure 14: Paths Used To Cut Through Pioneer Cemetery- Author

Figure 15: Eroding Eastern Edge At Pioneer Cemetery- Author

Figure 16: The Carriage Road And Mature Conifers At Eugene Pioneer Cemetery- Author

Figure 17: The Rules and Hours Sign at Eugene Masonic Cemetery- Author

Figure 18: Table Comparing Conditions at Case Study Sites- Author

Figure 19: The “Wet Zone” Management Area at Eugene Masonic Cemetery. https://www.facebook.com/search/photos/?q=Eugene%20Masonic%20Cemetery&place_id=113913508638492&surface=tyah

Figure 20: Framework Process Flowchart Diagram- Author

Definitions

BIOPHYSICAL CONDITIONS-

“Biophysical conditions include living things (bio), such as plants and animals, and non-living things (physical), such as rocks, soils and water. The biophysical environment is made up of four parts: the atmosphere, hydrosphere, lithosphere and biosphere.”

<http://www.preliminarygeography.hsieteachers.com>

ECOSYSTEM FUNCTIONS-

“Ecosystem function is the technical term used to define the biological, geochemical and physical processes and components that take place or occur within an ecosystem. Or more simply put, ecosystem functions relate to the structural components of an ecosystem (e.g. vegetation, water, soil, atmosphere and biota) and how they interact with each other, within ecosystems and across ecosystems. Sometimes, ecosystem functions are called ecological processes.”

<http://www.ecosystems-services.com.au/ecosystem-functions.html>

ENDOWMENT FUND-

“An endowment fund is an investment fund set up by an institution in which regular withdrawals from the invested capital are used for ongoing operations or other specified purposes. Endowment funds are often used by nonprofits, universities, hospitals and churches. They are funded by donations, which are tax deductible for donors.”

<http://www.investopedia.com/terms/e/endowment-fund.asp#ixzz479Xl99sw>

INVASIVE SPECIES-

“An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.”

<http://eol.org>

HEIRLOOM SPECIES-

“A horticultural variety that has survived for several generations usually due to the efforts of private individuals”

<http://www.merriam-webster.com/dictionary/heirloom>

NATIVE PLANT COMMUNITIES-

“A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plant species form recognizable units, such as oak savannas, pine forests, or marshes, that tend to repeat over space and time. Native plant communities are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes. Examples of natural disturbances include wildfires, severe droughts, windstorms, and floods.”

<http://www.dnr.state.mn.us/npc/index.html>

NON-PROFIT ORGANIZATION (NPO)-

Associations, charities, cooperatives, and other voluntary organizations formed to further cultural, educational, religious, professional, or public service objectives. Their startup funding is provided by their members, trustees, or others who do not expect repayment, and who do not share in the organization's profits or losses which are retained or absorbed. Approved, incorporated, or registered NPOs are usually granted tax exemp-

tions, and contributions to them are often tax deductible. Most non-governmental organizations (NGOs) are NPOs.

<http://www.businessdictionary.com/definition/non-profit-organization>

PASSIVE RECREATION-

“Outdoor recreational activities, such as nature observation, hiking, and canoeing or kayaking, that require a minimum of facilities or development and that have minimal environmental impact on the recreational site.”

<http://www.yourdictionary.com/passive-recreation>

PUBLIC OPEN SPACE-

“Land laid out as a public garden, or used for the purposes of public recreation, or land which is a disused burial ground. Public open space should be taken to mean all open space of public value, including not just land, but also areas of water such as rivers, canals, lakes and reservoirs which offer important opportunities for sport and recreation and can also act as a visual amenity.”

http://www.dorsetforyou.com/media/word/3/i/S106_Recreation__Open_Spaces_Definitions.doc

SOCIOCULTURAL CONDITIONS-

“**Sociocultural conditions** is a term used to describe the social and cultural factors that affect people’s attitudes, beliefs, behaviors, preferences, customs and lifestyles. Demographics describe statistics about a population.”

www.johnwiley.net.au/highered/management

Appendix A:

GUIDED INTERVIEW QUESTIONS

- 1) Would you support establishing a native shrub layer at Pioneer Cemetery? Why or why not?
- 2) What are some of the benefits of using native shrubs in the city and specifically in cemeteries?
- 2) What native shrubs are most suited to growing in Pioneer cemetery sites with minimal maintenance?
- 3) What practices are best to establish of NW native shrubs?
- 4) What maintenance practices, or lack thereof, discourage the growth of native shrubs?
- 5) What are the most effective ways to transition from an exotic invasive shrub layer to a native shrub layer?
- 6) How can a native shrub layer be maintained?
- 7) What is the biggest threat to the native shrub layer once established?
- 8) What are some of the challenges associated with establishing native shrubs?
- 9) What are some of the challenges associated with maintaining a mature native shrub layer?
- 10) What is the maintenance regime at this cemetery?
 - a) How often is it mowed?
 - b) Is there weed removal?
 - c) How is weed removal accomplished?
 - d) What plants are removed?
- 11) Is there planting of native shrubs?
- 12) What plants are encouraged or planted?
- 13) What is the desired outcome of maintenance?
- 14) Is there irrigation?
- 15) How are paths maintained?
- 16) Is there ongoing maintenance to encourage or maintain native shrubs?
- 17) Is there an ecological ethic driving maintenance decisions?
- 18) Are ecological concerns considered when maintenance decisions are made?
- 19) What factors do drive decisions about maintenance, and who makes these choices?
- 20) How is maintenance accomplished?
- 21) How is maintenance it funded?
- 22) Who does the maintenance work?
- 23) Are experts used to make management decisions? Are the experts volunteer or paid?
- 24) Are community members included in decision making?
- 25) Who decides how the cemetery will be maintained?
- 26) What is the maintenance budget for this space?
- 27) How would you alter the maintenance regime to encourage native shrubs?
- 28) Is there a management plan in place?
- 29) How was the management plan developed?
- 30) What are some of the management goals and who decided on those goals?
- 31) Is there a NPO in place?
- 32) Does the cemetery association receive donations?
- 33) How does the cemetery association communicate with the public?
- 34) What are the roles of volunteers and or the community in management, maintenance, and

funding?

35) Is the cemetery being used by the public?

36) How is it used by the public?

37) Are there uses that should be discouraged?
Encouraged?

38) Are events are held on site? Does this gener-
ate revenue?

Appendix B:

INTERVIEWS AND PARTICIPANTS

Interview #1: A specialist in native plants, ecology, and biodiversity. I asked mostly questions about benefits of native plants, whether they were appropriate, and why. I asked about management and maintenance of native plants, specifically shrubs. This individual worked with Masonic Cemetery on their management plan as an expert volunteer, so I also asked questions about the process of the formation of that management strategy.

Quotes: “Even the most knowledgeable experts disagree on certain things. There is no one right answer for even a specific site. Creating a strong management plan requires a lot of people to care, but also be willing to compromise.”

“People don’t always accept the messy look, but that mess is where everything alive is eating, mating, and seeking shelter. That messiness of plantings indicates higher levels of biodiversity, especially of invertebrates. If we clean all the dead plant matter out in winter, we are also cleaning out the invertebrates, which feed the whole system.”

Interview #2: A specialist in native plants ecology and biodiversity. I asked mostly questions about benefits of native plants, whether they were appropriate, and why. This person teaches in the Masonic and Pioneer Cemeteries, so I asked about the use of both sites, and the current conditions of the plant communities in each.

Quotes: “Indian plum should be planted everywhere.” “People think of biodiversity as being about birds and animals, and it partially is, but it has to start with the plant communities. A diversity of composition, age, and structure of the plantings are what support a diversity of invertebrates, birds and animals. You can’t support diverse wildlife with a monoculture.”

“A diversity of structure in plantings, you know, a ground, shrub, understory, and canopy layer, allows different species to use these layers as habitat. Some birds insist on nesting in the shrub or understory layer, and that doesn’t exist in Pioneer Cemetery. There are a few shorter trees, but the structure is primarily the ground and canopy layers with a few rose bushes in between.”

Interview #3: A graduate of the University of Oregon Landscape Architecture Department who worked to develop the management plan at Masonic Cemetery with the collaboration of other experts. A former paid employee of the Masonic Cemetery Association. Helped identify the micro-climates and management zones at Masonic Cemetery.

Quotes: “I have no idea why he wanted to put all those Ponderosa Pines down by the Mausoleum. Well, I know why, but I don’t know if I like it. In a few years they will shade out a lot of the prairie plants, but they are good for the squirrels that nest here. I don’t agree with the choice, but that’s just the way it goes.”

“There was some disagreement on what to do, but we came together and compromised.”

“I’d like to see more Oregon White Oak, and I’d like to see a more aggressive approach to the sweet cherries in the cemetery. I think they pretty much all need to come out, because they’re so invasive and there are so many of them. The birders want them to stay. The bird people are convinced they’re great for the birds, but I don’t know. They sure are full of birds when the fruit gets ripe, so they stay for now.”

Interview #4: A community user of both cemeteries, employee of the University of Oregon and resident of South Eugene neighborhood. Lives next to Masonic Cemetery and walks through Pioneer Cemetery to work. Volunteers on work party days at the Masonic Cemetery. Knows quite a bit about plants, but wouldn’t qualify as

a native plant expert, because they know more about heirloom, horticultural, and agricultural plants.

Quotes: “The Masonic cemetery is my favorite place to walk. It’s just beautiful when the flowers are blooming, and there are birds everywhere. I’m always trying to get pictures of them, especially the hummingbirds, but I never get a good shot. That’s for the guys with fancy cameras and tripods, I guess. I see them at Masonic every once and a while.”

Interview #5: A member of Pioneer Cemetery Association, a volunteer, and a history expert.

Quotes: “undergrads stumble through on their way from a frat party back to the dorms.”

“The native shrubs just won’t work here, it wouldn’t be safe if people had spaces to duck down and hide away. Even when you can see all the way across, people get hurt in there, people do drugs. If it was full of shrubs people would be living in them. Even the lilac bushes end up with beer bottles and cigarette butts hidden all around them, that’s now, with good visibility.”

Interview #6: A Maintenance worker and grounds-keeper at the Eugene Pioneer Cemetery. Follows the preservation plan and contributes to decision making processes. Experiences and works on the site daily, and has for over twenty years.

Quotes: “One reason is respect. These are war veterans and their families. These guys were military, and I imagine they would like the grass and everything tidy and trimmed short. The people who come to pay their respects, too. They just want it to look like it’s taken care of, out of respect for their dead.”

“So many people visit, or are involved with the board or volunteering because their family is buried here. The president of the Board has his grandpa here, and trimmed the grass on the

grave when he was a boy”

“A lot of people take care of their own family plots, and we let them plant what they want, or take out what they want, as long as they aren’t planting the nasty stuff. They are supposed to take certain things out, too, like the ivy and other vines when they start growing on the monuments, but if I see that I usually get to it before anyone else.”

“Nobody can plant ivy anymore, it just eats up the headstones. It literally will put holes in the stone. It’s crazy.”

Interview #7: A volunteer at Masonic Cemetery

Quotes. “The Masonic Cemetery Association has raised literally thousands of dollars.”

“We try to come to all of the work parties.”

“It has changed so much, it used to be kind of scary, with garbage and blackberry brambles everywhere. It never used to be a place to take your kids, but now it is.”

Interview #8: A volunteer at Pioneer Cemetery

Quotes: “Several Eagle Scouts have done their projects here, one worked on restoring a veterans plot, sometimes they come as a troop to pick up trash.”

“A lot of work has been done to clean up and restore headstones”

Appendix C:

OBSERVATIONAL STUDY OF COMMUNITY USE

Over the course of two weeks in May, observations of the human uses of the two case-study cemeteries were made. The observations at Masonic Cemetery occurred Friday, May 15th from 4pm to 6pm; Saturday, May 23rd from 10am to 12pm; and Wednesday, May 27th from 12pm to 2pm. The observations at Pioneer Cemetery occurred Friday, May 22nd from 4pm to 6pm; Saturday, May 16th from 10am to 12pm; and Wednesday, May 20th from 12pm to 2pm. All visitors are counted under one category only, and if they were engaging in other behaviors it is noted. The lists of numbers are the numbers of people in each group.

MASONIC CEMETERY

Friday, May 15th from 4pm to 6pm

Walkers- 1, 1, 3, 2, 2, 1
 Joggers- 2, 1, 1, 1, 1, 1
 Bicyclists- 1
 Dog-walkers, 1, 2, 1, 1
 Families (groups with children)- 3, 2,
 Photography, drawing, writing, playing music- 1
 Smoking- 0

Saturday, May 23rd from 10am to 12pm

Walkers- 1, 4, 1, 2, 2, 3
 Joggers- 3, 1, 1, 2
 Bicyclists- 2, 1
 Dog-walkers, 2, 1, 2, 1, 1,
 Families (groups with children)- 2, 4, 3(kids
 only, oldest maybe 12 yrs. old), 2
 Photography, drawing, writing, playing music-
 1, 1

Smoking- 1,

Wednesday, May 27th from 12pm to 2pm

Walkers- 1,
 Joggers- 1, 1
 Bicyclists- 0
 Dog-walkers- 1, 1
 Families (groups with children)- 0
 Photography, drawing, writing, playing music- 0
 Smoking- 0

PIONEER CEMETERY

Friday, May 22nd from 4pm to 6pm

Walkers- 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1,
 2, 1, 1, 1
 Joggers- 2, 1, 1, 1, 1, 1
 Bicyclists- 0
 Dog-walkers- 1,
 Families (groups with children) - 0
 Photography, drawing, writing, playing music- 0
 Smoking- 1, 2, 3, 1, 1

Saturday, May 16th from 10am to 12pm

Walkers- 1, 1,
 Joggers- 2, 1, 4, 1,
 Bicyclists- 0
 Dog-walkers, 1, 1, 2
 Families (groups with children) - 2
 Photography, drawing, writing, playing music-
 2, 1
 Smoking- 1

Wednesday, May 20th from 12pm to 2pm

Walkers- 2, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1
 Joggers- 8, 1,
 Bicyclists- 0

Dog-walkers- 0

Families (groups with children) - 0

Photography, drawing, writing, playing music- 1

Smoking- 3, 1, 1, 1, 3, 1, 2,

The Pioneer Cemetery seems to act as footpath on many people's commute to the University. People tend to walk directly through the space, on well-worn paths, both planned and improvised.

One or multiple running groups use the cemetery to train, usually going all the way around the site, multiple times, surprisingly quickly. These groups of runners have been observed on multiple site visits, and once in this observational study.

Another observed use of this site is smoking cigarettes. University and construction workers and students were observed smoking mostly in the Northeast corner of the cemetery, but in other locations as well.

Appendix D:

FORMING A NON-PROFIT ORGANIZATION

1. Obtain nonprofit materials from your state's corporate filing office. This packet should include sample or fill-in-the-blank articles of incorporation and your state's nonprofit corporation laws. It should also contain a filing fee schedule, as well as forms and instructions for checking the availability of your proposed business name. The articles of incorporation will contain the name of your corporation, the corporation's address, a "registered agent" (a person who agrees to receive legal papers on behalf of the corporation), and sometimes the names of the corporation's directors.

2. Choose an available business name that meets the requirements of state law. State requirements vary, but generally, the name of your nonprofit cannot be the same as the name of another corporation on file with the corporations division, the name must end with a corporate designator, such as "Corporation," "Incorporated," "Limited," or "Corp.," "Inc." or "Ltd.," and the name cannot contain certain words prohibited by the state, such as Bank, Cooperative, Federal, National, United States or Reserve. Also, you must make sure your name won't violate a trademark owned by another company (in your state or out of state). To do this, you'll need to conduct a trademark search. You aren't usually required to file or reserve the name with your state. Once you file your articles of incorporation, your nonprofit's name will be automatically registered.

3. File formal paperwork, usually called "articles of incorporation," and pay a small filing fee (typically \$30 or \$40).

4. Apply for your federal and state tax exemptions.

5. Create corporate "bylaws," which set out the operating rules for your nonprofit corporation, including procedures for holding meetings, making major business decisions, voting rights and other important guidelines.

6. Appoint the initial directors. Directors, who meet and make decisions collectively as the board of directors, have the authority (and responsibility) to manage and run the nonprofit corporation. Many states allow nonprofits to have just one director, but other states require at least three. Some states require the directors to be chosen before filing the articles of incorporation because you must list their names in the document.

7. Hold the first meeting of the board of directors. Before you start doing business, you must elect a board of directors and hold an initial meeting of the board. Typically, the bylaws are adopted by the corporation's directors at their first board meeting. The directors also will elect officers — state law usually requires a president, secretary and treasurer, and sometimes a vice president as well. Then, the directors should authorize the newly elected officers to take actions necessary to start the business of the nonprofit, such as setting up bank accounts and admitting members. Minutes of the meeting should be created and filed in the corporate records book.

8. Obtain licenses and permits that may be required for your corporation. A local business license (sometimes called your "tax registration certificate") may be required for your activities, and if you sell anything to consumers, you'll need a sales tax permit.

<http://nonprofitorganizations.uslegal.com>, 2016

Appendix E:

BRUCE NEWHOUSE'S NATIVE PLANTS INVENTORY

Eugene Masonic Cemetery: Native Plants

Eugene Masonic Cemetery: Native Plants

Names follow the *Oregon Flora Project* (Cook & Sundberg eds. 2012).

Bold font plants highly recommended for Eugene Masonic Cemetery.

Bruce Newhouse: Ver. 2012-11-30				
Latin name	Common name	Present EMC	Add to EMC	Eugene Masonic Cemetery: Comments
TREES				
<i>Abies grandis</i>	Grand Fir	x	F	1.5" dbh 2012. Planted. Introduce a few more in dry, shady, N slope areas
<i>Acer macrophyllum</i>	Bigleaf Maple	x		Reproducing naturally
<i>Alnus rubra</i>	Red Alder		S	Consider introducing a couple on lower slopes of swale/ditch area.
<i>Arbutus menziesii</i>	Madrone	x		Protect natural reproduction; move seedlings to desirable places. Release from conifer overtopping where possible.
<i>Calocedrus decurrens</i>	Incense-Cedar	x		
<i>Cornus nuttallii</i>	Pacific Dogwood	x		About 50 planted 10/96; about 25 remain 2012. Keeping density low may deter anthracnose.
<i>Crataegus suksdorfii</i>	Suksdorf's Hawthorn	x		<i>C. suksdorfii</i> below mausoleum, and below Camas Meadow. Remove hybrid <i>C. monogyna</i> × <i>suksdorfii</i> , also?
<i>Fraxinus latifolia</i>	Oregon Ash	x		
<i>Pinus ponderosa</i> var. <i>ponderosa</i>	Ponderosa Pine	x		Uncommon. Some planted.
<i>Prunus emarginata</i> var. <i>mollis</i>	Bitter Cherry		F	
<i>Prunus virginiana</i> var. <i>demissa</i>	Chokecherry	x	E	Some planted long ago, still present near NW corner. Introduce 1 or 2 other places.
<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>	Douglas-Fir	x		Many appear infected with Butt Rot and Red Cubical Rot
<i>Quercus garryana</i> var. <i>garryana</i>	Oregon White Oak	x	E	Limit introductions to a few on edges. No rush.
<i>Quercus kelloggii</i>	California Black Oak	x	E	One large tree on E side of Public Square. Tilted strongly, pruned to ease weight. One sapling on S side of Square.
<i>Rhamnus purshiana</i>	Cascara		F	
<i>Taxus brevifolia</i>	Pacific Yew	x	F	Planted; E of Public Square
<i>Thuja plicata</i>	Western Red Cedar	x		Planted on N side, about 2.5" dbh in 2012
<i>Tsuga heterophylla</i>	Western Hemlock	x		Planted near NE corner, thriving
SHRUBS and SMALL TREES				
<i>Acer circinatum</i>	Vine Maple	x	F	Planted
<i>Amelanchier alnifolia</i> var. <i>semiintegrifolia</i>	Pacific Serviceberry		E	Planted SE corner and above Garden Shed.

APPENDIX E

Eugene Masonic Cemetery: Native Plants

<i>Arctostaphylos columbiana</i>	Hairy Manzanita	x		Planted on S side of mausoleum
<i>Berberis aquifolium</i>	Tall Oregongrape	x	P,E	Scattered throughout. Common.
<i>Ceanothus cuneatus</i> var. <i>cuneatus</i>	Buckbrush		E	
<i>Ceanothus sanguineus</i>	Redstem Ceanothus		E	
<i>Cornus sericea</i>	Redstem Dogwood		S	In damp swale below mausoleum.
<i>Corylus cornuta</i> var. <i>californica</i>	California Hazel	x		Check carefully against <i>C. avellana</i> (Euro. Hazelnut). Kalapuya heritage plant.
<i>Holodiscus discolor</i> var. <i>discolor</i>	Oceanspray	x	E	Planted
<i>Lonicera involucrata</i>	Twinberry		S	
<i>Malus fusca</i>	Pacific Crabapple		S	Add on moist slope above swale/ditch.
<i>Oemleria cerasiformis</i>	Osoberry	x		Scattered throughout. Common.
<i>Philadelphus lewisii</i>	Mock Orange	x		Planted
<i>Physocarpus capitatus</i>	Ninebark	x		Planted in SW corner
<i>Ribes divaricatum</i>	Straggley Gooseberry		S	In shady area of moist swale.
<i>Ribes sanguineum</i> var. <i>sanguineum</i>	Red Flowering Currant	x		Only 1 native (?) plant in cemetery. Many planted, some red, some pink, some white. Consider swapping out white gradually for Red of Pink, which will attract more hummingbirds and is the common, native color.
<i>Rosa gymnocarpa</i>	Baldhip Rose	x		
<i>Rosa nutkana</i> var. <i>nutkana</i>	Nootka Rose	x		
<i>Rubus leucodermis</i>	Blackcap	x		Very thorny; tasty fruits.
<i>Rubus parviflorus</i>	Thimbleberry	x		Common in N and NE areas.
<i>Rubus spectabilis</i>	Salmonberry		F	Cool and moist site; probably N or NE on edge
<i>Rubus ursinus</i>	Dewberry; Trailing Blackbry.	x		Thorny, common.
<i>Salix scouleriana</i>	Scouler's Willow		F, E	
<i>Sambucus mexicana</i>	Blue Elderberry	x	E	Planted
<i>Sambucus racemosa</i> var. <i>arborescens</i>	Red Elderberry	x	F	Planted, may be gone
<i>Spiraea douglasii</i> var. <i>douglasii</i>	Douglas' Spiriraea		S	Planted along lower edge of Camas Meadow.
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	Snowberry	x		Common
<i>Toxicodendron diversilobum</i>	Poison-oak	x		Foliage contact usually leads to severe skin rash.
<i>Viburnum ellipticum</i>	Oval-Leaved Viburnum	x	E,P	Planted. Add 3-5 more in oaks.
FORB and VINES				
<i>Achillea millefolium</i>	Yarrow	x	P	Planted in butterfly garden. Add to prairies?
<i>Actaea rubra</i>	Baneberry	x		2

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<i>Agoseris grandiflora</i>	Large Flowered Agoseris		P	
<i>Agoseris heterophylla</i> var. <i>heterophylla</i>	Annual Agoseris		P	B. Newhouse has seed available
Allium acuminatum	Hooker's Onion		P	Dry areas near oaks
<i>Allium amplexens</i>	Narrowleaf Onion	x	P	
<i>Anaphalis margaritacea</i>	Pearly Everlasting	x	E	
<i>Angelica arguta</i>	Shining Angelica		E?	
<i>Anisocarpus madioides</i>	Woodland Tarweed		F, E	
<i>Apocynum androsaemifolium</i> var. <i>androsaemifolium</i>	Spreading Dogbane	x		Near top plaza and to NE. Move from paths to sunny areas.
<i>Aquilegia formosa</i>	Red & Yellow Columbine	x	E	Showy red and yellow flowers.
<i>Arnica amplexicaulis</i>	Clasping Arnica		F, E	May be able to get seed at Spencer Butte with City permission
<i>Artemisia douglasiana</i>	Mugwort	x		Mostly in N section
<i>Asarum caudatum</i>	Wild Ginger	x		Planted @ E corner of Public Square and W of scatter garden.
Asclepias speciosa	Showy Milkweed	x	P	Planted just south of Mausoleum
Balsamorhiza deltoidea	Balsamroot		P	
<i>Barbarea orthoceras</i>	American Wintercress		E	
<i>Bidens cernua</i>	Nodding Beggarticks		S	
<i>Brodiaea elegans</i> ssp. <i>hooveri</i>	Elegant Brodiaea	x	P	Uncommon, in Camas Meadow
Calochortus tolmiei	Tolmie's Cat's Ear	x	P	In grass above closed section of University & just SE of mausoleum across gravel. Uncommon. Collect seed on site, start in new areas.
<i>Calypso bulbosa</i>				Hasn't been seen in the cemetery in a few years. May be gone. Difficult to establish. More common slightly higher in elev.
<i>Calystegia atriplicifolia</i> ssp. <i>atriplicifolia</i>	Night Blooming Morning Glory		P	The only native morning glory.
<i>Camassia leichtlinii</i> ssp. <i>suksdorfii</i>	Leichtlin's Camas	x	P	Planted near Elinor. Perhaps start near 25th & Univ. entrance area? Kalapuya heritage plant.
<i>Camassia quamash</i> ssp. <i>maxima</i>	Common Camas	x		Blue-purple clusters on stalk; only in Camas Meadow and small patch NW of Mausoleum. Kalapuya heritage plant.
<i>Cardamine nuttallii</i> var. <i>nuttallii</i>	Spring Beauty	x		Small pink flowers in early spring. Top area & Carriage Rd. below Public Square.
<i>Cardamine penduliflora</i>	Willamette Valley Bittercress		S	Seed collect in Amazon Park, with City permission.
<i>Castilleja attenuata</i>	Narrow-leaved Paintbrush		?	
<i>Castilleja hispida</i>	Hairy Paintbrush		?	
<i>Castilleja tenuis</i>	Hairy Owlclover		?	
Chamerion angustifolium var. canescens	Fireweed		E	
Clarkia amoena ssp. lindleyi	Farewell-To-Spring		P	
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	Four Spot		P?	
<i>Clarkia purpurea</i> ssp. <i>viminea</i>	Large Godetia		P?	
<i>Claytonia parviflora</i> ssp. <i>parviflora</i>	Small Flowered Miner's Lettuce	x		Small flower, common plant
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	Miner's Lettuce	x		Small flower, common plant
<i>Claytonia sibirica</i>	Siberian Candyflower	x		Common on NE side

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<i>Collinsia grandiflora</i>	Large Flowered Blue-Eyed Mary		P	
<i>Collomia grandiflora</i>	Large Flowered Collomia		P	
Cynoglossum grande	Hound's Tongue	x	P	Introduced. Start more in oak fringes
Delphinium menziesii	Menzie's Larkspur		P	Start in far SW corner only, or it might hybridize.
<i>Delphinium oreganum</i>	Oregon Larkspur	x		From B. Newhouse; may not have survived
<i>Delphinium trolliifolium</i>	Tall Larkspur	x	F, E	Stunning, tall blue-purple stalks.
Dicentra formosa ssp. formosa	Bleeding Heart	x	F	Planted. More needed.
<i>Dichelostemma congestum</i>	Ookow	x	P, E	Scattered above entry road. Also may be in S center of cemetery. More needed.
Dodecatheon hendersonii	Henderson's Shooting Star	x	P	S of Public Square. More needed. Collect seed in E. part of Armitage Park with permission.
Drymocalis glandulosa var. glandulosa	Sticky Cinquefoil		E	
<i>Epilobium densiflorum</i>	Close Flowered Boisduvalia		S	Moist areas.
Erigeron speciosus var. speciosus	Showy Daisy		P	B. Newhouse has Coburg Hills seed; closest site available
<i>Eriogonum nudum var. nudum</i>	Barestem Buckwheat		P	
Eriophyllum lanatum	Oregon Sunshine		P	
<i>Erysimum capitatum var. capitatum</i>	Wall Flower		E	
<i>Erythronium oregonum</i>	Oregon Fawnlily	x		Showy pale yellow flowers susceptible to picking; consider transplanting out of pathways
<i>Eschscholzia californica</i>	California Poppy	x	P, E	In beds on S side of mausoleum A California form, so technically not native here.
<i>Eurybia radulina</i>	Rough Leaved Aster		F, E	
Fragaria vesca ssp. bracteata	Woods Strawberry		P,C	Not in deepest shade.
Fragaria virginiana var. platypetala	Broadpetal Strawberry	x	P,C	More needed.
<i>Fritillaria affinis</i>	Checker Lily	x	F,E	Protect, slightly pops a bit? Unusual flower, not particularly showy; does get picked; consider transplanting out of pathways
<i>Gentiana sceptrum</i>	King's Gentian			If seed available: TNC Willow Creek, OCF NW corner
Geranium oreganum	Oregon Geranium	x	F, E	Showy, deep pink flowers. More needed.
<i>Geum macrophyllum var. macrophyllum</i>	Large Leaved Avens	x	F, E	Moist areas; more needed.
Gilia capitata ssp. capitata	Bluefield Gilia		P	
<i>Goodyera oblongifolia</i>	Rattlesnake Plantain	x		Was one location (center of Brownlee plot), and David started 2nd clump. Introduced in mid 90s.
Grindelia integrifolia	Willamette Valley Gumweed	x	P	Yellow flowers late in summer, early fall; few in cemetery. Check against <i>G. integr. x nana</i>
<i>Heracleum lanatum</i>	Cow Parsnip	x	E	30 present. More needed.
<i>Heuchera micrantha var. micrantha</i>	Small Flowered Alumroot		E?	
<i>Hydrophyllum occidentale</i>	Western Waterleaf		F	B. Newhouse has Crow Rd. seed

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<i>Hydrophyllum tenuipes</i>	Slender-Stemmed Waterleaf		F	
<i>Iris tenax</i> var. <i>tenax</i>	Oregon Iris	x	E	Just above entry road; about 12' W of Moore brown granite headstone, 8' N of 10" dia. QUEGAR. Some on W side of Geary plot. A bit near crypt. More needed.
<i>Lathyrus nevadensis</i> var. <i>nevadensis</i>	Sierra Pea		F	
<i>Lathyrus polyphyllus</i>	Leafy Pea		F	
<i>Leptosiphon bicolor</i>	Bicolored Linanthus		P	Moon Mt. seed, with City permission.
<i>Ligusticum apiifolium</i>	Celery Leaved Lovage		E	B. Newhouse has local seed
<i>Lilium columbianum</i>	Tiger Lily	x	F	Planted. More needed.
<i>Linnaea borealis</i> var. <i>longiflora</i>	Twinflower		F	Shady, slight moister than average.
<i>Lithophragma parviflorum</i> var. <i>parviflorum</i>	Small Flowered Woodland Star		P	
<i>Lomatium dissectum</i> var. <i>dissectum</i>	Fern Leaved Lomatium	x	E, P	Planted; from B. Newhouse; Eugene provenance. More needed.
<i>Lomatium hallii</i>	Hall's Lomatium		P	Rocky and sunny if possible: around base of headstones?
<i>Lomatium macrocarpum</i>	Large Fruited Lomatium		P	Sunny spots near oaks. Seed from City at Moon Mountain?
<i>Lomatium nudicaule</i>	Barestem Lomatium	x	P	Near closed section of University; yellow flower clusters interesting.
<i>Lomatium triternatum</i> var. <i>triternatum</i>	Nineleaf Lomatium	x	P	From Doak Cr. Nursery; BN collection from Hwy. 58 just E of I-5 (local).
<i>Lomatium utriculatum</i>	Spring Gold		P	Small forest gaps to hot, sunny rocks/concrete.
<i>Lonicera ciliosa</i>	Orange-Flowered Honeysuckle		E	Near fences, small trees, or roses that it can climb in. Possibly over tall plot markers or headstones.
<i>Lonicera hispidula</i> var. <i>hispidula</i>	Hairy Honeysuckle	x		Common
<i>Lotus formosissimus</i>	Bicolored Lotus		P	Moist areas with Camas
<i>Lotus pinnatus</i>	Bog Lotus		P	Same as above, but keep separated.
<i>Lotus purshianus</i> var. <i>purshianus</i>	Spanish Lotus		P	Keep seed on hand to toss in disturbed areas.
<i>Lupinus arbustus</i>	Spurred Lupine		P	Good at germinating on disturbed soil. Seed collect near Solar Heights?
<i>Lupinus polycarpus</i>	Miniature Lupine	x		Cute, small annual lupine with deep blue-purple flowers.
<i>Lupinus polyphyllus</i> var. <i>polyphyllus</i>	Large Leaved Lupine	x	P	Planted in Butterfly Garden. Obtain seed of purple flowered plants from Lorane Hwy. Plant in moist areas near swale.
<i>Lupinus rivularis</i>	Riverbank Lupine	x	P	Planted in Butterfly Garden. Good at colonizing disturbed soil.
<i>Madia elegans</i>	Showy Tarweed		P	Good at colonizing disturbed soil. Kalapuya heritage plant.
<i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>	Large False Solomon's Seal	x	F	White plumes smell nice; NE area. Keep spreading in cemetery.
<i>Maianthemum stellatum</i>	Starry False Solomon's Seal	x	F	More needed; keep spreading.
<i>Marah oreganus</i>	Wild Cucumber; Old-Man-in-the-Ground	x		Plant resembles cucumber vine. One plant NE of head of seep above mausoleum. Several others.
<i>Mentha canadensis</i>	Field Mint		S	Introduce in wet swale? 5

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<i>Mertensia platyphylla</i>	Western Bluebells		F	Blue flowers. Introduced in one spot. Can be aggressive in landscaping beds. Take care if introducing more: may spread too much.
<i>Micranthes integrifolia</i>	Wholeleaf Saxifrage	x	P	White flowers in clusters on spikes; Camas meadow. Collect seed on site, add to N prairie
<i>Microseris laciniata</i> ssp. <i>laciniata</i>	Cutleaf Microseris	x	P	One plant in closed section of University; consider transplanting (trampling problem). Collect seed on site from single plant on Univ. closed section. Add to prairies.
Mimulus guttatus	Yellow Monkeyflower		S	Showy yellow addition to ditch.
<i>Myosotis laxa</i>	Small Forget-Me-Not		S	Add to swale
<i>Nemophila menziesii</i> var. <i>atomaria</i>	Baby Blue-Eyes		P	Add to prairie at edges of oaks
Olsynium douglasii var. <i>douglasii</i>	Grass Widows		P	Warm, dry sites (next to headstones, curbs?) Collect seed at Spencer Butte with City permission.
<i>Orthocarpus bracteosus</i>	Rosy Owlclover		P	Seed from W. Eug. Wetlands through City staff?
<i>Osmorhiza occidentalis</i>	Western Sweet Cicely		P	B. Newhouse has Camp Cr. Road seed.
<i>Oxalis oregana</i>	Oregon Wood Sorrel	x		Planted.
<i>Oxalis suksdorfii</i>	Western Yellow Woodsorrel	x	E	Uncommon in N section. Best if not in deep shade. Partial sun needed.
<i>Perideridia gairdneri</i> ssp. <i>borealis</i>	Mountain Yampah		P	B. Newhouse has Crow Road seed.
<i>Phacelia nemoralis</i> ssp. <i>oregonensis</i>	Woodland Phacelia		E	
Plectritis congesta	Rosy Plectritis		P	Should become a common species in moist, sunny areas.
Potentilla gracilis var. <i>gracilis</i>	Slender Cinquefoil	x	P	Should become a common species in moist, sunny areas.
<i>Poteridium occidentale</i>	Western Burnet		P	Good colonizer of disturbed soils
Prosartes hookeri	Hooker's Fairybells	x	F	Only a couple of plants in cemetery
Prosartes smithii	Smith's Fairybells		F	
<i>Prunella vulgaris</i> var. <i>lanceolata</i>	Self-Heal; Heal-All	x	P	Watch for hybridization with introduced var.
<i>Ranunculus alismifolius</i> var. <i>alismifolius</i>	Plantain Leaved Buttercup		S	
<i>Ranunculus occidentalis</i>	Western Buttercup	x		Yellow flower; meadow areas.
<i>Ranunculus orthorhynchus</i> var. <i>orthorhynchus</i>	Straightbeak Buttercup	x		Yellow flower; wet meadows, ditches
Rupertia physodes	California Tea		P	Scatter a few around prairie edges.
<i>Sagittaria latifolia</i>	Wapato		S	Add to swale if local source can be found.
<i>Sanicula bipinnatifida</i>	Purple Snakeroot		P	Good colonizer of disturbed soils
<i>Sanicula crassicaulis</i>	Pacific Snakeroot	x		Dull yellow flowers in small clusters; foliage attractive
<i>Satureja douglasii</i>	Yerba Buena		F	
Scrophularia californica ssp. <i>californica</i>	California Figwort		F, S	Moist; partial sun/shade. Upper Amazon source with City permission.
Scutellaria lateriflora	Mad Dog Skullcap		S	Slopes near swale.
Sedum spathulifolium ssp. <i>spathulifolium</i>	Spatulate Leaved Stonecrop		E, P, C	Part sun to sun, headstone/curb areas
Sedum stenopetalum ssp. <i>stenopetalum</i>	Wormleaf Stonecrop		E, P, C	Part sun to sun, headstone/curb areas
Senecio integerrimus var. <i>exaltatus</i>	Tall Western Groundsel		P	Under oaks; seed (starts?) from Friends of Buford Park. Maybe difficult to germinate.
<i>Sericocarpus oregonensis</i>	Oregon Aster		P	Under oaks.
<i>Sidalcea cusickii</i>	Cusick's Checkermallow		P	Add two clumps in moist prairie or swale; seed from Amazon Park with City permission.

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<i>Sidalcea malviflora</i> ssp. <i>virgata</i>	Rose Checkermallow	x		Very attractive pink flowers in spikes.
<i>Sisyrinchium bellum</i>	Beautiful Blue-Eyed-Grass		P	Add to upland prairie if seed can be found.
<i>Sisyrinchium idahoense</i> var. <i>idahoense</i>	Idaho Blue-Eyed-Grass		P	Deep purple flower resembles miniature iris; Camas meadow. Add more if seed can be found.
<i>Solidago lepida</i> var. <i>salebrosa</i>	Canada Goldenrod	x	P	Planted in Butterfly Garden. Add two clumps to edge of prairie.
<i>Symphotrichum hallii</i>	Hall's Aster	x	P	Expand population.
<i>Symphotrichum subspicatum</i>	Douglas' Aster	x	P	In both butterfly garden plots. Add, but keep far from <i>S. hallii</i>
<i>Synthyris reniformis</i>	Snow Queen		F, E	
<i>Tellima grandiflora</i>	Fringecup	x		
<i>Thalictrum occidentale</i>	Western Meadowrue	x		Attractive, lacy foliage.
<i>Thalictrum polycarpum</i>	Tall Western Meadowrue		F	Add to several areas in forest. Collect seed at Amazon Park with City permission.
<i>Thermopsis gracilis</i>	Golden Pea		P	Collect seed at LCC interchange
<i>Toxicoscordion venenosum</i>	Meadow Deathcamas	x		One, just above mausoleum; several in SW corner of camas field with ALLAMP. Spread to enlarge population
<i>Trientalis latifolia</i>	Woodland Starflower		F	
<i>Trifolium eriocephalum</i> ssp. <i>eriocephalum</i>	Woolly Head Clover		P	Possible seed through Friends of Buford Park
<i>Trifolium variegatum</i>	White Tip Clover		P	
<i>Trifolium willdenovii</i>	Tom Cat Clover		P	
<i>Trillium albidum</i>	Sessile Trillium	x		Keep expanding
<i>Trillium ovatum</i> ssp. <i>ovatum</i>	Western Trillium	x		Keep expanding
<i>Triteleia hyacinthina</i>	Hyacinth Triteleia	x		One patch downhill from crypt is outstanding. Check to be sure again in future to be sure exactly that it is this species.
<i>Vancouveria hexandra</i>	Inside-Out-Flower	x		Keep spreading
<i>Veratrum californicum</i> var. <i>caudatum</i>	Corn Lily	x		One or 2 in cemetery; growing in shade, non-flowering. Still present?
<i>Verbena hastata</i>	Blue Verbena		P?	Introduce if local seed source can be found.
<i>Veronica americana</i>	American Brooklime		S	
<i>Viola adunca</i>	Western Blue Violet		P	Add if local seed source can be found
<i>Viola glabella</i>	Smooth Woodland Violet	x		
<i>Viola praemorsa</i> ssp. <i>praemorsa</i>	Upland Yellow Violet		P	Collect seed at Moon Mt. with City permission
<i>Wyethia angustifolia</i>	Narrow-Leaf Wyethia	x		Protect, enhance existing plants in Camas Meadow.
GRASSES, RUSHES & SEDGES				
<i>Acnatherum lemmonii</i>	Lemmon's Needlegrass		p	Add to sunny curb areas?
<i>Bromus carinatus</i> var. <i>marginatus</i>	Mountain Brome	x		May be hybridizing with <i>B. sitchensis</i>
<i>Bromus sitchensis</i>	Sitka Brome	x		May be hybridizing with <i>B. carinatus</i>
<i>Bromus vulgaris</i>	Columbia Brome		F	
<i>Carex densa</i>	Dense Sedge	x		
<i>Carex hendersonii</i>	Henderson's Sedge		F	
<i>Carex leptopoda</i>	Dewey's Sedge	x		
<i>Carex peltata</i>	Woolly Sedge		S	
<i>Carex stipata</i> var. <i>stipata</i>	Sawbeak Sedge		S	
<i>Carex tumulicola</i>	Foothill Sedge	x		Expand in upland prairies
<i>Danthonia californica</i>	California Oatgrass	x		Expand in upland prairies

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<i>Elymus glaucus</i> ssp. <i>glaucus</i>	Western Ryegrass	x	P	Expand in upland prairies
<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	Bearded Wheatgrass		P	
<i>Festuca californica</i> var. <i>californica</i>	California Fescue		P	Add in oak areas, partial sun.
<i>Festuca roemerii</i> var. <i>roemerii</i>	Roemer's Fescue		P	
<i>Hordeum brachyantherum</i> ssp. <i>brachyantherum</i>	Meadow Barley		P	
<i>Hordeum jubatum</i>	Foxtail Barley	x		
<i>Juncus bolanderi</i>	Bolander's Rush		S	
<i>Juncus effusus</i> ssp. <i>pacificus</i>	Pacific Rush	x	S	
<i>Juncus occidentalis</i>	Western Rush	x		
<i>Juncus patens</i>	Gray or Spreading Rush	x		
<i>Koeleria macrantha</i>	Junegrass	x		From Doak Cr. nursery, 2012.
<i>Luzula</i> sp.	Pacific Woodrush	?		Taxonomy of genus unresolved here.
<i>Melica subulata</i>	Alaska Oniongrass		F	
<i>Trisetum canescens</i>	Tall Trisetum	x		Trace amounts in N area
FERNS and ALLIES				
<i>Adiantum aleuticum</i>	Maidenhair Fern		F	Moist area
<i>Blechnum spicant</i>	Deer Fern	x		Planted
<i>Cryptogramma acrostichoides</i>	Parsley Fern		C	Concrete plots and headstone bases?
<i>Cystopteris fragilis</i>	Fragile Fern		C	Concrete plots and headstone bases?
<i>Dryopteris arguta</i>	Shield Fern		F	Dry areas
<i>Pentagramma triangularis</i> ssp. <i>triangularis</i>	Gold Back Fern		C	Concrete plot covers and headstone bases?
<i>Polypodium glycyrrhiza</i>	Licorice Fern	x		In trees in NW, also planted on ground near top.
<i>Polystichum munitum</i>	Western Sword Fern	x		Some native, some planted
<i>Selaginella wallacei</i>	Wallace's selaginella		C	On concrete plot covers?

Appendix F:

EUGENE'S REGIONAL CLIMATE DATA

The climate descriptions and data that follow were recorded at the Eugene Airport, and are based on data recorded daily from 1974 to 2012.

“Over the course of a year, the temperature typically varies from 34°F to 84°F and is rarely below 25°F or above 94°F. The *warm season* lasts from June 28 to September 17 with an average daily high temperature above 76°F. The hottest day of the year is July 30, with an average high of 84°F and low of 54°F. The *cold season* lasts from November 13 to February 27 with an average daily high temperature below 52°F. The coldest day of the year is December 27, with an average low of 34°F and high of 45°F” (National Weather Service, 2016).

“The length of the day varies significantly over the course of the year. The shortest day is December 21 with 8:52 hours of daylight; the longest day is June 20 with 15:31 hours of daylight. The *earliest sunrise* is at 5:28am on June 17 and the *latest sunset* is at 9:01pm on June 23. The *latest sunrise* is at 7:53am on November 3 and the *earliest sunset* is at 4:34pm on December 8” (National Weather Service, 2016).

“The median cloud cover ranges from 16% (mostly clear) to 100% (overcast). The sky is cloudiest on December 18 and clearest on August 9. The clearer part of the year begins around June 19. The cloudier part of the year begins around October 5. On August 9, the *clearest day* of the year, the sky is *clear, mostly clear, or partly cloudy* 72% of the time, and *overcast or mostly cloudy* 26% of the time. On December 18, the *cloudiest day* of the year, the sky is *overcast, mostly cloudy, or partly cloudy* 85% of the time, and *clear or mostly clear* 14% of the time” (National Weather Service, 2016).

“Precipitation is most likely around December 15, occurring in 70% of days. Precipitation is least likely around August 9, occurring in 17% of days. Over the entire year, the most common forms of precipitation are light rain and moderate rain. *Light rain* is the most severe precipitation observed during 44% of those days with precipitation. It is most likely around March 31, when it is observed during 31% of all days. *Moderate rain* is the most severe precipitation observed during 40% of those days with precipitation. It is most likely around December 12, when it is observed during 30% of all days” (National Weather Service, 2016).

“During the *warm season*, which lasts from June 28 to September 17, there is a 20% average chance that precipitation will be observed at some point during a given day. When precipitation does occur it is most often in the form of light rain (52% of days with precipitation have at worst light rain), moderate rain (28%), thunderstorms (9%), and drizzle (7%)” (National Weather Service, 2016).

“During the *cold season*, which lasts from November 13 to February 27, there is a 67% average chance that precipitation will be observed at some point during a given day. When precipitation does occur it is most often in the form of moderate rain (43% of days with precipitation have at worst moderate rain), light rain (39%), light snow (7%), and heavy rain (6%)” (National Weather Service, 2016).

“The likelihood of snow falling is highest around January 4, occurring in 8% of days. Snow rarely accumulates at this location” (National Weather Service, 2016).

“The relative humidity typically ranges from 34% (comfortable) to 98% (very humid) over the course of the year, rarely dropping below 21% (dry) and reaching as high as 100% (very humid). The air is *driest* around August 2,

at which time the relative humidity drops below 40% (comfortable) three days out of four; it is *most humid* around November 12, exceeding 96% (very humid) three days out of four” (National Weather Service, 2016).

“Over the course of the year typical wind speeds vary from 0 mph to 14 mph (calm to moderate breeze), rarely exceeding 21 mph (fresh breeze). The *highest* average wind speed of 8 mph (gentle breeze) occurs around March 22, at which time the average daily maximum wind speed is 14 mph (moderate breeze). The *lowest* average wind speed of 6 mph (light breeze) occurs around October 14, at which time the average daily maximum wind speed is 12 mph (gentle breeze). The wind is most often out of the *south* (23% of the time), *north* (22% of the time), and *south west* (13% of the time). The wind is least often out of the east (2% of the time) and north east (4% of the time)” (National Weather Service, 2016).