

Ecologists and Organizers:
Participatory Research for Shared Understanding
in the Green Seattle Partnership

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A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Science

University of Washington

2012

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Program Authorized to Offer Degree:
School of Environmental and Forest Sciences

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Abstract

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Key Words: Civic Environmental Stewardship, Urban Forest Sustainability, Adaptive Management, Mental Models, Participatory Research

ABSTRACT. The city of Seattle’s landscape of urban natural areas provides a myriad of social and ecological services, but many of Seattle’s forested parks are experiencing a serious decline in biodiversity and ecosystem function due to the predominance of invasive species. In response, dozens of community groups have begun to steward their neighborhood parks, and public agencies and non-profit organizations have aided this effort with technical assistance, research, training, and funding. These collaborative efforts have formalized into the Green Seattle Partnership (GSP), with an ambitious goal of restoring 2,500 acres of forested parkland by 2025.

This thesis reports on a study performed in partnership with GSP stakeholders. Building on previous empirical research, it was based on the idea that shared understanding among multiple stakeholders is critical to the success of adaptive and collaborative ecosystem management efforts. This study was undertaken to (1) assess the degree of and potential for shared understanding among the Partnership’s many constituencies, and (2) provide recommendations to strengthen its capacity for adaptive management.

The study used a combination of qualitative interviewing and Conceptual Content Cognitive Mapping (3CM) to elicit the mental models of ecological restoration of 17 GSP Forest Stewards—a key constituency group. It used inductive and deductive content analysis to provide a comprehensive, qualitative description of Steward mental models, and to compare these models to GSP’s framework for ecological restoration. Based on this analysis, the study found that Forest Stewards held a wide variety of conceptual understandings of ecological restoration, with some Stewards’ mental models focused primarily on the ecological processes of sustaining the forest, and others focused primarily on the social processes of building community. It also found that Stewards varied greatly in the extent to which their mental models reflected key concepts from GSP’s framework for restoration, with a significant degree of agreement on the activities and outputs of restoration, but far less shared understanding regarding the effort’s long-term ecological and social outcomes. It found that Stewards did not share an understanding—among themselves or with GSP—regarding the long-term role of community engagement in urban forest sustainability. However, as a group, the Stewards collectively held nearly every key concept from GSP’s framework—indicating a strong potential for shared understanding. This thesis concludes by offering several recommendations based on these findings in order to build shared understanding for adaptive capacity.

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Acknowledgments

This thesis would not have been possible without the amazing contributions of dozens of people over several years. I'd like to begin by acknowledging the incredible contributions of you wonderful people, and to express my heartfelt gratitude for the opportunity to work with you all.

First and foremost, thanks are due to the Forest Stewards that served as *participants* in this work. In between organizing work parties, writing grants, and transforming local landscapes, 17 of these citizen superheroes found time to sit down with me for my thesis. I am in awe of their work and their impact, and I am so grateful for the opportunity to learn from them.

The efforts of the *Community Committee* changed what could have been an entirely academic exercise into an amazing experience in participatory research and utilization-focused learning. This Community Committee was made up of Rory Denovan and Michael Yadrick from the City of Seattle Department of Parks and Recreation; Weston Brinkley, Ara Erickson, and Joanna Nelson de Flores from Forterra; and Ella Elman and Nelson Salisbury from EarthCorps. These individuals made an indelible impact on this thesis, and on how I think about research. But far more importantly, alongside the dozens of Stewards and thousands of community volunteers, these are the people who are keeping Seattle's forests alive for another generation.

I am extremely grateful to the members of my *Thesis Committee*, including Gordon Bradley and Clare Ryan from the School of Environmental and Forest Sciences, and Steve Page from the Evans School of Public Affairs. They pushed me constantly to uphold the highest scientific standards, but also allowed me the freedom to follow my passion.

I am indebted to the small but committed group of student environmental anthropologists, sociologists, economists, and psychologists that make up the *Social Science Lab*. These brilliant people helped me through dozens of iterations of the research design (one involving t-tests and a quasi-experiment!), they listened to dozens of my polemics about the virtues of participatory approaches, and they kept it fun through dozens of happy hours. Thank you for being an amazing group of colleagues.

It is hard to underestimate the contribution of the friends and family members that served as *readers* of my thesis, including my partner Robert Gandy, and my friend Daniel Brody. Sometimes in qualitative efforts, the "thick description" can get a bit too thick—but these two never wavered in their determination to support me.

Finally thanks to *Amanda Davis*, the graduate adviser from the School of Environmental and Forest Sciences. There was no part of my time in the program that was not aided immeasurably by her consistent and thoughtful support to me and every other graduate student. How anyone gets into, moves through, and graduates from the School without her is beyond me.

Dedication

This thesis is dedicated to the Forest Stewards of the Green Seattle Partnership— you ecologists and organizers, with dirt under your fingernails, shovels in your garage, and flyers pouring from your printers, with your sore muscles and strong friendships, with your big visions and little budgets, you sew the seeds of sustainability.

Introduction

Exploring Civic Stewardship, Adaptive Capacity, and Participation in the Green Seattle Partnership

The city of Seattle's landscape of urban natural areas provides a myriad of social and ecological services (American Forests 1998), but many of Seattle's forested parks are experiencing a serious decline in biodiversity and ecosystem function due to the predominance of invasive species (SUNP 2004). Without a focused intervention to change these ecological dynamics, Seattle's urban natural areas will degrade rapidly over the next decades (GSP 2005)—resulting in an “evergreen city” missing its forest canopy. In response, dozens of community groups have begun to steward their neighborhood parks—pulling ivy and planting trees in an effort to restore these natural areas. Public agencies have recognized and aided this effort with technical assistance and support, and a network of non-profit organizations has grown to provide research, training, and funding for urban ecological restoration (GSP 2005). These collaborative efforts have formalized into the Green Seattle Partnership, with an ambitious goal of restoring 2,500 acres of forested parkland by 2025.

This thesis reports on a study performed in partnership with key stakeholders from the Green Seattle Partnership, undertaken to (1) assess the degree of and potential for shared understanding among the Partnership's many constituencies, and (2) provide recommendations to strengthen its capacity for adaptive management. This chapter serves to introduce the theoretical and case-specific background necessary to understand the context of the study, as well as to summarize the study's objectives. It also provides a roadmap to the remaining chapters.

THEORETICAL AND CASE-SPECIFIC BACKGROUND

This study builds on an immense body of academic work, but it is also situated in the practical experience and needs of the Green Seattle Partnership. Below, the formative academic and practical themes and the case-specific background necessary for understanding the study are explored in more detail.

Formative Themes of the Study

Three key themes loom large throughout the study—the growth of *collaborative stewardship*, the necessity of *adaptive approaches to ecosystem management*, and the role of *participatory research*

paradigms. The forthcoming literature review in *Chapter One* explores the specific dimensions of research and practice that inspired this study. However, these formative themes are introduced below:

- **Collaborative Stewardship.** The rise of community-based environmental stewardship in Seattle parallels larger trends in natural resource management, where collaboration with community stakeholders has become a common strategy to “address increasingly complex environmental problems” (Koontz *et al.* 2004: 19). Research has documented the growth of these community-based ecosystem management efforts nationwide in both rural (Weber 2000) and urban (Svendsen and Campbell 2008) areas. These efforts “may be an effective and viable strategy for ecosystem management” (Wolf *et al.* 2011: 4, citing Svendsen and Campbell 2008 and Andersson *et al.* 2007).
- **Adaptive Approaches to Ecosystem Management.** As researchers and practitioners have come to grasp the immense complexity inherent in collaborative management of social and ecological systems, they have begun to call for adaptive approaches to natural resource management. These researchers and practitioners advocate for “an explicit focus on linking collaborative efforts with systematic learning. Learning involves the collaborative or mutual development and sharing of knowledge by multiple stakeholders, and feeds directly into the development of capacity for adaptation by individuals and social collectives” (Armitage and Plummer 2010: 12).
- **Participatory Paradigms of Research.** Participatory approaches to research—what Fortmann (2008) calls “doing science together”—facilitate “the creation of a community of learning in which scientists and community members from different backgrounds work collectively to investigate a problem in a deliberative way” (Ballard and Belsky 2010: 612). The utility of participatory paradigms for this research stems from the nature of the research problem; as Ashby (2003) notes, “[r]esearch for participatory resource management requires, but is not limited to, the use of participatory methods” (9).

This study employed a participatory methodology to explore the potential for adaptive management in one specific collaborative stewardship effort—the Green Seattle Partnership.

The Green Seattle Partnership: a Collaborative Response to Urban Forest Decline

Ecological restoration in Seattle’s urban forest began when community organizations noted the decline of their beloved urban natural areas and mounted neighborhood-based responses in the early 1990s.

More than a decade passed before the City of Seattle, prompted by startling new scientific research by the Seattle Urban Nature Project (SUNP 2004), adopted restoration of urban natural areas as a citywide goal. In 2005, the City, alongside Forterra (formerly the Cascade Land Conservancy), formalized this restoration strategy as the Green Seattle Partnership (hereafter, “GSP”).

GSP is “dedicated to promoting a livable city by re-establishing and maintaining healthy forested parklands. ...It is the largest urban forest restoration effort in the nation” (GSP 2005: 6). The development of GSP included the creation of a formalized and centralized institutional structure depicted in Figure 1.

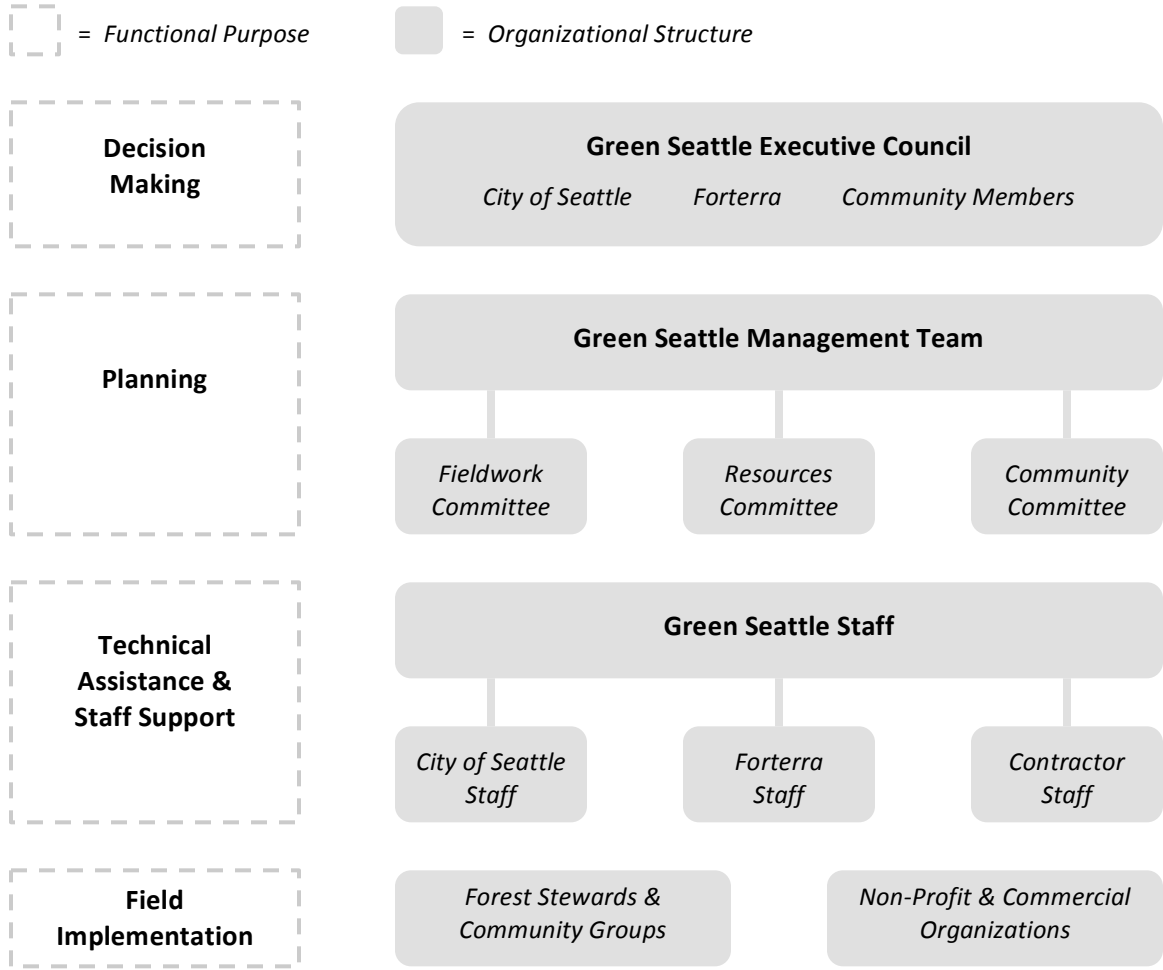


Figure 1: Structure and Function in the Green Seattle Partnership.

Adapted from GSP 2005.

However, the community organizations and neighborhood groups who spearheaded restoration are still at the heart of the effort. The entrance of major institutions such as the City and Forterra has brought a citywide vision and significant new resources to the work, but the strategy still relies on community groups for the bulk of restoration efforts—the pulling of ivy, digging of blackberries, and planting of trees. Thus, GSP provides support to these community groups in a variety of ways, including:

- **Resources.** GSP provides access to tools and plants—two of the more expensive aspects of ecological restoration;
- **Expertise.** GSP staff partner with community groups for site visits, planning, and design; and, most importantly for the purposes of this research:
- **Training.** GSP trains a cohort of *Forest Stewards*—members of each community group that serve as liaisons between their community and GSP, and are charged with coordinating restoration efforts at specific parks throughout the city.

This study focuses on *Forest Stewards*, because they are at the nexus of GSP. The work they undertake, and the processes they use to do so, will determine the ultimate success of GSP and the destiny of Seattle’s urban forest.

RESEARCH OBJECTIVES AND RESEARCH QUESTIONS

Because of the structural nature of GSP, there is both a “grassroots” element (the Forest Stewards and the community groups they represent) and a “grasstops” element (GSP’s executive council and management team). This study sought to *assess and promote shared understanding among these two groups in order to build capacity for adaptive management.*

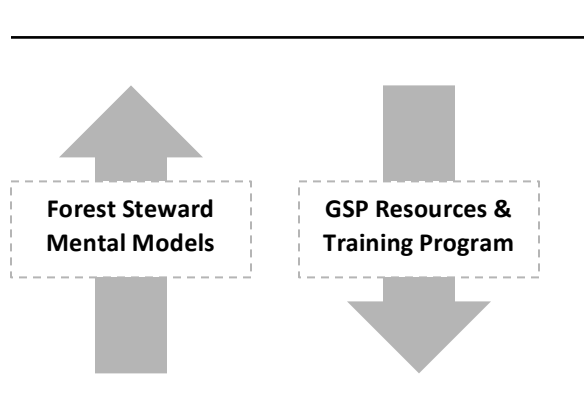


Figure 2: *Two Sources of Understanding in GSP.*

Forest Stewards bring their own unique understanding to the work they do—a “bottom-up” source of knowledge represented by their *mental models*. Additionally, GSP brings its formalized, landscape-scale understanding—a “top-down” source of knowledge that it imparts through the provision of resources, expertise, and training. These two sources of understanding are represented in Figure 2.

Based on empirical evidence from other adaptive and collaborative environmental management efforts (McLain and Lee 1996), the degree to which these two sources of understanding overlap may impact the success of the project. Put another way: while program managers at GSP have a comprehensive vision, it is Forest Stewards and their volunteers that are actually carrying out the work to realize this vision; are these stakeholders all on the same page?

In order to *assess the degree of and potential for shared understanding* among GSP participants, this study asked two related questions, depicted in Figure 3.

Figure 3: *Research Objective and Research Questions*

Research Objective: To assess the degree of and potential for shared understanding among GSP participants in order to strengthen the capacity of GSP to use adaptive approaches to environmental management.

Research Questions:

1. *What are the mental models of ecological restoration held by Forest Stewards?*
2. *To what extent do Forest Stewards' mental models of ecological restoration reflect the Green Seattle Partnership's framework for ecological restoration?*

In answering these questions, this study takes two concrete steps toward building this shared understanding:

- First, it provides a **comprehensive, qualitative description of Steward mental models**. This study brings to light, for the first time, Forest Stewards' own conceptual understandings of ecological restoration—documenting mental models at the “grassroots” of the program in order to share these understandings with the program managers at GSP’s “grasstops.”
- Second, it provides an **assessment of Steward reflection of the GSP framework**. This study assesses the extent to which concepts that GSP program managers consider critical to ecological restoration permeate Forest Stewards' models of restoration. It leads to recommendations for improving GSP's program of education and training, in order to promote shared understanding.

A ROADMAP TO THE THESIS

The remainder of this thesis details the study's theoretical and practical underpinnings, its research design and methods, and its findings and larger implications. Though its two research questions are interrelated, the findings for each stand alone as valuable information. Thus, the results for each question form their own chapters, and discussion of insights gleaned from the integration of these two sets of results make up the final chapter. Additionally, the use of participatory research approaches made these findings significantly more robust, so the role played by participation will be reported on throughout the thesis. Each chapter's contents are summarized below.

Chapter One serves as a critical *review of the literature* on the benefits of and risks to Seattle's urban forests, detailing a model of urban forest sustainability and the innovative management practices that GSP uses and seeks to use in its efforts. It also outlines the contours of a vibrant debate about the theories and methods of *community participation in research processes*.

Chapter Two reports on the *research design*—providing transparency about the practical ways participation was undertaken at various stages in the research process of this study; and describing the study's definitions and its sampling, data collection, and analysis procedures. Additionally, it characterizes the sample along several key variables, and describes the limitations inherent in the study. The chapter also references a variety of data collection and analysis instruments used in the study and attached as appendices.

Chapter Three lays out the results of research undertaken to answer *Question 1*, describing in detail the three components of Steward mental models—Steward perceptions of their sites before restoration, Steward perceptions of their sites after restoration, and Steward perceptions of the process of ecological restoration. It concludes with two typologies of Steward mental models: a *Comprehensive Job Description* of Steward efforts, and several *Ideal Types* of Steward mental models.

Chapter Four reports on the results of the research undertaken to answer *Question 2*, describing the collaboratively created *Green Seattle Logic Model*, and reporting how concepts from this model are represented in Steward mental models. It concludes by introducing the *Reflection Score*, a comprehensive measure of how thoroughly GSP's key concepts are present in Steward mental models.

Chapter Five integrates the results of the previous chapters into a series of key findings and recommendations to build shared understanding between the “grassroots” and the “grasstops” of GSP.

Chapter One

Management Practices for Urban Forest Sustainability

Much has been written on the transformative impact of human activity on ecosystems around the globe (Vitousek *et al.* 1997). Many environmental and social scientists now study human-dominated landscapes as integrated social-ecological systems (Berkes *et al.* 2003)—an acknowledgement that in certain systems, the degree and extent of human impact on the natural environment is so great that these systems cannot be meaningfully decoupled. This is especially true of urban forest landscapes, the social-ecological system of concern to the Green Seattle Partnership (GSP).

This chapter reviews the literature necessary to understand the academic and practical context of this study. It begins with a discussion of the benefits of and risks to Seattle’s urban forest and provides a model of urban forest sustainability. It details GSP’s use of new management practices for urban forest sustainability, including ecological restoration and collaboration, and provides an overview of the academic literature for each. It thoroughly discusses *adaptive approaches to environmental management*, a third management practice that GSP seeks to incorporate. It concludes by outlining the contours of a vibrant debate about the theories and methods of *community participation in research processes*.

URBAN FORESTS AND THE SEARCH FOR SUSTAINABILITY

Urban forests serve as a city’s “green infrastructure,” providing an incredible number of often overlooked ecosystem services (Benedict and McMahon 2006, Bolund and Humhammer 1999). In the Puget Sound region, these services include stormwater filtration, temperature regulation, and air pollution reduction, among many others (American Forests, 1998, Schwab 2009). They also provide a variety of other, less tangible benefits to human communities—with research documenting the role “nearby nature” can play in psychological wellbeing (Kaplan 1995), health and wellness (Pretty and Barlett 2005), civic engagement (Shandas and Messer 2008), and community empowerment (Westphal 2003).

The long-term sustainability of Seattle’s urban forest, however, is threatened by the dominance of invasive species and low rates of native tree regeneration (SUNP 2004). In essence, Seattle’s century-old history of logging resulted in an urban tree canopy consisting of species of similar age and composition,

while the spread of invasive plants has prevented a diversity of tree species and ages from regenerating—meaning that once the trees of the current canopy die, there are few trees underneath to take their place (GSP 2005). The result of a “business as usual” management approach will be long-term decline of Seattle’s urban forest.

In search of management approaches to stem the decline of Seattle’s urban forest (Mead 2010), resource managers at the City of Seattle adopted a model of urban forest sustainability developed by Clark *et al.* (1997). The model calls for resource managers to broaden their perspective—to see the forest and the trees—by focusing not merely on plants but also on the three areas described below:

- **The Vegetative Resource.** “The engine that drives urban forests” (21) is, of course, the plant species of which it is composed. Sustainable urban forests require “a mix of [plant] species, sizes, and ages that allow for continuity” (21-22).
- **The Community Framework.** Long-term sustainability of the urban forest will require “all parts of the community [to] share a vision for their forest and act to realize that vision” (22).
- **Resource Management.** Sustainable urban forests require a resource management apparatus up to the task of stewardship of the vegetative resource and engagement of the community.

With the founding of GSP, the City put this model to work—transforming its resource management apparatus and engaging the community to work toward urban forest sustainability by adopting new management practices of *ecological restoration* and *collaborative stewardship*. The following pages introduce some of the academic literature related to the new management practices put into use via the establishment of GSP, and situate each of these management practices within the model of urban forest sustainability.

Management Practices for Urban Forest Sustainability: *Ecological Restoration*

The first management practice in use by GSP to sustain the urban forest is *ecological restoration*. Restoration is generally considered a relatively young field in natural resource management, with its origins stemming from Aldo Leopold’s efforts to restore tall grass prairies in the Midwest (Callicott 2000). However, as Palmer *et al.* (2006) note, “[e]cological restoration has been practiced in some form for centuries. For instance, many indigenous people tended lands to sustain natural ecosystem services, such as production of basket-weaving materials, food crops, or forage for game animals” (1).

The most common use of restoration as a management strategy is in response to disturbance to an ecosystem—and the Society for Ecological Restoration defines the practice as “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (SER 2004: 3). In some cases, restoration implies an attempt to bring a site back to some historical condition (Egan and Howell 2001), often defined in the North American context as pre-European settlement. In other cases, restoration implies an attempt to strengthen the ecological function of an ecosystem, with less regard to its history (Falk *et al.* 2006). Finally, for some the purpose of restoration is to retain or enhance ecosystem services and the stock of natural capital they represent (Aronson *et al.* 2007).

GSP is embracing the use of ecological restoration—in place of its prior management approach based on the notion that “natural areas take care of themselves” (GSP 2005: 17)—and has set general restoration goals based on extensive assessment of its forests (EarthCorps 2010). The use of restoration as a management practice has transformed the relationship between the Vegetative Resource and Resource Management spheres of Clarke *et al.*'s (1997) model of urban forest sustainability—creating an imperative for more active management of the vegetative resource.

Management Practices for Urban Forest Sustainability: *Collaborative Stewardship*

The second management practice in use by GSP to bolster the prospects of urban forest sustainability is *collaborative stewardship*. In general, collaborative approaches to governance bring together public agencies, community groups, and other stakeholders to “create a shared vision and joint strategies to address concerns that go beyond the purview of any particular party” (Chrislip *et al.* 2010: 5).

Collaborative approaches to environmental problems have come into favor among many public agencies in recent years, marking a general increase in the role of public participation in environmental management (Dietz and Stern 2008), especially related to natural resources policy and planning (Koontz *et al.* 2004). Weber (2000) terms this emerging form of environmental governance “grassroots ecosystem management” or GREM, and succinctly describes its unique elements:

Emerging in the late 1980s and early 1990s, the GREM movement believes that win-win-win outcomes are possible relative to the gridlocked and often ineffective status quo in public lands management. It adopts a cross-cutting, holistic (ecosystem) approach to policy by seeking to meld nature together with economy and community. It seeks to devolve significant authority to local, place-based alliances (networks) of affected stakeholders from the community and relevant federal, state, and local agencies (238).

This form of collaborative environmental management has been profiled extensively in academic literature.

Another manifestation of collaborative environmental management that has received comparatively less attention in scholarly literature is what Wolf *et al.* (2011) term “civic environmental stewardship” and what this study terms *collaborative stewardship*—the hands-on engagement of citizens and community groups in stewardship of natural resources (Brinkley 2010). While seldom acknowledged, these efforts at civic stewardship can have important localized impacts on the urban environment (Svendsen and Campbell 2008). The expanded reach of community-based stewardship of the environment has even caught the attention of the National Research Council, who wrote recently that “[i]n the United States, citizens engage directly in environmental stewardship through a host of watershed councils and ‘stream teams,’ through ‘bucket brigades’ that monitor air quality, through land trusts and forest councils, and in dozens of other ways” (Dietz and Stern 2008: 10).

By devolving so much control and so many resources to individual, park-based stewardship groups, GSP has embraced collaborative stewardship as a management practice for urban forest sustainability. This use of collaboration has transformed the relationship between the Resource Management and Community Framework spheres of Clark *et al.*'s (1997) model of urban forest sustainability, bringing community members actively into the management apparatus for the first time.

Management Practices for Urban Forest Sustainability: *Adaptive Management*

GSP seeks to bolster its current, limited use of adaptive management, and the broader purpose of this study is to increase the capacity of GSP to manage adaptively. Below, this literature review explores the theory and practice of adaptive management in some detail—describing its basic premises and definitions, and the important influence of institutions and individuals in determining its success.

As researchers and practitioners have come to grasp the immense complexity inherent in collaborative management of social and ecological systems, they have begun to call for adaptive approaches to natural resource management. These researchers and practitioners advocate for “an explicit focus on linking collaborative efforts with systematic learning. Learning involves the collaborative or mutual development and sharing of knowledge by multiple stakeholders, and feeds directly into the development of capacity for adaptation by individuals and social collectives” (Armitage and Plummer 2010: 12).

By moving their efforts toward more adaptive approaches, GSP is responding to a call to advance the concept of adaptive learning in collaborative urban forestry. The emphasis on adaptive learning was

identified through a participatory needs assessment documented in Wolf and Kruger (2010), who point to “the importance of policy and planning that is informed by science,” but note that there are “few specifics about the iterative transactions between human systems and landscape outcomes that must take place” (40). Similarly, Dwyer *et al.* (2002) argue for urban forestry research to create knowledge “to support collaborative and adaptive management” (234).

Premises of Adaptive Management

Adaptive management was introduced to natural resource management in Holling’s (1978) seminal text, *Adaptive Environmental Assessment and Management*. Since that time, researchers and practitioners have distilled the following basic premises on which adaptive management is based:

- *The natural world—and our interaction with it—is marked by complexity, uncertainty, and risk* (Lee 1999, Walters and Holling 1990).
- *Despite this uncertainty, managers must still act.* Sometimes the risk of not acting is worse than the risk of acting with only imperfect information (Lee 1993).
- *By utilizing adaptive management strategies, managers can turn management actions into learning opportunities to reduce subsequent uncertainty* (Stankey *et al* 2005, Stankey *et al* 2003).

The specific practical details of adaptive management cycles differ by context, but they share an iterative process of learning by doing, involving linked stages of planning, acting, monitoring, and evaluating. However, there are at least three major conceptions of adaptive management as it is studied and practiced.

The first is a narrow definition that many researchers—but relatively fewer practitioners—have coalesced around: the belief that “formal methods of scientific inquiry, based on hypothesis testing, represent the most effective and efficient means of acquiring new knowledge” (Stankey *et al* 2005: 33). These researchers promote the use of models and hypothesis testing (Schreiber *et al* 2004) as essential to adaptive management, agreeing that “[s]cience contributes the engine for learning to adaptive management; without science, adaptive management becomes unreflective operations uninformed by rigorous examination” (Graham and Kruger 2002: 2).

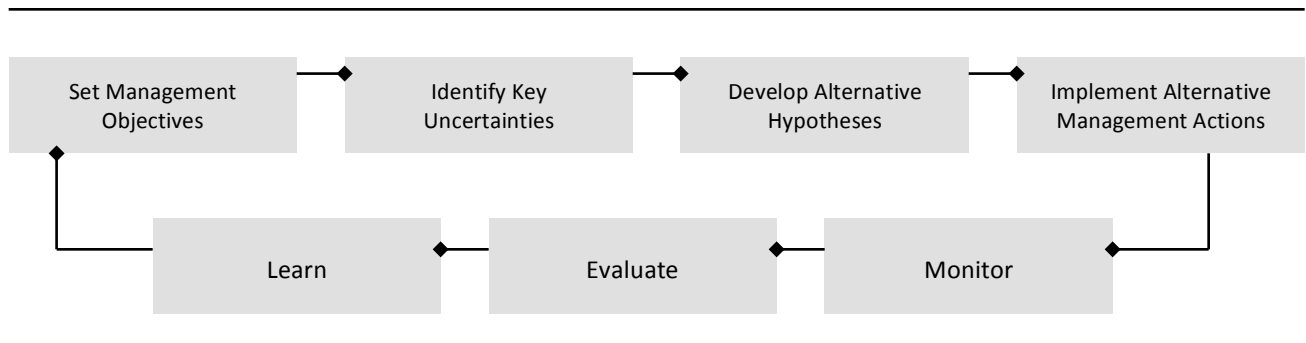


Figure 4: *The Formalized Adaptive Management Cycle*

This formalized adaptive management has come to mean more than trial-by-error, which Gunderson (1999) termed the “default model for learning” (35). Rather, in this conceptualization, true adaptive management cycles—displayed in Figure 4—mirror the scientific research process as much as traditional management or policy processes. The adaptive management cycle begins with setting management objectives and identifying the key uncertainties relevant to scientists and managers. Next, it involves developing alternative hypotheses for the uncertainty, and developing several possible management actions; essentially, each action is believed to advance toward the outcome *if* its associated hypothesis is correct. These actions are implemented, but coupled with rigorous scientific monitoring. The progress each management action makes toward the goal is evaluated, and the result is new knowledge that reduces uncertainty and guides future management actions.

Other researchers and practitioners argue that other forms of knowledge, including traditional ecological knowledge and local and informal knowledge, have an important role to play as well. Proponents of these “qualitative approaches to adaptive management” note that there are “two ways of knowing, scientific ecology and Traditional Ecological Knowledge,” and that these different methodologies “are potentially complementary” (Berkes *et al* 2000: 1259). Stankey and Schindler (1997) note that “a more cooperative (and collaborative) approach to knowledge that sees personal or experiential knowledge as rich, relevant, complementary, and the source of insight that verifies or challenges scientific understanding will likely prove beneficial” (9) to adaptive management.

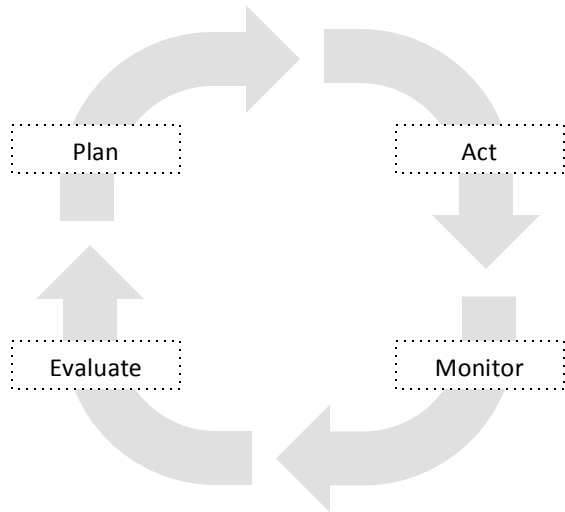


Figure 5: *The Informal Adaptive Management Cycle*

The final, more informal definition of adaptive management encompasses a much broader range of practices. This conceptualization understands adaptive management as any institutional practice that facilitates an iterative cycle of planning, action, and purposeful evaluation, depicted in simplified form in Figure 5. This definition draws from literatures and institutional practices as broad as total quality management, organizational learning, performance management, and participatory action research (Bormann *et al* 1999, Yorks

and Marsick 2000), and does not insist on the primacy of scientific information in the process.

Institutional Determinants of Adaptive Management

Despite the simplicity and elegance of the premises of adaptive management, most observers agree that “adaptive management has been more influential, so far, as an idea than as a practical means of gaining insight into the behavior of ecosystems utilized and inhabited by humans” (Lee 1999: 1).

There are several critical factors that contribute to the lack of widespread and effective incorporation of adaptive management practices into natural resource management in general or restoration in particular. First, many institutions do not develop and sustain the capacity necessary to learn and adapt. Researchers have found that “one of the key barriers to effective use of adaptive management” is the lack of “flexible institutions capable of monitoring, evaluating, and taking corrective action” (McLain and Lee 1996: 437). Studies have distilled several critical attributes of adaptive institutions, including:

- **Commitment to knowledge acquisition.** Adaptive institutions must demonstrate a commitment to the creation of knowledge, despite its opportunity costs. “[T]he monitoring and evaluation effort needed” to perform adaptive management “has proved costly and controversial” (McLain and Lee 1996: 444). Managers must choose between spending limited resources on learning objectives or on management objectives—and the culture of the institution will affect this decision.

- **Structures to enhance information flow.** Adaptive institutions must utilize processes to share information between the large diversity of relevant stakeholders. Adaptive management processes often involve, at a minimum, scientists from various disciplines, front-line resource managers, and decision- or policy-makers. They often include resource users, collaborations of public and private institutions, and members of the general public. Adaptive institutions include structures to ensure that information garnered in any one of these sectors is shared with the others.
- **Learning forums for shared understanding.** Adaptive institutions must promote a shared understanding of information among stakeholders, often through the use of learning forums. On its own, scientific information is merely a series of 1s and 0s in a spreadsheet, and not readily usable for managers. Adaptive institutions provide opportunities for scientists, managers, and other stakeholders to collectively evaluate and provide meaning to scientific data. This shared understanding helps “foster the sense of collective responsibility that is needed to convince relatively autonomous stakeholders to engage in long-term, collective action” (445).

Mental Models and Individual Determinants of Adaptive Management

To implement effective adaptive approaches, GSP must work on three landscapes: the very visible terrain of the natural resource being managed, the bureaucratic topography of the institutions charged with management, and the hidden contours of the human minds engaged in management.

Much research on adaptive management has focused on the institutional determinants described above, while comparatively little attention has been paid to the ways that individual scientists, policymakers, and practitioners impact adaptive management processes. Graham and Kruger (2002) probe the key role played by individual scientists—and the ways in which those individuals’ culture and perceptions influence the process. Researchers in the fields of both environmental psychology and organizational learning have explored the role of mental models in impacting how people behave related to environmental management.

Mental models are “cognitive representations of external reality” (Jones *et al.* 2011: 46), mental abstractions that unconsciously individuals create to make sense of a complex world, and through which they filter new information. A significant amount of research over several decades has explored the concept of mental models in general (see, for example, Craik 1943 and Johnson-Laird 1984), as well as

how they relate to natural resource management (see, for example, Mathevet *et al.* 2011 and DuToit *et al.* 2011). Additional research has tested a variety of methodologies for eliciting and comparing mental models, described in more detail in *Chapter Two*.

Because people’s mental models “provide the mechanism through which new information is filtered and stored” (Jones *et al.* 2011: 46), they

exert significant influence over both how new information is understood and whether or not that information will impact behavior...Effective communication and education require an understanding of people’s existing cognitive maps so that information may be framed in a way that encourages people to notice and integrate the new information rather than ignore or reinterpret it (Kearney and Kaplan 1997: 580-581).

Given the critical role of shared understanding in adaptive management, the influence of individual people’s mental models and cognitive understanding on the efficacy of adaptive approaches is likely quite high. Therefore, many practitioners have been intentional about “managing mental models—surfacing, testing, and improving our internal pictures of how the world works,” a practice that Senge (1990) contends will offer “a major breakthrough for building learning organizations” (163).

SUMMARY: BUILDING CAPACITY FOR ADAPTIVE MANAGEMENT

GSP uses a variety of innovative management practices in its efforts to sustain Seattle’s urban forest, including ecological restoration and collaborative stewardship. This chapter has reviewed critical literature on each of these management practices, as well as detailed the literature on adaptive management—a third practice that GSP seeks to incorporate into its managerial toolkit. The objective of this study is to build the capacity of GSP to use adaptive approaches to management. As detailed in *Chapter Two*, it worked toward these objectives by undertaking research for shared understanding through elicitation of mental models of critical stakeholders.

POSTSCRIPT ON PARTICIPATION: A “RISKY INTERFERENCE” IN THE RESEARCH PROCESS

In addition to the academic literature described in above, this research derived much of its inspiration from the purposeful participation of stakeholders from the GSP community. This postscript outlines the contours of a vibrant debate about the theories and methods of community participation in research processes, and then details the role participation played in this study.

While the need for some level of public participation in environmental decision-making has become widely accepted (Dietz and Stern 2008), for many the participation of non-scientists in objective

research processes is a bridge too far. “[T]he idea of uniting science and participation,” writes Ashby (2003), “seems at worst a messy, and even risky, interference by lay people in the domain of experts, complicating controlled experimentation and throwing scientific standards into question” (16).

Despite the risk, the researcher elected to draw from the literature on and practice of participation in the study because of the nature of the research problem; as Ashby (2003) notes, “[r]esearch for participatory resource management requires, but is not limited to, the use of participatory methods” (9). In addition, the researcher also believed the GSP community could benefit from a participatory approach; as Kruger and Sturtevant (2003) note, participatory approaches have “particular value [in] developing within all participants a greater consciousness of environmental and social conditions” (24; for an empirical example of these benefits from participatory work, see Ballard and Belsky 2010). Because of the empirical need for and potential benefits of a participatory research approach, this research was also informed by the following literature on participation.

Theories and Realities of Participation

Participatory approaches to research draw from a rich history of methodological and epistemological influences (see Wilmsen 2008: 8), from Lewin’s (1948) concepts of participation for *industrial democracy* in the global north to Freire’s (1981) advocacy for participation in *popular education* in the global south. Participatory approaches have gained considerable traction in recent years in medicine (Cornwall and Jewkes 1995) and public health (Israel 2005, Minkler and Wallerstein 2008), leading to a refining of the processes involved in such approaches.

As the need to better understand the relationship between communities and environmental conditions has grown, advocacy for use of participatory approaches to research in the field of natural resources has become more frequent (Kruger and Sturtevant 2003)—leading to the publication of several key guides to participation in natural resources research, including Fortmann (2008), Wilmsen *et al.* (2008), and Pound (2003).

The pages that follow distill this rich literature into a summary of the key theoretical distinctions between participatory paradigms and conventional approaches to research. A series of tables exploring these distinctions are presented and explained below; their content, unless otherwise cited, is adapted from Cornwall and Jewkes (1995), Kruger and Sturtevant (2003), and McDougall and Braun (2003). It is important to note that these distinctions are often clearer in theory than they are in practice. Following the approach other literature on participation has taken, they are depicted below as two dichotomous

paradigms; however, they might be more accurately represented as two ends of a continuum, with most research situated somewhere in between the poles.

Research Objectives in Conventional and Participatory Approaches to Research

The first key distinction between conventional and participatory approaches to research, summarized in Table 1, is the primary objective of each paradigm:

- **Understanding and Generalizability.** Conventional approaches to research generally seek to identify and understand universal laws or principles, and they generally seek widespread adoption of this understanding. These approaches are rooted in positivism, based on the notion that “a single true reality exists and is discoverable by science; it also assumes that universal laws about this reality can be identified and used for prediction and control” (Kruger and Sturtevant 2003: 25).
- **Action and Particularity.** In contrast, participatory approaches to research are generally oriented toward action. This research ideal is rooted in the traditions of John Dewey, who “held that action and knowledge are inseparable, and who sought a stronger democracy through the participation of all levels of society” (Wilmsen 2008: 5; see also Greenwood and Lewin 1998). Because the aim is improvement of local conditions, what matters is “understanding particularity” (Kruger and Sturtevant 2003: 28)—that is defining and interpreting information in a way that advances local priorities, rather than creating generalizable findings.

Table 1: Research Objectives in Conventional and Participatory Approaches		
	Conventional Approaches	Participatory Approaches
Primary Research Objectives	UNDERSTANDING & GENERALIZABILITY: <i>Enhanced understanding, prediction, and control by discerning general laws or principles.</i>	ACTION & PARTICULARITY: <i>Improvements for sustainable natural resource management at local sites.</i>

The Roles of Scientists and Stakeholders in Conventional and Participatory Approaches to Research

The second key distinction between conventional and participatory research approaches, summarized in Table 2, is the shift in the roles of the scientist of local people:

- **Scientists and Subjects.** In conventional research approaches, building from the positivist paradigm, the scientist is assumed to be “an objective and impartial observer” (McDougall and Braun 2003: 26), who can “study an object without influencing or being influenced by it” (Kruger and Sturtevant 2003: 25). The primary role of local people is to serve as subjects in the research process, who may later incidentally become passive recipients of the research results.
- **Facilitators and Co-Learners.** By contrast, participatory research is “research by and with a community rather than simply for or about a community” (Wulfhorst *et al.* 2008: 23). Participatory research—what Fortmann (2008) calls “doing science together”—“facilitates the creation of a community of learning in which scientists and community members from different backgrounds work collectively to investigate a problem in a deliberative way” (Ballard and Belsky 2010: 612).

	Conventional Approaches	Participatory Approaches
Role of Scientists	<i>Objective and impartial observer who gathers information for diagnosis, planning, and evaluation.</i>	<i>Facilitator and co-learner, active participant in supporting local processes of change.</i>
Role of Local Stakeholders	<i>Subjects, or potentially users who may be passive recipients of the research results.</i>	<i>Local people become researchers, co-learners, and experts and are involved in decision-making at each step.</i>

This new relationship implies a very different job for the scientist in the research process. As Wilmsen (2005) put it, “the professional researcher acts as a facilitator of the research, providing advice and technical assistance” (51). It also implies a new—and more intensive—role for local people, which is why it is “a particularly important approach when there is a need for people to become more knowledgeable stewards of environmental and social conditions” (Kruger and Sturtevant 2003: 29)

Ripples Throughout the Research Process

These two key distinctions ripple throughout the whole of the research process, which in participatory research approaches involves “the participation of key stakeholders alongside scientists in a jointly managed process of investigation and learning” (Ashby 2003). As Cornwall and Jewkes (1995) put it:

the key element of participatory research lies not in methods but in the attitudes of researchers. The key

difference between participatory and other research methodologies lies in the location of power in the various stages of the research process. ...[T]he single most striking difference between participatory and conventional methodologies...lies less in the theories that inform these methodological frameworks or even in the methods they use, but in who defines research problems and who analyses, generates, represents, owns and acts on, the information that is sought (1667-1668).

In conventional approaches, the agenda is set by funding agencies and researcher priorities; the formulation of questions and collection and analysis of data are the purview of the researcher alone; and the findings are presented to and owned by academic bodies, funders, and the researcher. In contrast, in participatory approaches, the agenda is set by local needs and priorities; local people are engaged in formulating questions and collecting and analyzing data; and findings are intended to be locally accessible, locally useful, and owned cooperatively between the researcher and local people.

Participation in Practice

It is important to note that the theoretical distinctions outlined above are idealized comparisons. Implementing fully participatory research projects—following these lofty ideals of participation—is difficult in many cases and impossible in some. This difficulty stems from many sources, including the reluctance of scientists, policymakers, and participants to fully buy-in to participation (Barreteau 2010), “institutional biases against adopting participatory approaches” (Wilmsen and Krishnaswamy 2008: 51) in research institutions, and the added cost in time, resources, and relationships that participation requires (Erickson 2010).

As a result, many studies that aim toward participation—including this one—will, in reality, fall short of the ambitious bar set by ideal participatory research standards. Researchers will include participatory elements at some stages of the research process, but retain more traditional approaches at other stages; thus, in many cases, “the relationship between traditional and participatory research is often confusing, the lines between them blurred” (McDougall and Braun 2003: 20).

Criteria to Navigate the Confusion

To guide researchers seeking to find a place for participation in their work, Wulforth *et al.* (2008) created three evaluative criteria for participatory studies, based on more than a decade of experience with participatory research practice through the Community Forestry and Environmental Partnerships Program. These criteria are introduced below, and in *Chapter Five* used to evaluate the role of participation in this study; they are:

- **Community-Centered Control.** The extent to which power over the research process is shared between scientists and local people is central to participatory research. Studies that aim toward participation must “engage the community as a partner in the ownership and control of decisions, answers, and processes through the facilitation of continued community involvement throughout the research process” (31).
- **Reciprocal Production of Knowledge.** The extent to which the research process creates knowledge that is useful to local people as well as to academic audiences is critical to participatory research. Studies that aim toward participation must “fulfill community goals, as well as those of the research-oriented individual or organization” (35).
- **Translating Knowledge into Action.** The extent to which the research process translates its findings into useful action to improve communities and the environment is central to participatory research. Studies that aim toward participation must be oriented toward action, as “generating and discovering knowledge in communities makes little practical sense if that information is not also put to use for social change in the form of practical outcomes” (39).

An attention to these criteria has guided the research process as much as has the other theoretical literature cited above. The following chapters detail the study’s research design and methods, findings, and recommendations, and the transformative imprint of stakeholder participation looms large in each of these areas.

Chapter Two

Research Design and Methods

OVERVIEW: METHODS FOR ASSESSING SHARED UNDERSTANDING

The purpose of this study was to characterize the mental models of Stewards and to determine the extent to which these models contained (or, in the language of this study, “reflected”) GSP’s framework for ecological restoration—all in order to promote a shared understanding between GSP constituents. This chapter provides detail on the methods used to accomplish these objectives.

This chapter reports on the *research design*, beginning with a discussion of the role *participation* played, and including the study’s *definitions* and its *sampling, data collection, and analysis procedures*. Additionally, it *characterizes the sample* along several key variables, and describes the *limitations* inherent in the study. In the spirit of research transparency, it references a variety of data collection and analysis instruments used in the study and attached as appendices.

THE ROLE OF PARTICIPATION IN THIS STUDY

Stakeholder participation at critical junctures of the research process had a profound impact on the study, and so it is important to clearly identify how participation occurred at the outset of a description of the study’s design and methods. The pages below describe the stakeholders involved and the extent of their involvement.

Figure 6: Members of the Community Committee

City of Seattle Parks and Recreation

- Rory Denovan, Plant Ecologist
- Michael Yadrick, Plant Ecologist

Cascade Land Conservancy

- Ara Erickson, (former) Green Cities Program Manager
- Joanna Nelson de Flores, Green Seattle Partnership Project Manager
- Weston Brinkley, Green Cities Research Analyst

EarthCorps

- Ella Elman, Ecologist
- Nelson Salisbury, Ecologist

Defining the “Community” in Community-Based Participatory Research

The “community” at the heart of this study was the members of the Green Seattle Partnership—from the Forest Stewards and their volunteers at the “grassroots” level to the program managers from the City, Forterra, and EarthCorps at the “grasstops.” However, the participatory elements of the research involved only the program managers—hereafter referred to as “GSP stakeholders.” A Community Committee,

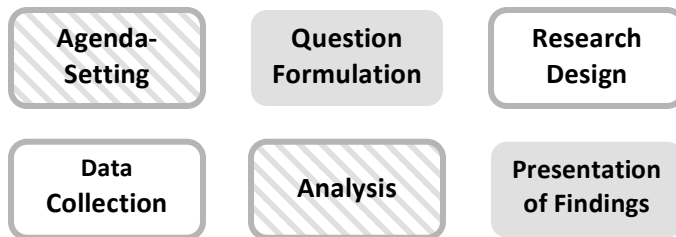
comprised of these GSP stakeholders, participated at various stages of the research, and its members are named in Figure 6.


Situating Participation in Specific Research Stages

While this study incorporated substantial elements of participation, the degree of participation differed at each stage of the research process:

- The researcher took charge of *agenda-setting*. Once committed to studying the GSP, based on initial consultation with GSP stakeholders the researcher narrowed the universe of possible themes to one: adaptive management. However, this topic itself derives from Wolf and Kruger’s (2010) participatory research needs assessment described above—meaning that this theme had been identified by similar community-level practitioners as worthy of exploration. In this way, this study utilized both conventional and participatory approaches.
- The process of *formulating questions* involved significant participation by GSP stakeholders. The Community Committee collaboratively identified specific priorities within the frame of adaptive management—in this case, the focus on shared understanding between all parties. This occurred through a series of iterative conversations and formal check-ins with members of the Community Committee over more than a year as the research was developed and planned.
- The researcher developed the *research design*. Likewise, *data collection* was led by the researcher with little truly participatory input from GSP stakeholders or from research participants. Rather, these elements of the study were developed in consultation with an academic adviser and a thesis committee, based on standard social science protocols.
- The *analysis* process was completed in two stages. First, the researcher completed initial analysis of the data (including coding and development of typologies). Then, in the spirit of “utilization-focused” (Patton 2008) research, the larger lessons and recommendations that emerged from this analysis were developed in conjunction with the Community Committee. To do this, the researcher engaged GSP stakeholders in discussion and analysis of initial results at a Participatory Analysis Workshop that took place in March 2012. This allowed the researcher to inform the larger lessons and recommendations unearthed by the study with the understandings of the key stakeholders to whom they are oriented.

- The researcher also committed to an action- and community-oriented *presentation of findings* which includes (1) a practitioner-focused findings and recommendations document in addition to the academic thesis you hold in your hands, (2) a workshop with Forest Stewards to present



 = Conventional Element

 = Participatory Element

 = Blended Elements

findings and recommendations, and (3) ongoing conversations with members of the Community Committee to translate the research into actionable information.

These stages, and the degree of participation used in each, are summarized in Figure 7. The role of participation in the entire study is evaluated and discussed further in a postscript in *Chapter Five*.

Figure 7: Participation and Convention in the Research Process

RESEARCH DESIGN

This study used several qualitative and participatory research methods for the purpose of “surfacing” (Senge 1990: 163) the mental models of ecological restoration of Forest Stewards, for creating a GSP framework, and for assessing the extent to which Steward models reflect concepts from that framework. The study’s research design is described in detail in the following pages.

Defining the Unit of Analysis: What is a Mental Model?

Building on a variety of other research using the concept of the mental model as applied to natural resource management (Jones *et al.* 2011), this study defines mental models as “the cognitive representations of the world that frame how people interact with the world” (Mathevet *et al.* 2011: 43). Mental models serve as the schema or framework through which individuals interpret information, the “knowledge structures embodying people’s assumptions, beliefs, ‘facts,’ and misconceptions about the world” (Kearney and Kaplan 1997: 580).

To operationalize this broad definition, for the purposes of this study a *mental model of ecological restoration* is composed of a Steward’s conceptualization of the state of her site before ecological restoration, the processes of ecological restoration she undertakes at her site, and the state of her site after ecological restoration is completed. These elements are pictured in the conceptual model depicted in Figure 8 below.

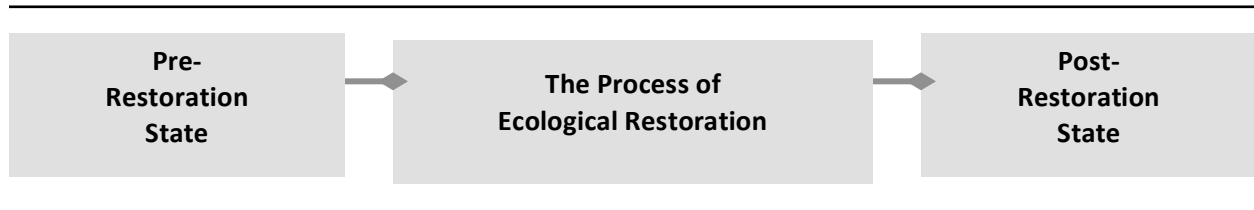


Figure 8: A Conceptual Model of Mental Models of Ecological Restoration

Sampling Procedures

This study sampled participants from the larger population of Forest Stewards participating in the Green Seattle Partnership. In 2011, the total population of GSP Forest Stewards numbered around 150 (Nelson de Flores 2011). The only criterion for inclusion was that the participant was currently enrolled as a Forest Steward—meaning they had gone through GSP training and were assigned stewardship duties at a specific park or parks.

Sampling procedures were limited by privacy issues. Due to privacy policies, GSP stakeholders were not able to share names and information of the Forest Steward population for random or more purposeful sampling. Therefore, this study used *convenience sampling* within the Steward population, recruiting for participation using the following process:

- The researcher provided a recruitment email to the GSP stakeholder that works most directly with Stewards. The text of this letter can be seen in Appendix 1a.
- This GSP stakeholder sent the email to a Forest Steward listserv, recruiting Stewards for participation. Additional information was provided to interested Stewards. The text of this information can be seen in Appendix 1b.
- Willing participants signed up for the study using an online portal, the text of which can be seen in Appendix 1c. The researcher attempted to interview all recruited Stewards.

This process resulted in a sample of 17 Stewards out of a total population of around 150 Stewards (Nelson de Flores 2011), or around 11% of the total population. An in-depth characterization of the sample can be found in later in this chapter.

Data Collection

This study used conceptual content cognitive mapping (3CM), a technique proposed by Kearney and Kaplan (1997), to elicit the mental models of Stewards.

Eliciting Mental Models Through Conceptual Content Cognitive Mapping

A variety of techniques for eliciting mental models are available to researchers in the natural resources field. For example, the Actors, Resources, Dynamics, and Interactions (ARDI) method—used by Mathevet *et al.* (2011) and Etienne *et al.* (2011) to elicit stakeholder mental models in a participatory fashion—asks participants to systematically identify the key concepts of the system. Researchers also use a variety of techniques for indirect elicitation of mental models; for example, Carley and Palmquist (1992) extracted mental models from textual evidence, including documents and interview transcripts.

This study adopted the 3CM method because it has been used in natural resources research in a variety of similar contexts (see Kearney *et al.* 1999, Kearney and Bradley 1998, and Lee and Kant 2006 for examples). Additionally, as Kearney and Kaplan (1997) note, “experience with the 3CM technique supports the claims that it is a valid measure of cognitive structure and provides the type of environment that permits people to make contact with their knowledge and express it effectively” (599).

3CM asks participants to “construct a mental representation of the system they interact with” (Arentze *et al.* 2008: 843). By developing representations of participants’ mental models, 3CM creates data that can be analyzed quantitatively and qualitatively to describe the key concepts—and relationships among concepts—that underpin how Stewards understand restoration at their site.

3CM has both structured and open-ended procedures. In structured procedures, participants are given a limited set of concepts and asked to arrange them in a meaningful way. In open-ended procedures, as in Graham and Kruger (2002) or Lee and Kant (2006), participants are invited to create their own concepts through a series of interactive steps. As Graham and Kruger (2002) note, this approach to 3CM treats the method as “an interactive process whereby individuals participate in a reflective conversation to articulate their understanding of critical issues” (17).

The 3CM Procedure

Because this study sought to document mental models in a field—collaborative stewardship—rarely profiled in academic literature (Wolf *et al.* 2011, Svendsen and Campbell 2011) and thus without an extensive case history to create a structured procedure from, an open-ended approach was selected.

Figure 9: The 3CM Procedure at a Glance

Step 1: A Visualization Exercise

- Participants were asked: “I want you to think about your site *before* you began to do restoration work. Tell me about what it looked like, and what was happening there.”
- Next, participants were asked: “Now, imagine your site once it has been restored completely. Tell me about what it will look like then, and what will be happening there.”

Step 2: Identification of Restoration Concepts

- Participants were asked: “Now I’m curious, given the two pictures you just laid out, what is the process of ecological restoration at your site?”
- As the participants identified concepts, the interviewer wrote each one down on separate note card and placed it in front of the participant.

Step 3: Organization of Restoration Concepts

- Participants were asked: “Now, I’d like you to group or organize these concepts according to how you see them. You can draw circles around a group, you can draw lines or arrows between groups or concepts. You can feel free to write down more concepts on other cards at any time.”
- Participants were asked: “Tell me about the arrangement you’ve created.” If they created discrete clusters, they were asked to label those clusters with a short descriptive name or phrase.

This approach is detailed in Figure 9, and the 3CM instrument itself can be found in Appendix 2.

The specific 3CM procedure was pre-tested on two individuals involved in similar stewardship of urban ecological restoration areas, but not through GSP and thus not part of the sampled population. Based on this pre-test, the specific language of the questions was adapted to improve clarity.

The 3CM interviews took place in locations selected by the participants—usually in their homes or in coffee shops in their neighborhoods. The interviews lasted between thirty and sixty minutes, and ended once the participant had finished and explained their cognitive map. Interviews were recorded and subsequently transcribed; Steward maps were likewise transcribed into computerized versions, which can be found in Appendix 3. Collectively, these interview transcripts and computerized maps represent the data that this study created and analyzed.

Data Analysis

For Question 1, this research used inductive analysis of the data resulting from the 3CM process to characterize Steward mental models. For Question 2, this study used deductive analysis (based on a coding scheme derived from participation of GSP stakeholders) on Steward models to determine the

extent to which those models reflected key GSP concepts. For the development of larger lessons and recommendations, this study used a collaborative analysis workshop with GSP participants to highlight indigenous concepts. Each of these processes is described in more detail below.

Question 1: Inductive Content Analysis to Characterize Steward Mental Models

Some forms of analysis of 3CM data involve quantitative assessments—the likelihood that a concept appears in more than one map, for instance (see Kearney and Bradley 1998). Others use qualitative content analysis techniques—often in the form of inductive coding procedures, designed to discover “patterns, themes, and categories in one’s data,” allowing “[f]indings [to] emerge out of the data” (Patton 2002: 453).

For Question 1, this study analyzed the data both qualitatively and quantitatively, in two related phases:

- **Qualitative Analysis.** Following Graham and Kruger’s (2002) lead, this study used a qualitative, inductive approach to content analysis in order to characterize Steward mental models. The process involved iterative analysis of the interview transcripts and 3CM maps using the qualitative analysis software NVivo 9 to identify and categorize repeated concepts, common relationships among concepts, and common emergent themes. This first step in analysis was carried out in a firmly inductive way, without the use of an external coding scheme, in order to capture as accurately as possible the “grassroots” understanding of Steward mental models.
- **Quantitative Analysis.** Several conceptual trends were identified in the qualitative analysis, and additional analysis was performed to understand how these conceptual trends were represented and distributed quantitatively in the sample. Individual concepts (meaning individual note cards with concepts on them) in Steward maps were coded as either *community* or *ecology*, based on the meta-themes that emerged in the qualitative analysis. Then, each Steward’s map was assigned scores based on formulas the researcher developed, depicted below:

$$\text{Steward } N \text{ Ecology Score} = \frac{\# \text{ Ecology Concepts in Steward } N\text{'s Map}}{\# \text{ Total Concepts in Steward } N\text{'s Map}}$$

$$\text{Steward } N \text{ Community Score} = \frac{\# \text{ Community Concepts in Steward } N\text{'s Map}}{\# \text{ Total Concepts in Steward } N\text{'s Map}}$$

If a Steward's map yielded an *Ecology Score* of higher than 0.6 (that is, if more than 60% of her concepts were coded as ecological), she was labeled an *Ecologist*. If a Steward's map yielded a *Community Score* of higher than 0.6 (that is, if more than 60% of his concepts were coded as community oriented), he was labeled a *Community Organizer*. If neither score surpassed .6 nor fell below .4, that Steward was labeled a *Community-Based Restorationist*.

For instance, if a Steward's map contained 25 total note cards (and thus 25 total concepts), and 16 of these concepts were coded as *ecology*, this Steward's ecology score would equal .64, and thus she would be labeled an Ecologist. If a Steward's map contained 9 total note cards, and 7 of these concepts were coded as *community*, this Steward's community score would equal .78, and thus he would be labeled a Community Organizer.

The end product is a rich description of the variety of Stewards' mental models of ecological restoration at their sites that captures both the similarities and differences across the sample, detailed in *Chapter Three*.

Question 2: Deductive Analysis to Determine How Steward Mental Models Reflected GSP's Framework

Analysis to determine the extent to which Steward models reflect GSP's framework for ecological restoration involved the use of a deductive coding scheme—that is, Steward models were closely reviewed for the presence or absence of certain concepts. This process occurred in several steps:

- First, GSP stakeholders were engaged in a participatory process to create a GSP framework for ecological restoration. This iterative process involved a review of key GSP documents, ongoing informal conversations with GSP stakeholders, creation of a draft framework, and a participatory determination that the final product was an accurate representation of GSP's framework. This framework took the form of the Green Seattle Logic Model; it is displayed and described in more detail in *Chapter Four*.
- Next, a deductive coding scheme was developed, using the Green Seattle Logic Model as a guide. Specific codes were created to measure each element of the framework. This coding scheme is attached as Appendix 4.
- The deductive coding scheme was applied to the Steward mental models. Specifically, this study measured the *presence or absence* of codes (and the concepts from the Green Seattle Logic Model they represent) in each Steward's mental model.

- Finally, the researcher used the presence or absence of concepts to calculate the percentage of Stewards whose mental models incorporated the concept, as a measure of how well shared that concept was across the sample of Stewards. This study used the same data to score each Steward according to his or her level of reflection across all GSP concepts. The resulting *Reflection Score* is a measure of the extent to which any single Steward's mental model reflects GSP's core concepts; amalgamated, it can provide a rough estimate of shared understanding across the sample of Stewards. These results are reported in *Chapter Four*.

This approach to analysis served to ensure that the concepts measured were those that mattered to GSP stakeholders, and allowed the study to quantitatively gauge the extent to which these concepts were represented in Steward mental models. The products of this analysis are detailed in *Chapter Four*.

CHARACTERIZING THE SAMPLE

The sampling procedures described above yielded 17 study participants, out of a population of 150, representing approximately 11% of the total population of Stewards. GSP does not routinely track many of the demographic variables we might use to compare the sample of Stewards to the larger population of Stewards, so this study will not be able to directly compare these two groups. Rather, this study will characterize its sample along several key variables, identified by both the researcher and GSP stakeholders as important measures of variability. These variables are:

- **Stewardship Tenure**, which represents the length of time a participant has been enrolled as a Steward in GSP's program. Stewardship tenure was measured in the number of years the participant had served as a Steward, and will be reported as the proportion of very new Stewards, medium-term Stewards, and long-term Stewards (who have served in the program less than two years, two to six years, and more than six years, respectively) represented in the sample.
- **Geographic Distribution** of sites, which serves as a proxy for the geographic distribution of Stewards. Due to the confidential nature of the research, this study will not measure geographic distribution by reporting exactly which Stewards (and which parks) were in the sample. However, it will measure geographic distribution by aggregating the data into the three geographically distinct zones of Seattle: *North* (above the Ship Canal), *Central* (the Ship Canal to

I-90), and *South* (below I-90), and reporting both the number of parks and the number of acres of each zone represented in the sample.

- **Park Size**, which represents the size of the park that a Steward was assigned to work in. Here, it is measured by the number of Stewards assigned to small parks and the number of Stewards assigned to large parks (less than and greater than 5 acres, respectively) represented in the sample.

Steward variation in the sample along each of these three variables is described in more detail below.

Stewardship Tenure in the Sample

Stewards as a whole vary greatly in the length of time they have performed ecological restoration work on their site (Nelson de Flores 2011). Some have served unofficially as Stewards for more than a decade; many Stewards began their work when GSP became formalized in 2005; and more continue to enter the program annually.

It is reasonable to assume that the length of time they have served as a Steward may impact how they understand their work, and it would be desirable to have representation from Stewards of various “age classes” in the sample. The stewardship tenure of the Stewards in the sample is displayed in Figure 10.

The sample included representation from Stewards who have been performing ecological restoration in their parks for more than six years, or before GSP formalized these efforts ($n=5$ or 33%); Stewards that began their work in the last two to six years ($n=8$ or 44%); as well as Stewards who have been in the program less than two years ($n=4$ or 22%).

Thus, the sample is likely to capture a variety of perspectives from along the spectrum of stewardship tenure.

Geographic Distribution in the Sample

Seattle is a city of neighborhoods that often vary greatly in terms of their demographic makeup and in the number of their forested greenspaces.

It is reasonable to assume that the diversity of variables associated with geographic location impact how Stewards understand the work they do. However, gauging directly how well the sample of Forest Stewards represents this geographic diversity is difficult, because GSP does not routinely track or share

information about the location of its Stewards. Stewards usually—though not exclusively—live in the neighborhoods surrounding their parks, so this study tracked the geographic location of the parks that sampled Stewards worked in instead.

The percentage of parks in each zone in the sample, as well as the percentage of park acres in each zone in the sample, is pictured in Figure 10.

The sample included representation from Stewards assigned to parks in the *North* ($n_{\text{parks}} = 4$ or 24%, $n_{\text{park acres}} = 273$ or 39%), *Central* ($n_{\text{parks}} = 5$ or 29%, $n_{\text{park acres}} = 138$ or 20%), and *South* ($n_{\text{parks}} = 6$ or 35%, $n_{\text{park acres}} = 292$ or 42%) zones.

Thus, the sample is likely to capture a variety of perspectives from along the spectrum of geographic distribution.

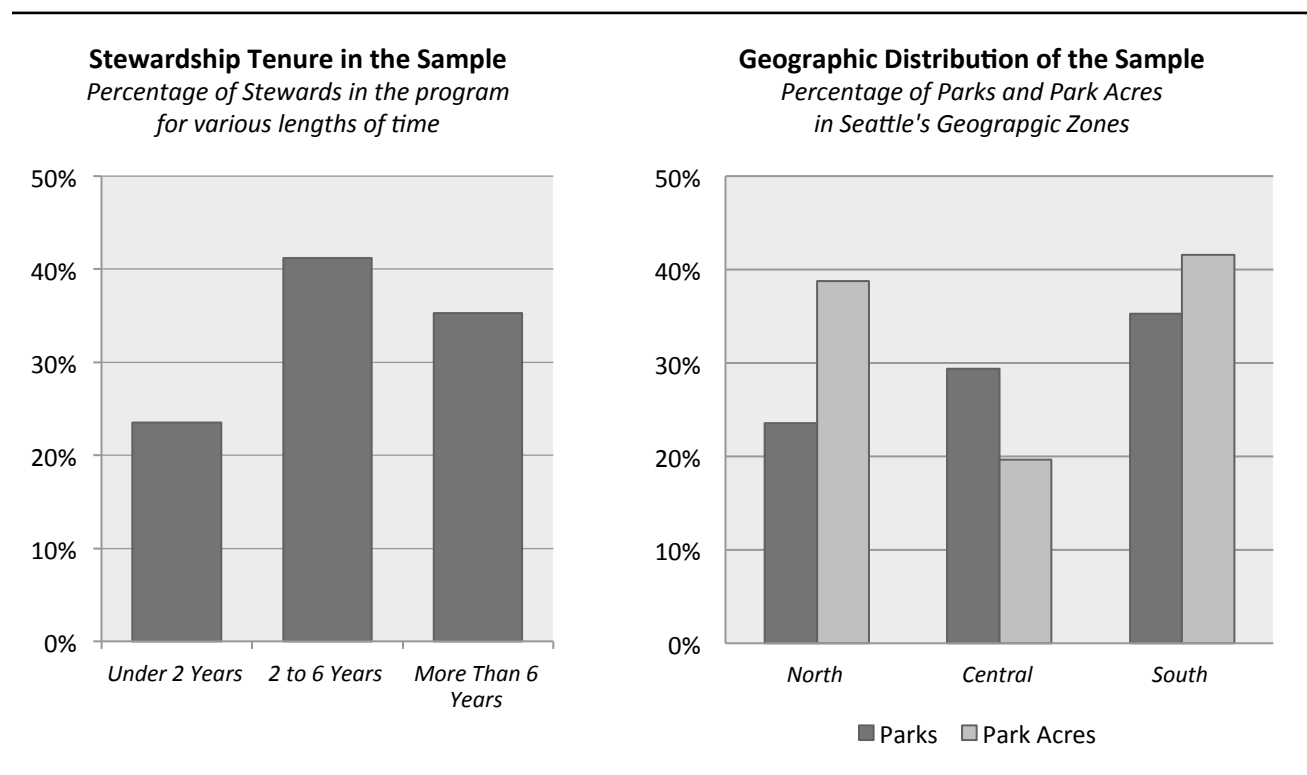


Figure 10: Characterizations of the Sample Along Several Measures of Variability

Park Size in the Sample

Some of Seattle's forested parks are just a few acres, while others are several hundred acres. It is possible that the size of a site under stewardship impacts the mental model of the Steward assigned to

it. Five Stewards in the sample were assigned to parks smaller than five acres, and twelve Stewards in the sample were assigned to parks larger than five acres. Thus, the sample is likely to capture a variety of perspectives from along the spectrum of park size.

METHODOLOGICAL LIMITATIONS

This study faced a variety of limitations due mainly to the real-world constraints of working with stakeholders and participants. These are described below.

Limitations Due to Sampling Procedures

Several key limitations of the study emerged from its sampling procedures:

- First and foremost, the *sample size* was smaller than desired. This was due to constraints on time and on the ability of the researcher to recruit, due to privacy concerns. This study followed the guidance of Patton (2002), who notes that qualitative endeavors can be based on “relatively small sample sizes...selected purposefully,” because “[s]tudying information-rich cases yields insights and in-depth understanding rather than empirical generalizations” (230).
- However, the use of *convenience sampling*—a frequently used technique in much of social science research—is “neither purposeful nor strategic” (242), and its use here represents a limitation.
- Next, in order to accommodate privacy concerns, participants opted-in to the research—meaning they represent a *self-selecting sample*. This may imply some bias, and is a limitation inherent in this study.

The researcher characterized the sample along several key measures of variability in the Steward population, to understand the diversity of Stewards represented in the sample. However, either a more purposeful or more random sampling procedure might allow for stronger conclusions to be made.

Because of these limitations, this study does not attempt to prove quantitatively that its sample is an accurate reflection of the larger population of Stewards, and makes no definitive claims about the representativeness of its findings. Rather, it seeks to characterize the mental models of the Stewards in its sample—while acknowledging that its sample represents a wide variety of Stewards along several critical variables.

Limitations Due to the Participatory Nature of the Study

There is ongoing discussion in the social sciences about how to assess validity and quality in participatory research (see Ashby 2003). However, while this study used participatory approaches to develop its questions, the parts of the research process that often draw criticism for use of participation (research design, data collection, and initial analysis) were performed by a researcher rather than by GSP stakeholders. Thus, much of the debate about validity and quality does not limit the findings of this study.

Chapter Three

Ecologists and Organizers: The Mental Models of Forest Stewards

OVERVIEW: DESCRIBING STEWARD MENTAL MODELS OF ECOLOGICAL RESTORATION

The first objective of this research was to elicit and describe the mental models of Forest Stewards, in order to promote shared understanding among GSP stakeholders. This was accomplished through a combination of qualitative interviewing and a conceptual content cognitive mapping (3CM) process, and this chapter describes the results of this endeavor.

It begins by presenting in detail the three components of Steward mental models—Steward perceptions of their sites *before restoration*, Steward perceptions of their sites *after restoration*, and Steward perceptions of *the process of ecological restoration* (see Figure 8 repeated below for convenience). It concludes with two typologies of Steward mental models, amalgamated here into a *comprehensive job description* of Steward efforts, and a description of several *ideal types* of Steward mental models.

In the spirit of transparency, all parenthetical citations in this chapter refer to the code number assigned to a Steward, their interview transcripts, and their map, unless otherwise noted.

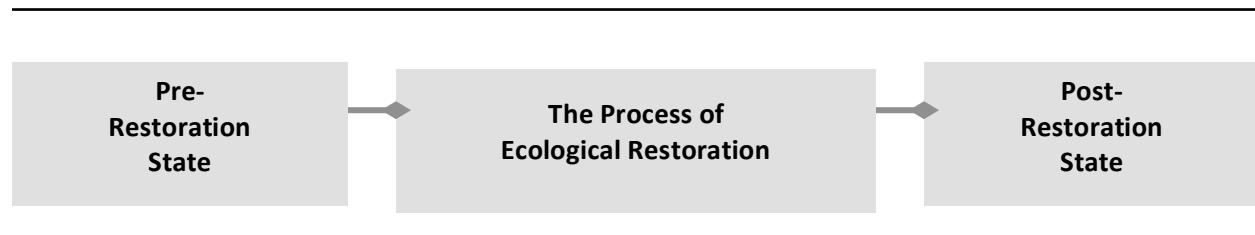


Figure 8: *A Conceptual Model of Mental Models of Ecological Restoration*

STEWARD PERCEPTIONS OF PRE-RESTORATION SITE CONDITIONS

In order to characterize Steward perceptions of the pre-restoration state of their site, Stewards were asked about their perceptions of their sites before they or anyone else began the process of ecological restoration there. Their responses, which are used here to understand Steward perceptions of pre-restoration site conditions, included great detail on the ecological composition and dynamics of their sites, as well as on the lingering impacts of historic and contemporary human uses of these landscapes. These themes are summarized in Figure 11, and then described in detail below.

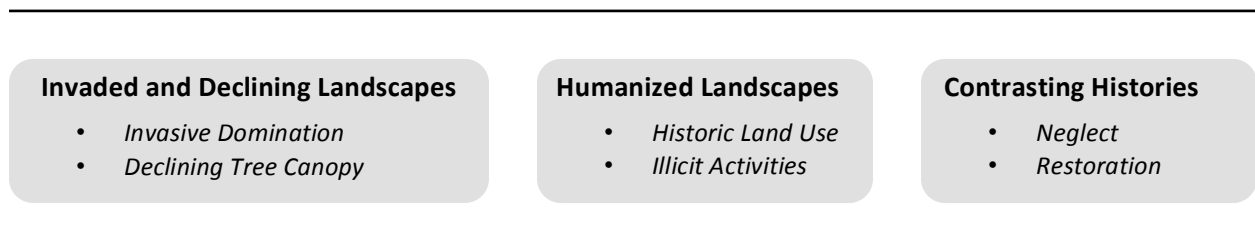


Figure 11: Summary of Steward Perceptions of the Pre-Restoration Landscape

Invaded and Declining Landscapes

All Stewards discussed the ecological conditions in their parks, with two key themes emerging clearly: most of their sites were dominated by invasive plants, and the tree canopies on their sites were in decline.

Invasive Dominated Landscapes

All Stewards ($n=17$) discussed the overbearing presence of invasive species. *“The most dominating landscape features,”* according to one Steward, *“were the invasive weeds”* (12). Stewards referred to more than a dozen invasive species, including laurels, wild clematis, and hollies—but the most commonly referenced species were English Ivy and Himalayan Blackberry. The landscape *“was 99.9% ivy, it was an ivy desert”* (8), said one Steward, while another noted that the site was *“blackberries as far as the eye could see, blackberry canes thirty feet high, fifty feet wide and hundreds of feet long”* (21).

A Declining Tree Canopy

Most Stewards ($n=9$) discussed a declining tree canopy. These Stewards saw an older canopy, consisting of mostly deciduous and relatively few coniferous species, coming toward the end of their natural lifespan without a new generation of trees rising to take their place.

One Steward narrated what was a commonly told story: *“There is certainly a lack of trees. A lot of what you see here is deciduous—they’re all alders and maples. And those are going to fall down. They’re all 70 years old, 80 years old. They’re all going to fall down. There’s very few regenerating conifers in the park”* (21). This narrative is shared with many other Stewards, who echo it by saying that their sites were *“primarily forested now by things which have been growing for 70 or 80 years. A lot of the alder and*

maple, which is predominant, grew up or regenerated itself in 1930 and after, and a lot of it is coming down now” (19).

Some Stewards saw this phenomenon as a consequence of human impacts on the landscape; as one Steward noted,

In this area, when you clearcut as was done here, ... then what comes back are the deciduous species, alder, big leaf maple and so on. And ... those trees are in the process of dying. They're mature and they're one by one falling over and dying, getting rotten, getting pecked to pieces by woodpeckers. And I can see this happening in all the parklands that I go to (11).

Stewards also tied the decline of the canopy to the presence of invasive species, with one Steward describing a patch of blackberries “*infiltrating all the Doug Firs*” (21)—while others noted that losing the canopy would increase the negative impacts of invasive plants. As one Steward said: “*If we did nothing, the maple and the alder would all fall down, and it would be rather barren and the invasives would take over even more than they have*” (19).

Humanized and Historical Landscapes

The vast majority of Stewards ($n=14$) described a variety of human impacts on their sites, both historical and contemporary, that contributed to a general sense that these sites were *humanized landscapes*. These impacts included descriptions of the sites’ historic land uses, and the ecological and social impacts of contemporary illicit activities.

Historic Land Use

Most Stewards ($n=9$) had a keen awareness of the former land uses of their sites, and the way these human impacts affected their landscapes today. Most prominently, Stewards noted that their sites had former industrial and commercial uses ($n=6$), a variety of histories of building and development ($n=5$), and in some cases a history of formal gardening ($n=3$). Each of these themes is described in more detail below.

First, Stewards described a variety of former *industrial and commercial uses* for their sites, including:

- **Logging.** Sites were impacted by timber extraction activities at about the same point in time. One Steward said that a site “*was logged in the early part of the 20th century*” (11)—a sentiment echoed by several others.

- **Agriculture.** Sites were used for food production. Stewards noted that some sites “were grazed to the ground” (5) by livestock, and in one site “there was an orchard built by an early pioneer that’s still active” (11).
- **Heavy Industry.** In a few cases, Stewards described a history of heavy industry, including “a brick factory, [and] a clay mine to supply the brick factory” (19), and a rail road—with one Steward noting that “they ran trains on it from 1878 up until 1973 when it was decommissioned” (9).

Next, Stewards described a variety of impacts from *building and development*. This ranged from the small and isolated impacts of homesteaders—as one Steward put it, “one person lived down there and had a little house” (11)—to intensive housing developments wherein, as one Steward noted, “we had like 600 buildings in 1946, so virtually every square inch had been either built on, or demolished and built on again, just changing all the time” (21). Additionally, a small number of Stewards mentioned the major impacts of military development, with one describing the intense disturbance caused by a Naval base formerly housed at a site:

When the Navy came along they flattened out whatever was up a little bit, and filled it, put in a lot of fill. And basically, directly underneath this spot ... is where the intersection of a couple of runways were during the Navy time. And when the Navy pulled out in the 70s, they took the runways out and piled up the rubble, and also a lot of fill was brought in from construction sites all over. You know, Pike Place garage downtown, and elsewhere, and they used that to make the hill, so it’s challenging (20).

Finally, a few Stewards ($n=3$) described the impacts of *formal gardening* that occurred to manage their sites as parks. As one Steward put it:

Right through the middle of it, the Olmstead brothers had laid out Lake Washington Boulevard, and with that came a lot of parks-driven landscaping. It’s not proven, but a lot of landscaping included elements like planting of English ivy as ornamentals that grew well along the sides of new parkland. So we have quite a few remnant Rhododendrons that were planted, probably as old as 1920 or even earlier (5).

Illicit Activities

Stewards said their sites faced “a lot of urban pressure—you know: litter, loitering, and all the illegal things people do when they think they can get away with it” (2). They described some of these urban pressures in detail, including:

- **Crime.** Stewards described their parks as the site of various crimes, from drug dealing to prostitution, and that these crimes had a negative impact on the community’s use of the park. One Steward said the site “was dark and scary, and people didn’t go to the area except for

nefarious activities that I didn't participate in. Once a month or so someone would call the police for everything from drug dealing to people doing target practice on the trees. It was really a dreadful place" (14).

- **Parties.** Parks were often the sites of parties, with one Steward noting, *"it was a party place. A lot of people would go in there. It was wide open because we didn't have the vegetation we have today. There were a lot of open areas where people used to roll kegs and drink, take their beer cans in, party, and then that stuff would just get left behind" (4).*
- **Garbage.** Stewards often mentioned the presence of extensive amounts of litter. Sometimes, this litter was the result of the crime and partying described above; one Steward described *"the empty 40s of malt liquor, and the little dime bags of various illicit substances, the small little square baggies with skull and crossbones on them. And our dog, she and I would walk and I would bring one poo bag for her and one plastic bag to pick up the empties" (12).* In other cases, this litter was the result of its former land use, with one Steward noting, *"before it was a park it was used as a dump. So there are in fact—like we got an old, old washing machine from the 50s out. And there are oil tanks and water tanks, there's like a 55-gallon drum" (3),* and another saying, *"it's surrounded by houses and people have for many years used it as their basic garbage dump—yard clippings, old cars, all junk of every kind went into the canyon" (6).*

Landscapes of Neglect and Abandonment

Most Stewards ($n=9$) described their sites as historically *neglected landscapes*—areas that were left to their own devices for decades. *"It was kind of a great unknown wilderness,"* said one Steward, *"that no one would ever deal with" (6).* Another commented that their site was *"pretty neglected before we started working on it" (3).* This neglect was often cited as a source of both the ecological and social problems on sites.

In some cases, this neglect was coupled with an initial human impact on the site, and often tied to the historic land use impacts described above. Thus, Stewards described sites in which former land owners *"knocked down the houses and just let it sit there for about 20 years" (2),* or were *"spraying herbicides up until 1973, and then after that nothing was touched, as far as I can see" (9).*

Several Stewards noted that the neglect experienced by their sites was ongoing—that due to the landscape conditions, their sites had been abandoned by the local community. As one Steward put it, *“the community had blocked [the park] out of their consciousness”* (17).

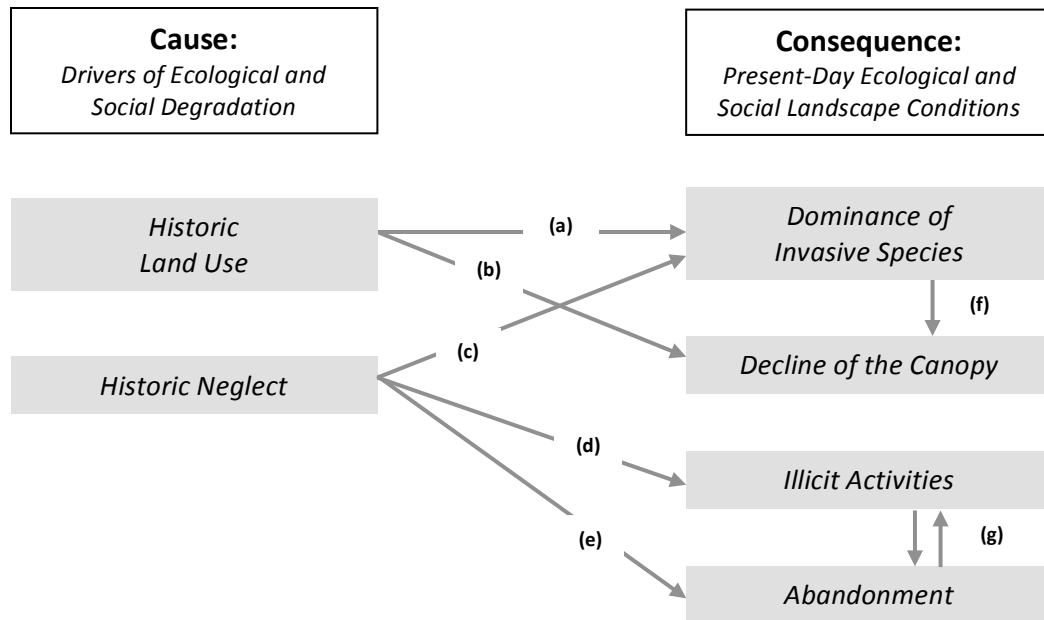
Landscapes of Restoration

In contrast, even when asked about the condition of their sites *“before you or anyone else began the process of ecological restoration at your site,”* some Stewards ($n=5$) pointed to early restoration work by the community or by the City, and considered their sites *landscapes in restoration*. As one Steward noted,

We know probably restoration work took place in a few fits and starts maybe in the 70s and 80s — some small neighborhood groups just basically cleaning up. In one instance they pulled out like 80 tires out of the ravine, just kind of a neighborhood cleanup effort. And actually in the 80s there was an attempt to sort of rip out all the weedy material down in one area that was kind of the focal point for the park. So we know that took place (5).

Synthesis: Condition, Cause, and Consequence of Degradation in Steward Mental Models

Collectively, Stewards described a landscape condition characterized by the dominance of invasive plants, the decline of the canopy, and the presence of illicit activities—all of which created sites that were degraded in terms of their ecological and social value. Stewards also identified the impacts of historic land use and contemporary neglect as being responsible for these negative landscape conditions. Taken together, Stewards articulated a mental model with a sophisticated sense of causal mechanisms linking present-day ecological and social landscape conditions to a series of historical ecological and social drivers. These relationships are depicted and described in Figure 12.



Arrow A represents the causal linkage identified by Stewards between historic land use and the dominance of invasive species, whether from the purposeful planting of invasive species or the disturbance that allowed invasives to flourish. **Arrow B** represents the causal linkage identified by Stewards between historic land use and the decline of the canopy, wherein significant logging created a homogenous canopy made up of trees of similar species and ages, and currently in similar situations of decline.

Arrow C represents the causal linkage identified by Stewards between historic neglect of the site and the dominance of invasive species, wherein a long-term lack of maintenance or attention following an initial impact resulted in an invaded landscape. **Arrow D** represents the causal linkage identified by Stewards between historic neglect of the site and the present-day dominance of illicit activities, wherein the long-term neglect of sites created opportunity for illegal activity to thrive. **Arrow E** represents the causal linkage identified by Stewards wherein historic neglect of the site persists as present-day abandonment of the site by the community.

Arrow F represents the causal linkage identified by Stewards between the dominance of invasive species and the decline of the canopy, wherein invasives prevent the regeneration of conifers and other native trees. **Arrow G** represents the self-reinforcing process whereby the presence of illicit activity on the site contributes to the abandonment of the site by the community, and the abandonment of the site by the community provides the opportunity for illicit activity to continue.

Figure 12: Cause and Consequence of Degradation in Steward Mental Models

STEWARD PERCEPTIONS OF POST-RESTORATION SITE CONDITIONS

Stewards were also asked about their perceptions of how their site will be “once the process of ecological restoration is finished.” Their responses, which are used here to describe Steward perceptions of post-restoration site conditions, constitute a set of visions for the ecological and social outcomes of their restoration work—as well as a window into their understanding of what the process of restoration entails. Key themes are summarized in Figure 13, and then described in detail below.

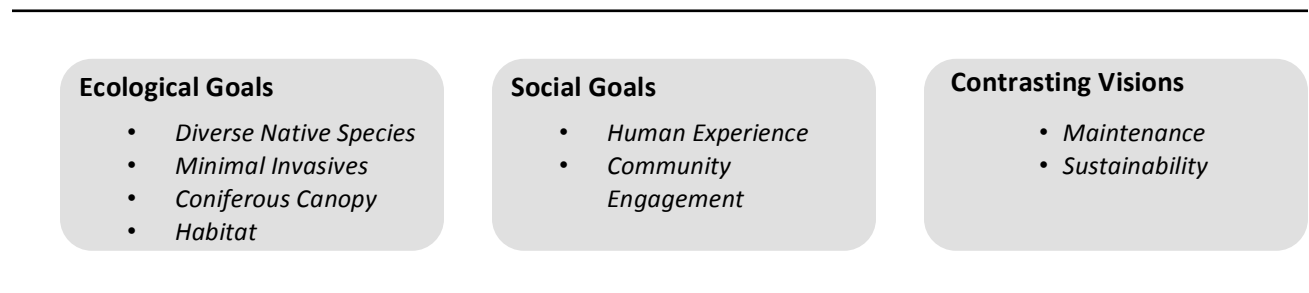


Figure 13: Summary of Steward Perceptions of the Post-Restoration Landscape

Visions of Ecological Conditions

Nearly all Stewards (n=16) envisioned changed ecological conditions on their site after restoration, but the detail with which Stewards described these visions varied greatly. While many Stewards merely described a changed distribution of native and invasive species, others envisioned larger changes to the landscape—including a more diverse and coniferous forest, better habitat for wildlife, and other structural features of the landscape.

Native and Invasive Species

A large number of Stewards were in agreement on one key aspect of their post-restoration site ecology—the role of native and invasive species.

- **Native Species.** A majority of Stewards (n=13) envisioned a landscape made up entirely or predominately of plant species native to the Pacific Northwest. In some cases this included a highly ambitious vision; as one Steward put it, “Ultimately I talk about the 500 year plan, which is going to be an old growth forest again” (21). Others had simpler, shorter-term goals. One Steward’s simple, one sentence vision: “Mature, thriving native plants of great variety” (15).

- **Invasive Species:** Generally, Stewards ($n=7$) perceived a landscape with a “minimal” (3, 15) abundance of invasive plants, rather than one entirely free of those species. “*Our intent is to not eliminate the invasives,*” one Steward said, “*I mean, we’d love to, but that’s an unrealistic goal*” (19). Still, Stewards did envision a site condition in which invasive plants do not represent the threat they currently do; as one Steward put it: “*I see something very healthy, still with some invasives, but at the maintenance level, and at a lower threat*” (13).

A Coniferous Canopy

Most Stewards ($n=10$) were particularly clear on one point—their end goal was a canopy made up of far more coniferous trees than currently present. In some cases, this was a general vision of “*a nice forest canopy of conifers and some deciduous trees around the periphery*” (2).

In others cases, Stewards had very specific ideas for the canopy in terms of tree species, numbers, and timelines; one Steward envisioned a site that “*has thousands of new conifers planted in it—probably 5,000 or 10,000, really large numbers of them. ... Obviously in 25 years we don’t have mature conifers. We have young ones that are kind of bushy at the bottom. But within 50 years, you start to get some opening underneath from the shade of the conifers*” (11).

For some Stewards, the focus on conifers implies a return to historical landscape conditions. As an example, one Steward noted: “*The first time it was logged of its conifers was late 1800s. It was logged a second time in the early 1900s. ... So the future is the third generation conifer forest, and it will be a combination [of conifers] indigenous to the Northwest*” (8).

For other Stewards, the focus on a coniferous canopy was due to contemporary rather than historical ecological imperatives. As one Steward said:

So I guess my end of life goal—because I plan on living here until the day I die, and even when I retire I’m still going to live here—so my goal is to make sure it’s conifer forest. 30 years from now we’re going to have hemlocks, cedars, something in there to create a darker forest so we can make it easier to maintain because right now that ivy’s killing us (4).

Biodiversity

Some Stewards ($n=6$) envisioned a site with much higher plant species biodiversity than currently present—what one Steward called “*a preponderance of diverse, native species growing in there*” (2). As another Steward described it:

My big goal is to get way more species diversity back in there. Most of the restoration in Seattle that I've seen ... is just to plant the usual suspects. You know, tall mahonia, ferns, some Doug Firs—you know, this standard stuff. A few wetland plants where it's really wet like Ravenna. But I would love to get hundreds of species of plants in the park (21).

Wildlife Habitat

Some Stewards ($n=5$) envisioned a landscape more hospitable to native fauna. One Steward's goal was to *"increase the wildlife potential"* and provide *"more places for wildlife to hide and be happy"* (11), while another noted that *"all my goal is diversity of native plants and animals, more wildlife habitat, more animals"* (20).

Landscape Structure

A small number of Stewards described their ecological visions for the site in more depth, describing several features of landscape structure that they were working toward, including a variety of canopy layers, connectivity across the landscape, and a diversity of ecosystem types:

- **Layers:** Some Stewards ($n=4$) took care to describe the layers of the forest that would result from restoration. As one Steward said, *"You can create layers of species that can take care of themselves"* (5).
- **Landscape Connectivity:** A few Stewards ($n=3$) envisioned a landscape of forests more connected than at present. For these Stewards, the goal is to *"link that forest to the other forests around the area"* (20).
- **Eco-Zones:** Some Stewards ($n=3$) envisioned a series of ecosystem types, rather than a single dominant forest ecosystem, as the end goal of their restoration. One Steward describes a vision that *"divides the whole area into habitat zones and gives us a plant list for each zone, and a planting technique for how you go from the mess to the new way"* (11). Another saw *"lots of habitats and ecosystems, I definitely see conifers as a large presence, but also different subsets—an oak prairie savannah habitat. Madrones definitely play a large part in that ecosystem"* (13).

Visions of Community Benefits and Community Engagement

Most Stewards ($n=10$) envisioned some form of social benefits as outcomes of the process of restoration. As one Steward noted: *"At the point that I'm at now, I'm really interested in having the community interact with the site, not only in maintaining the restoration but in enjoying it"* (17). Both

these visions—the increased opportunity for communities to enjoy a site, and the community-building process of long-term engagement with the site—were echoed by other Stewards.

Human Experience of Nature

Stewards identified a strong link between the restored ecology of a site and the benefits that it can provide humans—specifically in terms of the opportunity restored natural areas provide for urban communities to experience nature. After restoration, according to one Steward, the site will feature “more wildlife habitat, more animals. But also benefits for humans, and all the stuff that social science researchers tell you are benefits of natural areas and so on and so forth” (20). As another Steward put it:

I like to say that although this park is not going to be old growth, ever, you’re not going to have that experience of walking through a forest that takes your breath away with the grandeur of the trees—but it’ll be a snapshot, an experience that folks can have where they are on a city street one second, and they duck in the woods, and they have a feeling like they could be somewhere in the Cascades, somewhere far away from Seattle, somewhere more rural or even in the forest. I know it will be as close as we are able to in this urban landscape to get there (12).

Community Engagement

A smaller number of Stewards also envisioned stronger community engagement with the site over the long-term. Many Stewards noted concerted efforts were in place to increase community engagement in the restoration process—as one Steward put it,

The third purpose of the plan is to keep the neighbors interested. Giving them work to do, giving them some recreational opportunities, and trying to get a sense of ownership and involvement from the landowners. ... Five years into the restoration process and there gets to be a cadre of regular people who are used to the idea of what this plan is, who have come out and done some work parties, people that are neighbors (11).

In several cases, Stewards noted that the purpose of community engagement was to support the long-term needs of the restoration process for volunteers, maintenance, funding, and coordination. As two Stewards described it:

One of our goals had been—if you’re going to have a park where people value it, the only way to really restore it is if people in the neighborhood value it. So we put a lot of trails in, all of it with the idea of getting rid of the invasives, getting rid of the garbage, and creating a natural area that people could see and people could value. And to create more access to the park so that people can value it. People don’t take care of what they don’t value. Our goal is to deal with the invasives, plant the natives, but our goal is also to create a park that people can value and can access (6).

My goal is to increase volunteerism. ... By showing volunteer enthusiasm—if you have an active volunteer base, whereas before we didn’t have that—by doing so, they know this is an active park where the community is involved and taking care of it. And the money, and grants, they follow active volunteer work. So that’s another benefit I see in the future—planting the seed like was done for me, I see families come in and young

kids come in. I do this every day, they see me every day, and as I get older I hope to plant the seed in just one or two to take over (4).

Differing Visions of Maintenance and Sustainability in Restoration

Many Stewards ($n=7$) expressed a belief that their sites will continue to require at least some level of maintenance for an indefinite period. *“What we’ve come to understand,”* noted one Steward, *“is that there’s a huge component of maintenance. That’s never going to end”* (14). Another described this idea in more detail:

There is no “done.” It’s an ongoing process. One thing we’ve learned in that there’s wave after wave of invasive that comes in. You know, there’s very few blackberries, we’ve got them under control, but now we’ve got the knotweed, the polygonum is there ... and ivy is coming in. So it’s not going to be finished (2).

For some Stewards, the anticipated need for long-term maintenance impacted their understanding of the process and purpose of restoration. These Stewards saw restoration as an ongoing process that takes place over long periods of time, rather than a single intervention that results in a restored landscape. *“Even when restoration is done,”* one Steward said, *“there will always be a need for some maintenance to occur. So the idea of there being completed ecological restoration, I don’t know if that really exists, per se. There’s no completion date, it just turns more into a maintenance type phase”* (12).

Other Stewards, while acknowledging the need for long-term maintenance, envisioned a more self-sustaining landscape in the future. When asked about his goals, one Steward said, *“Ultimately everyone talks about the word ‘sustainability.’ That might not be the right word to use, but obviously you want to create something that’s going to be more self-maintaining, something that’s going to take care of itself. More and more hands-off”* (5). As another described it:

Hopefully when we’re done—not that we’re ever going to be done, because there’s 35 acres and there’s always going to be areas to work on—but there’s going to be an area that’s as close to a sustainable system as we can create. But I’m 65 years old, we have to create as sustainable a system, that requires as little input as we can. Obviously, you never get to the point where there’s no input required—that’s an illusion. It’ll always require maintenance. It’ll always require someone looking at it. But we want to create a system that requires much less maintenance than it does now (6).

In either conceptualization, Stewards agree that restoration is a very long process. As one Steward put it, *“When I’m finished, the work won’t be finished. When the work is finished, I will be long gone”* (19).

Synthesis: Aiming Toward Ecological and Social Goals, Maintainable or Sustainable

Collectively, Stewards envisioned a series of ecological and social goals, including: an abundance of diverse, native species, the lack of threatening invasive species, and a coniferous canopy, as well as a

landscape designed for human connection to nature and a process that supported community engagement. Stewards came to no consensus on whether this vision required ongoing maintenance or was self-sustaining once achieved.

STEWARD PERCEPTIONS OF THE PROCESS OF ECOLOGICAL RESTORATION

Through the 3CM process, Stewards created detailed maps of their conceptual understanding of the process of ecological restoration at their sites. This process elicited a wide variety of responses—captured in Appendix 3—that range from philosophical concepts to tangible actions, from inherently scientific approaches to purely social efforts. No two Stewards created identical maps, implying that no two Stewards understand the process of ecological restoration in exactly the same way.

These models included interrelated stages of *planning, site work, maintenance, adaptive management, community involvement, education*, and collaboration with *community partners*. These themes are summarized in Figure 14 and described in detail below.

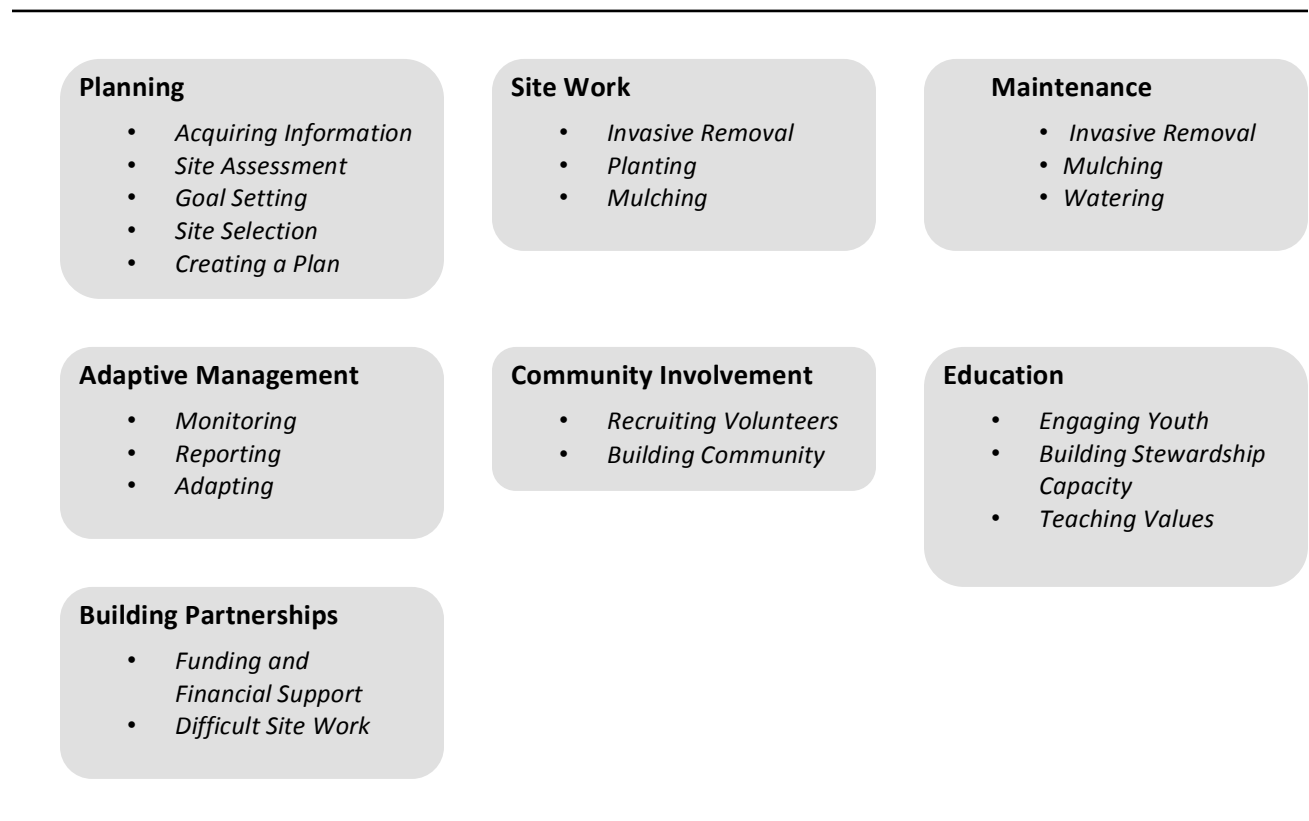


Figure 14: Summary of Steward Perceptions of the Process of Ecological Restoration

Planning

Most Stewards ($n=10$) conceptualized *planning* as a critical step in ecological restoration. When it was mentioned, it was generally the first step in the process. Planning itself was characterized by a series of smaller—often interrelated—steps, including acquiring information, assessing the site, setting goals, selecting where on the site to work, and sometimes creating a written plan—each of which is described in more detail below.

Acquiring and Using Information

Many Stewards ($n=7$) put a premium on *acquiring and using information* in the planning process. They needed general ecological knowledge, including “*knowledge of a Northwest forest*” (3), as well as more practical ecological knowledge including “*species ID*” and “*planting techniques*” (19). They also identified a need for site-specific knowledge, including information about “*my park specifically*” (3). Stewards obtained this information from a variety of sources, including technical experts from the City and affiliated non-profit organizations—what one Steward referred to as “*‘handholding’ from GSP*” (17)—as well as from the site itself. One Steward noted that she “*learn[s] new things with each site visit*” (8).

Site Assessment

Many Stewards included a process of *site assessment* in their planning stages. One group of Stewards ($n=5$) used site assessment to provide a systematic identification of native and invasive plants on site—for, as one Steward put it, “*native/invasive species ID*” (20). A second, smaller group of Stewards ($n=3$) used site assessment for a deeper knowledge of site conditions, including “*understanding hydrology*” (3), “*observing plants that indicate ecosystem conditions*” (8), and “*identify[ing] areas that are the cause of problems*” (6). These Stewards used site assessment to inform their understanding of “*what is possible, what is appropriate*” (21) for the restoration.

Goal Setting

Some Stewards ($n=5$) worked to *set goals* for their restoration work—something they characterized as a reflective process that included considerations of the nature of the site and the philosophy of restoration in general. One Steward made sure to ask, “*restoring to what, and for whom?*” (3), while others put a focus on “*goal setting*” (15) by “*seeing where we want to go*” and asking “*is this what we hope to see at our site?*” (8).

Site Selection

Another group of Stewards ($n=4$) included a process for *site selection* in their planning stages. While they may have many acres in their park, they began by selecting where to start the restoration process—using both ecological and logistical considerations in doing so. Ecologically, Stewards sought to identify and prioritize work in “*big impact areas*” (4) that are the “*causes of problems—ie, seed sources*” (6). Logistically, Stewards sought a “*manageable area*” (6) with sufficient “*access*” (5).

Creating a Plan

In some cases, Stewards ($n=5$) noted that this process resulted in a written *plan*. The planning process culminated in “*develop[ing] a [Vegetation Management Plan]*” (3) according to one Steward, and this “*plan brings legitimacy*” (11) according to another.

“Dirt Work”

All Stewards referred in some way to the physical processes of transforming the site—what one Steward referred to as “*dirt work*” (7) and another as “*complicated gardening*” (3). This process almost invariably involved removing invasive plants, planting native species, mulching, and watering—each of which is described in more detail below.

Invasive Removal

All Stewards ($n=17$) included *invasive removal* in their understanding of ecological restoration. While some had a “*zero tolerance for invasives*” (5), other sought simply to “*remove as much of the invasives as possible*” (5). Stewards were conversant in a variety of “*techniques for invasive removal*” (19), from creating “*survival rings on trees*” (3) to use of mechanical control through “*mow[ing] blackberries*” (21).

Planting

Nearly all Stewards ($n=15$) made reference to *planting* in their restoration work. For most Stewards ($n=9$), this process began with “*identifying sources of plant materials*” (6)—from “[*Seattle Parks and Recreation*], *donation, salvage*” (5), as one Steward put it, or from “*purchase or propagation*” (19) as another said. A small number of Stewards ($n=3$) noted that under certain conditions, “*native plants regenerate on their own*” (21), so they focused less on planting than on “*open[ing] up areas for natural regeneration*” (4).

In varying numbers, Stewards reported that they planted trees ($n=7$), shrubs ($n=5$), and groundcover ($n=2$). A smaller number of Stewards ($n=3$) noted that they focused on “*establishing conifers*” (5) or “*nurturing conifers*” (2) as they planted. Stewards identified a variety of other goals in selecting plants—with some Stewards ($n=3$) specifying goals of “*increasing diversity*” (5), and others ($n=2$) working for a “*sustainable system strong enough to protect itself*” (6).

Mulching

Finally, many Stewards ($n=12$) described *mulching* as the final step of the “*dirt work*” process. After planting, they “*put down woodchip mulch*” (20) in order to “*improve soil conditions*” (5) and “*stem erosion*” (8). In a small number of cases ($n=2$), Stewards would also “*collect and use [large wood debris]*” alongside mulching.

Maintenance

Stewards recognized the need for long-term engagement with their sites, and many expressed the idea that the “*dirt work*” process did not end in a single iteration. They often referred to this as *maintenance*, and noted that it involved ongoing attention to invasive removal and planted areas:

- **Invasive Removal:** Many Stewards ($n=7$) recognized the need to intensively maintain removal areas for the short-term by “*going back to areas to prevent re-invasion*” (6) and “*re-weeding in 3 months*” (7). One Steward anticipated “*3 years for invasive removal*” (2).
- **Maintaining Planted Areas:** A group of Stewards ($n=5$) discussed a planting establishment period, during which the plants would require “*intense aftercare*” (20) to ensure their survival. Several Stewards delineated this as a long-term endeavor, with one noting that the goal would be to have “*well established plants...by year 5*” (5).
- **Watering:** A core aspect of the plant establishment period identified by many Stewards ($n=11$) was the need for watering. Some Stewards anticipated complex “*water systems*” (14) in order to “*irrigate for three years*” (9), while others only sought “*minimal watering*” for the “*first summer only*” (5).

Adaptive Management

Some Stewards included basic concepts of adaptive management, including monitoring, reporting, and adapting, in their restoration work:

- **Monitoring:** Some Stewards ($n=6$) described a formal or informal monitoring process to record “*what was done and where*” (11), and to “*document what works and what doesn’t*” (14). This was done through use of “*before & after images*” (21) and “*GPS*” (11) in “*monitoring plots*” (7).
- **Reporting:** Some Stewards ($n=4$) noted a formal process of “*reporting to GSP*” (14) the results of this monitoring. In some cases, Stewards noted their data “*goes to [the] habitat map*” (7), GSP’s tool for tracking restoration progress citywide.
- **Adapting:** Some Stewards ($n=5$) described a formal or informal process of using monitoring data and other new learning to change their management of the site. One Steward noted he “*use[s] long-term data from monitoring to modify treatment*” (7), while another noted she “*look[s] back and look[s] forward*” in order to “*adapt*” (15).

Community Involvement

Many Stewards ($n=11$) noted a strong commitment to “*engaging the community*” (13) in the process of restoration, and identified several purposes for this effort:

- **Recruiting Volunteers:** A group of Stewards ($n=8$) described a keen attention to “*volunteer coordination & retention*” (3), and noted they often saw “*neighbors as [the] key volunteers*” (11).
- **Building Community:** Another group of Stewards ($n=3$) saw a value in a more general process of “*building community*” (4). They made special efforts to “*learn & do more community interaction*” (17) in order to “*[make] the neighborhood more cohesive.*”

In order to achieve these two purposes, Stewards utilized a variety of involvement techniques. A group of Stewards ($n=5$) relied on tools of “*outreach*” (17) to “*[keep] the community updated*” (14) and provide “*consistent communication with [the] neighborhood*” (11). Stewards made special efforts to “*learn about [the] community*” (17) in order to “*[get] to know the neighbors*” (11). Smaller numbers of Stewards made efforts to raise their park’s visibility ($n=2$), and to use community celebrations strategically for community involvement ($n=2$).

Education

Most Stewards ($n=11$) considered “*educating the public*” (2) to be a core aspect of their restoration work. Stewards identified a variety of approaches to making education central to their work:

- **Engaging Youth:** A group of Stewards ($n=5$) included young people in their educational activities, actively “*involving school kids, K-12 and college*” (3). Some sought to provide “*outdoor experience for youth*” (11) in order to “*address nature deficit [disorder]*” (14). Others sought to “*engage young people to care for the environment*” (4).
- **Building Stewardship Capacity:** Another group of Stewards saw the purpose of education as building the stewardship capacity of volunteers. Stewards made special efforts to “*teach people the process*” (7) and “*teach techniques to volunteers*” (4) in order to, as one Steward put it, move from a base of “*volunteers with various skills*” to a “*cadre of skilled volunteers*” (6).
- **Teaching Values:** Finally, a small number of Stewards ($n=2$) used education to “*model respect*” and teach about “*environmental values*” such as “*awareness of greater welfare*” (2), and to “*plant a seed to inspire others*” (4).

Building Partnerships

Most Stewards ($n=11$) made special efforts to build partnerships as part of their restoration work. Through “*cooperation with public and private groups*” (14), Stewards worked to create a “*network of support*” (12) for their parks. Specifically, Stewards sought out partnerships for:

- **Funding & Financial Support:** Some Stewards ($n=5$) partnered with other groups for funding, working with public and private “*granting agencies*” (12) including the “[*Department of Neighborhoods*]” and “*King County*” (17), as well as non-profit organizations for “*fiscal sponsorship*” (11).
- **Difficult Site Work:** A group of Stewards ($n=4$) used partnerships with contractors for certain site work, including “*for steep slopes*” (13) and for work involving “*herbicides*” (13, 4).

TWO TYPOLOGIES OF STEWARD MENTAL MODELS: JOB DESCRIPTIONS AND IDEAL TYPES

Based on the qualitative analysis of Steward mental models described in *Chapter Two*, this research offers two typologies (Patton 2002: 457-562) to represent Steward mental models comprehensively, and

to describe the variation inherent within them. First, the *comprehensive job description* provides a framework for succinctly describing the vast majority of concepts captured within the Stewards' mental models, and is useful in identifying a clear bifurcation in those models. Second, the introduction of *ideal types* of Stewards describes the ways that this bifurcation exists as a major variation in Steward mental models, and quantitatively analyzes how this manifests itself within the population of Stewards sampled.

Steward Mental Models as a Comprehensive Job Description

In their mental models of ecological restoration, Stewards described a wide variety of ideas, tasks, and roles. While these concepts took hours to elicit in interviewing, and pages to detail above, they can be represented fairly comprehensively in a simple list—a “job description” of a Steward’s work, according to the Stewards themselves. It is depicted in Figure 15.

Analysis of the models for the purpose of developing this job description revealed a fundamental distinction between concepts characterized by their relationship to a site’s *ecology* and those characterized by their relationship to a site’s *community*:

- **Ecology:** Some of the Steward perceptions described above (planning, “*dirt work*,” maintenance, and adaptive management) are characterized by their relationship to the site’s *ecology*. Each aspect of these concepts, each of these tasks within the restoration process, are directly connected to the site itself and its ecology—assessing the biotic elements of the site, altering them through invasive removal and planting, and monitoring and maintaining that change, for instance.
- **Community:** Other Steward perceptions (involvement, education, and partnerships) are characterized by their relationship to a site’s *community*. Each of these concepts, each of these tasks within the restoration process, are driven by the social elements of the work rather than the ecological—recruiting and coordinating volunteers, building the stewardship capacity of a neighborhood, and bringing in resources from other organizations, for instance.

Therefore, the job description is depicted in a bifurcated fashion—with one set of concepts represented as tasks for attending to the site’s ecology, and another set of concepts represented as tasks for attending to the site’s community.

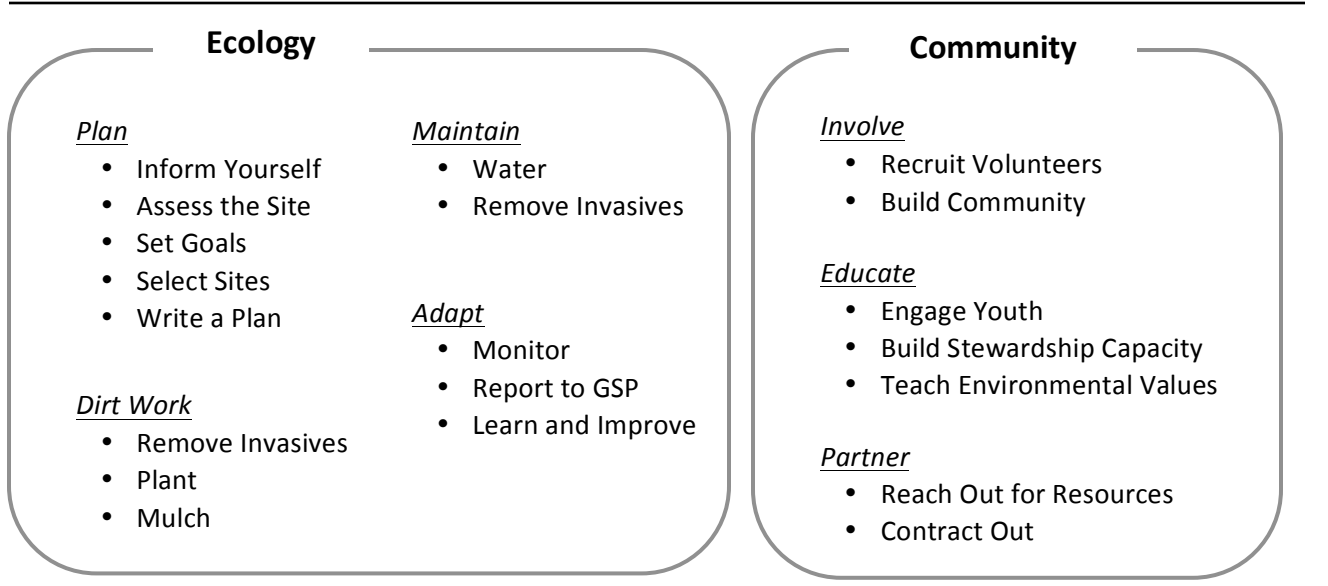


Figure 15: *The Comprehensive Job Description*

Identifying “Ideal Types” in Steward Mental Models

The comprehensive job description captures the *collective* work of Stewards—meaning that every task on the job description was identified by multiple Stewards in their mental models, but that not every individual Steward identified each individual task. In fact, the quantitative analysis described in *Chapter Two* revealed that certain Stewards were far more likely than others to identify certain concepts in their models; that is, some Stewards pulled more heavily than others from one side of the job description.

One way to represent this bifurcation in Steward mental models is through identifying three *Ideal Types* of Stewards. *The Ecologists* are comprised of Stewards whose mental models are drawn primarily from the ecological concepts, while *The Community Organizers* are comprised of Stewards whose mental models are drawn primarily from the community concepts. Meanwhile, the *Community-Based Restorationists* are those Stewards whose pull from the ecological and community concepts is more balanced.

Qualitative and quantitative descriptions of how each group manifested in the sample are described below and depicted in Figure 16¹.



The Ecologists

Sampled Stewards whose mental models classified them as Ecologists represented 58.8% of Stewards in the sample ($n=10$). These Stewards exhibited a nuanced and informed understanding of ecology, including knowledge of their site's plant and animal life, soils, and hydrology. They knew of and used multiple methods for various restoration tasks, having experimented with a variety of ways to remove invasives or get new plants established. Finally, they tended to incorporate science more fully into their work, using site assessment data to drive planning, and using ongoing monitoring to drive adaptive management. For an example of an Ecologist's map, see Map 21 in Appendix 3.



The Community Organizers

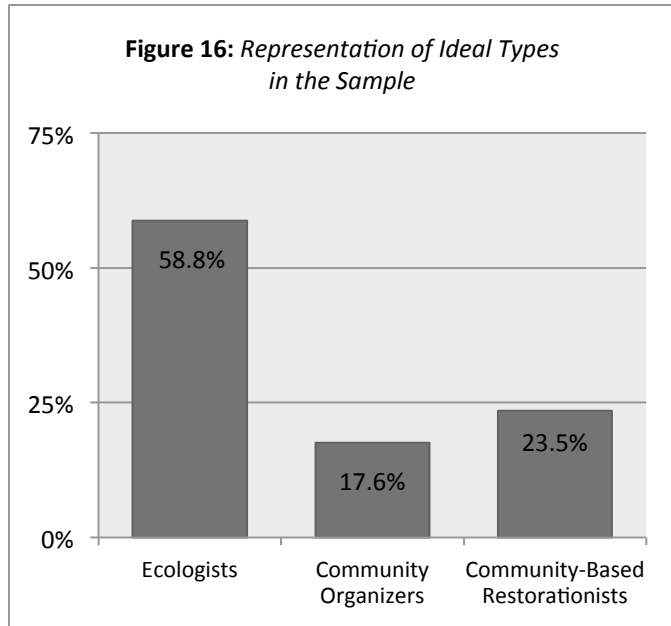
Sampled Stewards whose mental models classified them as Community Organizers represented 17.6% of Stewards in the sample ($n=3$). These Stewards believed that a series of social and administrative processes—engaging and educating community members, partnering with other organizations to gain legitimacy and acquire resources, for example—were the keys to supporting the “*dirt work*” of restoration. They saw community building as both the means and the ends of their role, equal in importance to ecological changes on the site. For an example of a Community Organizer's map, see Map 17 in Appendix 3.



The Community-Based Restorationists

Sampled Stewards whose mental models classified them as Community-Based Restorationists represented 23.5% of the Stewards in the sample ($n=4$). These Stewards did not simply contain traits from each other type—they were not ecologists who happened to be working in an urban area, or community builders that used nature as a medium. They did more than merely draw in equal measure

¹ It is tempting to perform additional analysis on ideal types in the sample, including how these types correlate to



from both sides of the job description. Rather, they envisioned community-based restoration as a new model for both building community and improving the environment, and they viewed the process of restoration as an integration of social and ecological processes. For examples of these blended types, see Map 13 and Map 14 in Appendix 3.

SUMMARY: REPORTING ON THE GRASSROOTS

The first objective of this research was to elicit and characterize the mental models of ecological restoration held by Forest Stewards, in order to promote a shared conceptual understanding between the “grassroots” and “grasstops” of GSP. This chapter has reported on the results of a process of qualitative interviewing and conceptual mapping to meet that objective.

In summary, this chapter characterized the contours of Steward mental models in great detail, describing the specific concepts cited by Stewards and the rate at which they were cited. These concepts were amalgamated into a *comprehensive job description*—a typology meant to simplify the great number of concepts present in Steward mental models into an understandable model. As a whole, the sampled Stewards:

- **Plan** for restoration on their site by seeking appropriate information, assessing their site’s ecology, and setting goals;
- **Work** for restoration by removing invasives, planting native species, and performing short-term maintenance to aid plant establishment;
- **Maintain** their sites over the long term by watering and performing on-going invasive removal;
- **Adapt** their management practices by monitoring and reporting on their restoration efforts, using this information to guide future actions;
- **Involve** their community through various outreach strategies in order to recruit volunteers and build a sense of community;

- **Educate** as a part of their work, with a focus on young people, teaching environmental values, and building the stewardship capacity of their neighborhood; and
- **Partner** with other organizations to bring in resources.

This chapter also identified two thematic trends in the concepts cited by Stewards: a series of ideas defined by their relationship to a site's ecology, and a series of ideas defined by their relationship to a site's community. In short, the first four bullets of the summary above are ecological in nature, while the last three bullets are more community oriented.

By exploring how this bifurcation manifested itself in Steward mental models, this research identified three ideal types of Stewards:

- **The Ecologists**, whose mental models were marked by their use of scientific information and their focus on the "dirt work" of the site, and who made up a majority of the sample;
- **The Community Organizers**, whose mental models were characterized by their focus on social processes and their use of restoration as a vehicle for community building, and who made up nearly a fifth of the sample; and
- **The Community-Based Restorationists**, whose mental models were defined by their integration of ecological and social processes and their dual focus on improving the site and the community, and who made up nearly a fourth of the sample.

This analysis implies that a large majority of Stewards approach their work with GSP using mental models oriented firmly toward ecological concepts, while significant minorities of Stewards engage in their work with GSP with mental models focused on community concepts, or are able to accommodate both sides of the equation.

Chapter Four

The Reflection Score: Green Seattle Concepts in Steward Mental Models

OVERVIEW: HOW STEWARD MENTAL MODELS REFLECT THE GSP FRAMEWORK

The second objective of this study was to determine the extent to which Stewards have incorporated key concepts from GSP’s framework for ecological restoration into their mental models—or, in the language of this study, how Steward mental models *reflect* critical GSP concepts. This was accomplished by comparing the mental models described in *Chapter Three* to a GSP framework developed through a participatory engagement with GSP stakeholders; this chapter describes the results of this endeavor.

It begins by describing the *Green Seattle Logic Model*, and reporting how concepts from this model are represented in Steward mental models. It concludes by introducing the *Reflection Score*, a comprehensive measure of how thoroughly GSP’s key concepts are present in Steward mental models.

The Green Seattle Logic Model: A Participatory Framework to Assess Steward Mental Models

In order to assess the extent to which Steward mental models reflect GSP’s framework for restoration, this study developed a framework (created with an iterative, participatory process with a Community Committee) to represent the core concepts that GSP hopes will guide Stewards’ work at their sites. For more details on the process of developing the logic model, please see *Chapter Two*. This framework took the form of a logic model—“a road map of [the] program, highlighting how it is expected to work, what activities need to come before others, and how desired outcomes are achieved” (Kellogg 2005: 35).

The Green Seattle Logic Model, displayed in Figure 17, begins with a set of assumptions about the ecological and social environment of the urban forest, lays out a series of activities Stewards must undertake, describes the tangible short-term impacts of Stewards’ work on the landscape and the community, and ends with a vision of the long-term outcomes that GSP is geared toward. The logic model is described in detail below; language in italics refers to specific concepts derived directly from the model.

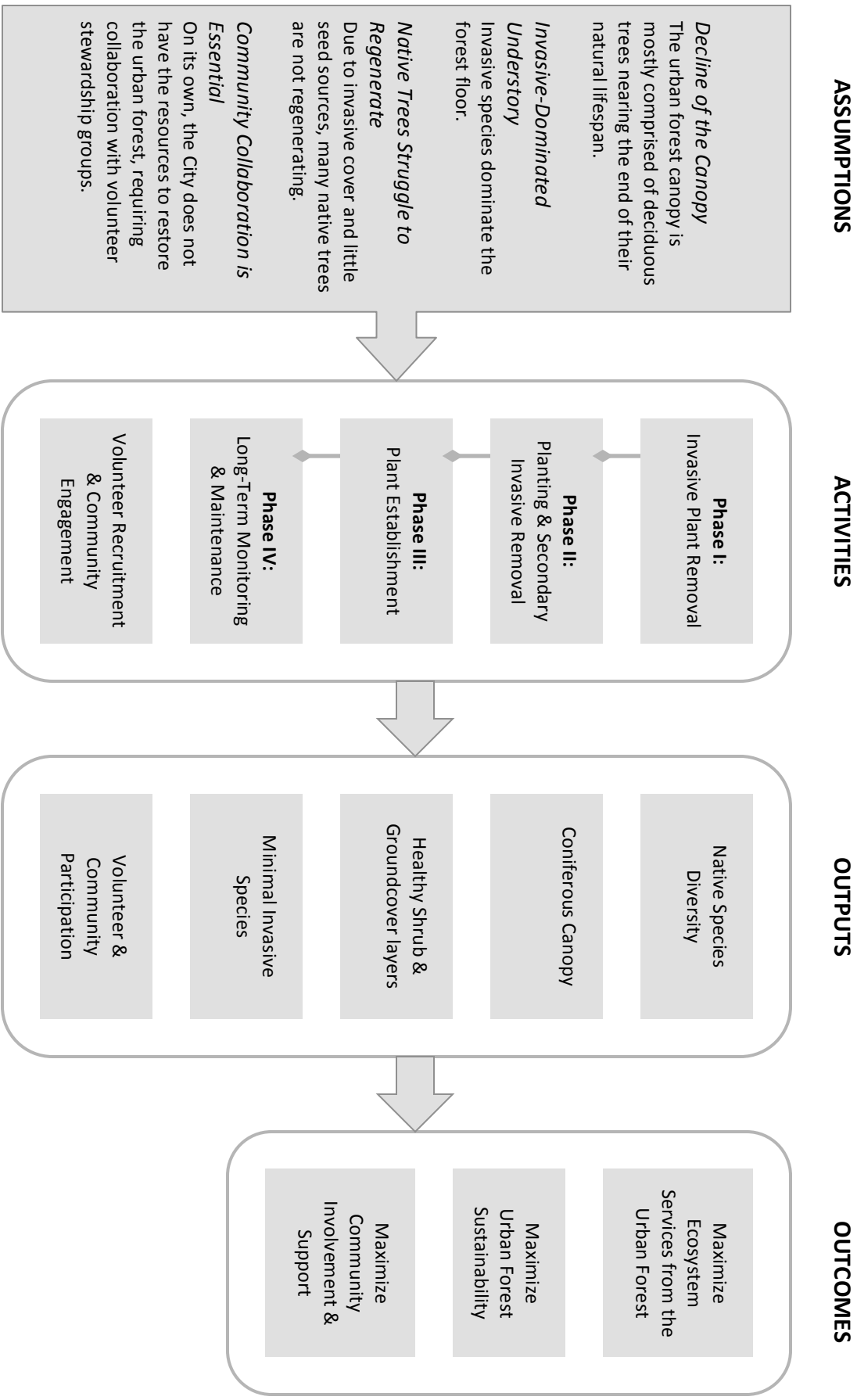


Figure 17: The Green Seattle Logic Model

Assumptions

The first element of the logic model is a series of *assumptions* about the health of Seattle’s urban natural areas that underpin GSP’s work. They serve as a sort of problem statement, a reason for being of the collaboration. GSP program managers want Stewards to understand these basic assumptions in order to do their work effectively. In short, these assumptions are that:

- the urban forest canopy is mostly comprised of deciduous trees nearing the end of their natural lifespan—implying a *decline of the canopy*;
- a variety of non-native invasive species smother the forest floor, resulting in an *invasive-dominated understory*;
- due to this invasive cover and lack of tree species diversity, *native trees struggle to regenerate*; and
- in order to change the trajectory of these urban natural areas, *community collaboration is essential*.

Activities

Next, the logic model contains series of *activities* that Stewards should undertake in order to restore their sites. These activities are captured in several phases:

- *Phase I: Invasive Removal*, in which invasive species are removed from the site;
- *Phase II: Planting & Secondary Invasive Removal*, in which native species are planted and continued attention is paid to invasive removal;
- *Phase II: Plant Establishment*, a short-term period of mulching, watering, weeding, and sometimes re-planting to ensure the newly planted landscape survives its first few years; and
- *Phase IV: Long-Term Monitoring & Maintenance*, an ongoing process of observing change at the restoration site and responding to maintenance needs.

Additionally, Stewards must put in place active *volunteer recruitment and community engagement* processes to support these phases.

Outputs

The third series of concepts on the logic model represents the *outputs* of the Stewards work—that is, the immediate and tangible impacts of the restoration process on the landscape and in the community. These outputs include a variety of structural elements of the forest—*native species diversity*, a

coniferous canopy, healthy forest *layers*, and the presence of only *minimal invasive species*—as well as the continuing presence of *volunteer and community participation*.

Outcomes

The final elements of the logic model are its *outcomes*, the three long-term changes in the landscape and in the community that are expected to result from Stewards' efforts. These represent GSP's goals to:

- *Maximize Ecosystem Services from the Urban Forest*—representing an acknowledgement that healthy urban natural areas provide benefits (such as increasing water and air quality) that can be enhanced through restoration;
- *Maximize Urban Forest Sustainability*—representing a vision of restoration as an effort to combat canopy decline and enhance the urban forest's ability to sustain itself; and
- *Maximize Community Involvement & Support*—representing a belief in the inherent value of a community engaged in stewarding and advocating for its natural areas.

Reflection of Green Seattle Logic Model Concepts in Steward Mental Models

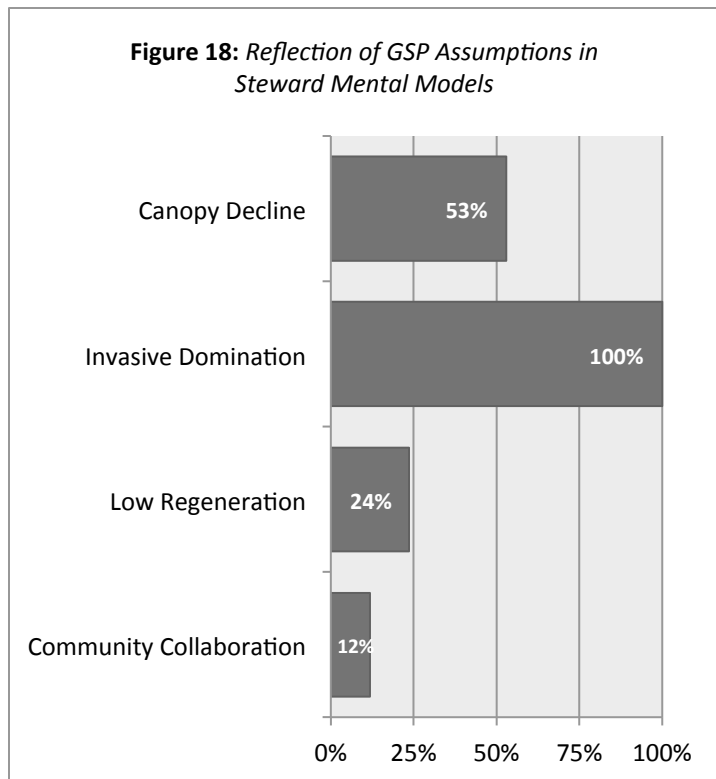
The Green Seattle Logic Model represents an *indigenous typology* that “provide[s] clues to analysts that the phenomena to which the labels refer are important to the people in the setting” (Patton 2002: 458); that is, creating the model in a participatory fashion allowed the study to focus in on the concepts that matter most to GSP stakeholders. Therefore, as described in *Chapter Two*, this model was used to develop a deductive coding scheme (attached as Appendix 4) used to assess the extent to which Steward mental models reflect GSP's core concepts.

The remainder of this chapter is dedicated to reporting the findings of that analysis, and follows the basic format of the logic model, by discussing the percentages at which Stewards cite GSP assumptions, activities, outputs, and outcomes in their mental models. It ends by providing Stewards a *Reflection Score*—a heuristic developed to represent how well Steward mental models on the whole reflect GSP concepts.

Reflection of Green Seattle Assumptions in Steward Mental Models

The assumptions of the logic model refer to the key concepts that GSP believes Stewards should understand in order to effectively restore their sites. Steward mental models reflect the assumptions of

the logic model at percentages of between 12% and 100%. These findings are displayed in Figure 18, and discussed in detail below:



- Canopy Decline.** 53% of Stewards in the sample referenced a declining canopy in their mental models, with some citing the advanced age and general uniformity of tree species as underlying drivers of this decline. 47% of Stewards did not include this concept in their mental models. This implies that just over half of Stewards have adopted one of GSP's key tenants into their mental models.
- Invasive Domination.** 100% of Stewards in the sample referenced the ubiquitous presence of invasive

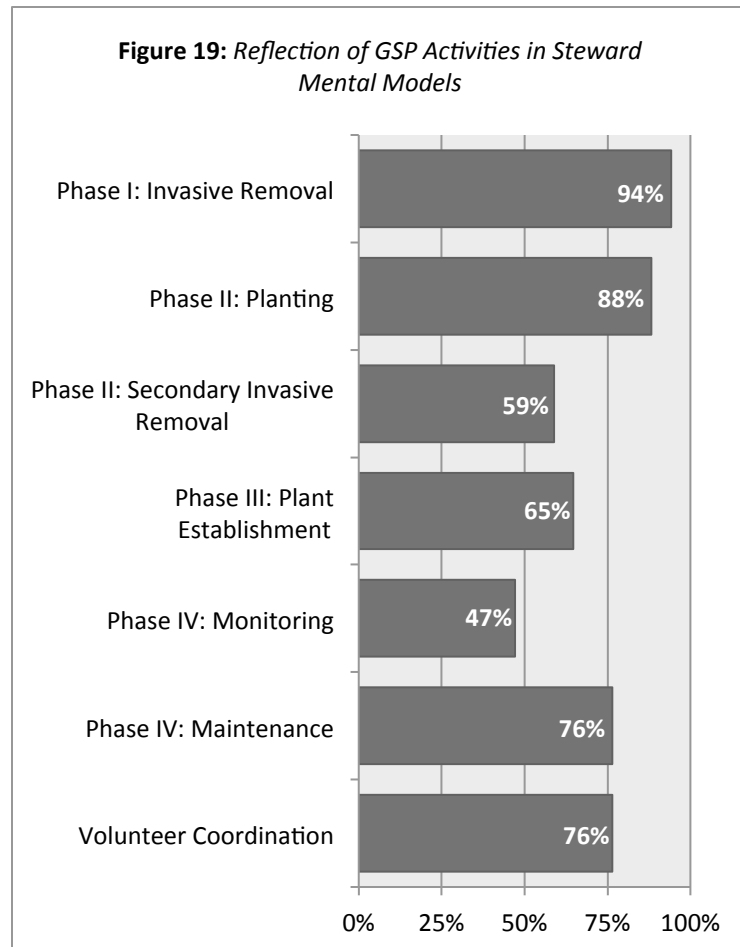
species on their sites, with most discussing the deleterious impacts of these species as well. This implies that Steward mental models strongly reflect GSP's focus on invasive plants.

- Low Rates of Regeneration.** Only 24% of Stewards in the sample included concepts related to the low rates of native tree regeneration in their mental models; those Stewards usually made reference to conifers in particular. 76% of Stewards did not include any concepts related to native tree regeneration in their mental models. This implies that only a minority of Stewards has fully incorporated the concept of native tree regeneration into their mental models.
- Community Collaboration.** Just 12% of Stewards in the sample referenced the necessity of community collaboration for restoration to occur. While Stewards did include a variety of references to community involvement, detailed below, they rarely cited the assumption that restoration could not occur without community collaboration in the process.

Reflection of Green Seattle Activities in Steward Mental Models

The activities of the logic model refer to tangible steps GSP hopes Stewards will take to restore their sites. Steward mental models reflected the key activities of the logic model at percentages of between

47% and 94%. These findings are displayed in Figure 19, and described in detail below:



- Invasive Removal and Planting.** 94% of Stewards in the sample included concepts related to the removal of invasive species, and 88% included concepts related to planting native species. This reflects a high degree of shared understanding on the first set of activities.

- Secondary Invasive Removal and Plant Establishment.** In contrast, Stewards cited concepts related to the short-term stewardship of the site at comparatively lower percent-

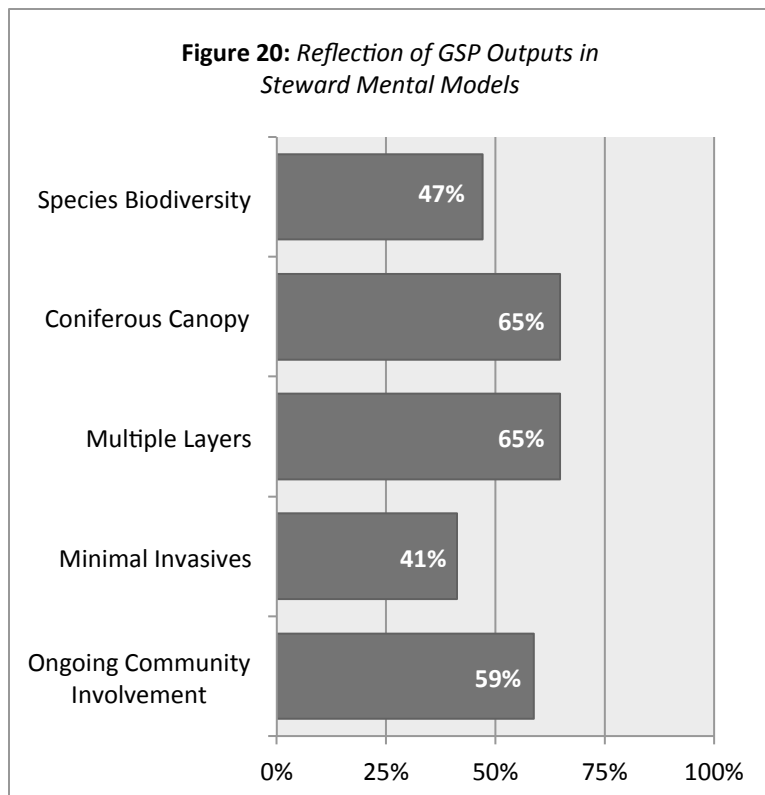
ages. 59% of Stewards in the sample referred to a process of secondary invasive removal, and 65% included the tasks associated with plant establishment in their mental models. While these findings imply that majorities of Stewards have incorporated these activities into their mental models, there are still sizeable minorities that have not.

- Long-Term Monitoring and Maintenance.** 47% of Stewards in the sample referenced concepts related to long-term monitoring of their sites, while 76% of them included concepts related to long-term maintenance. This implies that while a large majority has internalized some aspects of GSP's intended long-term activities (maintenance), less than half have adopted monitoring into their mental models.

- **Volunteer Coordination.** 76% of Stewards in the sample referenced recruiting and coordinating volunteers in their mental models, implying that a strong majority considers this activity to be a part of their mental model.

Reflection of Green Seattle Outputs in Steward Mental Models

The outputs of the logic model refer to the tangible and short-term changes to the landscape and the community that GSP believes Stewards should be working toward in order to restore their sites. Steward



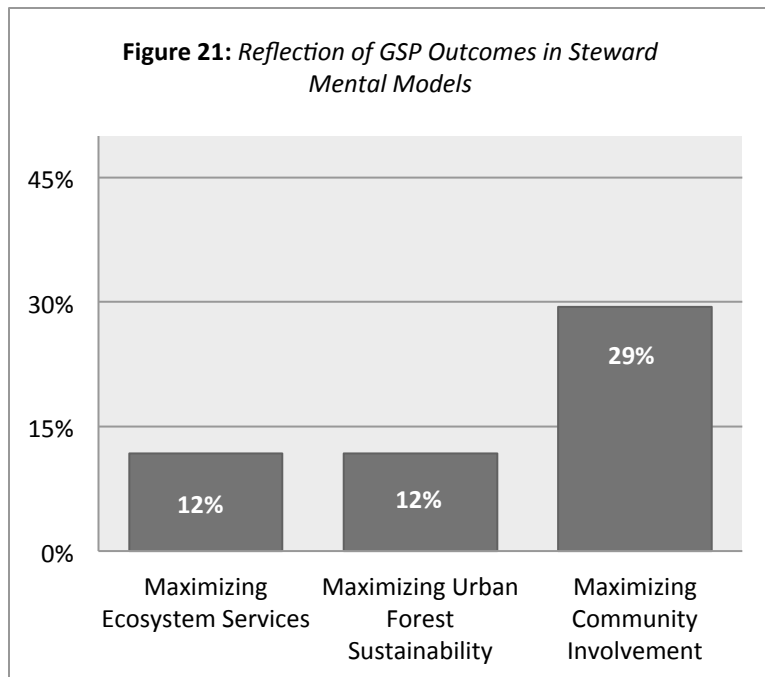
mental models reflected the logic model's outputs at percentages of between 41% and 65%. These findings are displayed in Figure 20 and described in detail below:

- **Species Biodiversity.** 47% of Stewards in the sample referenced biodiversity of native species as an output they were working toward, implying that less than half of Stewards have incorporated this concept fully into their mental models.
- **A Coniferous Canopy.** 65% of Stewards in the sample included concepts related to increasing the amount of coniferous trees in the canopy, implying that a majority of Stewards have adopted this concept into their mental models.
- **Multiple Layers.** 65% of Stewards in the sample referenced their work to establish healthy tree, shrub, and groundcover layers, meaning that a majority of Stewards have incorporated this concept into their mental models.
- **Minimal Invasives.** 41% of Stewards in the sample envisioned little or no invasive species as an output of their restoration work, implying that less than half of Stewards have a clear vision of an invasive-free landscape in the short-term.

- **Ongoing Community Involvement.** 59% of Stewards in the sample referenced an increase of sustained community involvement and volunteerism as an output of their restoration work, implying that a majority has adopted this concept into their understanding of restoration.

Reflection of Green Seattle Outcomes in Steward Mental Models

The outcomes of the logic model refer to the long-term changes in the landscape and the community that GSP believes should result from effective restoration efforts by Stewards. They are the big picture goals that the program is working toward. Steward mental models reflected these concepts at comparatively lower percentages of between 12% and 29%. These findings are displayed in Figure 21, and described in detail below:



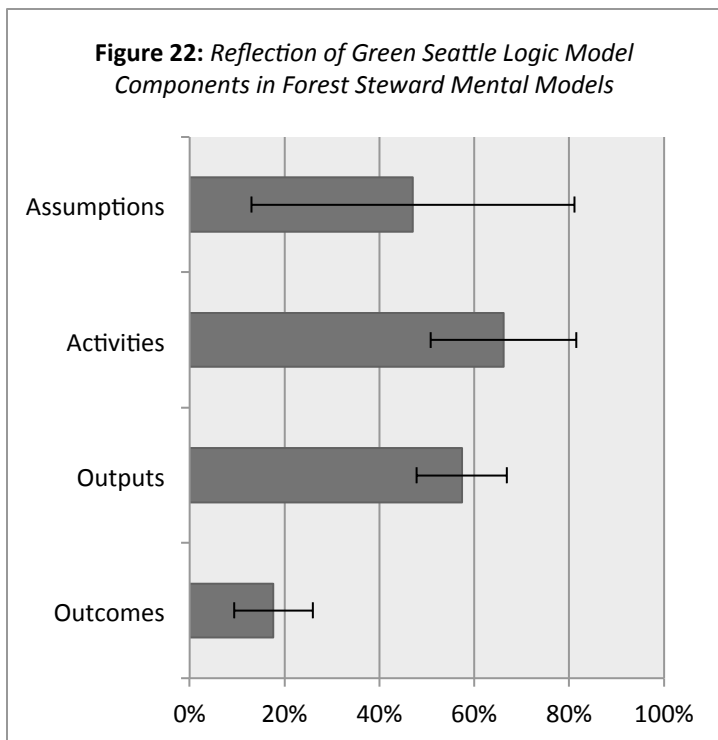
- **Maximizing Ecosystem Services.** Just 12% of Stewards in the sample referenced any ecosystem service as a long-term outcome of their efforts. In this case, a small minority Stewards mentioned water quality and carbon sequestration; most did not broach this concept. This implies that few Stewards have adopted ecosystem services fully into their mental models.

- **Maximizing Urban Forest Sustainability.** Only 12% of Stewards in the sample included the idea of sustainability of the urban forest as a long-term outcome of restoration. A small number of Stewards elegantly described their vision of a more sustainable forest, but they were joined by very few of their colleagues in doing so. This implies that few Stewards have adopted sustainability fully into their mental models.

- **Maximizing Community Involvement and Support.** 29% of Stewards in the sample referenced the idea of an involved and supportive community as an outcome of their work, implying that less than a third of Stewards have incorporated this concept into their mental models.

Considering the Reflection of the Green Seattle Logic Model in Steward Mental Models

These percentages of reflection for each logic model component, with their respective standard deviations, are displayed in Figure 22. These findings imply differing levels of reflection for each



component of the logic model:

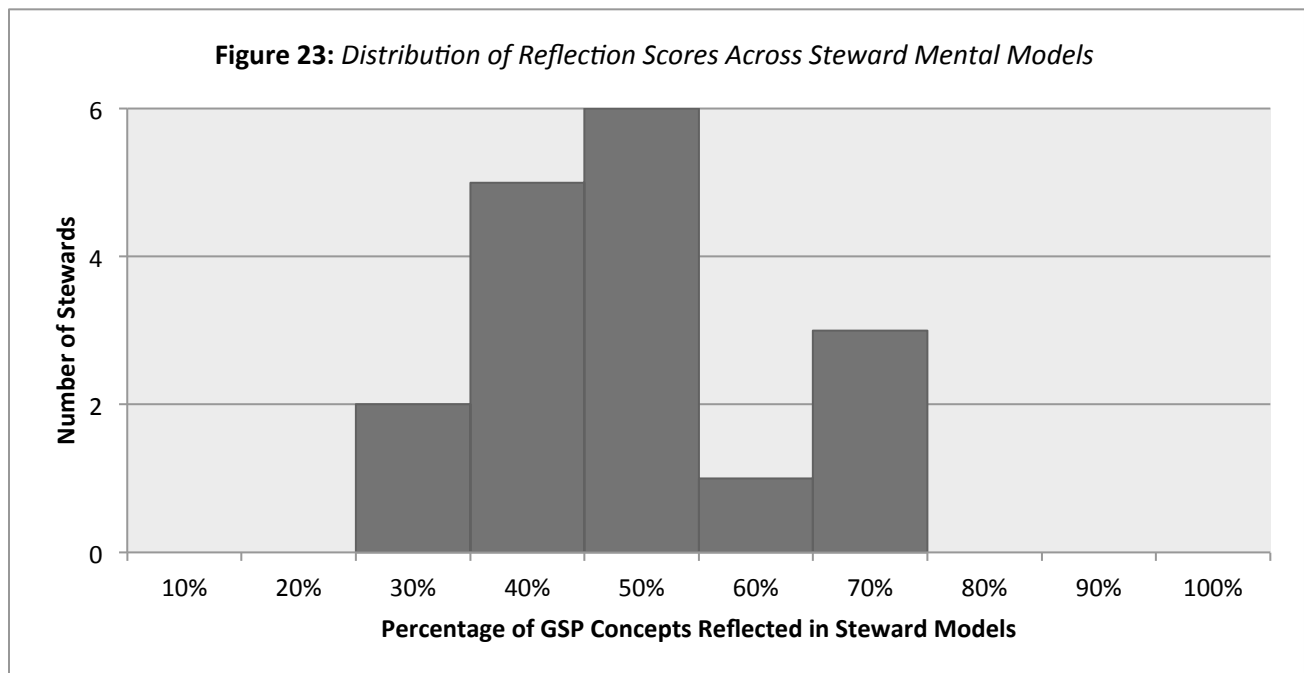
- On average in the sample, 47% of Stewards' mental models reflected GSP's core *assumptions*—though this number masks an extremely wide variation in the data.
- On average in the sample, 66% of Stewards' mental models reflected GSP's key *activities*, but considerable variation means that different activities have been adopted at differing percentages.
- On average in the sample, 57% of Stewards' mental models reflected GSP's key landscape and community *outputs*, without major variation between the specific outputs.
- On average in the sample, only 18% of Stewards' mental models reflected GSP's core *outcomes*, implying that few Stewards have incorporated long-term ecological or social outcomes fully into their mental models—and these findings are not marked by major variation.

The Reflection Score: A Measure of Shared Understanding Among Stewards

The findings above reported on the level of shared understanding of specific GSP concepts across the sample of Stewards. Using the same data, this study scored each Steward in the sample according to his or her level of reflection across all GSP concepts. The resulting *Reflection Score* is a measure of the

extent to which any single Steward’s mental model reflects GSP’s core concepts; amalgamated, it can provide a rough estimate of shared understanding across the sample of Stewards.

The distribution of Stewards according to their Reflection Score is displayed in Figure 23. It implies that the average Steward’s mental model reflected just over half of GSP’s key concepts (mean = 54%, median = 53%, standard deviation = 12%). The half of the distribution below the mean appears normal, while the distribution above the mean is skewed—with a cluster of Stewards whose mental models exceed 70% reflection.



SUMMARY: REPORTING ON REFLECTION

The second objective of this study was to determine the extent to which key GSP concepts are reflected in the mental models of Stewards. In order to do so, it worked with GSP stakeholders to create the Green Seattle Logic Model, which contained a series of assumptions that Stewards should have in their minds, activities that they should undertake, landscape and community outputs their work materializes, and long-term outcomes that they work toward.

This chapter reported on that logic model, and the percentages at which Steward mental models reflect concepts within it. In general, Stewards’ mental models reflect about half of GSP’s assumptions, and more than half of GSP’s activities and outputs, but less than a fifth of GSP’s long-term outcomes.

Additionally, this chapter introduced the Reflection Score, a way of comprehensively measuring how

much any single Steward's mental model reflects GSP concepts, and provided a distribution of reflection scores across the sample of Stewards. On average, a Steward's mental model reflected just over half of the concepts from the Green Seattle Logic Model.

Chapter Five

Findings and Recommendations for Shared Understanding and Adaptive Capacity

OVERVIEW: SHARED UNDERSTANDING BETWEEN THE “GRASSROOTS” AND “GRASSTOPS”

The purpose of this study was to assess the degree of and potential for shared understanding in GSP. To do so, this study provided:

- **A comprehensive, qualitative description of Steward mental models.** This study brought to light, for the first time, Stewards’ own conceptual understandings of ecological restoration—documenting mental models at the “grassroots” of the program in order to share these understandings with the program managers at GSP’s “grasstops.”
- **An assessment of Steward reflection of the GSP framework.** This study analyzed the extent to which concepts that GSP stakeholders consider critical to ecological restoration permeate Stewards’ models of restoration.

These products shed real light on shared understanding in GSP—but they do not offer an easy way to determine a comprehensive, quantitative measurement. Rather, by integrating these findings and offering several recommendations based on them, this study concludes by serving as a more formative assessment of shared understanding among GSP participants.

INTEGRATION AND DISCUSSION OF FINDINGS

Each of the previous two chapters reported on this study’s results in isolation; the pages below bring these results into conversation as a series of findings and recommendations for shared understanding in GSP’s community-based restoration efforts. It is important to note that a participatory analysis process was used, as described in *Chapter Two*, engaging GSP stakeholders in a discussion of preliminary findings to create a filter from which these final conclusions emerge.

Finding #1: Differences in Steward Mental Models and Program Logic

There are important differences in Steward mental models—with distinctions manifesting both *within* the sampled group of Stewards, and *between* Stewards and GSP stakeholders. These differences represent potential gaps in understanding.

When asked the same question (“*what is the process of ecological restoration at your site?*”), Stewards in the sample provided surprisingly varied responses; the rates at which these responses reflected key concepts from the Green Seattle Logic Model also differed greatly. Each of these aspects of difference in explored in greater detail below:

- **Community and Ecology.** *Chapter Three* explored Steward mental models, eliciting the key concepts that make up the schema through which Stewards consider their work. It identified a key distinction between concepts related to a site’s ecology and concepts related to a site’s community—as well as a difference in the rates at which Steward mental models incorporate concepts from either side of this typology. The “ideal types” of Stewards developed from this finding (Ecologists, Community Organizers, and Community-Based Restorationists) represent real differences in Steward mental models—and thus, likely represent real differences in the way Stewards approach their work, take in and use information, and understand and relate to larger program goals. A large majority of Stewards approach their work with a mental model focused on ecological concepts.
- **Program Logic.** *Chapter Four* explored the extent to which Steward mental models reflected key concepts of GSP’s framework for restoration. While majorities of Stewards incorporated GSP’s key activities and immediate outputs, Stewards shared the program’s assumptions and its long-term outcomes at much lower percentages. A shared understanding of activities and outputs is essential—but less agreement on other areas may be cause for concern. The program assumptions represent a problem statement of sorts, while its outcomes represent a vision for the future. In other words, Stewards and the program do not fully share a comprehensive understanding of what has caused the problem and what a better future looks like.

These findings point to clear distinctions among Stewards, and between Stewards and GSP stakeholders. While these differences don’t necessarily stand in the way of shared understanding, they make its actualization more difficult.

Finding #2: Shared Understanding Between Steward Mental Models and Program Logic

While there are critical differences between models, and gaps in shared understanding, there is also a remarkable degree of similarity between the collective analysis of Steward models and GSP’s program logic.

Taken as a whole, the sampled group of Stewards collectively cited nearly every concept in the Green Seattle Logic Model. This means that the key concepts Stewards collectively noted, captured in Figures 11, 13, 14, and 15 in *Chapter Three*, overlap in many cases with key concepts in program logic, captured in Figure 17. These similarities are displayed in Table 3 below.

Concept from Green Seattle Logic Model from Figure 17	Corresponding Concepts from Steward Mental Models from Figures 11, 13, 14, and 15
Decline of the Canopy	Decline of the Canopy
Invasive-Dominated Understory	Dominance of Invasive Species
Native Trees Struggle to Regenerate	-
Community Collaboration is Essential	-
Invasive Plant Removal	Remove Invasives
Planting	Plant
Long-term Monitoring and Maintenance	Monitor, Maintain
Volunteer Recruitment and Community Engagement	Recruit Volunteers, Build Community, Build Stewardship Capacity
Native Species Diversity	Diverse Native Species
Coniferous Canopy	Coniferous Canopy
Healthy Shrub and Ground Layers	Landscape Structure
Minimal Invasives	Minimal Invasives
Volunteer and Community Participation	Community Engagement
Ecosystem Services	-
Urban Forest Sustainability	Sustainability, Maintenance
Community Involvement and Support	Community Engagement

While the conceptual overlap is tremendous, the scale of Table 3 above is *sample-wide*—meaning that these concepts are shared by some but not all participants. In other words, as a whole, Stewards reflect nearly all of GSP’s concepts, but this reflection is spread unevenly across individual Stewards, meaning it is also incorporated unevenly across landscapes and across neighborhoods. Thus, in this case, the findings indicate merely the *potential* for shared understanding, rather than the clear presence of it.

Finding #3: Confusion About Long-Term Community Involvement and Sustainability

The concepts with the least shared understanding—both within the sample and between Stewards and GSP stakeholders—relate to the role of the community over the long-term, and the long-term objective of restoration. Each of these distinctions is detailed below:

- **The Role of Community.** Stewards do not share, among themselves or with GSP stakeholders, a uniform vision for community engagement over the long haul. While community concepts play some role in nearly every Steward’s mental model, a relative paucity of models place these concepts in a central role. In comparing logic model concepts to Steward mental models, the community aspects—from the assumption that community collaboration is essential to the long-term outcome of engaged communities—are reflected at low percentages.
- **Maintenance or Sustainability.** Stewards do not share, among themselves or with GSP stakeholders, a common vision of forest sustainability. In their mental models, some Stewards envision the need for ongoing, intensive maintenance over the long-term, while others believe their work may lead to a more “hands-off” ecosystem over time. In comparing their mental models with GSP concepts, Stewards reflected the long-term outcome of urban forest sustainability at the lowest rate of any concept measured.

At issue here is the long-term role of the community in the care of the forest. In the terms of Clark *et al.*'s (1997) model of urban forest sustainability, there is a lack of clarity in how the community framework should be incorporated into the resource management apparatus over the long term. Is GSP attempting a one-time, twenty-year intervention into community-based restoration, at the end of which the community is extricated from the resource management apparatus? Or is GSP envisioning the urban forest as a social-ecological system, a “hands-on” landscape that will require community stewardship over the long-term?

RECOMMENDATIONS FOR DEVELOPING SHARED UNDERSTANDING

The following recommendations are intended to develop shared understanding among GSP participants in order to bolster their capacity to manage adaptively at the program scale, and stem from the key findings described above. The four recommendations are detailed below and summarized in Figure 24.

Recommendation #1: Develop and Use a Rapid Assessment Tool for Incoming Stewards

GSP should develop a rapid assessment tool to identify the critical contours of the mental models of incoming Stewards. The tool need not—in fact, should not—be as complex and methodologically rigorous as the 3CM procedure used here; rather, the rapid assessment tool should be simple and cost-effective.

A variety of literature has documented the ways that individuals' mental models affect management decisions (see, for example, Senge 1990 and Jones *et al.* 2011). In the context of GSP, this implies that Community Organizers are likely to respond to training, information, and provision of resources in one set of ways, while Ecologists may respond in differing ways. Because of the autonomy Stewards have in

Figure 24: Summary of Recommendations

1. GSP should *develop and use a rapid assessment tool* to identify the critical contours of the mental models of incoming Stewards.
2. Where possible, GSP should *pair incoming Stewards based on their mental models*, placing an Ecologist and a Community Organizer at each site.
3. GSP should *create learning forums opportunities* for Stewards of varied mental models to teach and learn from each other.
4. GSP should *develop and communicate a clear vision* for the role of the community in the long-term sustainability of the urban forest.

their decision-making, and because of the pivotal role they play in the process of restoring Seattle's urban forest, it is important to gain a sense of the mental models Stewards bring to their work. A rapid assessment tool would allow GSP stakeholders to simply and quickly assess a new Steward's orientation to her work—is she focused on building community, restoring ecosystems, or both? This could offer a clue into what sorts of support and training she may need, and what kinds of strengths and skills she may bring.

Recommendation #2: Pair Ecologists with Community Organizers

Where possible, GSP should pair incoming Stewards based on their mental models, placing an Ecologist and a Community Organizer at each site.

The job of a Steward is incredibly varied—from gaining an intimate knowledge of a site's ecology to developing relationships with a site's community; from organizing events to tracking data; from raising funds to raising a new tree canopy. A Steward whose mental model and whose skill set can prioritize all these tasks at once is a rare find, and this study found that less than a fourth of Stewards fully incorporated these two sets of concepts into their mental models. By pairing Ecologists with Community Organizers at the same sites, GSP can draw from the strengths of both to build the capacity of Stewards to perform all parts of their job description.

Recommendation #3: Provide Learning Forums for Ecologists and Community Organizers

GSP's ability to place pairs of complementary Stewards at sites will likely be limited. Where this is not

possible, *GSP should create opportunities for Stewards of varied mental models to teach and learn from each other.*

Research has shown the importance of learning forums—that is, opportunities for stakeholders with differing perspectives to learn from each other—in adaptive management processes (McLain and Lee 1996). In this case, GSP could host sessions for Community Organizers to teach the key concepts and tools of community engagement, from volunteer recruitment to building partnerships; or, for Ecologists to teach more about ecological restoration, from assessing a site to monitoring and adapting management. Such learning partnerships within a cohort of Stewards would allow for key concepts to spread horizontally across Stewards and across sites, building capacity for integrative stewardship as well as developing shared understanding.

Recommendation #4: Develop and Communicate A Vision for Community Engagement and Long-Term Sustainability

GSP should develop and communicate a clear vision for the role of the community in the sustainability of the urban forest. GSP should consider crafting this vision in collaboration with Stewards.

The areas of least shared understanding (described in Finding #3 above) relate to the contrasting visions of the role of community members in ensuring the sustainability of the urban forest. GSP should clarify their long-term vision of community engagement in urban forest sustainability based on several key questions:

- *Once the first years of invasive removal and planting are completed, what kind of long-term resource management will be required?* Stewards differ on this question—with some envisioning long-term, ongoing, intensive maintenance, and others envisioning a landscape that eventually sustains itself. Messages in GSP’s education and training, as well as the Green Seattle Logic Model, accommodate both visions.
- *Once the first years of invasive removal and planting are completed, what is the role of a Steward and a stewardship group?* In general, while GSP has developed a clear vision for the ecological aspects of restoration (setting metrics for species diversity and abundance, for instance), the details of the community’s role over the long-term, and the long-term community outcomes associated with that role are less clear in both Steward models and in GSP education.

Collectively, this confusion prevents the development of a shared understanding of the long-term role of the community in resource management and forest sustainability. Truly, this is what is most unique about GSP—the transformation of the relationship between urban communities and their natural resources. This is in many ways uncharted territory, but a lack of shared understanding on this issue may hinder the program’s progress. GSP needs to develop and communicate a clear long-term vision of a “hands-on” forest, and of community groups active for a generation and more—so that Stewards and GSP stakeholders can share an understanding of the true outcomes of the partnership.

Ultimately, it is Stewards and their community volunteers that will carry out this vision. Based on the depth of knowledge and commitment demonstrated by Stewards during this study, and the degree of *collective* shared understanding described in Finding #2, Stewards could also play an important role in crafting this vision alongside GSP stakeholders.

CONCLUSION: SHARED UNDERSTANDING AND ADAPTIVE CAPACITY IN GREEN SEATTLE

Adaptive management is premised on the notion that we cannot let uncertainty stymie innovative efforts to manage natural resources for human and ecological benefit. Critical to the success of collaborative and adaptive approaches is a strong sense of shared understanding underpinning the work of various stakeholders.

This study focused on assessing the degree of and potential for shared understanding between GSP’s Stewards (its “grassroots”) and program managers (its “grasstops”), in order to bolster its capacity to manage adaptively. The study found that there are both important differences and significant areas of overlap in the understandings of the grassroots and grasstops elements of the effort, and offered three recommendations for bridging these gaps. It also identified a critical area where there is more confusion than shared understanding, both among and between the grassroots and the grasstops—namely, the long-term vision for community engagement in urban forest sustainability. For this issue, it offered a fourth recommendation: that GSP stakeholders develop and communicate a new vision for Seattle’s urban forest as a social-ecological system.

GSP’s ambitious goal of restoring all 2,500 forested acres of Seattle’s urban parks is as unique and innovative as it is ambitious and inspiring. The true indicators of success—a reinvigorated forest canopy shading a biodiverse forest below, and a network of engaged and empowered communities with their hands in the dirt—will be impossible to measure for a generation or more. However, by attending to the degree of shared understanding among program participants, GSP can increasingly incorporate adaptive

elements into its work—allowing adjustments and improvements to be made in the day-to-day and year-to-year efforts that aim toward a sustainable urban forest.

OPPORTUNITIES FOR FUTURE RESEARCH

Building off other research in adaptive management (most notably McLain and Lee 1996), this study made the assumption that shared understanding in collaborative and adaptive efforts is important. However, for GSP to spend the time and energy required to develop shared understanding, it should have some confidence that these efforts will make tangible contributions to a more sustainable urban forest. The researcher identified a series of questions, described below, that could be explored to better understand this.

- **From Mental Models to Management.** The most important direction for future research is on the extent to which differences in mental models manifest as differences in management practices—and ultimately, as differences in landscapes and communities. This study identified important differences in mental models, but do these differences matter to management? Essentially, researchers should ask: *Do Stewards with differing types of mental models tend to manage their restoration efforts in measurably different ways?*
- **From Shared Understanding to Landscape Outcomes.** This study also identified important opportunities to assess and use mental models to develop a greater sense of shared understanding among all GSP participants. It is critical to understand whether an investment in “managing mental models” (Senge 1990: 163) actually results in meaningful program improvements. Essentially, researchers could ask: *Can GSP advance further toward its outcomes through attending to Steward mental models and shared understanding?*
- **Mental Mapping as an Academic Exercise and as a Management Practice.** A series of studies used 3CM to elicit mental models, and found it to be an effective method of mapping participants’ knowledge (Kearney and Kaplan 1997). This study suggested GSP perform some variety of “rapid assessment” mental mapping with its incoming Stewards. However, little research has been done on the efficacy of mental modeling through less rigorous and less time-consuming methods. Essentially, researchers could *test a variety of cognitive mapping techniques to identify which are both time- and cost-effective.*

POSTSCRIPT ON PARTICIPATION: EVALUATING THE USE OF PARTICIPATORY METHODS

As a final window into the role of participatory approaches in this study, Wulforth's (2008) criteria for participation (described in *Chapter One*) were applied to this study's research process. The goal is not to definitively declare the study participatory or not, but to transparently examine the ways in which this effort differed from conventional approaches and aimed toward more participatory ones. Specifically:

- **Community-Centered Control.** Specific stages of the research process (most notably, the formulation of research questions and the engagement of stakeholders in analysis) represented authentic forms of participation and power-sharing in this study. By handing off control of something as fundamental as the research questions, the study took a large step toward community-centered control. However, other steps (most notably research design and data collection) were taken in isolation from the Community Committee—meaning that a substantial number of formative decisions were made without devolving significant control to stakeholders.
- **Reciprocal Production of Knowledge.** By committing to situating the study in the GSP community, selecting a research agenda from previous participatory work, engaging stakeholders in formulating questions, and animating the analysis with the meanings of stakeholders, this study took as its heart the production of knowledge useful for the GSP community. While this sentiment had sometimes to be balanced with academic needs, the study never strayed from a commitment to the reciprocal production of knowledge.
- **Translating Knowledge into Action.** This study at its core was oriented toward action—it focused in on one specific attempt at collaborative stewardship, and brought a utilization-focused approach to each step of the research process. Additionally, the creation of a practitioner- and community-oriented document and presentation to communicate findings and recommendations confirms this focus on knowledge for action.

Regardless of where this study rates on the scale of participation (if such a scale exists), it is critical to acknowledge the role played by GSP stakeholders in the study's formulation and implementation. The objective of this study was to assess the degree of and potential for shared understanding between the "grassroots" community members of GSP and its "grasstops" program managers. Through the experience of the research process, the researcher was convinced that the prospects for meeting this objective were materially improved through the substantive participation of the community.

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Appendix 1: Recruitment Tools

Appendix 1a: Recruitment Email

The following email was distributed to the entire population of Forest Stewards through Forterra's Green Seattle Project Manager.

Please note, recruitment for this study was done when the research design anticipated a two-stage interview process, and these recruitment materials reflect that. During the research process, however, the researcher and his academic Committee determined that one stage would be sufficient.

Hello Forest Stewards!

My name is Justin Hellier, and like you I have spent many hours grubbing blackberries and pulling ivy in my neighborhood park. I am now a graduate student at the University of Washington, conducting my thesis research on how Forest Stewards use scientific information to help restore their sites.

I am writing to ask you to take part in this research! Specifically, I would like to interview you about the process of ecological restoration on your site. For more details on the research, please click [here](#).

Participation is 100% voluntary—but your participation will be a great help to my research, and it is also an opportunity to give your thoughts about how to make restoration at your site more effective. The interview will last about 30 minutes, at a location that is convenient and comfortable for you, and the information you provide is completely confidential.

If you are willing to participate in a 30-minute interview, please [click here to sign up!](#)

If you have any questions or concerns, please feel free to contact me.

Sincerely,

Justin Hellier

Appendix 1b: Additional Information Offered to Interested Stewards

Adaptive Management in the Green Seattle Partnership: Science, Community Collaboration, and Ecological Restoration

About the Research

This research is being performed by a University of Washington graduate student, as part of his thesis research. It is independent from the City of Seattle, the Cascade Land Conservancy, EarthCorps, or any other group associated with the Green Seattle Partnership (GSP) -- but it was developed with a substantial amount of input from these groups, and is aiming to create valuable information for these groups.

This research is focused on how Forest Stewards understand the process of ecological restoration at their sites, and how they use scientific information, education, or training in their work. For Round One, it will seek to interview 20 to 25 Forest Stewards about what ecological restoration looks like on their site. For Round Two, it will select 7 to 10 of these Forest Stewards to interview in greater depth about what information they use to help them restore their site, what information they need or wish they had, and what they think of some of the information that GSP has provided.

In the end, the research will result in both an academic thesis as well as a set of findings and recommendations geared toward the members of the GSP. Hopefully, it will help GSP to provide more effective information, education, and training to Forest Stewards.

About the Researcher

Justin Hellier, the Principal Investigator of the research, is currently a graduate student, and has spent more than 5 years working in community-based ecological restoration in city parks in both Seattle and Olympia.

This research is being performed as part of Justin's thesis, in fulfillment of the requirements for a Master of Public Administration degree from the Evans School of Public Affairs and a Master of Science Degree from the School of Environmental and Forest Sciences at the University of Washington.

To participate in this research, please [click here](#) to sign up!

For more information about this research, please contact Justin at hellier@uw.edu.

Appendix 1c: Recruitment Survey

Page 1 of 3

Thank you for your interest in this research!

I have a lot of respect for the amazing work you do in your park, and I really look forward to the opportunity to learn from you as a part of my thesis research.

If you are interested in participating, please keep reading -- or just click "Next" at the bottom of this page to sign up!

How You Can Help

I would like to interview you about the process you take to restore your site.

- The interview will last about 30 minutes, and will take place somewhere convenient and comfortable for you.
- While I would like to record the interview, the information you provide will be kept strictly confidential, and I will share a copy of my results you with in June if you would like.
- Interviews will be happening from **October 15 until December 5**.

About This Research

Green Seattle Partnership has an ambitious goal -- to restore all of Seattle's forested parks in 20 years. They are working toward this goal by engaging a network of community groups and giving volunteer Forest Stewards the training and resources they need to save their neighborhood parks. My research will focus on how Forest Stewards understand and use scientific information about their sites, in order to help the Green Seattle Partnership provide you with more effective education, training, and information.

For more details on this research, please click [here](#).

If you are interested in participating in these interviews, please click "Next" below to provide your contact information.

Page 2 of 3

Question 1.

What is your name?

Question 2.

What park(s) do you steward?

Question 3.

What is the best way to contact you?

- Phone
- Email

- Regular Mail
- Other:

Question 4.

Please provide the phone number, email, or address where you would like to be contacted.

Page 3 of 3

Thank you!

If you are selected to participate in this research, I will be contacting you shortly.

Please make sure to hit "Submit Responses" below.

If you have any questions, please feel free to contact Justin Hellier at hellier@uw.edu or 206.xxx.xxxx.

Good luck in the forest this planting season!

Appendix 2: 3CM Data Collection Instrument

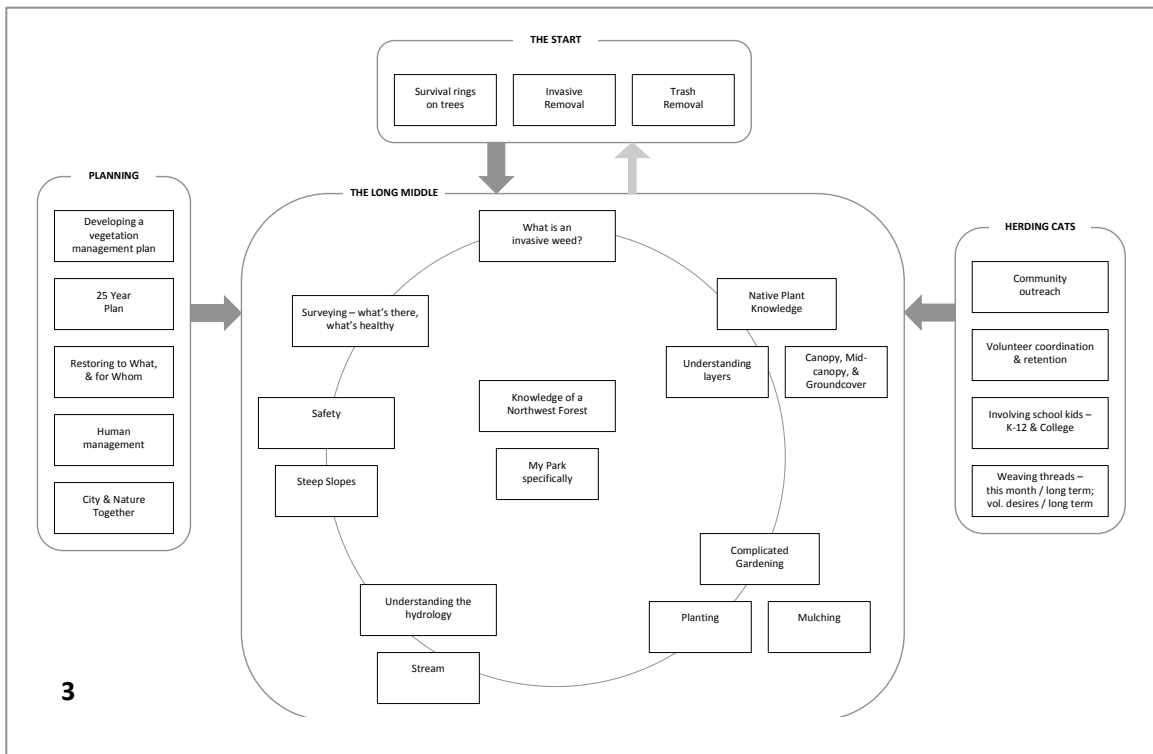
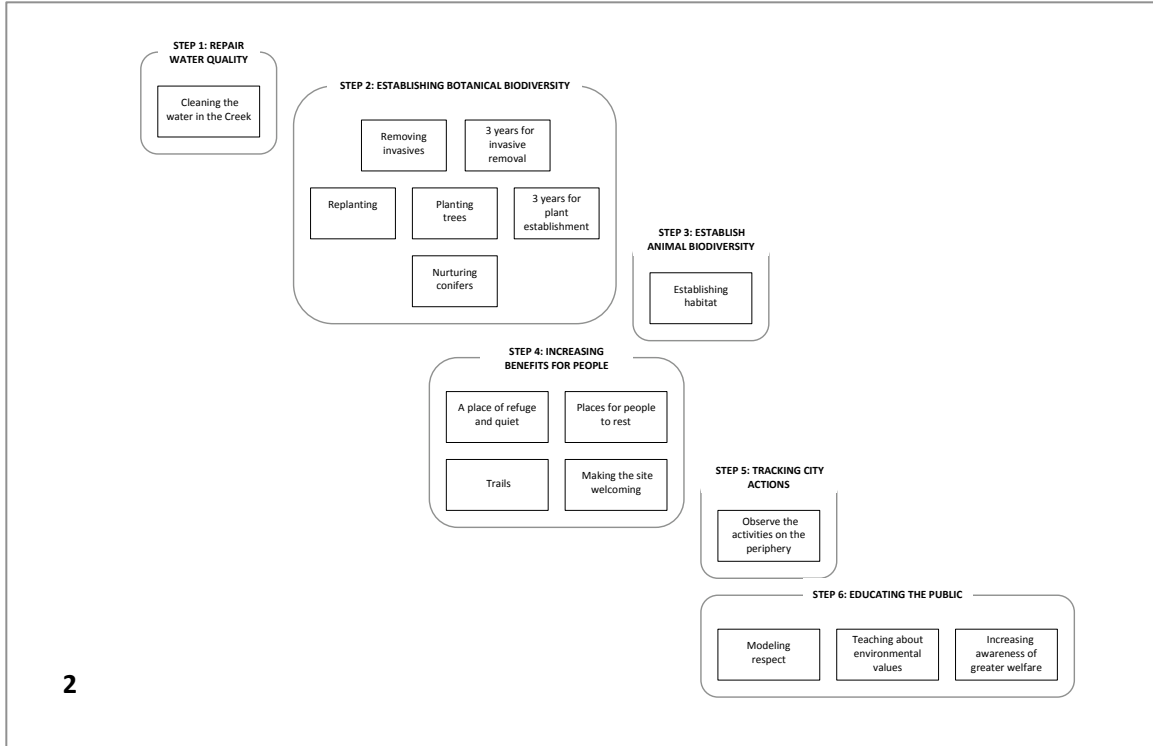
INTERVIEW ELEMENT	SAMPLE LANGUAGE
<p style="text-align: center;">Expressing Gratitude, & Ensuring Confidentiality</p>	<p>Thank you so much for taking part in this research.</p> <p>First, let me begin by letting you know that everything you tell me today is 100% confidential.</p> <p>That means that no one except you and I will know that you took part in this research, and that if anything you tell me today ends up in the results of the research, no one from the UW or from the Green Seattle Partnership will know that it came from you.</p>
<p style="text-align: center;">Asking for Consent to Record</p>	<p>It's really useful for me to have a transcript of what we talk about today, so I can refer to it as I continue my research.</p> <p>Is all right to record our conversation today?</p>
<p style="text-align: center;">Introduction to the Interview Process</p>	<p>Our goal today is to capture in words and on paper how you understand the process of ecological restoration at your site.</p> <p>We'll do that in two steps—first, I'll ask you to tell me about your site before and after ecological restoration.</p> <p>Then, we'll do a short activity to help you describe exactly what ecological restoration looks like at your site.</p> <p>Do you have any questions at this point?</p>
<p style="text-align: center;">“Focus on One Site”</p>	<p>As we do this activity, I'd like you to focus on the site that you work on as a part of the Green Seattle Partnership. What site will you have in mind?</p>
<p style="text-align: center;">Visioning: <i>Before</i></p>	<p>I'd like you to think about your site <i>before</i> you or anyone else began the process of ecological restoration there.</p> <p>Tell me what it looked like, and what was happening there.</p>

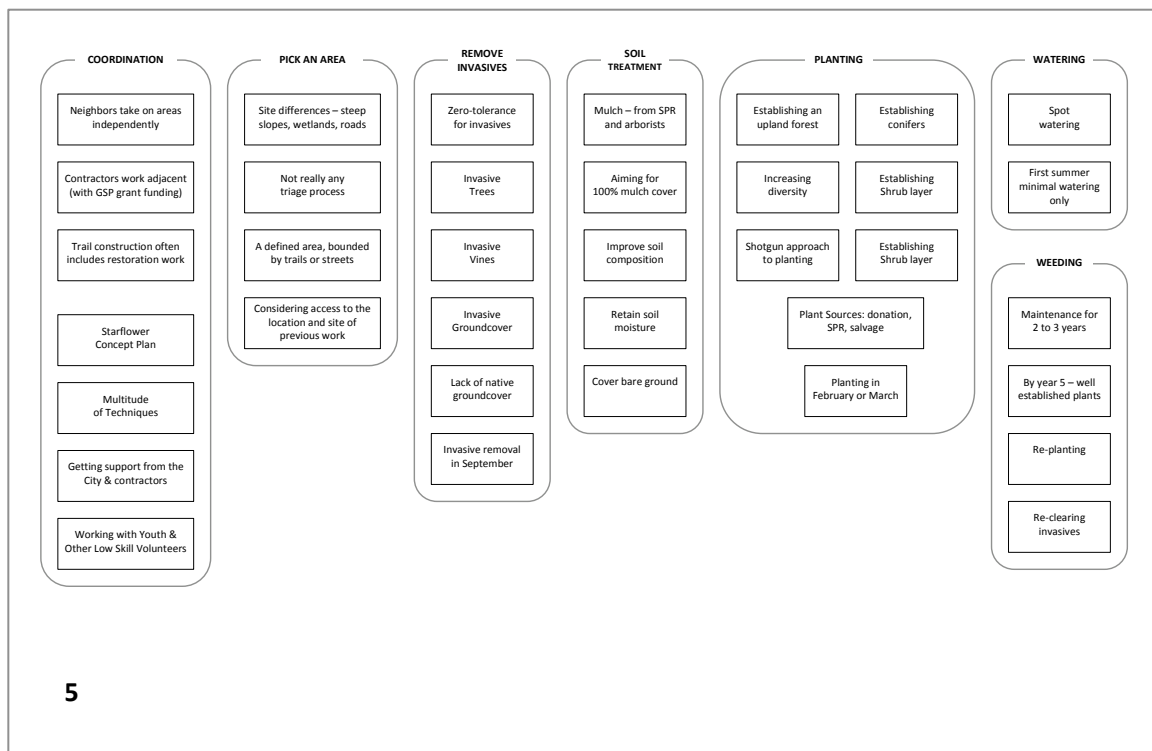
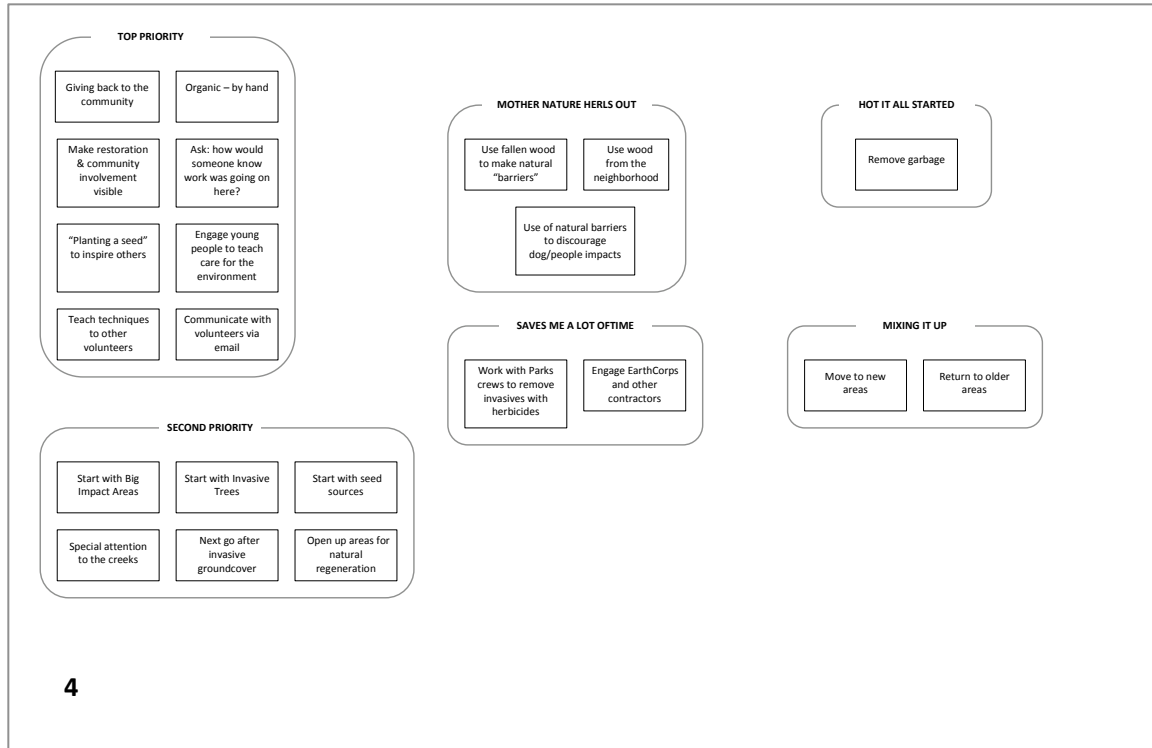
<p>Visioning: After</p>	<p>I'd like you to imagine your site way down the road once the process of ecological restoration is complete.</p> <p>Tell me what it will look like, and what might be happening there.</p>
<p>Explaining 3CM</p>	<p>Now we're going to do an activity called cognitive mapping – an activity that will help us get your thoughts down on paper.</p> <p>I'm going to ask you a question, and as you answer, I will write down the key concepts from your answer on these sticky notes.</p> <p>After that, I'll ask you to take a few minutes to arrange the sticky notes into categories, and name those categories.</p> <p>Do you have any questions so far?</p>
<p>The 3CM Question</p>	<p>So, a moment ago you laid out two pictures—one of your site before the process of ecological restoration began, and one of what you imagine your site will be like once the process of ecological restoration is complete.</p> <p>Now, I'm curious, given these two pictures you just described:</p> <p style="text-align: center;"><i>What is the process of ecological restoration at your site?</i></p>
<p>The Midway Prompt</p>	<p>Take a look for a moment at the words you've got down in front of you. Is there anything really critical that is missing?</p>
<p>Arranging Categories</p>	<p>So far we've got a lot of concepts down on the sticky notes in front of you.</p> <p>What I'd like you to do now is to organize these concepts according to how you see them.</p> <p>You can create groups, draw circles around groups, and draw lines or arrows between concepts or groups.</p> <p>You can also feel free to write down more concepts on other sticky notes at any time, or to discard any concepts you don't need anymore.</p>

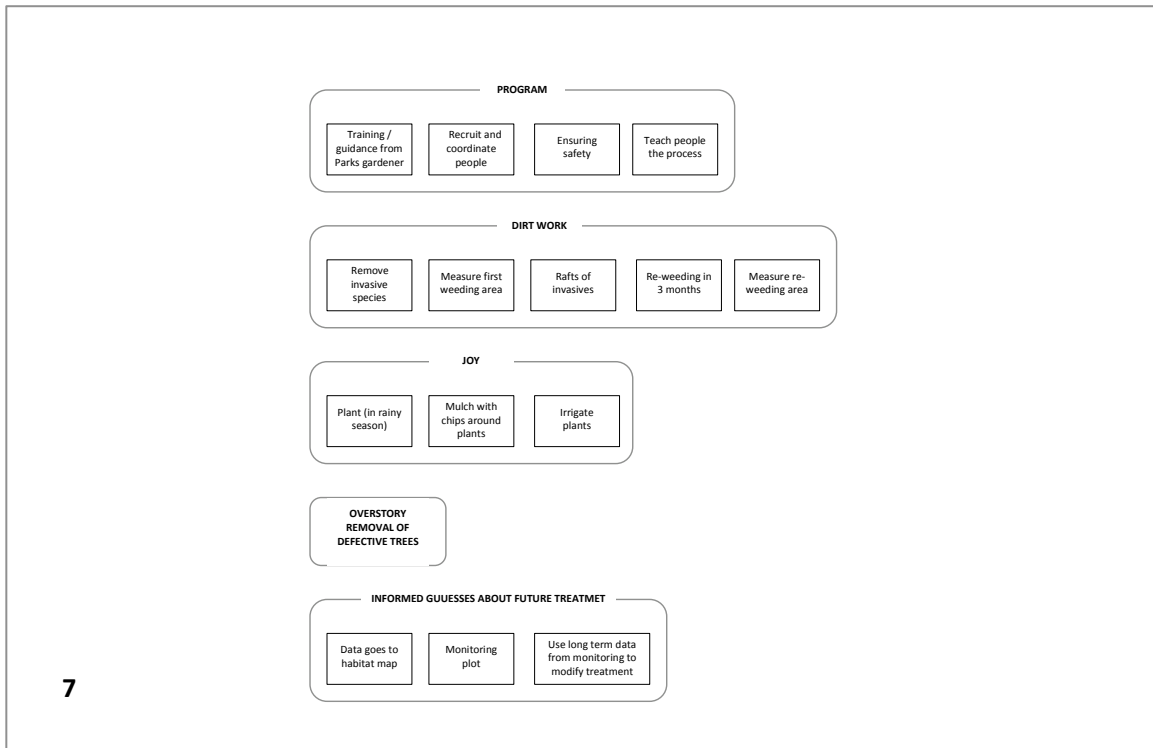
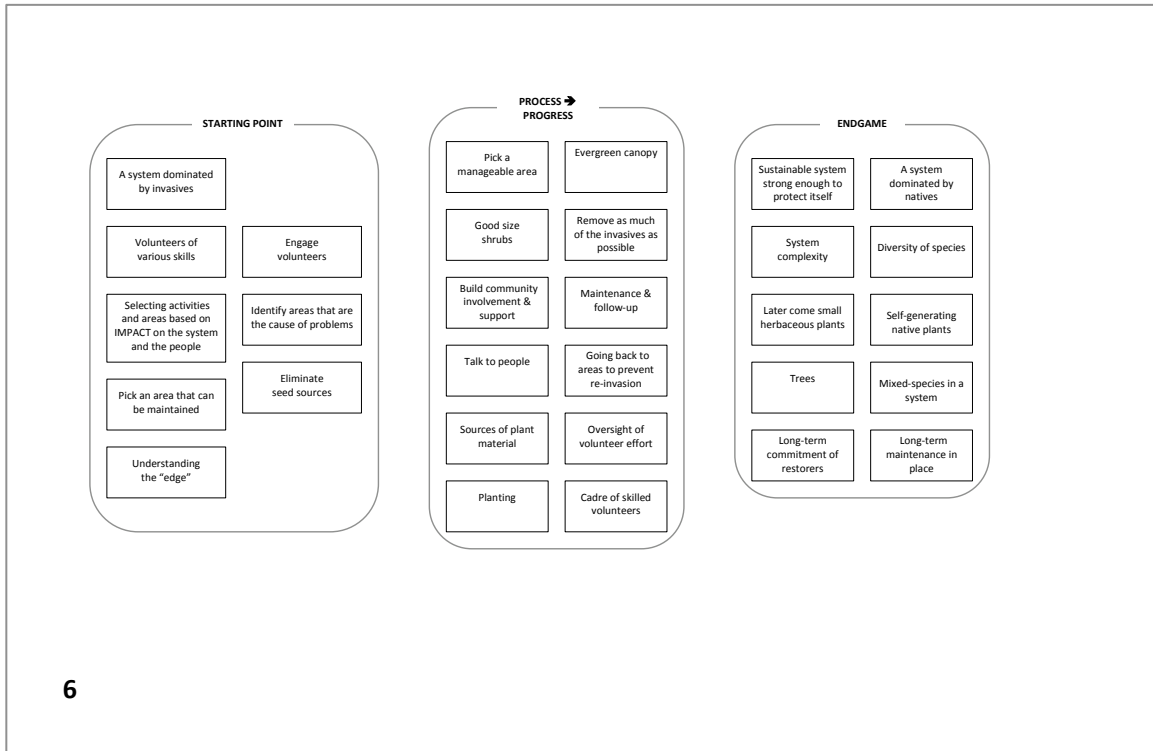
	As you arrange them, please let me know why you're doing what you're doing.
Naming Categories	<p>I see you've created some discrete groups here.</p> <p>Can you create a name or title for each discrete group, and then write it on the map?</p>
The Final Narration	<p>You've created a map here that represents what the process of ecological restoration at your site looks like to you.</p> <p>One last time, tell me about the map you've created.</p> <p>Using this map: <i>what is the process of ecological restoration at your site?</i></p>
Round Two Recruitment	<p>In a few months, I will be doing a second phase of this research, and I may want to interview you again with a different set of questions.</p> <p>Would you be willing to take part in another interview, if you were selected from the sampling process?</p> <p>That interview will take about half an hour.</p>
Gratitude & Goodbye	<p>Thank you so much for taking part in the interview today.</p> <p>I really appreciate your time, your thoughts, and more importantly all the great work you're doing at your site!</p>

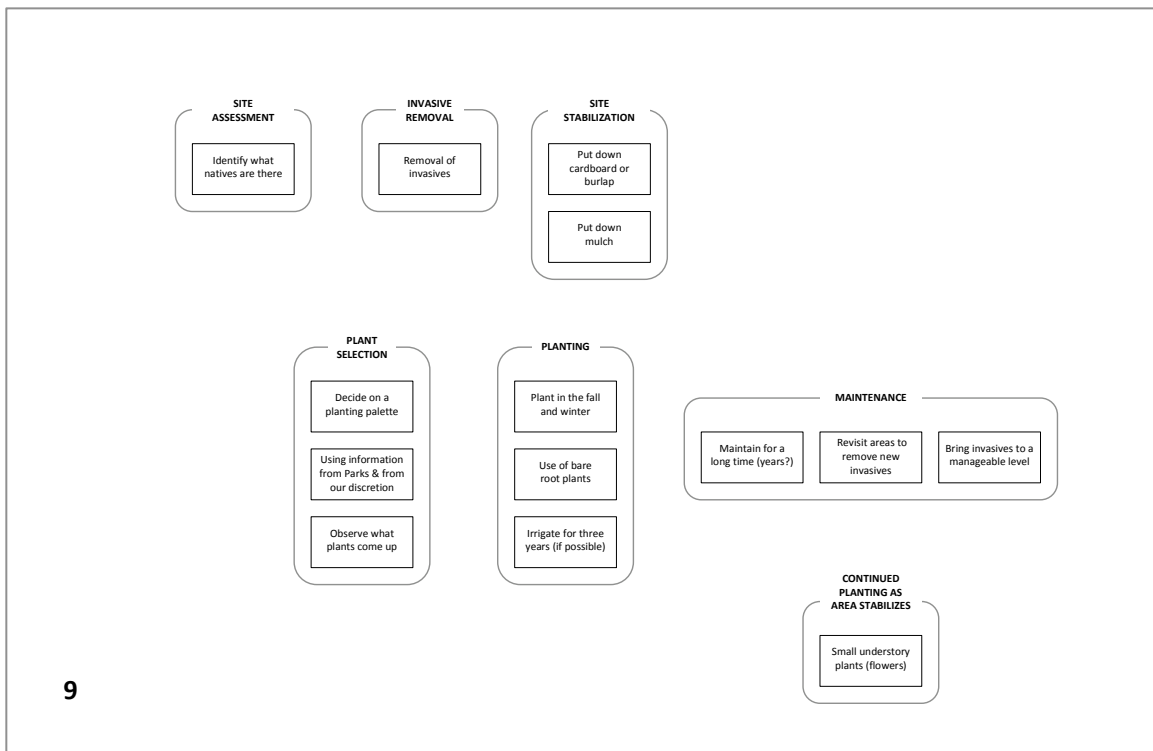
Appendix 3: 3CM Maps

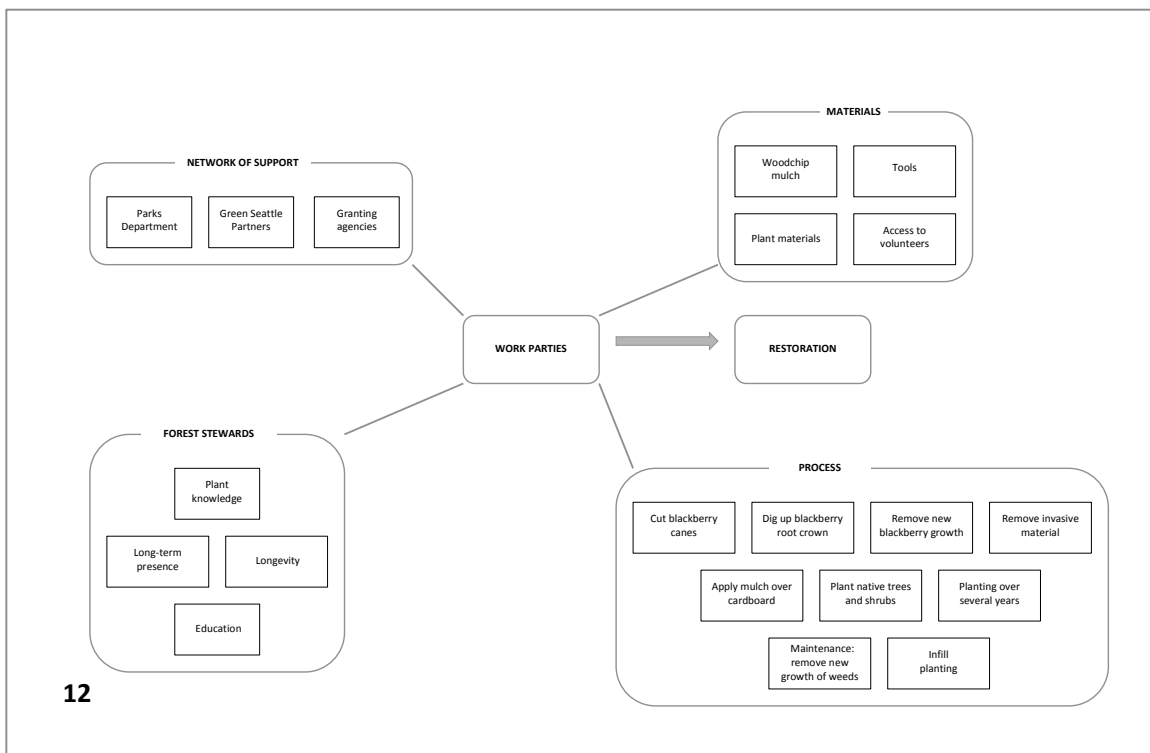
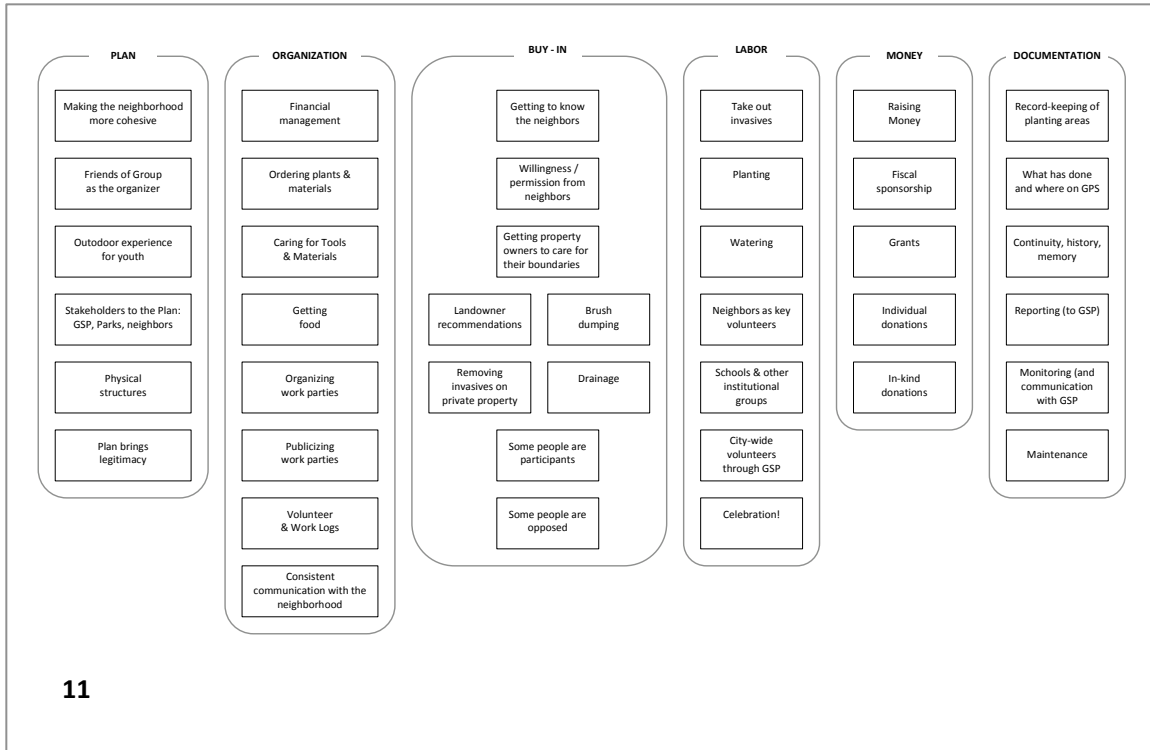
The following pages contain the 17 maps created by Stewards during the 3CM process. As noted in the description of this method, Stewards first answered the question “What is the process of ecological restoration at your site?” While they spoke, the researcher wrote down their key concepts on note cards, and then asked the Stewards to arrange the note cards in meaningful categories, to name the categories, and to show relationships between them. Finally, the researcher transcribed the maps into Word documents in order to make analysis easier. These transcribed maps make up this appendix.

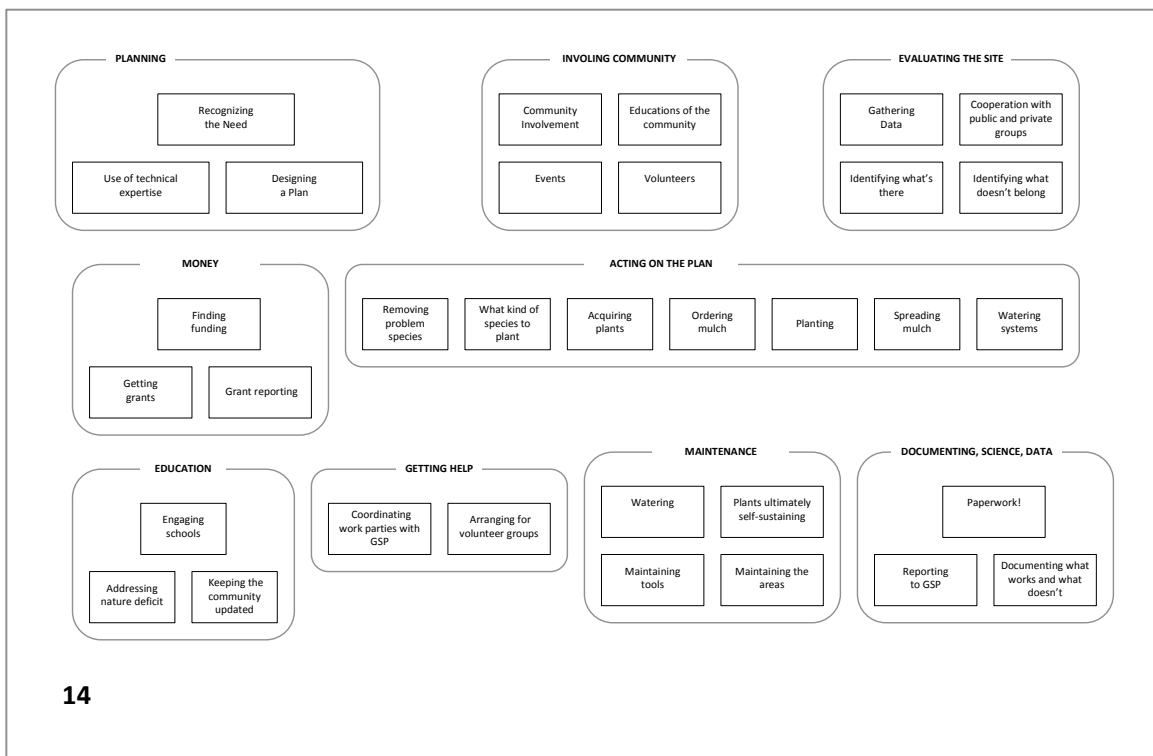
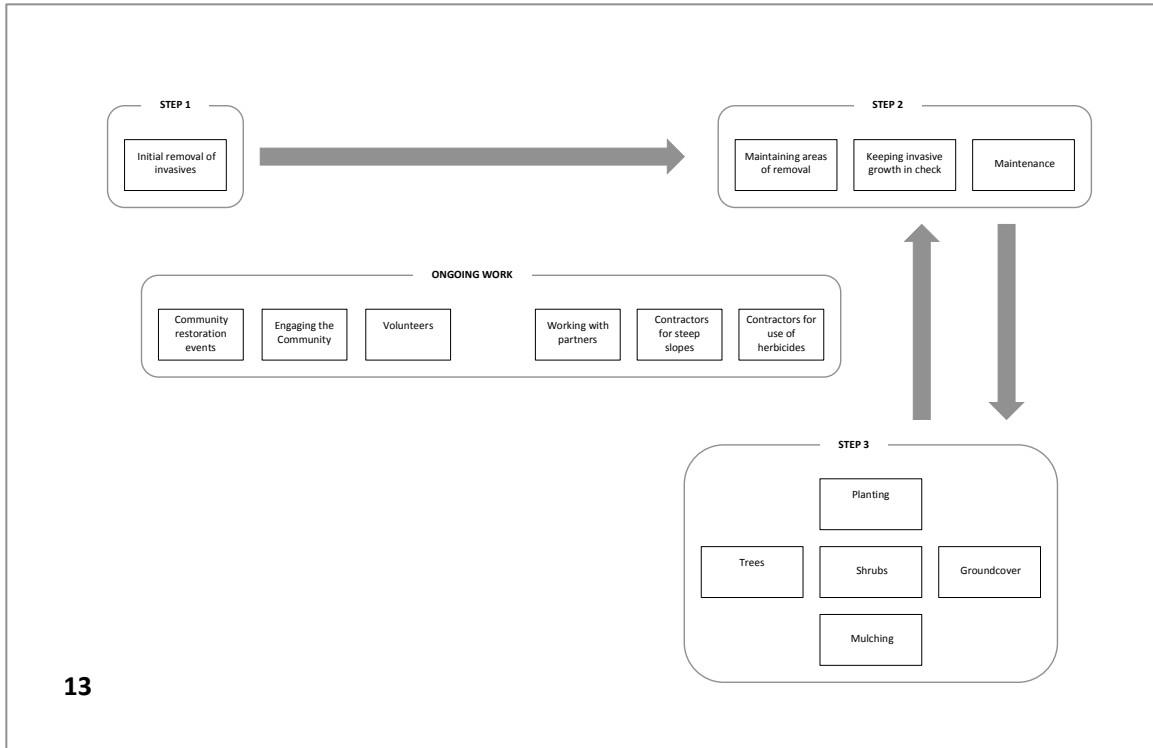


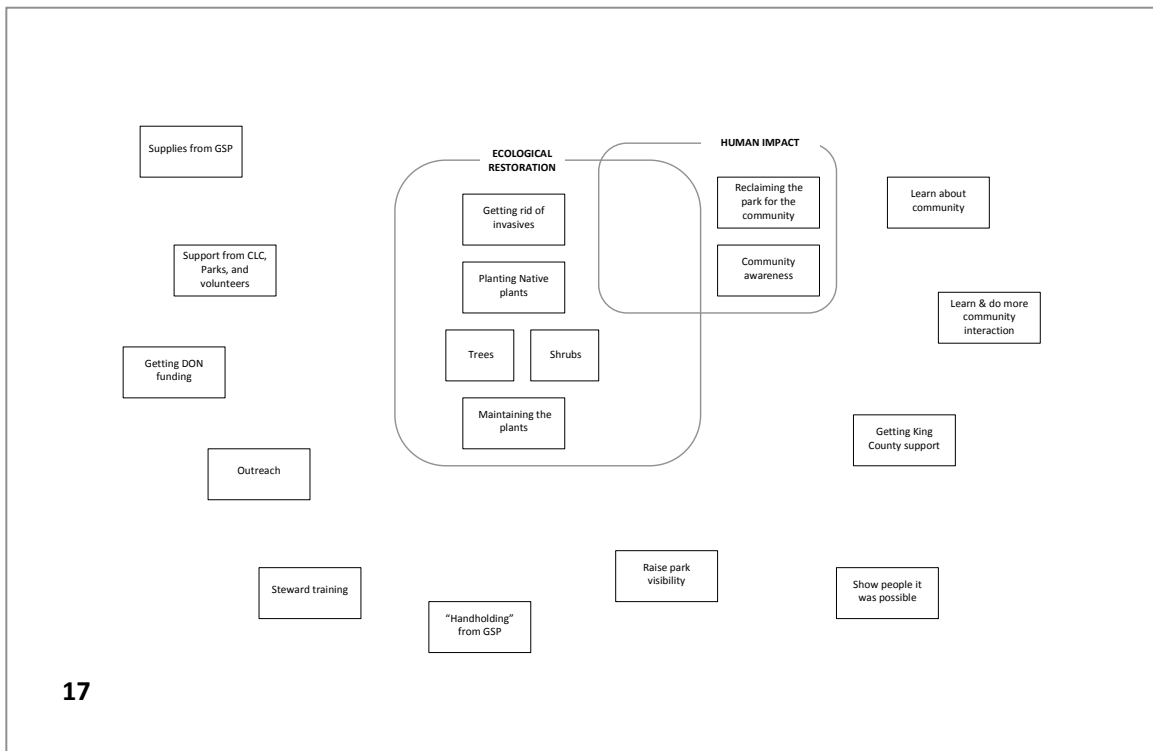
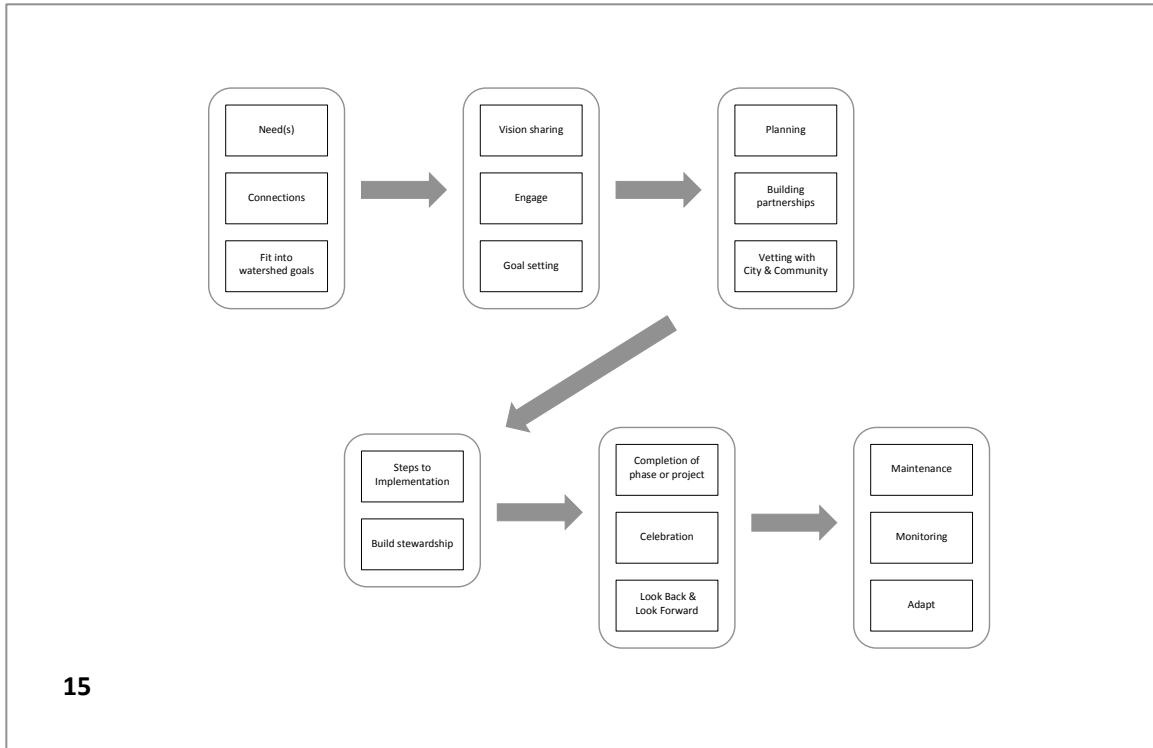


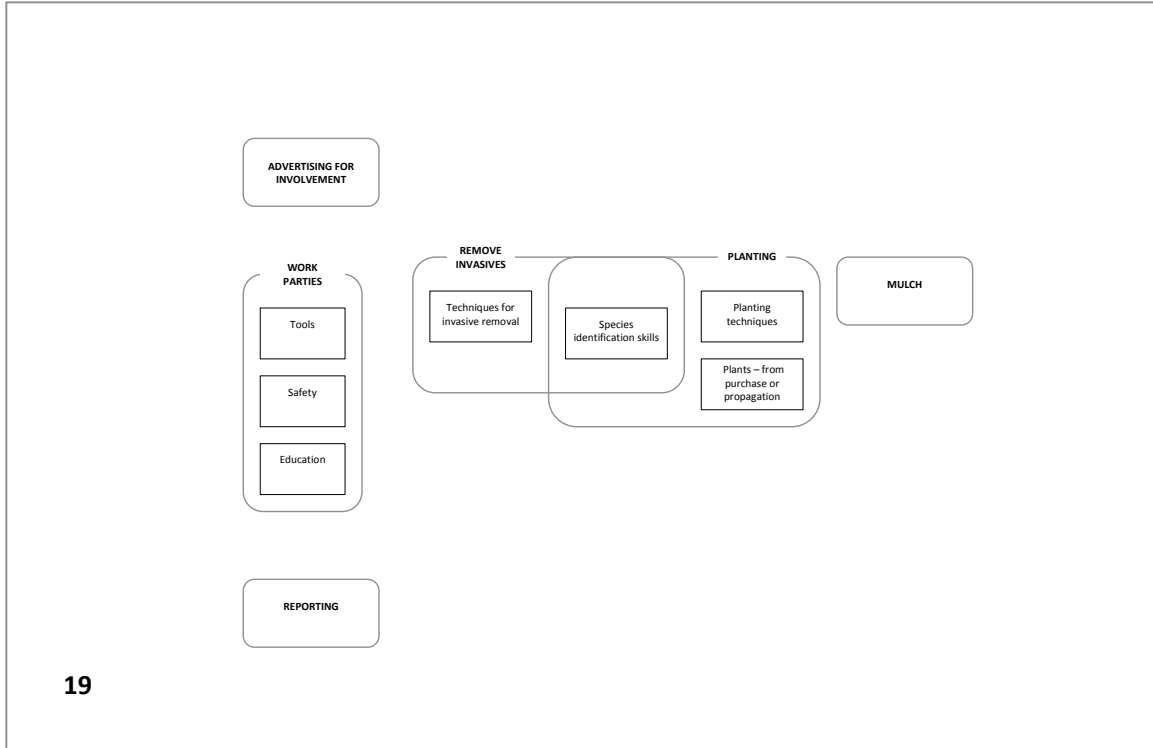




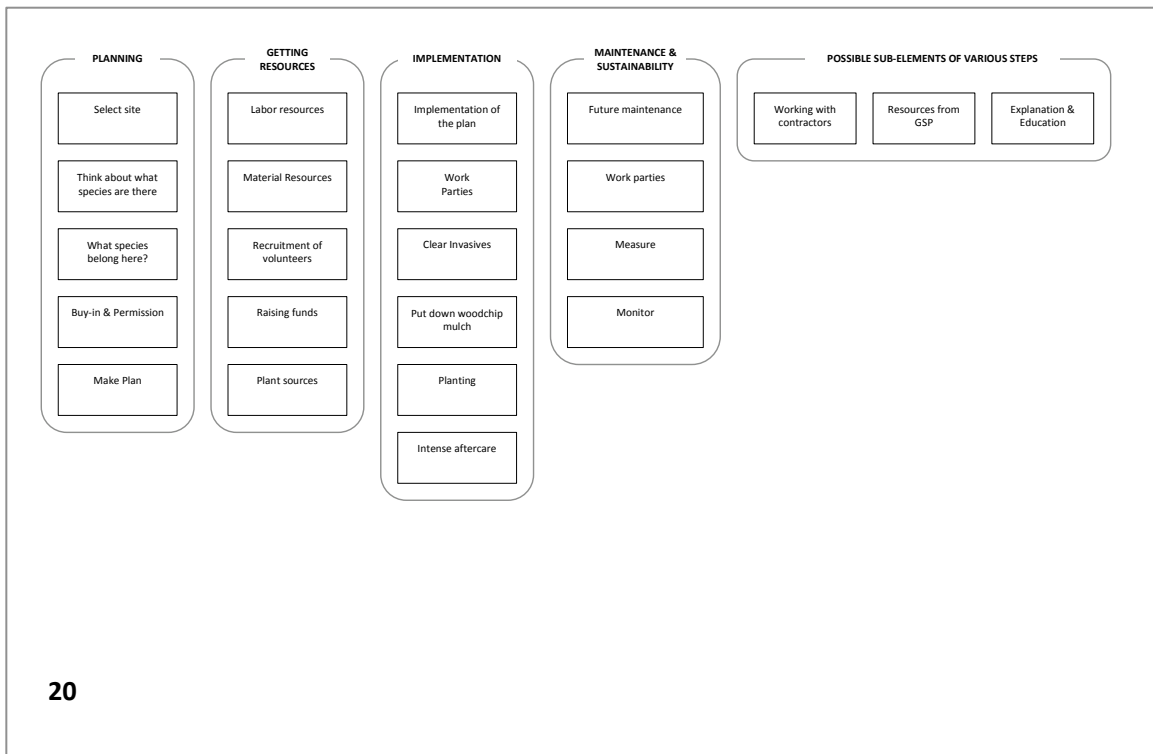




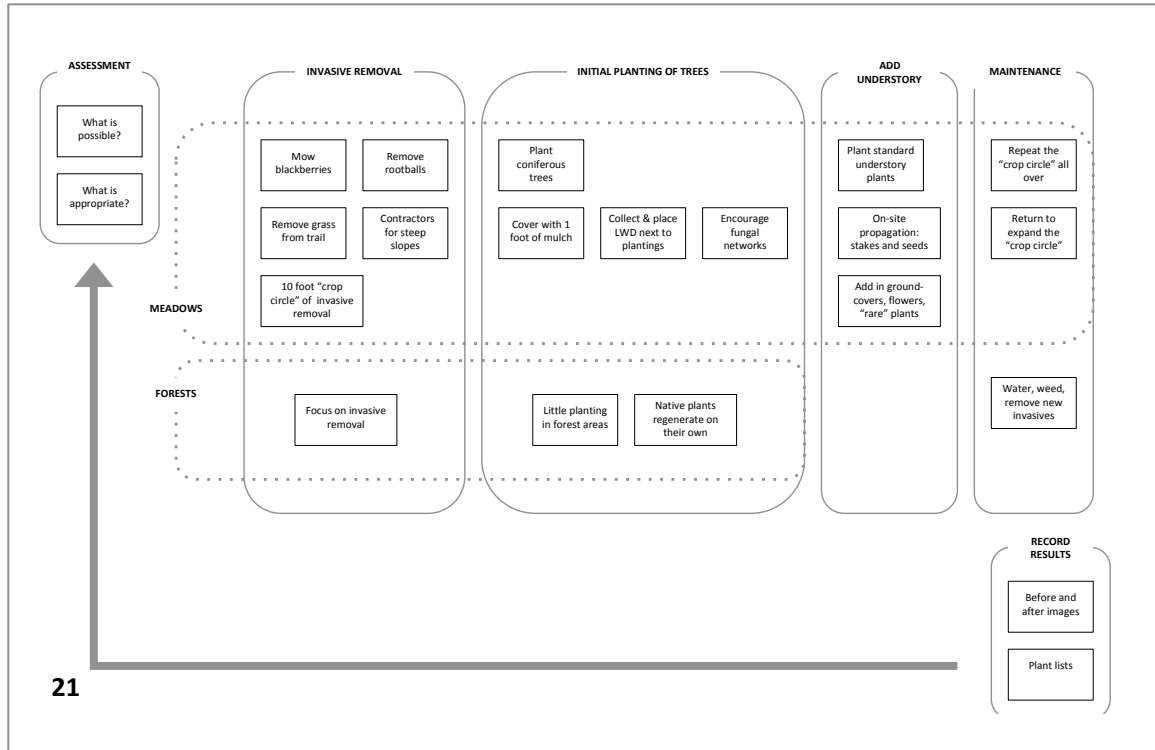




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Appendix 4: Deductive Coding Scheme for Question 2

This deductive coding scheme is a tool for measuring the presence or absence of concepts derived from the Green Seattle Logic Model in the mental models of sampled Stewards.

Reviewing each Steward's 3CM map and interview transcripts, perform the following steps:

1. Record the Steward's identifying number in their column.
2. Review the Steward's transcribed response to the question about *pre-restoration conditions*, searching for the presence of absence or absence of concepts related to the codes below.
3. Review the Steward's transcribed response to the question about *post-restoration conditions*, searching for the presence of absence or absence of concepts related to the codes below.
4. Review the Steward's mapped response to the question about *the process of ecological restoration*, searching for the presence of absence or absence of concepts related to the codes below.
5. For each concept where, in any of steps 2 to 4, the Steward's response contained a concept on the table of codes below, whether once or more than once, write a 1 in the row next to that concept in the Steward's column.
6. For each concept where, in any of steps 2 to 4, the Steward's response did not contain a concept on the table of codes below, write a 0 in the row next to that concept in the Steward's column.

